CLERK'S COPY.

179

952,909
Sup Ct

TRANSCRIPT OF RECORD

(IN THREE VOLUMES)

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, ~~1939~~ 1940

No. ~~6~~ 1

THE UNITED STATES OF AMERICA, PETITIONER

vs.

APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT
COURT OF APPEALS FOR THE FOURTH CIRCUIT

VOLUME 1

PETITION FOR CERTIORARI FILED JANUARY 26, 1940
CERTIORARI GRANTED MARCH 4, 1940

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1939

No. 674

THE UNITED STATES OF AMERICA, PETITIONER

vs.

APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

INDEX

	Original	Print
Record from D. C. U. S., Western District of Virginia	1	1
Praecipe for transcript of record	2	1
Writ of subpoena	4	2
Bill of complaint	5	4
Motion to amend bill of complaint, with amendments	23	19
Answer of defendant, as amended	44	39
Order granting leave to amend complaint, etc., September 19, 1935	81	67
Petition of the State of Virginia for leave to appear as *amicus curiae*	83	68
Petition of the State of West Virginia for leave to appear as *amicus curiae*	92	72
Motion for taking deposition filed on the 26th of August, 1936	98	76
Order of August 26, 1936, on motion for taking deposition	106	83
Stipulation re plaintiff's requests for findings and conclusions	106-A	84
Plaintiff's suggested findings of fact and conclusions of law and plaintiff's supplemental requested findings of fact and conclusions of law as renumbered and rearranged for purposes of appeal	107	84
Opinion of the court, Paul, J.	133	101
Findings of fact and conclusions of law	194	154

Record from D. C. U. S., etc.—Continued.	Original	Print
Final decree and order granting exceptions	199	157
Assignment of errors, as amended	201	158
Order extending time for transcript of record	224	178
Order extending time for transcript of record	225	178
Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on Appeal	227	179
Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on appeal	228	180
Order extending time for transcript of record	229	180
Order extending time for transcript of record	230	181
Stipulation as to printing record on appeal under Rule 23	231	181
Stipulation as to sending up original exhibits	232	182
Order of February 2, 1939, directing the clerk to transmit all original exhibits which are not copied in full in the approved statement of evidence	233	183
Order approving statement of evidence	234	183
Statement of evidence under Equity Rule 75	236	184
Testimony for plaintiff:		
Fred D. Bradford—Direct	237	185
Lewis Harvey—		
Direct	237	185
Cross	239	187
J. W. Flannagan—		
Direct	241	189
Cross	243	190
T. W. Coleman—		
Direct	253	198
Cross	255	199
Redirect	259	202
Recross	259	203
Walter H. Towe—		
Direct	260	203
Cross	261	204
Redirect	261	205
Recross	261	205
E. H. Linkous—		
Direct	261	205
Cross	263	206
E. P. Hartsock—		
Direct	264	206
Cross	264	207
Redirect	265	208
R. L. Howard—		
Direct	265	208
Cross	271	213
Redirect	276	217

Record from D. C. U. S., etc.—Continued.
Testimony for plaintiff—Continued.

	Original	Print
William Collins—		
Direct	277	218
Cross	279	220
George M. Webb—		
Direct	284	224
Cross	287	226
Charles E. Weiss—		
Direct	289	228
Cross	293	231
Redirect	296	234
J. G. Graham—		
Direct	297	235
Cross	298	236
Redirect	299	237
James Breeding—		
Direct	300	237
Cross	305	241
J. E. Owen—		
Direct	308	244
Cross	310	246
Redirect	315	250
Recross	316	251
J. W. Crowell—		
Direct	317	251
Cross	319	254
A. S. Breeding—		
Direct	320	255
Cross	322	256
Redirect	327	260
A. W. Snyder—		
Direct	327	260
Cross	330	263
Recross	334	266
L. T. Meredith—		
Direct	335	266
Cross	337	268
E. C. Meredith—		
Direct	337	269
Cross	338	270
Redirect	339	271
Ely Duncan—		
Direct	339	271
Cross	342	273
Redirect	343	274
T. C. Redpath—		
Direct	343	274
Cross	344	275
Redirect	345	276
Recross	346	276

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
H. L. Fagg—		
Direct	346	276
Cross	348	278
J. D. Haley—		
Direct	348	278
Cross	350	280
Thomas Monahan—		
Direct	350	280
Cross	353	282
Dan Hodge—		
Direct	359	287
Cross	360	289
Redirect	361	289
James Micou—		
Direct	362	290
Cross	363	291
Redirect	363	291
Zattoo Farmer—		
Direct	364	291
Cross	366	293
Redirect	367	294
Recross	368	295
Albert W. Snidow—		
Direct	368	295
Cross	372	299
Redirect	376	302
W. P. Snodgrass—		
Direct	377	302
Cross	379	304
Redirect	381	305
D. C. Allison—Direct	381	305
H. B. Allison—		
Direct	382	306
Cross	383	307
Paul L. James—		
Direct	386	309
Cross	395	317
John H. Peters—		
Direct	399	319
Cross	402	322
Redirect	414	332
Recross	415	333
James H. Howard—		
Direct	417	335
Cross	419	336
Redirect	420	337
Recross	420	337

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Henry S. Skeen—		
Direct	422	339
Cross	424	341
Redirect	425	342
William Price—		
Direct	425	342
Cross	427	343
Redirect	431	347
J. R. Smith—		
Direct	432	348
Cross	437	352
Redirect	451	364
B. T. Johnson—		
Direct	451	364
Cross	454	367
Redirect	459	371
Recross	460	372
J. A. Medley—		
Direct	461	372
Cross	465	375
Redirect	480	387
H. A. Starbuck—		
Direct	482	389
Cross	483	390
J. H. Dickinson—		
Direct	485	391
Cross	488	394
Redirect	490	395
D. L. Lane—		
Direct	490	395
Cross	492	397
Emmett M. Smith—		
Direct	493	398
Cross	494	399
E. N. Farley—Direct	495	399
Charles Edward Kenley—		
Direct	496	400
Cross	498	402
R. E. Lucas—		
Direct	500	404
Cross	501	404
J. W. Reed—		
Direct	502	405
Cross	504	407
Redirect	506	408
Lewis M. Smith—Direct	507	409

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Everett W. Lilly—		
Direct	510	412
Cross	512	413
Redirect	514	415
J. H. Hoover—		
Direct	514	415
Cross	515	416
Marshal Richmond—		
Direct	516	416
Cross	517	418
J. W. Graham—Direct	519	419
P. H. McGrath—Direct [omitted in printing]	519	419
D. H. Kauffelt—		
Direct [omitted in printing]	522	
Cross [omitted in printing]	522	
James John Green—Direct [omitted in printing]	523	
W. L. Burks—		
Direct	524	420
Cross	526	421
Z. V. Burks—		
Direct	527	422
Cross	531	426
Redirect	532	426
Recross	533	427
Gordan A. Farmer (deposition)—		
Direct	534	428
Cross	537	430
Redirect	538	431
Recross	539	432
Mrs. Hettie D. Helvey—		
Direct (deposition)	539	432
Cross	544	436
Redirect	544	436
Lucy Calfee Smith—		
Direct (deposition)	545	437
Cross	547	438
Redirect	551	442
Solomon C. Furrow—		
Direct (deposition)	551	442
Cross	553	443
Redirect	553	443
Recross	554	444
Redirect	555	445
D. R. Peterson—		
Direct (deposition)	555	445
Cross	556	446
Redirect	558	448
Re-redirect	558	448

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Robert Hill Moore—Direct (deposition)	559	449
William M. Martin—		
Direct (deposition)	561	450
Cross	563	452
Redirect	564	453
William M. Dalton (deposition)—		
Direct	564	453
Cross	566	455
Redirect	567	456
Recross	567	456
Redirect	567	456
Recross	567	456
Harvey C. Johnson (deposition)—Direct	568	456
W. C. Anderson (deposition)—		
Direct	570	458
Cross	572	459
C. H. Wauhop (deposition)—		
Direct	573	460
Cross	576	463
Redirect	578	464
Andrew G. Flanagan (deposition)—		
Direct	579	465
Cross	584	469
Redirect	585	470
T. G. Skaggs (deposition)—		
Direct	586	470
Cross	590	474
I. C. Stover (deposition)—		
Direct	594	477
Cross	596	478
Redirect	597	480
Robert Calloway (deposition)—		
Direct	598	480
Cross	599	481
Matthew V. Calloway (deposition)—		
Direct	599	482
Cross	602	484
Redirect	603	485
Recross	604	485
A. E. Miller (deposition)—		
Direct	604	486
Cross	609	4[illegible]
Redirect	610	490

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
R. W. Martin (deposition)—		
Direct	610	490
Cross	612	492
Redirect	612	492
Recross	612	492
Re-redirect	612	492
Re-recross	612	492
J. C. Martin (deposition)—Direct	612	492
Elbert E. Tomkies (deposition)—		
Direct	613	493
Cross	617	496
Redirect	621	499
Recross	621	499
Re-redirect	621	499
Re-recross	622	499
Dorsey B. Barton (deposition)—		
Direct	622	500
Cross	627	503
Redirect	628	505
W. C. Ratcliffe (deposition)—		
Direct	629	505
Cross	631	507
John Likens (deposition)—Direct	632	508
C. E. Roop (deposition)—		
Direct	634	509
Cross	636	511
Redirect	638	512
Recross	638	513
Redirect	639	513
William Kessler—		
Direct	640	515
Cross	651	524
Redirect	656	528
Recross	657	529
Witness recalled—		
Direct	657	529
Cross	659	531
J. J. Dirzulaitis—		
Direct	664	535
Cross	667	537
Redirect	673	541
Recross	674	542
Charles H. Pierce—		
Direct	676	543
Cross	703	565
Redirect	725	582

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Glen E. Edgerton—		
Direct	732	587
Cross	752	606
Redirect	770	619
Recross	780	626
Mrs. Minnie Lee Ward—		
Direct	787	632
Cross	790	635
Redirect	792	636
Recross	793	637
W. S. Winn—		
Direct	794	637
Cross	808	649
Redirect	889	711
Recross	894	715
Harry M. Trippe—		
Direct	896	716
Cross	926	748
Redirect	955	768
Edwin W. Kramer—		
Direct	956	769
Cross	1000	805
Earl E. Teeter—		
Direct	1051	847
Cross	1084	871
Redirect	1127	900
Recross	1130	902
H. G. Gerdes—		
Direct	1131	903
Cross	1162	926
Redirect	1189	947
Recross	1194	950
Col. Lewis H. Watkins—		
Direct	1203	957
Cross	1256	1000
Redirect	1363	1004
Recross	1365	1006
John R. Douglass—		
Direct	1367	1082
Cross	1384	1095
Redirect	1415	1116
Recross	1421	1120
Capt. C. Stone—		
Direct	1423	1121
Cross	1435	1130
Redirect	1439	1132
Recross	1439	1132

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
E. A. Sherman—		
Direct [omitted in printing]	1441	
C. L. Forsling—		
Direct [omitted in printing]	1453	
Cross [omitted in printing]	1462	
Redirect [omitted in printing]	1472	
Recross [omitted in printing]	1474	
Dr. H. T. Cory—		
Direct [omitted in printing]	1477	
Cross [omitted in printing]	1493	
Redirect [omitted in printing]	1498	
Recross [omitted in printing]	1501	
Redirect [omitted in printing]	1503	
Recross [omitted in printing]	1506	
Redirect [omitted in printing]	1508	
H. G. Gerdes (recalled)—		
Direct	1510	1133
Cross	1526	1150
Redirect	1532	1155
Cross	1532	1155
Redirect	1546	1166
Recross	1548	1168
Capt. Phillip C. Elsey—		
Direct	1550	1169
Cross	1561	1178
Redirect	1577	1191
P. A. Gragnon—		
Direct	1579	1193
Cross	1603	1211
Redirect	1620	1224
John D. Fitch—		
Direct	1625	1228
Cross	1630	1231
Redirect	1632	1233
Recross	1632	1233
Roger B. McWhorter—		
Direct	1633	1233
Cross	1674	1266
Redirect	1740	1333
Recross	1743	1335
James W. Johnson—		
Direct	1745	1338
Cross	1792	1380
Redirect	1808	1400
Recross	1812	1410
Dr. F. F. Barnes—Direct [omitted in printing]	1821	
John A. Davenport—		
Direct	1835	1415
Cross	1861	1434

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
H. G. Gerdes (recalled)—		
Direct	1871	1441
Cross	1896	1465
Redirect	1934	1493
Recross	1937	1495
Testimony for defendant:		
C. Rufus Spangler—		
Direct	1939	1498
Cross	1941	1500
Redirect	1944	1503
W. H. Spangler—		
Direct	1945	1503
Cross	1946	1505
Redirect	1951	1509
S. L. Buckland—		
Direct	1952	1509
Cross	1955	1511
Redirect	1960	1516
Recross	1962	1517
B. C. Lilly—		
Direct	1962	1517
Cross	1963	1518
Redirect	1970	1524
Recross	1971	1524
James Adair, Sr.—		
Direct	1971	1524
Cross	1973	1526
Redirect	1976	1528
Recross	1977	1529
N. A. Kersey—		
Direct	1979	1530
Cross	1982	1532
Redirect	1986	1536
H. Palmer Roberts—		
Direct	1986	1536
Cross	1988	1538
J. B. Talbot—		
Direct	1991	1540
Cross	1992	1541
Redirect	1996	1543
William Ingles—		
Direct	1996	1544
Cross	1996	1544
William R. Gerald—		
Direct	1999	1547
Cross	2002	1549
Redirect	2006	1552
Recross	2006	1552

Record from D. C. U. S., etc.—Continued.

Testimony for defendant—Continued.

	Original	Print
William R. Gerald (deposition)—		
Direct	2007	1552
Cross	2009	1554
A. Moore—		
Direct	2011	1555
Cross	2013	1557
Isaac Huff—		
Direct	2018	1561
Cross	2020	1562
Redirect	2023	1564
J. H. Knode—		
Direct	2024	1565
Cross	2031	1571
Redirect	2039	1577
F. B. Kegley—		
Direct	2041	1579
Cross	2070	1604
Redirect	2099	1629
Recross	2102	1631
E. C. Gannaway—		
Direct	2104	1632
Cross	2105	1633
Redirect	2108	1635
Recross	2108	1635
N. B. Harvey—		
Direct	2109	1636
Cross	2111	1638
Redirect	2118	1643
Recross	2118	1643
W. R. Hundley (deposition)—		
Direct	2119	1643
Cross	2123	1647
Redirect	2125	1648
Recross	2126	1649
Redirect	2126	1549
John G. Osborne—		
Direct	2127	1649
Cross	2130	1652
Redirect	2134	1655
Recross	2135	1656
Robert C. McWane—		
Direct	2135	1656
Cross	2143	1662
Redirect	2152	1669
Recross	2153	1670

Record from D. C. U. S., etc.—Continued.

Testimony for defendant—Continued.

	Original	Print
Frank P. Turner—		
Direct	2155	1671
Cross	2157	1672
J. B. Snethlage—		
Direct	2158	1673
Cross	2159	1674
A. A. L. Mathews—		
Direct	2160	1675
Cross	2174	1686
Redirect	2195	1702
Recross	2197	1704
Harold W. Buck—		
Direct	2198	1704
Cross	2203	1709
R. J. Holden—		
Direct	2216	1720
Cross	2236	1737
Redirect	2254	1751
Recross	2259	1756
H. S. Slocum—		
Direct	2260	1757
Cross	2273	1767
T. A. Patton—		
Direct	2282	1774
Cross	2283	1775
Rufus W. Putnam—		
Direct	2286	1777
Cross	2313	1797
S. M. Yarbro—		
Direct	2355	1834
Cross	2355	1834
Harold A. Thomas—		
Direct	2364	1841
Cross	2422	1883
Redirect	2488	1930
Recross	2504	1941
Daniel W. Mead—		
Direct	2506	1942
Cross	2530	1972
Redirect	2579	2011
F. W. Scheidenhelm—		
Direct	2581	2012
Cross	2664	2077
Redirect	2710	2118
Recross	2714	2123
Redirect	2717	2125
Recross	2721	2132

Record from D. C. U. S., etc.—Continued.

Rebuttal testimony for plaintiff:

	Original	Print
John E. Carpenter (recalled)—		
Direct	2725	2136
Cross	2747	2152
Re-direct	2772	2172
Re-cross	2774	2173
Re-direct	2775	2174
Rowland P. Castle—		
Direct	2777	2175
Cross	2788	2184
Re-direct	2800	2193
Harry R. Bright—		
Direct	2802	2194
Cross	2806	2199
W. H. Marshall—		
Direct	2810	2202
Cross	2815	2205
Thomas H. Graham—Direct	2828	2214
Roger B. McWhorter (recalled)—		
Direct	2832	2216
Cross	2840	2225
Lewis H. Watkins—		
Direct	2845	2228
Cross	2858	2240
H. G. Gerdes (recalled)—		
Direct	2881	2260
Cross	2891	2269
Plaintiff's exhibits:		
Exhibit No. 1—Map of New River (original exhibit)	2901	2277
Exhibits Nos. 2-13, inclusive—Photographs of bateaux and other types of boats on New River (original exhibits)	2903	2277
Exhibits Nos. 16-26, inclusive—Physician's certificates pertaining to certain witnesses for plaintiff (omitted)	2903	2277
Exhibits Nos. 27-29, inclusive—Day books and ledger of Lilly Lumber Company (omitted)	2903	2277
Exhibit No. 30—Photostat copy "Index to Reports, Chief of Engineers, U. S. Army, 1866-1912" (original exhibit)	2903	2277
Exhibit No. 31—Report of Chief of Engineers, 1873	2904	2277
Exhibit No. 32—Report of Moore and Briggs, 1819	2924	2298
Exhibit No. 33—Report of Chief of Engineers, 1877	2950	2324
Exhibit No. 34—Report of Chief of Engineers, 1878	2952	2326
Exhibit No. 35—Report of Chief of Engineers, 1879	2961	2333
Exhibit No. 36—Report of Chief of Engineers, 1880	2994	2360
Exhibit No. 37—Report of Chief of Engineers, 1881	3005	2370
Exhibit No. 38—Report of Chief of Engineers, 1882	3018	2382

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 39—Report of Chief of Engineers, 1883	303[illegible]	2394
Exhibit No. 40—Report of Chief of Engineers, 1884	3050	2404
Exhibit No. 41—Report of Chief of Engineers, 1885	3051	2405
Exhibit No. 42—Report of Chief of Engineers, 1886	3053	24[illegible]
Exhibit No. 43—Report of Chief of Engineers, 1891	3061	2413
Exhibit No. 44—Report of Chief of Engineers, 1897	3065	2416
Exhibit No. 45—Excerpt from The River and Harbor Appropriation Act of June 13, 1902	3067	2417
Exhibit No. 46—1912–1913—Alstaetter, Rossell, Bixby reports (House Document 1410, 62nd Congress, 3rd Session) on examination of New River from Radford, Virginia, to Hinton, West Virginia	3068	2418
Exhibit No. 47—Report of the Secretary of War, dated April 18, 1913	3078	2427
Exhibit No. 48—1930—January 24, 1930, to March 11, 1930—Kanawha River at Kanawha Falls, West Virginia—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 49—1930—March 11, 1930, to April 5, 1930—Kanawha River at Kanawha Falls, West Virginia—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 50—1930—January 25, 1930, to March 10, 1930—New River at Caperton, W. Va.—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 51—1930—March 12, 1930, to April 4, 1930—New River at Caperton, W. Va.—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 52—1929–1936—Rating curve for Kanawha River at Kanawha Falls, W. Va. (original exhibit)	3112	2466
Exhibit No. 53—1929–1931—Rating curve for New River at Caperton, W. Va. (original exhibit)	3112	2466
Exhibit No. 54—1929–1934—Rating curve for New River at Hinton, West Virginia (original exhibit)	3112	2466
Exhibit No. 55—October 27, 1928, to September 30, 1931—Rating table for Kanawha River at Kanawha Falls, W. Va. (original exhibit)	3112	2467
Exhibit No. 56—November 20, 1928, to September 30, 1930—"Rating table for New River at Caperton, West Virginia" (original exhibit)	3112	2467
Exhibit No. 57—4 sheets constituting "Rating tables for New River near Hinton, W. Va." for the following periods: October 1, 1929, to September 30, 1934; December 1, 1923, to September 30, 1929; December 1, 1923, to September 30, 1929; December 1, 1, 1923, to September 30, 1929 (original exhibits)	3113	2467

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 58—March 15, 1930—"Water Records at Glen Lyn for the week ending Saturday, March 15, 1930" (original exhibit)	3113	2467
Exhibit No. 59—1930—"Water Records at Glen Lyn for week ending Saturday, March 22, 1930" (original exhibit)	3113	2467
Exhibit No. 60—1930—"Water Records at Glen Lyn for week ending March 29, 1930." (original exhibit)	3113	2467
Exhibit No. 61—1930—"Water Records at Glen Lyn for week ending April 1, 1930" (original exhibit)	3113	2467
Exhibit No. 62—1930—Chart "New River at Eggleston, Va., March 11 to March 31, 1930" (original exhibit)	3113	2467
Exhibit No. 63—1930—Chart "New River at dam site "A" at Radford for the period from March 10, 1930, to April 1, 1930" (original exhibit)	3113	2467
Exhibit No. 64—1930—Chart "New River at Allisonia, March 11 to April 1, 1930" (original exhibit)	3113	2468
Exhibit No. 65—1930—Chart "New River at Ivanhoe from March 11 to April 1, 1930" (original exhibit)	3113	2468
Exhibit No. 66—5 pages, containing rating curves for— (a) Glen Lyn 1927–1928; (b) Eggleston 1911–24, 1925–23; (c) Dam site "A"; (d) Allisonia, 1930; (e) Ivanhoe, 1928–1930 (original exhibit)	3114	2468
Exhibit No. 67—5 sheets containing rating tables for New River at— Glen Lyn, 1927–1928; Eggleston, Oct. 1, 1920, to Sept. 30, 1931; Dam Site "A" 1927–1929; Allisonia, 1930; Ivanhoe, 1928–1930 (original exhibit)	3114	2468
Exhibit Nos. 68–83, inclusive—Water Supply Papers of United States Geological Survey (original exhibits)	3114	2468
Exhibit No. 84—Daily discharges for year ending September 30, 1935, at the gaging station on New River at Ivanhoe, Va. (original exhibit)	3114	2468
Exhibit No. 85—Daily discharges for the year ending September 30, 1935, at the gaging station on New River at Allisonia, Va. (original exhibit)	3114	2468
Exhibit No. 86—Daily discharges for the year ending September 30, 1935, at the gaging station on New River at Eggleston, Va. (original exhibit)	3114	2468
Exhibit No. 87—Daily discharges for the year ending September 30, 1935, at the gaging station on Little River at Graysonton, Va. (original exhibit)	3114	2468

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 88—Declaration of Intention to construct a dam and other project works	3115	2469
Exhibit No. 89—1926, August 30—Assignment of Declaration of Intention of New River Development Co. to Appalachian Electric Power Co. (original exhibit)	3121	2471
Exhibit No. 90—1926, August 30—Application for license by Appalachian Electric Power Co	3122	2471
Exhibit No. 90-A—1926, August 30—Maps accompanying application for license (also revised maps accompanying application for minor part license) (original exhibit)	3175	2482A
Exhibit No. 91—1926-27-28-31-32.—Excerpts from 6th, 7th, 8th, 11th, and 12th Annual Reports of Federal Power Commission dealing with Radford project	3176	24[illegible]3
Exhibit No. 92—1925, August 20—Report of General Taylor, Chief of Engineers on Declaration of Intention for project No. 739	3207	2517
Exhibit No. 93—1925, July 23—Report of District Engineer, Major A. K. B. Lyman and Endorsement (7/25/29) Division Engineer, C. W. Kutz on declaration for project No. 739	3214	2522
Exhibit No. 94—1925, October 15—Letter and memorandum of Major Trippe, District Engineer to Lt. Col. Edgerton, on probable effects of proposed Radford project on Kanawha River	3218	2524
Exhibit No. 95—1926, April 7—Letter from Merrill, Executive Secretary, to General Taylor, C. of E., transmitting data with respect to Pitt River. Attached is memo initialed "R. W. D." and diagram of variations on Pitt and Sacramento Rivers (original exhibit)	3221	2526
Exhibit No. 96—1926, July 23—Report of Hubert Deakyne, C. of E., to Merrill Executive Secretary on declaration for project No. 739	3222	2526
Exhibit No. 97—1925, December 29—Report of General Taylor, C. of E., to Executive Secretary on declaration for project No. 739 (original exhibit)	3224	2527
Exhibit No. 98—1927, April 12—Report of General Deakyne, C. of E.; 1926, December 22—Report of Major Trippe, District Engineer; 1927, January 13—1st Endorsement Col. Kutz, Division Engineer. In dealing with application for license for project #739	3232	2533
Exhibit No. 99—1925, October 22—List of 22 affidavits submitted to Federal Power Commission for consideration upon Declaration of Intention of New River Development Company	3257	2556

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 100—1926, March 2—Transcript of hearing before Federal Power Commission on Declaration of Intention	3305	2584
Exhibit No. 101—1926, October 28; September 28; November 20—re Application for license. Notice of public hearing at Radford, September 28, 1926. Mailing list of notices September 28, 1926. Transcript of public hearing at Radford, October 28, 1926. Statement filed on behalf of Appalachian Electric Power Co. regarding protests, November 20, 1926	3329	2604
Exhibit No. 102—1926, September 2—Letter from Curtis, Mallet-Prevost, Colt & Mosle to Federal Power Commission enclosing assignment of declaration from Development Co. to A. E. P. Co. and application for license of A. E. P. Co	3355	2624
Exhibit No. 103—1925, December 9—Telegram to Mr. Merrill, Executive Secretary, from Mr. Kramer re Pitt River	3356	2625
Exhibit No. 104—1925, December 15—Letter to Mr. Merrill from Mr. Kramer re Pitt River and enclosing hydrographs	3359	2626
Exhibit No. 105—1927, May 2—Letter from Mr. Bonner to Mr. Merrill enclosing copy of Kramer's report of Klamath River	3360	2628
Exhibit No. 106—1926, October 24—"Memorandum to Federal Power Commission re Declaration of Intention of New River Development Company" prepared by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3383	2635
Exhibit No. 106-A—1925, October 23—Letter from L. J. Bevan to C. M. Micou, re drainage areas and run-off (original exhibit)	3383	2635
Exhibit No. 106-B—Memorandum of request of New River Development Company in regard to Report of Chief of Engineers dated Aug. 20, 1925, upon the proposed project of the Company for a water power development on New River, in Virginia, with respect to which declaration of intention has been filed by the Company with the Federal Power Commission, dated Oct. 26, 1925	3384	2635
Exhibit No. 106-C—1925, October 1, 1925—"Supplemented Memorandum re Declaration of Intention of New River Development Company (original exhibit)	3388	2638
Exhibit No. 107—1926, February 20—Letter from Mr. Merrill, Executive Secretary to, Bascom Slemp giving notification of public hearing of March 2, 1926 (original exhibit)	3388	2638

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 108—1930, October 16—Letter from C. M. P. C. M. to Federal Power Commission enclosing new drawings for minor part license to be substituted for certain drawings filed with original application for license (original exhibit)	3388	2638
Exhibit No. 109—1926, April 15—Charge sheet pertaining to removal of General Taylor's report dated December 29, 1925, from files by F. P. C. (original exhibit)	3388	2638
Exhibit No. 110—"Record of the daily gage readings at Lock No. 24, Ohio River" (original exhibit)	3388	2638
Exhibit No. 111—"Record of daily gage readings at Lock No. 25, Ohio River" (original exhibit)	3388	2638
Exhibit No. 112—4 sheets being "gage readings of Locks Nos. 2, 3, and 4, Kanawha River, and Locks Nos. 26, 27, and 28, Ohio River, during low water periods of 1921, 1925, 1930, and 1932 (original exhibit)	3388	2638
Exhibit No. 113—Diagram showing hydrographs at gaging stations (Kanawha and New Rivers) with published mean daily flows July and August, 1932. Prepared U. S. Engineers Office, Huntington, W. Va., September 1935 (original exhibit)	3388	2638
Exhibit No. 114—1930, July and August—Diagram showing hydrographs at gaging stations (Kanawha & New Rivers) for July and August 1930. Prepared U. S. Engineer Office, Huntington, W. Va., September 1935 (original exhibit)	3389	2639
Exhibit No. 115—1936, January—Diagram—Kanawha & New Rivers, Discharge at gaging stations—Data compiled from Automatic Water Stage Recorder—U. S. Engineer Office, Huntington, W. Va., January 1936 (original exhibit)	3389	2639
Exhibit No. 116—1936, July 7—Diagram "Kanawha River Profile—Backwater studies—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3389	2639
Exhibit No. 117-A—1936, July 9—Diagram "Rating Curves—Kanawha River Lock No. 2, Mile 84.8, London Dam, Mile 82.81, and Lock No. 3, Mile 79.7—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3389	2639
Exhibit No. 117-B—1935, December 10—Diagram "U. S. Engineer Office, Huntington, W. Va., Rating Curves—Kanawha River, Locks Nos. 4 & 5, and Marmet" (original exhibit)	3389	2639
Exhibit No. 117-C—1935, December 5—Diagram—"Rating Curves—Kanawha River—Locks Nos. 6, 7, 8" (original exhibit)	3389	2639

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 117-D—1936, July 8—Diagram "Kanawha River—Rating Curves Locks No. 9 and Winfield—U. S. Engineer Office, Huntington, W. Va." (original exhibit)	3389	2639
Exhibit No. 117-E—1935, December 5—Diagram "Rating Curves—Kanawha River Locks Nos. 10 and 11" (original exhibit)	3389	2639
Exhibit No. 117-F—1935, December 10—Diagram "Rating Curves—Ohio River below Point Pleasant at Lock No. 26—U. S. Engineer Office, Huntington, W. Va." (original exhibit)	3390	2640
Exhibit No. 118—1935, December—Diagram "Kanawha River Profile—Six & Nine feet projects"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 119—1935, December—Diagram "Kanawha River and Tributaries—proposed improvements"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 120—1935, December—Diagram "Kanawha River and Tributaries—proposed improvements—profiles"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 121—July 4-21, 1936—Gage recorder chart for New River at Eggleston, Va. (original exhibit)	3390	2640
Exhibit No. 122—July 6-21, 1936—Gage recorder chart for New River at Hinton (Packs Ferry), W. Va. (original exhibit)	3390	2640
Exhibit No. 123—1919, August 29. Request for permit for repairs and replacements by Electro Metallurgical Company with following enclosures: (1) 1919, Aug. 29; Letter from W. J. Knapp, V-P, Electro-Met. Co. to Secretary of War. (2) 1919, Sept. 15 and 17; 1st and 2nd Endorsements by Howell and Beach, C. of E. (3) 1919, Sept. 27; 3rd End. by Pillsbury, C. of E. (4) 1919, Oct. 4; 4th End. by Howell, C. of E. (5) Plan of proposed location of replacement dam. (6) 1899, Mar. 2; Letter from Chief of Engineers' Office to Major Bixby, C. of E., enclosing permit. (7) 1899, Feb. 27—Permit to Wilson Aluminum Co. (original exhibit)	3390	2640
Exhibit No. 123-A—1934, October 24; Copies of correspondence and reports relating to the Kanawha Falls Plant of Elec-Met. Co. as follows: (1) 1934, Oct. 24; Letter from Capt, Clay, C. of E. to McNinch Chairman, F. P. C. enclosing the following: (2)		

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
1898, Nov. 12; letter from Wilson Aluminum Co. to Secretary of War. (3) Part of handwritten letter to Brig. Gen'l John M. Wilson, Chief of Eng. dated January 26, 1899. (4) War Department memorandum. (5) 1899, Feb. 13; Letter from Major Bixby to Brig. Gen. John M. Wilson, Chief of Eng. (6) War Department memo. (7) 3 endorsements by War Department. (8) Copy of telegram dated Feb. 17, 1899, from Mr. Wilson, Chief of Engineers to Wilson Aluminum Co. (9) Letter dated Feb. 18, 1894, from Wilson Aluminum Co. to Mr. Wilson, Chief of Engineers. (10) Letter from Sec. of War, Feb. 27, 1899, to Wilson Alum. Co. (original exhibit)	3391	2641
Exhibit No. 124—1926, November 30—Protest of Great Kanawha River Imp. Ass'n to H. M. Trippe	3393	2641
Exhibit No. 125—1926, November—Protest of Public Service Commission of W. Va	3396	2643
Exhibit No. 126—1925, May 28—Letter C. B. Slemp to General Taylor re letter from Mr. Buck	3400	2645
Exhibit No. 126-A—1925, May 27, Letter Mr. Buck of V. B. & B. to General Taylor, C. of E	3402	2645
Exhibit No. 126-B—Map—New River Development Co.—preliminary layout, Dam site above mouth of Little River	3405	2647
Exhibit No. 127—1925—June 1—First endorsement General Jadnin (C. of E.) to District Engineer, re Buck letter 5/27/25	3408	2647
Exhibit No. 128—1925, June 15, 2nd end. Trippe to Chief of Engineers (project on New River)	3410	2648
Exhibit No. 129—1925, June 18—3rd end. Col. Kutz to Chief of Engineers (project on New River)	3413	2650
Exhibit No. 130—1927, July 1—Letter from O. C. Merrill, Executive Secretary to C. M. P. C. M. together with form of license tendered A. E. P. Co.	3414	2650
Exhibit No. 131—1931, May 5—Letter from George Otis Smith to A. E. P. Co., together with form of license tendered at that time	3414Q	2663
Exhibit No. 132—Plate 11. Diagram showing change in wave as it passes downstream (original exhibit)	3414GG	2675
Exhibit No. 133—March 1930. Discharge hydrograph wave study of New River at Allisonia, Va., from March 11, 1930–March 31, 1930 (original exhibit)	3414GG	2675
Exhibit No. 134—March, 1930—Discharge hydrograph wave study New River at Eggleston, Va. from March 11, 1930–March 31, 1930 (original exhibit)	3414GG	2675

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 135—March, 1930—"Discharge hydrograph wave study New River at Glen Lyn, Va., March 12, 1930–March 30, 1930 (original exhibit)	3414GG	2675
Exhibit No. 136—March, 1930—"Discharge hydrograph wave study New River at Hinton, W. Va., March 13, 1930–March 30, 1930 (original exhibit)	3414GG	2675
Exhibit No. 137—March, 1930—"Discharge hydrograph wave study New River at Caperton, W. Va.—March 12, 1930–April 3, 1930 (original exhibit)	3414GG	2675
Exhibit No. 138—March, 1930—"Discharge hydrograph wave study New River at Damsite 'A' near Radford, Va., March 11, 1930, to March 31, 1930" (original exhibit)	3414GG	2676
Exhibit No. 139—1930, March—"Discharge hydrograph wave study at Kanawha River at Kanawha Falls, W. Va., March 12, 1930, to April 1, 1930" (original exhibit)	3415	2676
Exhibit No. 140—1930, March—"Discharge hydrograph wave study of New River at Ivanhoe, March 12, 1930, to March 31, 1930" (original exhibit)	3415	2676
Exhibit No. 141—1930, March—"Discharge hydrograph wave study of Kanawha River at Montgomery, W. Va. (Lock #. 2), March 14 to March 31, 1930" (original exhibit)	3415	2676
Exhibit No. 142—1935, System Load Curve, A. E. P. Co. and Amer. Gas & Electric Co.—Weekday, Oct. 28, 1935, Sat. Nov. 2nd, 1935, and Sunday, Nov. 3rd, 1935	3416	2676
Exhibit No. 143—1930, June 1, chart "New Kanawha River Power Waves, 3/11/30 to 4/3/30". (original exhibit)	3418	2676
Exhibit No. 144—10 sheets: Plans of locks and dams, Nos. 2 to 11, inclusive, on Kanawha River, as follows: (a) Kanawha River—Lock and Dam No. 2; (b) Kanawha River—Lock and Dam No. 3; (c) Kanawha River—Lock and Dam No. 4; (d) Kanawha River—Lock and Dam No. 5; (e) Kanawha River—Lock and Dam No. 6; (f) Kanawha River—Lock and Dam No. 7; (g) Kanawha River—Lock and Dam No. 8; (h) Kanawha River—Lock and Dam No. 9; (i) Kanawha River—Lock and Dam No. 10; (j) Kanawha River—Lock and Dam No. 11 (original exhibit)	3418	2676
Exhibit No. 145—1935—74th Congress, 1st Session, House Doc. 91, 308 Report of Kanawha River, W. Va., Va., and N. C	3419	2677

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 146—Views of shoals and rapids on unimproved section of New River between Wiley Falls, mile 88.6 and Radford, mile 146.1—July 13–15, 1936 (original exhibit)	3445	2714
Exhibit No. 147—Views of shoals and rapids on unimproved sections of New River between Wiley Falls, mile 88.6, and Radford, mile 146.1, and between Allisonia, mile 173.3, and Austinville Lead Mine, mile 190.0—June 22–29, 1936 (original exhibit)	3445	2714
Exhibit No. 148—Photograph of stern of boat showing type of propeller guard in July 1936 (original exhibit)	3445	2714
Exhibit Nos. 149–151, inclusive—Photographs of Gerdes' Party at Bull Falls in July 1936 (original exhibit)	3445	2714
Exhibit Nos. 152–154, inclusive—Photograph of Negro at Bull Falls in a rowboat in July 1936 (original exhibit)	3445	2714
Exhibit No. 155—1926—House Doc. #308, 69th Congress, 1st Session—Estimate of cost of examinations, etc., of streams where Power Development appears feasible (original exhibit)	3445	2714
Exhibit No. 156—Record of hearing before State Corporation Commission containing application and copy of State license (original exhibit)	3445	2714
Exhibit No. 157—Pilot license of John R. Douglass (read into the record) (omitted)	3445	2715
Exhibit No. 158—Map—"Parts of National Forests and Areas approved as National forests within the Kanawha River and New River watersheds" (original exhibit)	3445	2715
Exhibit No. 159—1922, June 12, letter from Geo. Otis Smith, Director U. S. G. S., including the Report #34 enclosed in said letter (excluded)	3445	2715
Exhibit No. 160—Map "Monongahela National Forest—West Virginia" 1936 (excluded)	3445	2715
Exhibit No. 161—"Graph of stream flow—storm of March 26, 1936—Bent Creek Experimental Forest" (original exhibit)	3446	2715
Exhibit Nos. 163–182, inclusive—"Photos of dams and reservoirs on upper New River showing silt deposits" (original exhibits)	3446	2715
Exhibit No. 183—Views of pools, shoals, rapids, and dams of Kanawha River and New River between London Lock, W. Va., and Hawks Nest, W. Va.—July 22, 1936 (original exhibit)	3446	2715

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 184—Photograph entitled "State line in vicinity of Round Bottom Branch" (original exhibit)	3447	2715
Exhibit No. 185—U. S. G. S. "Peterstown sheet" (original exhibit)	3449	2715
Exhibit Nos 186–187—Maps and deed descriptions, re Bluestone reservoir (original exhibits)	3451	2718
Exhibit No. 188—Key property map of A. E. P. Co. for Bluestone reservoir (original exhibit)	3452	2718
Exhibit No. 189—Report (pp. 3–4, 9–39) of Commissioners appointed to view certain rivers within Commonwealth of Virginia (original exhibit)	3454	2718
Exhibit No. 189–A—Map accompanying exhibit No. 189, John Marshall report (original exhibit)	3478	2735
Exhibit No. 190—Series of maps entitled "New River Survey, 1872 and 1878" (original exhibit)	3478	2735
Exhibit No. 191—Kanawha Valley Power Company license for project #1175 W. Va., including London and Marmet Dams (original exhibit)	3478	2735
Exhibit No. 192—Views of pools, shoals, and rapids on New River between Hinton, West Virginia, and Narrows, Virginia—July 19–20, 1936 (original exhibit)	3478	2735
Exhibit No. 193—Views of pools, shoals, and rapids on New River between Narrows, mile 101.0, and Allisonia, mile 172.0—July 9–13, 1936 (original exhibit)	3478	2735
Exhibit No. 194—Photostat of the chart from automatic gage, at Caperton, W. Va., for period August 8 to August 21, inclusive (original exhibit)	3478	2735
Exhibit No. 195—Blueprint of the recording gage chart at Kanawha Falls, for period July 30 to August 24, inclusive, 1930 (original exhibit)	3478	2736
Exhibit No. 196—Profile of New River, N. C., W. Va. and Va. (original exhibit)	3479	2736
Exhibit No. 197—Map styled "Railroads" (original exhibit)	3481	2736
Exhibit No. 198—Map entitled "New River, Va. and W. Va., Navigation improvements between Hinton and Wilson Creek, 1877 to 1889" (original exhibit)	3482	2736
Exhibit No. 199—Load curve of the Appalachian Electric Power Co. for week ending November 3, 1935 (original exhibit)	3484	2736
Exhibits Nos. 200–200–B—3 prints, U. S. Eng. Office, Huntington, W. Va., showing navigation features (barge lift, log chute, etc.) for Bluestone reservoir project (original exhibits)	3486	2736

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued. Original Print

Exhibit No. 201—Map showing existing ferries below the mouth of Wilson Creek on New and Kanawha Rivers (original exhibit) 3486 2736

Exhibit No. 202—Map showing ferries in operation prior to 1935 (original exhibit) 3486 2737

Exhibit No. 203—Photograph album of ferries on New River (original exhibit) 3486 2737

Exhibit No. 204—Illustration showing how Radford project could affect operating results of Bluestone development (original exhibit) 3486 2737

Exhibit No. 205—Photograph taken to show or to determine the direct measurement thickness of sediment in Byllesby reservoir (original exhibit) 3486 2737

Exhibit No. 207—Sedimentation map of Washington Mills reservoir showing original and present contours (original exhibit) 3486 2737

Exhibit Nos. 208–209—Topographic maps of sections of Washington Mills reservoir showing conditions—April 17 and April 23, 1936—after break-down (original exhibits) 3486 2737

Exhibit No. 210—Cross sections showing profiles on two ranges across the Washington Mills reservoir as of 4/17, and again on 4/23, 1936 (original exhibit) 3487 2737

Exhibit No. 211—Columnar sections of borings through sediment of Washington Mills reservoir (original exhibit) 3487 2737

Exhibit No. 212—Sedimentation map of Byllesby reservoir (original exhibit) 3487 2738

Exhibit No. 213—Chart showing longitudinal profiles of Byllesby reservoir (original exhibit) 3487 2738

Exhibit No. 214—Map of Buck reservoir showing present shore line (original exhibit) 3487 2738

Exhibit Nos. 215–217, inclusive—Cross section showing original and present profiles of the Buck reservoir (original exhibits) 3488 2738

Exhibit Nos. 218–220, inclusive—Cross sections showing the original and present profiles of Fields Mfg. Co.'s reservoir (original exhibits) 3488 2738

Exhibit Nos. 221–221-E, inclusive—Charts of the Ohio River, Pittsburgh, Pa. to mouth showing topography and soundings (original exhibits) 3488 2738

Exhibit No. 223—Federal Power Commission, National Power Survey, Principal Generating Plants and Electric transmission lines, United States, 1935 (original exhibit) 3488 2738

Exhibit No. 225—1 page—"Energy transactions between Appalachian Electric Power Co. and interconnected systems, 1934 3490 2738

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 226—Chart—"Study showing operation of Radford with stream flow conditions, as of the week ending Sunday, November 2, 1930, based on load curve, shape proportional to system load reported by Appalachian Electric Co., for week ending November 3, 1935" (original exhibit)	3491	2739
Exhibit No. 227—Map—"Appalachian Electric Power Co., wave study, New and Kanawha Rivers, March 1930" (original exhibit)	3493	2739
Exhibit No. 228—Map—"New River and Kanawha River Power Waves, March 11 to April 3, 1930" (original exhibit)	3493	2740
Exhibit No. 229—Chart—"Automatic Gauge Records, London and Marmet June 15–19, 1936" (original exhibit)	3495	2740
Exhibit No. 229–A—Corrected Exhibit No. 229 (original exhibit)	3495	2740
Exhibit No. 230—Profile of London, Marmet, and Dam No. 6 pools for June 16, 1936 (original exhibit)	3495	2740
Exhibit No. 230–A—Corrected Exhibit No. 230 (original exhibit)	3495	2740
Exhibit No. 231—Letter dated March 1, 1928, Curtis, Mallet-Prevost, Colt, & Mosle to Federal Power Commission, re Project No. 739, A. E. P. Co. (original exhibit)	3495	2740
Exhibit No. 232—Executive Order of the President authorizing the construction of the Bluestone reservoir project on New River (original exhibit)	3495	2740
Exhibit No. 233—Letter from Wm. W. Belknap, Secretary of War, in answer to the resolution of the House, on February 3, 1871, House Document No. 110, concerning James River and Kanawha Canal (original exhibit)	3495	2740
Exhibit No. 234—"The Congressional Globe"—1873, page 204 and page 206, adoption of resolution offered by Senator Windom (original exhibit)	3495	2740
Exhibit No. 235—"Journal of the House of Delegates of the State of West Virginia for the 11th Session, 1872–3" re James River and Kanawha Canal (original exhibit)	3495	2741
Exhibit No. 236—Report of the Committee of the House of Representatives, containing report No. 76 of the 3rd session of the 42nd Congress, re James River & Kanawha Canal (original exhibit)	3496	2741
Exhibit No. 237—"Congressional Record," Special Session of the Senate of the United States, March 4 to 26, 1873, Volume #1, re James River and Kanawha Canal (original exhibit)	3496	2741

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 238—Report of Major Craighill with report of Engineers Hutton and Harris, "James River and Kanawha Canal, United States Engineer Office, Baltimore, Md., April 11, 1873" (original exhibit)	3496	2741
Exhibit No. 239—Letter from Senator Davis, of the State of West Virginia, to Sec. of War, W. W. Belknap, dated November 12, 1873, re James River and Kanawha Canal [omitted in printing]	3497	2741
Exhibit No. 240—Report of the Board of Engineers of March 18, 1874, on the James River and Kanawha Canal [omitted in printing]	3499	2741
Exhibit No. 241—Report 307, Part 1, Senate, 43rd Congress, 1st Session, "Select committee on transportation routes to the seaboard, April 24, 1874" (original exhibit)	3565	2741
Exhibit No. 242—Photostatic copy of four pages from "Congressional Record," year 1874, re James River & Kanawha Canal (original exhibit)	3565	2741
Exhibit No. 243—Statutes at large, Volume 18, Part 3, Page 237, etc., re Act passed June 23, 1874, chapter 457, for estimates and surveys on transportation routes to the seaboard (original exhibit)	3565	2742
Exhibit No. 244—Report of Major Craighill, Corps of Engineers, U. S. A., entitled "Third Subdivision of the Central Transportation Route, January 13, 1875" (original exhibit)	3565	2742
Exhibit No. 245—Letter (pp. 54–57 printed herein) from the Sec. of War, etc., Senate Document No. 15, 44th Congress, 2nd Session, containing the reports of Major Craighill and Brig. Gen. Humphreys, Nov. 10, 1876 (original exhibit)	3567	2742
Exhibit No. 246—U. S. G. S. Report No. 20, the Whitetop Area, Virginia-Tennessee (original exhibit)	3575	2748
Exhibit No. 247—Photostatic copy of hearing before Major H. M. Trippe, re Diversion of New River to N. C. Jan. 13, 1925 (original exhibit)	3575	2749
Exhibit No. 248—Copy of letter addressed to the Hon. R. J. Noell, East Radford, Va., and signed by R. J. Holden, Professor of Geology, dated March 4, 1936 (original exhibit)	3575	2749
Exhibit Nos. 249–252, inclusive—"Aerial photos of certain reaches of New River, being Nos. 35, 58, 56, 57, in Government Exhibit No. 273" (original exhibits)	3575	2749
Exhibit No. 254—Letter dated November 14, 1927, to Major E. D. Ardery on "New River Development #6, Radford, Geological Examination," signed by F. W. Scheidenhelm (original exhibit)	3575	2749

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 255—Letter dated November 17, 1927, to Major E. D. Ardery from F. W. Scheidenhelm on "New River Development No. 6 (Radford), Geological Examination" (original exhibit)	3575	2749
Exhibit No. 256—Letter dated October 16, 1931, to Major Fred W. Herman from F. W. Scheidenhelm, pertaining to maintaining pool levels at dams 2, 3, and 4 on Kanawha River (original exhibit)	3575	2749
Exhibit No. 257—Letter dated September 18th, 1934, to Major John F. Conklin on subject of "Hydroelectric project of Appalachian Electric Power Company on New River near Radford, Va.," by F. W. Scheidenhelm (original exhibit)	3576	2749
Exhibit No. 258—Letter of April 2, 1936, to Major John F. Conklin on "Radford Hydro Project of Appalachian Electric Power Company, Capacity Curve of Reservoir," by F. W. Scheidenhelm (original exhibit)	3576	2749
Exhibit No. 259—Letter dated April 12, 1932, to Major Fred W. Herman, on New River Power Wave Study, by F. W. Scheidenhelm (original exhibit)	3576	2750
Exhibit No. 260—Letter dated April 20, 1932, to United States Engineer Department, signed by Daniel W. Mead and F. W. Scheidenhelm, re "New-Kanawha River Power Wave Study" (original exhibit)	3576	2750
Exhibit No. 261—Telegram dated December 10, 1930, addressed to F. E. Bonner, Executive Secretary, Federal Power Commission, sent by F. W. Scheidenhelm (original exhibit)	3576	2750
Exhibit No. 263—Letter signed by John F. Conklin, Lt. Col., Corps of Engineers, District Engineer, addressed to Kanawha Valley Power Company, "Kanawha River pool fluctuations resulting from operation of the Marmet and London hydroplants"	3576A	2750
Exhibit Nos. 264–A, B, C—Aerial photographs of New River from Hinton, W. Va. to Narrows, Va. (original exhibits)	3577	2752
Exhibit No. 265—Document on Report on Application for License, Federal Power Project No. 1175, West Virginia, to Chief of Engineers, U. S. Army, Washington, D. C., dated Feb. 24, 1932, at St. Louis, Mo. (changed to defense exhibit No. 525 as it was already in evidence) (original exhibit)	3577	2752

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued. Original Print

Exhibit No. 266—Dated March 12, 1932, informal comment upon the report of the United States Division Engineer at St. Louis, Feb. 24, 1932, on application of Kanawha Valley Power project No. 1175, West Virginia, by F. W. Scheidenhelm, consulting engineer for applicant (original exhibit) 3577 2752

Exhibit No. 271—Copy of protest to A. E. P. Co. against application of town of Galax, Va., for grant and loan from Government for construction of municipal hydro and diesel engine power plant and distribution system (original exhibit) 3577 2753

Exhibit No. 272—Letter dated April 9, 1932, from George Otis Smith to Mr. Thompson (original exhibit) 3578 2753

Exhibit No. 273—Book of aerial photographs of New River, W. Va., Va., and N. C. (original exhibit) 3578 2753

Exhibit No. 274—An Act approved May 6, 1887, incorporating the New River Steam Boat Company, and authorizing them to operate a steam boat on New River (original exhibit) 3578 2753

Exhibit No. 275—Act of February 3, 1888, of the General Assembly of Virginia, to authorize the Radford Land and Improvement Company to erect a dam across New River (original exhibit) 3578 2753

Defendant's exhibits:

Exhibit Nos. 500-504—Discharge hydrographs, a wave study of New River (original exhibits) 3579 2753

Exhibit No. 505—Document dated May 9, 1927, New River Development Company—Record for minutes (original exhibit) 3579 2753

Exhibit No. 506—Copy of 7th Annual Report of the Federal Power Commission 1927 (original exhibit) 3579 2753

Exhibit No. 507—Gage recorder chart of Kanawha River at Kanawha Falls, W. Va., for the period July 6 to 13, 1936, incl. (original exhibit) 3579 2753

Exhibit No. 509—House Doc. No. 190, 70th Congress, 1st Session (original exhibit) 3579 2754

Exhibit No. 510—Letter dated Feb. 5, 1927 from Major H. M. Trippe to F. W. Scheidenhelm (original exhibit) 3579 2754

Exhibit No. 511—Letter dated February 4, 1927 from F. W. Scheidenhelm to Major H. M. Trippe (original exhibit) 3579 2754

Exhibit No. 512—House Doc. No. 91, 74th Congress, 1st Session (original exhibit) (same as exhibit 145, a part of which is set forth at fol. 3419 herein) 3579 2754

Exhibit No. 513—Chart—Power Waves on New and Kanawha Rivers (original exhibit) 3579 2754

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 514—Letter dated October 20, 1931, from F. B. Duis to F. W. Scheidenhelm re pool levels on Kanawha River (original exhibit)	3580	2754
Exhibits Nos. 515–517, inclusive—Photographs of certain sections of New River (original exhibits)	3580	2754
Exhibit No. 518—Dublin, Va., W. Va., U. S. G. S. Quadrangle sheet	3580A	2754
Exhibit No. 519—Scarborough's New Census Map of Virginia, West Virginia, Maryland, Delaware, and District of Columbia (original exhibit)	3580B	2754
Exhibit No. 520—Map entitled "The Middle Atlantic Group comprising Virginia, West Virginia, Maryland, Delaware, and District of Columbia," published by National Power Survey (original exhibit)	3580B	2755
Exhibit No. 521—Map of Virginia, Maryland, Delaware, and District of Columbia, published by National Map Co., Indianapolis, Indiana (original exhibit)	3580B	2755
Exhibit No. 522—Randall McNally Map of Virginia (original exhibit)	3580B	2755
Exhibit No. 523—Map entitled "Commonwealth of Virginia, State Highway System, State Highway Commission, July 1936" (original exhibit)	3580B	2755
Exhibit No. 524—Map of Giles County, Commonwealth of Virginia, Department of Highways, Richmond, Va. (original exhibit)	3580B	2755
Exhibit No. 525—Copy of a report on application for license, Federal Power Project No. 1175, W. Va., dated Feb. 24, 1932 (original exhibit)	3580B	2755
Exhibit No. 526—Photograph of Shumate Falls (original exhibit)	3581	2755
Exhibit No. 527—Map dated 11/21/1912. Reconnaissance Map of New River from Hinton, W. Va., to Radford, Va., compiled under direction of Major F. W. Alstaetter. (Same as original exhibit 558–G)	3581	2755
Exhibit No. 528—Report of Major Craighill, Corps of Engineers, U. S. A. dated April 17, 1891	3583	2755
Exhibit No. 529—Letter dated February 4, 1930, addressed to Federal Power Commission, signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle	3589	2760
Exhibit No. 530—Memorandum, re Federal Commission's authority to adopt a policy of issuing a minor part license for projects located on nonnavigable streams and not involving the use of any land or other property of the United States, dated February 4, 1930	3589C	2762

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 531—Photostatic copy of letter dated July 21, 1930, addressed to Attorney General of United States and signed Patrick J. Hurley, Secretary of War	3589LL	2779
Exhibit No. 532—Document dated September 22, 1930, addressed to the President and signed by Wm. D. Mitchell, Attorney General. "The following opinion of the Attorney General was released by the Federal Power Commission, Sept. 26, 1930."	3589PP	2781
Exhibit No. 533—Letter of October 6, 1930, to Federal Power Commission signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle	3589YY	2787
Exhibit No. 534—Photostat copy of letter of October 16, 1930, to Federal Power Commission, signed—A. E. P. Co. by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3589ZZ	2788
Exhibit No. 535—Letter dated November 7, 1930, from War Department, Office of Chief of Engineers, to F. P. C. Exec. Secy. signed for Chief of Engineers by Major J. J. Kingman	3589AAA	2788
Exhibit No. 536—Letter dated October 31, 1930, from F. E. Bonner to A. E. P. Co. re Project No. 739 (original exhibit)	3589BBB	2789
Exhibit No. 537—Letter from F. P. C. to A. E. P. Co., dated November 6, 1930, signed by F. E. Bonner, Executive Secretary, and revised draft of minor-part license	3589CCC	2789
Exhibit No. 538—Photostatic copy of letter of November 8, 1930, to General Brown, Chief of Engineers, and signed by F. E. Bonner, Executive Secretary	3590	2790
Exhibit No. 539-A—Letter by Federal Power Commission of December 15, 1930, signed by F. E. Bonner, Executive Secretary to Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3590A	2795
Exhibit No. 539-B—"Inclosure 7992, from Federal Power Commission, U. S. Government Printing Office 1927." Marked copy. War Department office of Chief of Engineers, Washington, 11/11/1930, addressed to Federal Power Commission, signed "Lytle Brown, Major General, Chief of Engineers"	3592	2795
Exhibit No. 540-A—Letter dated 11/28/1930 from F. E. Bonner, Exec. Secy. of F. P. C. to A. E. P. Co. (original exhibit)	3593	2796
Exhibit No. 540-B—Certified copy of action of the Federal Power Commission upon application of the defendant for Minor Part license (original exhibit)	3593	2796

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 541—Memorandum dated October 28, 1930 for the Exec. Secy., signed M. C. Tyler, Lt. Col. Corps of Engineers, Chief of Engineers	3593A	2796
Exhibit No. 542—Copy of letter dated 11/8/1930 to F. E. Bonner from F. W. Scheidenhelm	3593L	2806
Exhibit No. 543—"Maneuvers of dams on Kanawha River during wave test, 1930" (original exhibit)	3593M	2806
Exhibit No. 544—"Report of Power Waves, New and Kanawha Rivers" (original exhibit)	3593M'	2807
Exhibit No. 545—Location map	3593N	2806A
Exhibit No. 546—Certificate for W. R. Hundly, East Radford, Va. (omitted)	35930	2807
Exhibit No. 547—Four pages; namely, page 848 of the Congressional Record for January 10, 1901; page 1001 of the Congressional Record for January 14, 1901; page 1002 of the Congressional Record for January 14, 1901; and page 1096 of the Congressional Record for January 16, 1901	3595	2807
Exhibit No. 548—Map—"Railroads in relation to New River"	3603	2812A
Exhibit No. 549—Album of photographs (original exhibit)	3605	2813
Exhibit No. 550—Map "Geological Map of the New River, Cripple Creek region, showing the approximate location of ore openings and properties tributary to the Cripple Creek Extension of the Norfolk and Western Railroad, by E. N. D'In-Villiers, Geologist, 1887" (original exhibit)	3605	2813
Exhibit No. 551—Letter addressed to Dr. J. E. Williams, Dean at V. P. I., Blacksburg, Va., dated February 2, 1936, and signed by R. J. Noell (original exhibit)	3605	2813
Exhibit No. 552—Carbon copy of a letter dated March 2, 1926, addressed to Hon. R. J. Noell, East Radford, Virginia, and without signature except "Dean of the College" and bearing the initials "JEW" (original exhibit)	3605	2813
Exhibit No. 553—Letter dated March 4, 1936, from R. J. Holden, Professor, of Virginia Polytechnic Institute, Department of Geology, Blacksburg, Virginia, addressed to Hon. R. J. Noell, East Radford (original exhibit)	3605	2813
Exhibit No. 554—Album, together with the identification map and the 60 photographs of New River (original exhibit)	3605	2814
Exhibit No. 555—Map showing locations of photographs, and photographs Nos. 114 to 127, inclusive, of New River (original exhibit)	3605	2814

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 556—Annual report of the President and Directors of the Board of Public Works to the General Assembly of Virginia, in pursuance of an act, entitled "An act creating a fund for internal improvements" (original exhibit)	3605	2814
Exhibit No. 557—Pages 140 and 141 of the Journal of the Virginia House of Delegates for 1817–18 containing a portion of the report of the House Committee on roads and inland navigation brought in on January 21, 1818 (original exhibit)	3605	2814
Exhibit Nos. 558–A–558–G—Map dated November 21, 1912, survey made by Major F. W. Alstaetter, Corps of Engineers. Sheets 1 to 7, inclusive, of the Alstaetter map dated November 21, 1912, marked, respectively, 558–A to 558–G (original exhibits)	3606	2814
Exhibit No. 559—Pages from the Report of the Chief of Engineers for 1875	3606–A	2814
Exhibit No. 560—Report of Chief of Engineers, 1887	3607	2823
Exhibit No. 561—Report of the Chief of Engineers for the year 1888, pages 225, 226, 1760, 1761 (original exhibit)	3612	2832
Exhibit No. 562—Report of the Chief of Engineers for the year 1889, pages 261, 262, 1961, and 1962 (original exhibit)	3612	2832
Exhibit No. 563—Report of the Chief of Engineers for the year 1890, pages 235, 236, 2249, 2250, 2251 (original exhibit)	3612	2832
Exhibit No. 564—Report of Brigadier General Casey, Chief of Engineers, United States Army, to the Secretary of War, dated November 16, 1894, to which is attached a third endorsement by Col. Craighill's underlying report, and also a second endorsement	3614	2832
Exhibit No. 565—Letter from the Secretary of War dated Dec. 16, 1903, transmitting letter from Chief of Engineers including report made by him on New River	3618	2835
Exhibit No. 566—Memorandum to the Secretary of War by Gen. Black, Chief of Engineers, dated May 19, 1916	3623	2840
Exhibit No. 567—Page 1284 of the Annual Reports of the Chief of Engineers of the War Department, year 1917 (original exhibit)	3634	2849
Exhibit No. 568—Copy of letter dated July 1, 1925, addressed to Mr. C. Bascom Slemp, and signed by O. C. Merrill, Executive Secretary of Federal Power Commission	3634–A	2849

Record from D. C. U. S., etc.—Continued.
Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 569—Letter dated July 3, 1925, addressed to Honorable O. C. Merrill, Exec. Secy., F. P. C., Washington, D. C. and signed by C. B. Slemp (original exhibit)	3634–B	2850
Exhibit No. 570—Letter dated October 24, 1925, addressed to the Federal Power Commission, Washington, D C., and signed by Curtis, Mallet-Prevost, Colt and Mosle	3634–C	2850
Exhibit No. 571—Letter of October 24, 1925, addressed to Major General Harry Taylor, Chief of Engineers, War Department, Washington, D. C., signed by Curtis, Mallet-Prevost, Colt & Mosle, as counsel for the Appalachian Electric Power Co., or its predecessors	3634–D	2851
Exhibit No. 572—Report of Major General Taylor, Chief of Engineers, dated December 29th, 1925, addressed to the Executive Secretary of the Federal Power Commission, Washington, D. C. (text of this exhibit is same as Government Exhibit No. 97) (original exhibit)	3604–E	2851
Exhibit No. 573—"Defendant's Exhibit No. 505" identified by Col. Edgerton as a part of the minutes subsequently printed as the minutes of the meeting of June 1, 1927 (original exhibit)	3635	2851
Exhibit No. 574–A—Photostat of letter of July 1, 1927, from Federal Power Commission, addressed to Curtis, Mallet-Prevost, Colt & Mosle, signed by O. C. Merrill, Executive Secretary bearing reference "Ep–739–VA Appalachian Electric Power Company"	3635–A	2852
Exhibit No. 574–B—Certified copy of a part of the minutes of the 88th meeting of the Power Commission held on the first day of June 1927	3635–B	2852
Exhibit No. 574–C—"Federal Power Commission, Washington, D. C. License on Navigable Waters, Project No. 739, Virginia, Appalachian Electric Power Co." with it is a form of license consisting of 16 pages (original exhibit)	3635–C	2853
Exhibit No. 575—Letter dated March 1, 1928, to Hon. Dwight F. Davis, Secy. of War, Hon. Hubert Work, Secy. of Interior, Hon. Wm. N. Jardine, Secy. of Agriculture, constituting the Federal Power Commission, and signed A. E. P. Co., by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3635–D	2853
Exhibit No. 576—Letter dated March 5, 1930, to Lt. Col. M. C. Taylor, Chief Engineer, Federal Power Commission, Interior Building, Washington, D. C., and signed by F. W. Scheidenhelm (original exhibit)	3635–D	2854

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 577—Photostatic copies of pages 6, 7, 8, and 9, of the Tenth Annual Report of the Federal Power Commission for the year 1930	3635–E	2854
Exhibit No. 578–A—Letter dated October 3, 1930, to Gen. Brown, Chief of Engineers, and signed by F. E. Bonner, Exec. Secy. (original exhibit)	3636	2857
Exhibit No. 578–B—Letter dated October 10, 1930, to the Exec. Secy., F. P. C., Washington, D. C., signed for the Chief of Engineers, by Hugh J. Casey, First Lieut. Corps of Engineers (original exhibit)	3636	2857
Exhibit No. 579–A—Photostatic copy of letter dated November 5, 1930, to Exec. Secy., F. P. C. and signed by Lytle Brown, Major General, Chief of Engineers	3638	2857
Exhibit No. 579–B—Photostat of report entitled "Second endorsement U. S. E. O. Huntington, W Va., Oct. 18, 1930, Div. Engineer, Upper Miss. Valley Division, St. Louis, Mo., signed by Major Herman, District Engineer."	3638	2857
Exhibit No. 579–C—Photostat copy of report on navigability of New River, Va. (Huntington District, August 29, 1930). Third endorsement, office, Division Engineer, Upper Miss. Valley Div., St. Louis, Mo., October 24, 1930, to Chief of Engineers, U. S. Army, Washington, and signed George R. Spalding, Lt. Col. Corps of Engineers	3638	2857
Exhibit No. 580—Memorandum dated October 21, 1930, entitled "Memorandum for Exec. Secy." and signed by J. F. Lawson, acting Chief Counsel (original exhibit)	3647	2865
Exhibit No. 581—Document dated October 30, 1930, entitled "Memorandum for the Sec. of Int., Acting Chairman," and signed by F. E. Bonner, Exec. Sec	3647–A	2865
Exhibit No. 582—Photostatic copy of letter dated November 8, 1930, to Hon. John G. Pollard, Gov. of Va., and signed by F. E. Bonner, Exec. Sec	3647–C	2866
Exhibit No. 583—Photostat of letter from Hon. John Pollard, Gov. of Va., to Mr. F. E. Bonner, Exec. Sec., F. P. C., dated Nov. 10, 1930	3647–D	2867
Exhibit No. 584—Letter Jan. 27, 1931, from Curtis, Mallet-Prevost, Colt & Mosle to F. P. C. re Project #739 (original exhibit)	3647–E	2867
Exhibit No. 585—Telegram dated January 28, 1931, from F. P. C., signed by George Otis Smith, Chairman, addressed to A. E. P. Co. (original exhibit)	3647–E	2867
Exhibit No. 586—Photostat of letter dated September 18, 1934, to Sec. of War, Washington, D. C., and signed by A. E. P. Co., by George N. Tidd, President	3647–F	2868

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 587—Photostatic copy of letter dated October 9, 1934, to A. E. P. Co. and signed by G. H. Dern, Secy. of War	3647–I	2871
Exhibit No. 588—Letter dated October 18, 1934, to Hon. George H. Dern, Sec. of War, and signed by George N. Tidd, President A. E. P. Co.	3648	2871
Exhibit No. 589—Letter dated September 18, 1934, to Hon. Frank R. McNinch, Chairman, F. P. C., signed by Appalachian Electric Power Company, by George N. Tidd, President (original exhibit)	3648–B	2873
Exhibit No. 590—Letter dated October 19, 1934 to Frank R. McNinch, Chairman, F. P. C., without signature but counsel for both sides agreed that it was signed by M. F. Millikan, General Counsel of the Company (original exhibit)	3648–B	2873
Exhibit No. 591—Photostatic copy of letter to M. F. Millikan, American Gas and Electric Company, signed by G. W. Dineweaver, Secretary, Federal Power Commission, dated October 23, 1934 (original exhibit)	3648–B	2873
Exhibit No. 592—Map showing locations of certain photographs from 61 to 113, both inclusive, of New River (original exhibit)	3648–B	2873
Exhibit No. 593—Paper on which Prof. Thomas drew sketch of wave	3648–D	
Exhibit No. 594—Hydrograph representing a possible hydrograph of operation of the A. E. P. Co. plant during a rather severe peak load operation, showing the discharge from the plant in cubic feet per second at various hours of the day	3649	2874A
Exhibit No. 595—Chart showing a wave drawn during presentation of testimony of Prof. Thomas	3651	
Exhibit No. 596—Diagram of triangular wave prepared by Prof. Thomas	3651–A	2874B
Exhibit No. 597—Diagram by Prof. Thomas pertaining to principle of integrating model	3651–B	2874C
Exhibit No. 598—Diagram by Prof. Thomas showing reduction of Waves	3651–C	2874D
Exhibit No. 599—Chart upon which Dr. Mead made diagram in connection with his testimony, pertaining to stream flow (original exhibit)	3651–D	2874
Exhibit No. 600—Chart bearing legend, "Profile New and Kanawha Rivers to Forks of New River and North Carolina to Ohio River, showing existing and and proposed power developments"	3652	2874E

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

Original Print

Exhibit No. 601—House Document No. 306, 74th Congress, First Session, entitled "Ohio River, letter from the Sec. of War transmitting, pursuant to Section 1 of the River and Harbor Act approved January 21, 1927, and Section 10 of the Flood Control Act, approved May 15, 1928, a letter from the Chief of Engineers, United States Army, dated August 14, 1935, submitting a report, together with accompanying papers and illustrations containing a general plan for the improvement of the Ohio River for the purposes of navigation and efficient development of its water power, the control of floods, and the needs of irrigation" (original exhibit) 3654 2874

Exhibit No. 602—This exhibit is the Table 45, Appendix A, referred to in the paragraph 263, page 146, of exhibit 601. The appendices to the reports otherwise embodied in House Document No. 306 (being exhibit 601) were not printed as part of that document (original exhibit) 3654–A 2874

Exhibit No. 603—Photostat of cover page of document entitled "The Ohio River Chart, drawings and description of features affecting navigation, navigable depths and tables of distances for its tributaries, compiled under the direction of the Chief of Engineers, United States Army," and also photostat of page 267 of that document (original exhibit) 3654–B 2874

Exhibit No. 604—Copy of letter dated June 13, 1936, from Mr. Baker to the late Sec. of War, Mr. Dern (original exhibit) 3654–C 2874

Exhibit No. 605—Reply of S. D. Embick, Acting Secretary of War, to Mr. Baker, dated June 22, 1936 (original exhibit) 3654–C 2874

Exhibit No. 606—Letter dated June 26, 1936, from Hon. John Paul to Secretary of War (original exhibit) 3654–C 2875

Exhibit No. 607—Letter dated July 17, 1936, to the Hon. John Paul, from Mr. Woodring, Acting Sec. of War (original exhibit) 3654–C 2875

Exhibit No. 608—Letter dated June 26, 1936, from Col. Conklin, addressed to the Kanawha Valley Power Company (original exhibit) 3655 2875

Exhibit No. 609—Letter dated July 10, 1936, to U. S. District Engineer Office, Huntington, W. Va., signed by Kanawha Valley Power Company, Graham Claytor, Vice President, subject "Kanawha River Pool Fluctuations resulting from operation of the Marmet and London Hydroplants" 3655–A 2875

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 610—Letter dated July 28, 1936, from the War Dept., United States Engineer Office, Huntington, W. Va., addressed to Col. F. W. Scheidenhelm, and signed by John F. Conklin, Lt. Col., Corps of Engineers, District Engineer (original exhibit)	3655–C	2877
Exhibit No. 611—Executive Order No. 6251, dated Aug. 19, 1933 (set forth in full at fol. 2900 hereof)	3655–D	2877
Memorandum required by Rule 14, Section 7	3656	2877
Clerk's certificate [omitted in printing]	3657	
Proceedings in the United States Circuit Court of Appeals for the Fourth Circuit	3658	2878
Docket entries	3658	2878
Appearance for appellee	3658	2878
Appearance for appellant	3658	2878
Argument of cause	3660	2880
Opinion, Chesnut, J	3661	2880
Dissenting Opinion, Parker, J	3718	2922
Decree	3745	2943
Order staying mandate	3745	2943
Order as to use of original transcript of record	3747	2944
Clerk's certificate [omitted in printing]	3748	2944
Order allowing certiorari	3749	2944
Stipulation as to printing of record	3750	2945

1 [Caption omitted.]

[File endorsement omitted.]

2 In United States District Court for the Western District of Virginia

In Equity No. 8

UNITED STATES OF AMERICA, APPELLANT

vs.

APPALACHIAN ELECTRIC POWER COMPANY, A CORPORATION, APPELLEE

Praecipe for transcript of recor.

Filed Feb. 24, 1939

To the CLERK OF THE ABOVE COURT:

Appellant and appellee having agreed upon the contents of this praecipe, you are hereby requested to disregard the several praecipes heretofore filed, and to include in the transcript of record to be filed in the United States Circuit Court of Appeals for the Fourth Circuit the following, and no other documents, to wit:

(1) Writ of subpoena.

(2) Bill of complaint, as amended.

(3) Answer of defendant, as amended.

(4) Order of September 19, 1935.

(5) Petition of the State of Virginia for leave to appear as amicus curiae.

(6) Petition of the State of West Virginia for leave to appear as amicus curiae.

(7) The sworn motion for taking depositions filed on the 26th of August 1936.

(8) The order of August 26, 1936, on the motion last aforesaid.

(9) Plaintiff's requested findings of fact and conclusions of law.

(10) Opinion of the court filed April 22, 1938.

(11) Findings of fact and conclusions of law.

(12) Final decree and order granting exceptions.

(13) Assignment of errors, as amended.

3 (14) Statement of Evidence under Equity Rule 75.

(15) Stipulation as to printing record on appeal under Rule 23.

(16) Stipulation as to sending up original exhibits.

(17) Order of February 2, 1939, directing the Clerk to transmit all original exhibits which are not copied in full in the approved statement of evidence.

(18) Approval by District Judge of statement of evidence.

(19) Original exhibits not copied in full in the approved statement of evidence.

(20) Memorandum under Section 7 of Rule 14.

(21) This praecipe.

(22) Clerk's certificate.

In addition to the foregoing you are requested to transmit the following documents which are not to appear in the printed record on appeal:

(a) Stipulation of July 8, 1936, relating to the admissibility in evidence of copies of certain documents.

(b) Stipulation signed by counsel dated September 14, 1938.

(c) Appellee's objections and proposed amendments to appellant's statement of evidence, filed February 1, 1939. (Original)

(d) Order entered on February 2, 1939, allowing appellee's objections and proposed amendments, as modified, to appellant's statement of evidence.

(e) Order entered on February 2, 1939, granting appellant an exception to the order allowing appellee's objections and proposed amendments, as modified, to appellant's statement of evidence.

(Signed) **Joseph H. Chitwood,**
Joseph H. Chitwood,
United States Attorney,
(Signed) **John W. Aiken,**
John W. Aiken,
Special Assistant to the Attorney General,
Of Counsel for Appellant.
(Signed) **Wendell W. Forbes,**
Of Counsel for Appellee.

4 United States of America, Western District of Virginia

Equity subpoena

[File endorsement omitted.]

Filed May 14, 1935

The President of the United States of America to the Marshal of the Western District of Virginia, Greeting:

You are hereby commanded to summon Appalachian Electric Power Company, a Corporation, if it be found in your district, to be and appear in the United States District Court for the Western District of Virginia, at Lynchburg, Virginia, on or before the twentieth day after service hereof, excluding the day of service, to answer a certain bill in equity, filed and exhibited in said court by The United States of America.

Make return how you have executed this writ and the time or times of service on the 29th day of May 1935. Hereof you are not to fail, under penalty of the law thence ensuing. And have you then and there this writ.

Witness the Honorable John Paul, Judge of the United States District Court for the Western District of Virginia, this 9th day of May 1935.

Attest: C. E. **Gentry**,
Clerk.

[SEAL] By (Sgd.) **Louis H. Price**,
Deputy Clerk.

A Copy—Teste:

——— ———,
Deputy Clerk.

MEMORANDUM

The above-named defendant is required to file answer or other defense in the Clerk's Office of the above-named court at Lynchburg, Virginia, on or before the twentieth day after service of this writ, excluding the day of service; as otherwise the above-mentioned bill may be taken pro confesso.

Executed this Subpoena on May 13th, 1935. On the Appalachian Electric Power Co., A Corporation, By delivering a copy in writing thereof to Mr. W. I. Whitfield, Manager of the within-named Corporation, at the principal office of the above-named corporation at Roanoke, Va. A place within my district.

John W. Stuart,
U. S. Marshal,
Western District of Virginia.
By (Sgd.) B. Y. **Harris**,
Deputy.

Original. Equity No. 8. Equity subpoena. United States District Court at Lynchburg, Virginia. In equity the United States of America vs. Appalachian Electric Power Co., Inc. To the Marshal: Make return of service hereof on the 29th day of May 1935.

"The service of all subpoenas shall be by delivering a copy thereof to the defendant personally, or by leaving a copy thereof at the dwelling house or usual place of abode of each defendant with some Adult person who is a member of or resident of the family." Equity Rule 13. Filed May 14th, 1935. C. E. Gentry, Clerk. By (Sgd.) Louis H. Price, Deputy.

5 In United States District Court for the Western District of Virginia

[File endorsement omitted.]

In Equity #8

THE UNITED STATES OF AMERICA, PLAINTIFF

vs.

APPALACHIAN ELECTRIC POWER COMPANY, A CORPORATION, DEFENDANT

Bill of complaint

Filed May 8, 1935

To the HONORABLE JUDGE OF THE DISTRICT COURT OF THE UNITED STATES, WESTERN DISTRICT OF VIRGINIA.

Now comes the United States of America, by Joseph H. Chitwood, United States Attorney for the Western District of Virginia, acting by the authority and under the direction of the Attorney General of the United States, and brings this its bill of complaint against the Appalachian Electric Power Company, a corporation, and thereupon complainant avers:

I

(1) The ground for the jurisdiction of this Court is that the United States is the plaintiff herein.

(2) That the defendant, Appalachian Electric Power Company, is a public service corporation duly organized and existing under the laws of the State of Virginia, with its principal place of business in the City of Roanoke, Virginia, in the Western District of Virginia.

(3) Plaintiff avers that on or about June 1, 1934, the defendant, Appalachian Electric Power Company, without having obtained any permit, license, or authority from plaintiff or any agent of plaintiff, began constructing a dam in and across the New River, near Radford in Pulaski County, Virginia, for the purpose of impounding the waters thereof and of utilizing the same for gen-

erating hydroelectric power for use and sale in public service, and is now unlawfully constructing the same. The said 6 project is hereinafter designated as the defendant's Radford project.

(4) Plaintiff avers that New River is a navigable interstate stream arising in North Carolina and flowing in a northerly and northwesterly direction across the State of Virginia, into West Virginia, to the injunction of Gauley River and New River, from which point it becomes known as the Kanawha River; that below the confluence of the New and Gauley Rivers the stream continues in a northwesterly direction and discharges into the Ohio River at Point Pleasant, West Virginia; that the said New River and Kanawha River together constitute one continuous stream; that plaintiff, by means of its agencies, the Corps of Engineers of the War Department, the United States Geological Survey, and the Federal Power Commission, has made many surveys of the New and Kanawha Rivers, and for many years has kept records showing the flow thereof; that at Kanawha Falls, West Virginia, the stream had a maximum discharge of 270,000 cubic feet per second in 1878 and a minimum average discharge for any one day of 841 cubic feet per second on October 8, 1930; that the lowest flow of record at Kanawha Falls, West Virginia, was 640 cubic feet per second and occurred on August 15, 1930, but the average flow for that day was greater than for October 8, 1930; that at Kanawha Falls during the years of record the mean of the annual maximum flows is 118,000 cubic feet per second, and the mean of the annual minimum flows is 1,850 cubic feet per second; that defendant proposes to install, in its powerhouse, machinery having aggregate capacity of 104,000 horsepower in four units of 26,000 horsepower each; that the hydraulic capacity of said installation is approximately 9,000 cubic feet of water per second; that the flow of New River at defendant's Radford dam site is less than 9,000 cubic feet per second for more than 95 percent of the time; that the average flow of New River at defendant's dam site is 3,100 cubic feet per second, and the flow of the river at said site is less than said average flow for about 60 percent of the time; that in order to make use of the installed capacity, defendant must necessarily alternately impound and release 7 large volumes of water, thus causing substantial artificial variations of the stream flow at all discharges below 9,000 cubic feet per second, and very great percentage variations from the natural flow at discharges below the average flow.

(5) Plaintiff avers that defendant's proposed reservoir would have gross capacity of approximately 206,000 acre-feet, and utilizable storage capacity of 100,000 acre-feet in a draw-down of 27

feet below the normal maximum reservoir level; that with said utilizable storage capacity defendant would, in making full use of the installed machinery, interfere with the natural flow of the river more than 95 percent of the time, and could at will, during periods of low and moderate flow, impound the entire flow of the river continuously for many days; that during periods of low flow, i. e., critical periods from the viewpoint of navigation interests, the part of the New-Kanawha River watershed lying above the Radford dam site is more productive of run-off than the part of said watershed below said dam site; that during the extreme low-water month of October 1930, 70 percent of all the water that pased the Kanawha Falls, West Virginia, gage and flowed into the canalized section of the Kanawha River, came from the drainage area above defendant's dam site; that during the low-water month of September 1902, 76 percent of all the water that passed the Kanawha Falls, West Virginia, gage came from the drainage area above defendant's dam site; that, in contrast, only 29 percent of the drainage area above the Kanawha Falls, West Virginia, gage lies above defendant's dam site.

(6) Plaintiff avers that, in improving the New River for the purpose of making it more suitable for use in interstate commerce, plaintiff actually improved the 26½-mile interstate stretch of said river from Wileys Shoals, Virginia, to Hinton, West Virginia, and also actually improved the 29¼-mile stretch of said river extending upstream from New River bridge (near Radford) in which latter stretch defendant's dam, powerhouse, and reservoir will be wholly located; that if the Kanawha and New Rivers were in their natural condition, in which condition they were navigable waters of the
United States, the impounding of the flow in defendant's
8 reservoir would render navigation impossible on said
streams during periods of low and moderate flow; that the impounding of water in defendant's reservoir during periods of low and moderate flow would make navigation impossible on the New River as improved by the plaintiff, and would impair navigation on the canalized section of the Kanawha River, and thus menace plaintiff's investment of approximately $25,000,000 in navigation improvements on the Kanawha and New Rivers.

(7) Plaintiff avers that in June 1932, the defendant filed with the State Corporation Commission, Commonwealth of Virginia, an application for a license to construct said project on New River just above the mouth of Little River, and that in October 1932 the State Corporation Commission issued a license to the defendant, substantially in accordance with the general and preliminary maps, plans, and specifications set forth in said application and in the exhibits filed therewith; that under the terms of said license the defendant purports to have the right to impound, as it sees fit,

the entire flow of the New River in said reservoir, at such times as the discharge of Little River, just below defendant's dam site, shall exceed 25 cubic feet per second and average 77 cubic feet per second for a 24-hour period, or average 221 cubic feet per second for a 7-day period; that the natural flow of Little River is always in excess of 25 cubic feet per second and exceeds 77 cubic feet per second for more than 99 percent of the time, and exceeds 221 cubic feet per second for 72 percent of the time.

(8) Plaintiff further avers that below the Radford project site plaintiff has erected ten dams in the Kanawha River for the purpose of improving navigation in said river; that said Kanawha River is a navigable river of the United States; that by the Rivers and Harbors Act of July 3, 1930 (46 Stat. 928), Congress authorized the War Department to construct those two certain dams known as the London and Marmet Dams in the said river "in accordance with the report submitted in House Document No. 190, 70th Congress, First Session, and with a view to providing a channel nine feet in depth and two hundred feet in width"; that said
9 Act was passed as a result of and to carry out the recommendations contained in a report of the Chief of Engineers contained in said House Document No. 190, 70th Congress, First Session, which said report informed Congress in substance that by constructing locks, dams, and power plants at the London and Marmet dam sites, navigation could be improved and revenue could be realized through the production of hydroelectric power which would in large part pay the expenses of construction and operation of the said dams, and also that the London and Marmet dams would take the place of the four uppermost Government dams then needing repairs; that plaintiff has adopted a plan recommended by the Secretary of War, as shown in House Document No. 31, of 73d Congress, First Session, providing for a nine-foot channel depth on the Kanawha River from the Ohio River to Kanawha Falls; and for the construction of a dam at Winfield, West Virginia, in the Kanawha River, and a dam in the Ohio River near Gallipolis, Ohio; that the six existing Government dams situated in the said river below the Marmet dam at this time are built with a concrete base and a movable crest with gates that stay closed (upright) at normal flow of the river, but which must be opened (lowered) when the flow reaches a certain volume and must then be closed by mechanical means whenever the flow recedes, in order to maintain the pool levels; that the said London and Marmet dams are being constructed with a concrete base with crest gates of the roller type which must be operated mechanically to control the pool levels.

(9) Plaintiff avers that said New River from Wilson Creek, Virginia, north and west to the Kanawha River in West Vir-

ginia, including the point at which the defendant, the Appalachian Electric Power Company, is now constructing the said Radford project, was in its natural condition, and is in its improved condition navigable waters of the United States; that in such natural condition it was, and still is, capable of use by the public for purpose of navigation and that by virtue of its connection with the Kanawha and Ohio Rivers it formed and forms a highway capable of being used for purposes of interstate and foreign commerce; that any obstructions to the navigability of said river arising from shallow places and rapids in the river or otherwise, where portages may be necessary, were and are capable of being removed and overcome by the improvement of said river; that on the lower portion of said waterway such improvements have been initiated, and are now in course of construction and that pending such improvements said New River and said Kanawha River irrespective of said shallow places and rapids are to be deemed navigable and to constitute one connected highway of interstate and foreign commerce subject to the care and protection of the plaintiff; and that any artificial obstructions erected or placed therein, without the consent, supervision, and control of the plaintiff are in violation of law.

(10) The plaintiff further avers that said New River has been recommended to Congress for improvement after investigation under its authority (Act of June 10, 1872; Act of July 2, 1874; Annual Reports of Chief of Engineers, 1875, page 631) by connecting the New and Kanawha Rivers with the James River as follows: by means of a series of locks, dams and canals to improve navigation on New River from the pool above Kanawha Falls to Hinton, West Virginia, thence through the Greenbrier River to a point where a canal was recommended connecting the said Greenbrier River with Jackson River, a tributary of the James River, at a point near Covington, Virginia; that a waterway could thus be developed whereby commerce from the Mississippi and Ohio Rivers could move through the Kanawha and up the New River and the Greenbrier, and thence by canal to the James River, and down the James River to the Atlantic Ocean; that by this means of connecting the said James and Kanawha Rivers, the New River, including the parts above and below Radford, would be made a useful part of the system of navigable waters of the United States; and that any difficulties arising on account of the rapids in said river are capable of being overcome through the improvement of said river by locks, canals, and dams.

(11) Plaintiff further avers New River has always been recognized and treated by the plaintiff and by the States of Virginia and West Virginia as navigable; that Congress has recognized and never abandoned navigability of said river; that the United

States Geological Survey, an agency of the plaintiff duly authorized by Congress, for many years has recommended and approved the purchase of lands under the Weeks' Act (16
11 U. S. C. 513–519) for the purpose of improving navigation by reforestation of the upland within the watershed of New River, thus preventing erosion and the deposit of silt in the channels of New and Kanawha Rivers (United States Geological survey reports, numbers 30 and 34); that Congress has appropriated money for, and plaintiff through the National Forest Reservation Commission and the Secretary of Agriculture, has purchased approximately 54,000 acres of such lands in the Unaka National Forest and is reforesting them and pursuing the policy of acquiring additional lands in said area; that the Chief of Engineers of the United States Army from 1873 up to 1913, pursuant to numerous acts of Congress, made surveys of said river from the mouth of Wilson Creek in Virginia, to Hinton, West Virginia, and reported the same as navigable and as actually carrying useful commerce; that Congress, acting upon the official recommendation of its engineers, appropriated, during the years 1876 to 1886, inclusive, a total of $112,000 for the improvement of navigation on New River; that said appropriations were expended under direction of the Chief of Engineers for the purpose and with the effect of improving said river for navigation from points in Virginia to points in West Virginia, including that part of the river in which the Radford porject is being constructed; that the channels through shoal places cut in the rocks to connect the long pools in said river are still in existence within the area of the Radford project and, while not now extensively used by reason of railroad competition and competition of commodities in other regions with the commodities here to be moved, are capable of use at this time and that any accumulation of silt therein could be easily removed; that in 1872 a Board of Engineers, acting under the authority of Congress, reported that a canal and waterway utilizing and joining the James and New Rivers would be economically and physically feasible and recommended a series of dams in the stretch of New River between Hinton, West Virginia, and the mouth of the Gauley River; that Congress by many special statutes has recognized the New River as navigable.

(12) The plaintiff further avers that the General Assembly of the State of Virginia by Act of February 15, 1812, created
12 a Commission to make investigation for the purpose of ascertaining the feasibility of connecting the navigable waters of the New, Kanawha, and James Rivers by means of a canal between the Jackson River near Covington, and the Greenbrier, a tributary of New River; that John Marshall, then Chief

Justice of the United States, was appointed to head said Commission, and that after making the trip by boat with the other Commissioners down the Greenbrier to Hinton, West Virginia, and by the same boat to Kanawha Falls, he reported the said New River navigable and that improvements were practicable to make New River a useful part of a waterway between the eastern part of Virginia and the Ohio River, and he favorably recommended the canal project to the General Assembly; that Acts of the Assembly of the State of Virginia, February 24, 1823, and March 2, 1855, provided State aid to a corporation formed by the State, for the purpose of constructing the James River-Kanawha Canal; and the Acts of February 12, 1872, and December 19, 1872, bespeak the aid of the State of West Virginia and of plaintiff in said enterprise.

(13) Plaintiff further avers that the legislative acts of the State of Virginia from earliest times to the present recognize the navigability of New River; that by Act of the Assembly of December 13, 1861 (Laws of Virginia 1861–1862, page 72), $30,000 was appropriated and expended for the improvement of said New River from Central Depot near Radford, to Hinton; that the State of West Virginia has always recognized the navigability of New River throughout its course in that State and its Legislature by joint resolution of September 21, 1872 (Laws of West Virginia 1873–1874, page 751), memorialized Congress to improve the same and to construct the James River-Kanawha Canal, hereinbefore referred to; that the foregoing Acts of Congress and reports and Acts of the United States Government and of the States of Virginia and West Virginia have established the navigability of New River.

(14) Plaintiff further avers that upon various sections of New River above Hinton, including the section between Lead Mines and New River Depot, within which the Radford project is being constructed, an extensive commerce has been carried on; that the Kanawha River is in fact a continuation of the same stream called New River above the juncture with Gauley River, 13 and is navigable and extensively navigated from the Ohio River to Kanawha Falls; that in the part of New River from Hinton to the mouth of the Gauley River, as well as in other parts of said stream, there are certain falls, shoals, and rapids constituting interruptions between navigable sections of said stream; that said river has been investigated by the Chief of Engineers and by other engineers acting under authority of Congress and has after such investigation been recommended by them to Congress for improvement between Mouth of Wilson and

the Ohio River; and that said stream in the intervening part between navigable sections is, by the definition in paragraph 7, section 3 of the Federal Water Power Act (41 Stat. 1063; 16 U. S. C. 796) navigable waters of the United States.

(15) Plaintiff further avers that the defendant, Appalachain Electric Power Company, on or about June 1, 1934, began the construction of said Radford project within the limits of said New River, a navigable river of the United States, the construction of a dam to raise and store the waters of said river, the construction of the power house hereinbefore described; and has continued and is continuing said construction, and is preparing and threatening to operate said project; that the said dam will totally obstruct the said river and the operation of the said project in accordance with the plans of the defendant, will at times totally obstruct and retard the stream flow and at times leave the bed of New River practically dry in long stretches of said stream, so as to render navigation impossible thereon; that said acts have been performed without the consent of Congress, without any permit, permission, authority, or approval from the Secretary of War, or recommendation from the Chief of Engineers, without any license under the terms of the Federal Water Power Act, and without any authority from the plaintiff, and in violation of law, and particularly, in violation of Sections 9 and 10 of the River and Harbor Act of March 3, 1899 (33 U. S. 401, 403), and of the Federal Water Power Act of June 10, 1920 (16 U. S. C. 791–823).

14

II

(16) Plaintiff further avers that unless the plaintiff can control the operation of the artificial obstructions to the natural flow of the New and Kanawha Rivers at all of the various dams on the said rivers already constructed, in the process of construction, and planned for future construction, including the Radford project, the improvement of the said New and Kanawha Rivers for navigation as contemplated, undertaken, and partially completed by the plaintiff, will be injuriously affected and retarded and interfered with, and the defendant will be in a position to affect, and at times to prevent any navigation in those pools created in the said rivers by the plaintiff to improve navigation, as well as in parts of the said rivers not included in such pools; that in the operation of the Radford project the defendant, Appalachian Electric Power Company, will intermittently store and release large quantities of water in accordance with its needs and the requirements of a public service corporation whenever it is profitable to do so; that such

intermittent storage and release of the waters of New River at said Radford dam will set up fluctuations in the flow of New River which will be transmitted to all that part of the river and to the Kanawha River below the site of the Radford project; that said fluctuations so caused will alter and modify the condition and capacity of the channel of New and Kanawha Rivers and of the pools created by the plaintiff therein for the purpose of improving navigation, and will at times cause and create shoal places in said New and Kanawha River; that the construction of said Radford project was started and has been and is being continued by defendant; that the construction and operation of said Radford project will seriously obstruct, alter, and modify the course, condition, and capacity of the channel of the New and Kanawha Rivers, both of which are navigable waters of the United States; that construction of said Radford project has not been authorized by Congress, has not been recommended by the Chief of Engineers, and has not been authorized by the Secretary of War or any other agency of the plaintiff, either prior to beginning the same or at any time; and that the acts of the defendants are in violation of the laws of the United States relating to navigable waters and particularly in violation of Section 10 of the River and Harbor
15 Act of March 3, 1899 (33 U. S. C. 403).

(17) Plaintiff is informed and believes and, therefore, avers that, pursuant to the Water Power Act of the State of Virginia of 1928 (as amended in 1932) relating to control of waters in said State, the defendant, Appalachian Electric Power Company, being a local public service corporation of the said State, on or about June 1, 1932, filed with the Corporation Commission of said State its application for a project on New River, substantially identical in plan with the scheme of development proposed in the said declaration of intention adopted by the defendant and as filed by the Appalachian Electric Power Company with the Federal Power Commission; that on or about October 25, 1932, the said Corporation Commission of the State of Virginia entered its order granting said application to defendant, Appalachian Electric Power Company, for the said Radford project on New River and issued its license therefor, pursuant to said State statute. Plaintiff further avers that defendant is preparing, planning, and threatening to operate its project in accordance with the schedules authorized by said license from the State and plaintiff avers that the quantities of water required to be released and the method of operation prescribed by said State license will at times be inadequate to maintain navigability in the navigable parts of New and Kanawha Rivers below said Radford project.

III

(18) Plaintiff further avers that on or about the 26th day of June 1926, New River Development Company filed its Declaration of Intention with the Federal Power Commission pursuant to section 23 of the Act of June 10, 1920 (41 Stat. 1063, 16 U. S. C. 817), for the said Radford project, Virginia, which is the same project as the Radford project herein referred to. That the said Declaration describes the scheme of development and represents the purpose of the proposed Radford project to be that of supplying hydroelectric power for public-utility use. That the pertinent part of section 23 of said Federal Water Power Act is as follows:

> "That any person, association, corporation, State, or municipality intending to construct a dam or other project works across, 16 along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States, may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws."

(19) Plaintiff is informed and believes, and therefore avers that on or about the 2d day of September 1926, the said New River Development Company transferred its rights and obligations under said Declaration of Intention to construct the said Radford project to the defendant, Appalachian Electric Power Company; that the said defendant, Appalachian Electric Power Company, adopted the plans of said declarant and continued the presentation thereof to the Federal Power Commission.

(20) Plaintiff further avers that upon the filing of said Declaration of Intention the Federal Power Commission, as required by section 23 of the Federal Water Power Act, caused an investigation to be made, and having examined into the matter and studied the plans of the said defendant, held a hearing, giving full oppor-

tunity to the declarant, New River Development Company and its successor, the defendant, Appalachian Electric Power Company, to introduce evidence and be heard in argument, and the Commission at its meeting on June 1, 1927, considered the evidence and being fully informed in the premises, made its finding; the original finding and rehearing thereon are exhibited herewith and prayed to be read as a part hereof, being marked "Exhibit A."

(21) Plaintiff avers that ample evidence in support of said findings upon the rehearing was before the Federal Power Commission, was duly considered by the Commission, and was given effect in said findings on the rehearings and plaintiff avers the fact to be that the construction and operation of said project will in law and in fact affect the interests of interstate commerce on said New and Kanawha Rivers.

17 (22) Plaintiff is informed and believes and, therefore, avers that, notwithstanding the filing of said Declaration of Intention, and not withstanding the finding upon rehearing of the Federal Power Commission that the construction of said project would affect the interests of interstate and foreign commerce, the defendant, Appalachian Electric Power Company, began the construction of the said project works on or about June 1, 1934, and has prosecuted construction thereof, and is now preparing and threatening to operate the same; to cause great fluctuations in the volume of New River; and to interfere with the flow of water into the pools created by the navigation dams of the plaintiff, without any authority of law, in violation of law, and contrary to the finding of the Commission, and to the express provisions of section 23 of the Federal Water Power Act..

(23) Plaintiff avers that the said defendant, Appalachian Electric Power Company, having through its predecessor filed a Declaration of Intention under section 23 of the Federal Water Power Act and the Federal Power Commission having in response thereto made an investigation and finding that the proposed construction would affect the interests of interstate commerce, and the defendant, Appalachian Electric Power Company, having adopted said declaration and renewed the request for a finding, and further because of the fact that said construction does and the said operation will affect the interests of interstate commerce on the New and Kanawha Rivers, the said construction and operation as above particularly set out without license therefor from the Federal Power Commission, or authority of law, is a violation of law by the defendants and each of them and particularly a violation of the Federal Water Power Act and section 23 thereof.

IV

(24) Plaintiff further avers that it has at great expense acquired the necessary riparian lands and constructed the said London and Marmet Dams hereinbefore referred to and is now constructing the Winfield Dam in the Kanawha River and through the Federal Power Commission has issued to the Kanawha Valley Power Company a license to utilize the waters of said stream for generation of hydroelectric power at the London and
18 Marmet Dams; that the compensation fixed by the Federal Power Commission and agreed to be paid by the said licensee is based upon the flow of water at the said dams available for producing power and such compensation will, under the requirements of section 10 (e) of the Federal Water Power Act (16 U. S. C. 803), be affected in the future in accordance with variations in the volume and value of said flow for the purpose of generating hydroelectric power; that the operation of said Radford project will cause fluctuations in the flow of said river which will cause changes in the water levels in the pools created by the dams below the said project, and will also cause violent changes in the amount of water available for power purposes at the hydroelectric plants now under license from plaintiff at said Marmet and London dams, thus reducing the amount of the income to be derived by the plaintiff from these said developments; that all of the aforesaid conditions and circumstances will arise unless the said project is operated under the terms and conditions of a license as required by the Federal Water Power Act.

(25) Plaintiff avers that the defendant, Appalachian Electric Power Company, began the construction of said Radford project, and is continuing the construction of the same, all as hereinbefore more particularly set forth; that the defendant is threatening to interfere with the natural flow of said New and Kanawha Rivers, in violation of the property rights of the plaintiff as owner of the lands, dams, locks, and improvements, and other property hereinbefore described; that the damages suffered by plaintiff by said acts cannot now be estimated, but will be very large; and that said acts are in violation of law, and in derogation of the sovereign authority of the plaintiff in its lands and over interstate and foreign commerce, and that said acts particularly violate sections 9 and 10 of the River and Harbor Act of March 3, 1899 (35 U. S. C. 401, 403), and the Federal Water Power Act (16 U. S. C. 791–823).

V

(26) Plaintiff further avers that the Federal Water Power Act, as evidenced by its title and content, was passed by Congress for the purpose of securing the development of navigation on
19 the large river systems of the country by promoting the construction of dams, with pools, in the shoals and rapids where navigation is interrupted, and by the construction of regulating reservoirs in the upper portions of the streams; that said Act requires the working out by the Federal Power Commission of comprehensive plans for the improvement of such river systems providing for coordination of navigation, with water power and other beneficial uses; that, in conjunction with other laws pertaining to navigable waters hereinafter referred to, it requires projects affecting the interests of interstate and foreign commerce to be constructed only under authority of the plaintiff as required by law, and under the conditions prescribed by licenses issued pursuant to said Act; that such licenses so issued require the operation of headwater reservoirs in a manner best adapted to the combined uses of navigation, power, flood control, and other beneficial public uses and (by section 10 (f) of the Act (16 U. S. C. 803)), require licensees on lower sections of the rivers to contribute toward the construction and maintenance of reservoirs by which they are benefited.

(27) Plaintiff avers that pursuant to the provisions of section 4 of the Federal Water Power Act (16 U. S. C. 797), section 10 of the Act of May 15, 1928 (45 Stat. 538, 33 U. S. C. 702j), and many other acts of Congress, and pursuant to the orders of the President issued under authority of the National Industrial Recovery Act, approved June 16, 1933, plaintiff has caused studies to be made for development of the New-Kanawha River system and is considering and drafting comprehensive plans for the development of navigation, flood control, prevention of soil erosion, development of water power, and other public uses of said stream system; that the proper development of said streams and its tributaries requires that the selection of the dam sites and of structures to be located thereon and therein be coordinated under the control of the plaintiff either by ownership or by license under the Federal Water Power Act; and that the said project now under construction by defendant, Appalachian Electric Power Company, if not under license of and control by plaintiff, is not adapted to fit into said plans or any plan to improve navigation on New River and Kana-
20 wha River in that it will alternately and periodically and for a large part of the time restrain the full flow of the stream

or release damaging waves of water; that the defendant has made no plans for the construction or operation of locks at the project dam in aid of navigation, and seeks to avoid making such provisions for locks, as well as to avoid the requirement that they shall contribute in proportion to their benefits toward the construction of the headwater improvements considered in said comprehensive plan and contemplated by said Federal Water Power Act; and, in so far as the operation of the said Radford project shall be intermittent or inconstant and not synchronized with other projects and developments under the control of this plaintiff, it will interfere with existent and prospective commerce on the New and Kanawha Rivers and with the operation of the works constructed by plaintiff to improve navigation.

(28) Plaintiff avers that the defendant, Appalachian Electric Power Company, in locating and commencing to construct said Radford project without the authority and consent of the plaintiff, has acted in violation of and is violating the Act of March 3, 1899 (33 U. S. C. 401), requiring the consent of Congress and of the Secretary of War and Chief of Engineers to the building of any structure in a navigable water of the United States; that the defendant in performing said acts has acted in violation of and is violating the Act of March 3, 1899 (33 U. S. C. 403), requiring the authority of the Secretary of War, and recommendation of the Chief of Engineers before commencing any work that will alter or modify the condition, or capacity of the channel of any navigable water of the United States; that the defendant in said acts has acted in violation of and is violating the Act of June 10, 1920 (16 U. S. C. 817), requiring a license from the the Federal Power Commission before beginning construction of any project and proceeding therewith after a finding by the Federal Power Commission that the project proposed would affect the interests of interstate commerce; and that the defendant in said acts has injured and is threatening injury to the rights of the plaintiff by reason of the effect of said acts upon the navigable capacity of the New and Kanawha Rivers, upon the improvements already made and now being made by the
plaintiff and upon the income which plaintiff will receive
21 by reason of said improvements; that by said acts the de-
fendant is interfering with and obstructing the plans of the plaintiff for the development and protection of the natural resources of the Nation and will prevent future development by the plaintiff in accordance with plans now formulated and to be formulated under the provisions of the Federal Water Power Act (16 U. S. C. 791–823), of the Weeks' Act (16 U. S. C. 513–

519), the many River and Harbor Acts which have been passed by Congress for many years for the improvement of navigation and development of the inland water courses throughout the United States, and particularly that Act approved June 21, 1927 (44 Stat. 1010), under which surveys have been made of the region involved in this Bill of Complaint; Section 10 of the Act of Congress for the control of floods on the Mississippi River and its tributaries, approved May 15, 1928 (33 U. S. C. 702 j); Sections 201 and 202 of the National Industrial Recovery Act, approved June 16, 1933, and the order of the President (Executive Order No. 6251, approved August 19, 1933), pursuant thereto.

(29) On information and belief, plaintiff avers that the aforesaid obstruction of the navigable waters of New River, without authority of the plaintiff, by said defendant, constitutes a trespass by defendant upon a public highway of commerce, in derogation of paramount rights of the plaintiff therein, that the project of the defendant in course of construction is a public nuisance, that when the project is completed and put in operation it will be a public nuisance.

(30) Plaintiff avers that it has no adequate remedy at law for the wrongs complained of in this bill of complaint or for any of them.

Wherefore, the premises considered, and to the end that it may obtain from this Honorable Court the relief to which it is by right and equity entitled, the plaintiff prays:

(1) That process issue out of this Honorable Court requiring the defendant to appear and make full, true, and perfect answer to this bill of complaint, but not under oath, answer under oath being expressly waived.

(2) That an injunction issue pendente lite restraining the defendant from continuing the construction, maintenance, 22 and operation of the said Radford project until final hearing or further orders of this Court.

(3) That after a full hearing herein an order issue out of this Honorable Court enjoining the defendant from constructing, maintaining, or operating the said Radford project, otherwise than under a license to be procured by said defendants from the Federal Power Commission, as required by law, or in the alternative.

(4) That the Court issue a mandatory order, to require the defendants to remove all or any part of such project works which lie within the limits of New River.

(5) And for such other and further relief as to the Court may seem just and proper.

(Signed) **JOSEPH H. CHITWOOD,**
United States Attorney.
(Signed) **HUSTON THOMPSON,**
Special Assistant to the Attorney General.
(Signed) **ALLAN D. JONES,**
Special Assistant to the Attorney General.
(Signed) **OSWALD RYAN,**
General Counsel, Federal Power Commission.
(Signed) **JOSEPH H. CHITWOOD,**
Solicitors for Plaintiff.

[*Duly sworn to by Joseph H. Chitwood; jurat omitted in printing.*]

23 In United States District Court

[Title omitted.]
[File endorsement omitted.]

Motion to amend bill of complaint

Filed September 19, 1935

To the Honorable JOHN PAUL, *Judge of said Court:*

Comes now the plaintiff and respectfully moves this Honorable Court for leave to amend the Bill of Complaint filed herein by the plaintiff in the following particulars:

I

(1) That paragraph (18) of the Bill of Complaint herein be amended to read as follows:

"(18) Plaintiff further avers that on or about the 26th day of June 1926, New River Development filed its Declaration of Intention with the Federal Power Commission, pursuant to section 23 of the Act of June 10, 1920 (41 Stat. 1063, 16 U. S. C. 817), for the said Radford project, Virginia, which is the same project as the Radford project herein referred to, and on September 2, 1926, the defendant (successor in interest to the New River Development Company) filed formal application for a license for said project 'upon the understanding that such application can be withdrawn if it should develop that a Federal license is not

required.' Copy of said Declaration of Intention and
24 said application for a license are exhibited herewith and
prayed to be read as a part hereof, being marked as Exhibit 'A.' That the said Declaration describes the scheme of development and represents the purpose of the proposed Radford project to be that of supplying hydroelectric power for public-utility use. That the pertinent part of section 23 of said Federal Water Power Act is as follows:

"'That any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States may, in their discretion, file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws.'"

II

That paragraph (20) of the Bill of Complaint filed herein be amended to read as follows:

"(20) Plaintiff further avers that upon the filing of said Declaration of Intention the Federal Power Commission, as required by section 23 of the Federal Water Power Act, caused an investigation to be made, and having examined into the matter and
studied the plans of said defendant held a hearing, giving
25 full opportunity to the declarant, New River Development
Company, and its successor, the defendant, Appalachian Electric Power Company, to introduce evidence and be heard in argument, and the Commission at its meeting on June 1, 1927 and at other meetings thereafter made it findings which are prayed to be read and considered as a part hereof."

(Signed) JOSEPH H. CHITWOOD,
Joseph H. Chitwood,
United States District Attorney.

26 Exhibit A—Bill of Complaint

NEW RIVER DEVELOPMENT CO.

Declaration of Intention To Construct a Dam and Other Project Works

* * * * *

June 25th, 1925

NEW RIVER DEVELOPMENT COMPANY,
31 NASSAU STREET,
New York, June 25th, 1925.

DECLARATION OF INTENTION TO CONSTRUCT A DAM AND OTHER PROJECT WORKS

New River Development Company, a public service corporation organized and existing under and by virtue of Chapter 150 of the Code of Virginia, intending to construct a dam and other project works across, along, over and in New River in the County of Pulaski, State of Virginia, hereby makes and files declaration of its intention so to do, pursuant to the provisions of Section 23 of the Federal Water Power Act and respectfully requests the Federal Power Commission to cause an immediate investigation of such proposed construction to be made.

In compliance with Regulation 7 of the Regulations of the Federal Power Commission, this Declaration of Intention is accompanied by exhibits which are hereby referred to and made a part hereof, as follows:

Exhibit A: Sketch map showing the stream to be utilized and the approximate location of the project as follows:

1. Map of Viele, Blackwell & Buck, Engineers, No. A-6836, showing general location of Project on New River;
2. Map of Viele, Blackwell & Buck, Engineers, No. R-7652, showing portion of river immediately affected by Project;
3. Map of Viele, Blackwell & Buck, Engineers, No. R-7656, showing general plan of proposed development.

Exhibit B: A brief description of the Project and its purpose, including data with respect to proposed height of dam, storage capacity of reservoir, power capacity of the Project and probable effect on present or prospective navigation;

27 Exhibit C: A statement as to whether, if the Commission finds that the Project will affect the interests of interstate or foreign commerce, the applicant proposes to apply for a permit or a license.

In witness whereof the applicant has caused its corporate name to be hereunto affixed by George N. Tidd, its Vice President, and its corporate seal to be hereunto affixed and attested by Frank B. Ball, its Secretary, thereunto duly authorized this 25th day of June 1925.

NEW RIVER DEVELOPMENT COMPANY,
By (Signed) GEORGE N. TIDD, *Vice-President*,

Attest:
[SEAL] (Signed) FRANK B. BALL, *Secretary*.

Declaration of Intention—Exhibit B

DESCRIPTION OF PROJECT OF NEW RIVER DEVELOPMENT COMPANY IN NEW RIVER, VIRGINIA

Under this Project it is proposed to develop for the purpose of generating hydroelectric power the fall in New River from the Norfolk & Western Railroad bridge at Hiawassie, Virginia, to a point near the mouth of Little River, a distance of approximately 20 miles with a fall of 110 feet. The dam is to be located about one mile above Little River or approximately seven miles above the town of East Radford. The development will be formed by a dam across the New River, with the powerhouse in front of the dam fed by short steel penstocks. The dam will be constructed of Cyclopean concrete on solid rock foundations and abutment, and provided with ample flood gates and spillway.

The principal elevations and data pertaining to the project are as follows:

Drainage area	2,396 sq. mi.
Water surface at dam site	El. 1,730 ±
High water over dam	El. 1,841
Top of retaining section and intake	El. 1,850
Top of flood gates and flashboards	El. 1,840
Sill of floodgates	El. 1,810
Crest of Spillway	El. 1,835
Height of Spillway section at deepest point	115 ft.
Height of intake section at deepest point	128 ft.
Pond formed by dam, about	4,000 acres
Storage with 10 ft. draft, about	40,000 acre ft.
Installed capacity	60,000 kw. or 80,000 hp.
Yearly output	200,000,000 kwh. ±

28 Eighty percent of all lands and water rights required for the development have already been purchased by or for the company.

There is no navigation in this section of the River, except ferry travel which will not be interfered with by the development, nor is there any navigation for approximately 160 miles below the proposed development. The proposed Project will be constructed and operated so as not to impair the navigable capacity of the stream below, nor to affect the interests of interstate or foreign commerce.

The foregoing description of Project of New River Development Company is a part of the Declaration of Intention made by the undersigned this 25th day of June, 1925.

New River Development Company,
By (Signed) Geo. N. Tidd, *Vice-President.*
Attest:
[seal] (Signed) Frank B. Ball, *Secretary.*

Declaration of Intention—Exhibit C

STATEMENT WITH REFERENCE TO APPLICATION FOR PERMIT OR LICENSE

If the Commission should find that the Project will affect the interests of interstate or foreign commerce the Board of Directors of the Declarant Company, immediately upon receipt of advice to such effect, will consider and determine whether the Declarant proposes to apply for a permit or for a license.

This statement is a part of the Declaration of Intention made by the undersigned this 25th day of June 1925.

New River Development Company,
By (Signed) Geo. N. Tidd, *Vice-President.*
Attest:
[seal] (Signed) Frank B. Ball, *Secretary.*

29 September 2, 1926.

Re: Declaration of Intention of New River Development Company—Application for License, Appalachian Electric Power Company

Federal Power Commission, *Washington, D. C.*

Dear Sirs: We beg to advise that Appalachian Electric Power Company, a Virginia public-service corporation, has recently acquired, among others, the properties heretofore held by New River Development Company for the proposed development on New River in Pulaski County, Virginia, which has been the subject of a Declaration of Intention on the part of that Company before your Commission.

We enclose an instrument, substantially in the form approved by your counsel as advised in Major Edgerton's letter to us of December 19, 1925, which has been executed by New River Development Company and Appalachian Electric Power Company, whereby the former transfers to the latter its rights and the latter assumes the obligations, under the Declaration of Intention of New River Development Company.

In order to expedite matters, Appalachian Electric Power Company is adopting the suggestion made by you in your letter of July 1, 1925, and is submitting herewith an application for a license for the proposed project, upon the understanding that such application can be withdrawn if it should develop that a Federal license is not required.

Under these circumstances we request that action on the Declaration of Intention, referred to in your letter of August 19, 1926, addressed to New River Development Company, be deferred for consideration at the same time as the application for license by Appalachian Electric Power Company.

The application of Appalachian Electric Power Company, executed in triplicate, is enclosed herewith but maps and drawings submitted as exhibits go forward under separate cover, rolled.

We should appreciate your early advice regarding arrangements for the publication of the required notice of application of Appalachian Electric Power Company for a license, which we should like to have commenced as soon as possible.

Very truly yours,

CURTIS, MALLET-PREVOST, COLT & MOSLE.

CMM-12.
Encl.

30 APPALACHIAN ELECTRIC POWER COMPANY

Application to Federal Power Commission for License (under Act of June 10, 1920) for Development No. 6, New River, a Major Project in the State of Virginia

1. Appalachian Electric Power Company, a corporation organized and existing under and by virtue of the laws of the State of Virginia, and having its office and principal place of business at the City of Richmond, in the State of Virginia, does hereby make application to the Federal Power Commission for a license for a project described herein and shown on general and detailed maps signed by applicant on the 30th day of August 1926, which maps are filed herewith and made a part hereof, said license to authorize the construction, operation, and maintenance of certain project works, the principal ones of which are designated as follows on said maps:

(a) Dam and Reservoir:

Concrete dam, height 110 feet, across New River. Reservoir approximately 19 miles long created by dam. Surface area of Reservoir approximately 4,000 acres.

(b) Water Conduits:

Turbines will be connected to intakes by steel penstocks imbedded in retaining section of dam.

(c) Powerhouse:

Powerhouse will be a brick and steel structure containing 4 and possibly 5—15,000 K.W. alternating current generators.

(d) Transmission Lines:

Power is generated at 13,200 volts 60 cycles, and is conducted into the transmission system already in operation located outside of project boundary about 590 feet from Powerhouse.

2. The location of the project applied for is as follows:

(a) In the State of Virginia.

(b) In the County of Pulaski.

(c) On the following-named stream; New River. Navigable and carrying commerce to the following extent: None, but tributary to the Kanawha River, which is navigable and carrying commerce up to Montgomery, W. Va., 155 miles below the project.

31 (d) In the region of the following-named cities and towns: Radford, Virginia; Pulaski, Virginia.

3. The proposed scheme of development for project is as follows:

A concrete dam across New River 1,627 feet long made up as follows:

	Length	Max. Height
South retaining section	240′	100′
Intake section	210′	128′
Spillway section	715′	115′
Flood gate section	282′	72′
North retaining section	180′	42′

South of the main dam a small dyke will be required about 300 feet long and 30 feet high.

The spillway allows for 6 feet overflow for a length of 675 feet and the gate section contains 4 flood gates 30′ x 50′.

Powerhouse is adjacent to and below south end of dam and will comprise 4 or possibly 5—20,000 H. P. vertical shaft turbines driving 15,000 K.W. 60-cycle generators. Turbines will have steel scroll cases connected to intakes by steel penstocks imbedded in retaining section of dam. The operating head will range from 100 to 110 feet.

4. The proposed market for the power to be developed is as follows:

All power which can be generated will be fed to an interconnected transmission system now in operation, which passes the proposed project site, and is connected with an operating network which is already generating approximately 300,000 K.W. by steam and water power and rapidly increasing. Network is interconnected from Ohio down to North Carolina.

All power generated can be utilized as soon as available.

5. The location and capacity of all power projects owned or operated by the applicant, the markets supplied thereby, and the relation thereof to the Project applied for, are briefly described as follows:

	Location	Capacity
Glen Lyn Steam Plant	Glen Lyn, Virginia	85,000 K.W.
Cabin Creek Steam Plant	Cabin Creek, West Va	83,200 K.W.
Logan Steam Plant	Logan, West Va	40,000 K.W.
Kenova Steam Plant	Kenova, West Va	16,750 K.W.
Back Water Creek Steam Plant	Lynchburg, Virginia	3,000 K.W.
Walnut Avenue Steam Plant	Roanoke, Virginia	7,000 K.W.
Slack Street Steam Plant	Charleston, West Va	8,450 K.W.
Hazard Steam Plant	Lothair, Kentucky	16,000 K.W.
Sprigg Steam Plant	Sprigg, West Va	7,500 K.W.
Byllesby Hydro Plant	Byllesby, Virginia	18,000 K.W.
Buck Hydro Plant	Buck, Virginia	6,210 K.W.
Reussens Hydro Plant	Lynchburg, Virginia	4,500 K.W.
Niagara Hydro Plant	Roanoke, Virginia	2,926 K.W.
	Total	298,536 K.W.

32 The foregoing include all the plants of the applicant and its subsidiary companies.

Applicant, together with its subsidiary companies, supplies electric energy to the western portion of Virginia, the southern half of West Virginia and the eastern portion of Kentucky.

The total K.W.H. output of applicant's system for the year 1925 was approximately 860,000,000 K.W.H. This output of electric energy was used in the various industrial communities in Virginia and West Virginia and Kentucky, a large proportion of the coal in this region being mined thereby and many chemical works being operated thereby, in addition to the service of light and power to many cities and communities.

The project applied for will, upon completion, become part of the above described system and will supply additional electric energy which is demanded by the territory served.

6. The following exhibits are filed herewith and are hereby made a part of this application:

Exhibit A: Certified copy of Organization papers;

Exhibit B: Other evidence that Applicant is qualified to proceed with the Project applied for;

Exhibit C: Statement re field notes of Project boundary;

Exhibit D: Statement re applicant's compliance with requirements of laws of State of Virginia;

Exhibit E: Statement of nature, extent, and ownership of water rights;

Exhibit F: Statement of nature, extent, and ownership of lands;

Exhibit G: Statement concerning financial ability of applicant to carry out project applied for;

Exhibit H: Statement of effect of Project on stream flow;

Exhibit I: Estimate of power capacity of project;

Exhibit J: General map covering the entire project area;

Exhibit K: Detail map covering entire project area;

Exhibit L: General design drawings of principal structures and appurtenant works;

Exhibit M: General descriptions and specifications of mechanical, electrical, and transmission equipment;

Exhibit N: Estimate of cost of developing project;

Exhibit O: Statement of time desired for completing construction of project works.

In witness whereof the applicant has caused its name and corporate seal to be hereunto signed and affixed by N. M. Argabrite, its Vice-President thereunto duly authorized, this — day of August 1926.

[CORPORATE SEAL] APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice-President.*
Attest:
(Sgd.) FRANK B. BALL, *Secretary.*

33 Application for License—Exhibit A

Pursuant to Regulation 4, Section 1

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

CERTIFIED COPY OF ORGANIZATION PAPERS

Organization papers of the applicant are submitted herewith, as Exhibit A, as follows:

1. Copy of Articles of Association of Appalachian Electric Power Company, filed in the office of the Secretary of the Commonwealth of Virginia, March 4, 1926, certified by the Secretary of the Commonwealth of Virginia.

2. Copy of Merger Agreement, Appalachian Electric Power Company, Appalachian Power & Light Company, and Appalachian Power Company, filed in the office of the Secretary of the Commonwealth May 1, 1926, certified by the Secretary of the Commonwealth of Virginia.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice-President.*

Application for License—Exhibit B

Pursuant to Regulation 4, Section 2

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

OFFICIAL STATEMENT OF ORGANIZATION OF THE CORPORATION AND LIST OF OFFICERS AND DIRECTORS

I, Frank B. Ball, Secretary of Appalachian Electric Power Company, do hereby certify that the organization of said corporation has been completed; and that the corporation is authorized to proceed with the project applied for according to the existing laws of the State of Virginia.

I further certify that the following is a true list of the principal officers and of the directors of the said corporation, with the full name and official designation of each, to wit:

Officers

Name	Office
R. E. Breed	President.
George N. Tidd	Vice-President.
N. M. Argabrite	Vice-President.
E. H. Maurer	Vice-President.
Frank B. Ball	Treasurer.
Frank B. Ball	Secretary.
Frank P. Hunter	Assistant-Treasurer.
J. F. McMillan	Assistant-Treasurer.
F. W. Drager	Assistant-Treasurer.
Frank P. Hunter	Assistant-Secretary.
J. F. McMillan	Assistant-Secretary.
F. W. Drager	Assistant-Secretary.

34 Directors: R. E. Breed, George N. Tidd, Frank B. Ball, F. W. Drager, N. M. Argabrite, N. M. Seabrease, Richard B. Scandrett, Jr.

Witness my hand and the seal of the corporation this 30th day of August 1926.

[CORPORATE SEAL] (Sgd.) FRANK B. BALL, *Secretary.*

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

Application for License—Exhibit C

Pursuant to Regulation 4, Section 3

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT RE FIELD NOTES OF PROJECT BOUNDARY

The final location survey of the project boundary is shown by metes and bounds on map submitted herewith as Exhibit K. Field notes are not submitted, the information being presented on the map referred to.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

35 Application for License—Exhibit D

Pursuant to Regulation 4, Section 4

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT RE APPLICANT'S COMPLIANCE WITH REQUIREMENTS OF LAWS OF STATE OF VIRGINIA

Applicant is a corporation duly organized and existing under the laws of State of Virginia, with powers to construct, maintain and operate works, including all kinds of water, electric, and other power plants, to be used for public service in the business of a general electric lighting and power corporation, with all the rights, powers, and privileges of such corporations under the laws of the State of Virginia. Such rights and powers include statutory right and power to acquire by condemnation, in the event the applicant cannot agree with the owners upon terms of purchase, all lands and rights, including rights as to bed and banks of the stream, necessary to construct, maintain, and operate the project applied for.

There are no other requirements of the laws of the State of Virginia with respect to bed and banks and with respect to the right to engage in the developing, transmitting, and distributing of power and in any other business necessary to effect the purposes of the license applied for, which need be complied with by the applicant.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

Application for License—Exhibit E

Pursuant to Regulation 4, Section 5

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT OF NATURE, EXTENT, AND OWNERSHIP OF WATER RIGHTS

Under Virginia law water rights pertain to the riparian owners, on nonnavigable streams such as New River. Applicant and its predecessors in interest have been engaged for many years past in negotiation for the purchase of riparian lands and appurtenant water rights required for the project applied for and has acquired by purchase approximately eighty percent (80%) of the necessary riparian lands, with appurtenant water rights. It has proceeded, as far as practicable, in perfecting its rights to use sufficient water for proper operation of the project works and has found that it will be necessary to institute condemnation proceedings to acquire the balance of the necessary water rights.

There exists in Virginia no State agency authorized or empowered to give a certified statement setting forth the extent and validity of the applicant's water rights.

36 No approval or permission of any State agency is required by Virginia law as a condition precedent to the applicant's right to take or use water for the operation of the project works.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

Application for License—Exhibit F

Pursuant to Regulation 4, Section 6

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT OF THE NATURE, EXTENT, AND OWNERSHIP OF LANDS

Approximately 80% of the total acreage of lands required for the construction and operation of the project, including all land within the project area, has already been acquired by the Applicant. The Applicant plans to acquire the balance of the necessary lands by condemnation proceedings under the laws of the State of Virginia and/or under the Federal Water Power Act.

The applicant at the time of filing this application has acquired the right to occupy and use lands owned by others as follows:

Acquired from	Date	Nature of right term	Expiration of term
S. T. Rigney, et ux	4/12/24	To submerge lands	Perpetual.
Bruce Clark, et ux	3/11/25	To submerge lands	Perpetual.
F. E. Roope	9/19/23	Railroad right-of-way	Perpetual.
H. L. Fagg, et ux	9/19/23	Railroad right-of-way	Perpetual.
W. C. Flinchun, et ux	9/19/23	Railroad right-of-way	Perpetual.
W. A. Earhart	9/21/23	Railroad right-of-way	Perpetual.
Bd. Supervisors, Pulaski County	6/22/25	To submerge lands	Perpetual.

This statement is part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

37 Application for License—Exhibit G

Pursuant to Regulation 4, Section 7

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT CONCERNING FINANCIAL ABILITY OF APPLICANT TO CARRY OUT PROJECT APPLIED FOR

Applicant is a going concern, owning and operating directly and through subsidiary corporations, extensive electric light and power properties in the States of Virginia, West Virginia, and Kentucky.

Applicant's capitalization is substantially as follows:

	Outstanding with public
Funded Debt:	
Underlying Divisional Bonds	$23,991,000
First and Refunding Mortgage Gold Bonds 5% Series of 1956	35,000,000
Appalachian Power Company 6% Gold Debentures	4,000,000
6% Note due on or before April 1, 1929	5,000,000

Capital Stock (no par value):
Preferred Stock: $7 Cumulative 225,000 Shares.
2d Preferred Stock: $7 Cumulative 100,000 Shares.
Common Stock: 5,000,000 Shares.

Earnings for the twelve months ending February 28, 1926, derived from properties now owned by the applicant and its subsidiary corporations were substantially as follows:

Gross Earnings		$15,380,631
Operating Expenses, Maintenance and Taxes		7,474,502
Net Earnings		$7,906,129
Annual Interest Requirements on Underlying Divisional Bonds held by the Public	$1,249,550	
$35,000,000 First and Refunding Mortgage Gold Bonds	1,750,000	
		2,999,550
Balance available for other charges, renewals and replacements reserves, dividends, etc		$4,906,579

It has recently marketed an issue of $35,000,000 First and Refunding Mortgage Gold Bonds (including in the capitalization above set forth) on a 5.20% yield basis. Its financial resources are deemed sufficient to finance the project applied for, which is designed to form one of the production units of applicant's system, the development of which is in response to the growth of an already existing consumers' demand for electric energy.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

38 Application for License—Exhibit H

Pursuant to Regulation 4, Section 8

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT OF EFFECT OF PROJECT ON STREAM FLOW

Proposed reservoir will back up water for approximately 19 miles above dam. Surface area of reservoir about 4,000 acres. Storage with 10-foot draft on reservoir 40,000 acre-feet.

The minimum flow proposed to be released during periods of low water shall be such amount as shall be required for the purposes of power, navigation, flood control, and municipal water supply. The proposed ponding of water will tend to equalize seasonal variations, to increase the minimum flow during low-water periods and reduce flood peaks below the project.

This statement is a part of the application for a license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

Application for License—Exhibit I

Pursuant to Regulation 4, Section 9

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

ESTIMATE OF POWER CAPACITY OF PROJECT

Estimate of power capacity of the project is the continued product of:

A. The factor—0.08;

B. The average static head in feet, viz, 106 feet; and

C. The water supply in cubic feet per second and not in excess of the hydraulic capacity of the approved project works, estimated (from duration curve) to be available from net flow or from storage, or from both, for 90% of the time, viz, 1,200 equals 10,176 H. P.

Data upon which such estimate is based is attached hereto and submitted herewith, viz: Duration curve, marked Exhibit I-A (for static head, see Exhibit L-4).

A list of all sources of power for the system of which the project will be a part is set forth in Exhibit K-5, hereto attached, to which reference is hereby made.

39 This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

Application for License—Exhibit J

Pursuant to Regulation 4, Section 10

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

GENERAL MAP COVERING ENTIRE PROJECT AREA

A general map covering the entire project area showing drainage area and important features of the project, state and county lines, etc., on a single sheet is submitted herewith denominated "Exhibit J." This map is accompanied by two blue prints.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

Application for License—Exhibit K

Pursuant to Regulation 4, Section 11

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

DETAIL MAP COVERING ENTIRE PROJECT AREA

Detail map covering entire project area, on a single sheet, is submitted herewith, denominated "Exhibit K." The drawing is accompanied by two blue prints. The lands marked on said map "A. P. Co." are owned by the applicant. The lands for which applicant holds rights of use and occupancy for purposes of the project are referred to in "Exhibit F" hereof.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

40

Application for License—Exhibit L

Pursuant to Regulation 4, Section 12

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

GENERAL DESIGN DRAWINGS OF PRINCIPAL STRUCTURES AND APPURTENANT WORKS

The following drawings are submitted herewith:

L-1 Elevation and Plan of Dam Site;
L-2 Flood Gates;
L-3 Profile of Diamond Drill Holes;
L-4 Cross Section and Analysis of Dam;
L-5 Analysis of Flood Gate Piers.

Each drawing is accompanied by two blue prints.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice-President.*

Application for License—Exhibit M

Pursuant to Regulation 4, Section 13

Application for License—Appalachian Electric Power Company

GENERAL DESCRIPTIONS AND SPECIFICATIONS OF MECHANICAL ELECTRICAL AND TRANSMISSION EQUIPMENT

Hydraulic Data:

4—vertical shaft Francis type single runner turbines, steel scroll cases, details concerning which will later be submitted.

(A 5th unit may be installed.)

Nominal rating 20,000 H. P.

Generator & Exciter Data:

4—vertical shaft 13,200-volt 60-cycle alternating-current generators with direct connected exciters (a 5th unit may be installed), details concerning which will later be submitted.

Transmission:

Cables will be led from generators through conduits to interconnected transmission systems beyond the project boundary where voltage will be transformed to system voltage.

This statement is a part of the application for a license made by the undersigned this 30th day of August 1926.

Appalachian Electric Power Company,
By (Sgd.) N. M. Argabrite, *Vice-President.*

41 Application for License—Exhibit N

Pursuant to Regulation 4, Section 14

Application for License—Appalachian Electric Power Company

ESTIMATE OF COST OF DEVELOPMENT PROJECT

Estimate of cost of developing the project is as follows:

Unwatering	$200,000	$200,000
Preparing bottom	50,000	50,000
No. Retaining Wall—180':		
Excavation—Earth, 1,200 c. y. @ $1	1,200	
" —Rock, 500 c. y. @ $4	2,000	
Concrete, 3,000 c. y. @ $8.50	25,500	
Reinforcing, 5,000 # @ $0.05	250	
		28,950

Flood Gates 282′:		
Excavation—Earth, 14,000 c. y. @ $1	$14,000	
" —Rock, 3,000 c. y. @ $4	12,000	
Concrete, 20,000 c. y. @ $9	180,000	
Reinforcing, 100,000 # @ $0.05	5,000	
4 Stoney Gates, hoist & towers 30′ x 50′	130,000	
1 set of stop logs & hoist	17,000	
Lights, power, wiring, etc	5,000	
		$363,000
Spillway Section 715′:		
Excavation—Earth, 13,000 c. y. @ $1	13,000	
" —Rock, 8,000 c. y. @ $4	32,000	
Concrete, 160,000 c. y. @ $8	1,280,000	
Reinforcing, 200,000 # @ $0.05	10,000	
Trash chute logs & details	1,500	
Tunnel, stairs, etc	5,000	
Flashboards 675′ x 5′	5,000	
		1,346,500
Intake Section 210′:		
Excavation—Earth, 17,000 c. y. @ $1	17,000	
" —Rock, 2,000 c. y. @ $4	8,000	
Concrete, 49,000 c. y. @ $8.50	416,500	
Reinforcing, 100,000 # @ $0.05	5,000	
Racks, supports, guides, etc., 6,000 sq. ft. @ $4	24,000	
1 gate and gantry	20,000	
$\frac{5}{16}$′ penstocks, 660,000 # @ $0.08	52,800	
Railings, covers, lights, power, etc	5,000	
		548,300
South Retaining Wall 240′:		
Excavation—Earth, 8,000 c. y. @ $1	8,000	
" —Rock, 2,000 c. y. @ $4	8,000	
Concrete, 24,000 c. y. @ $8.50	204,000	
Reinforcing, 40,000 lbs. @ $0.05	2,000	
		222,000
Forward		$2,758,750
Dam in Hollow South of Main Dam 325′:		
Excavation	1,000	
Core wall concrete, 1,200 c. y. @ $12	14,400	
Earth fill, 16,000 c. y. @ $0.75	12,000	
		27,400
42 **Power House Substructure 210′:**		
Excavation—Earth, 13,000 c. y. @ $1	13,000	
" —Rock, 6,000 c. y. @ $2.50	15,000	
Concrete 10,000 c. y. @ 14.00	266,000	
Reinforcing 600,000 # 0.05	30,000	
Piping	5,000	
		329,000
Power House Superstructure:		
730,000 cu. ft	165,000	165,000
Tail Race:		
Excavation—Earth, 72,000 c. y. @ 0.75	54,000	
" —Rock, 22,000 c. y. @ $2.50	55.000	
Concrete, 9,000 c. y. @ $9.00	81,000	
		190,000

Power House Equipment:		
Water wheels, gov., etc., 80,000 HP @ $3.50	$280,000	
Frt. & erection	42,000	
Generators & exciters, 60,000 KW. @ 8	480,000	
Frt. & erection	48,000	
Switchboard & switches	50,000	
Frt. & erection	10,000	
Pumps, piping & elec. supplies	25,000	
75-ton crane	19,000	
4–16′ ø Butterfly valves	120,000	
Frt. & erection	12,000	
		$1,086,000
Camp & Plant:		
Clearing and grubbing camp site	5,000	
10 cottages @ $4,250 (permanent operators)	42,500	
Temporary buildings & equipment	80,000	
Construction plant	350,000	
Maintenance of Const. plant	70,000	
Construction trestles	25,000	
R. R. siding	20,000	
Roads	25,000	
		$ 617,500
		$5,173,650
Forward		$5,173,650
General Expense:		
Clearing, reservoir, 3,000 A @ $10	$30,000	
New Highway, 10 mi. @ $5,000	50,000	
Motorizing 4 Ferries	10,000	
2 New ferries, Peek Creek	10,000	
Concrete casing to R. R. Viaduct	2,000	
Raising Highway Bridge	6,000	
Insurance on labor	50,000	
Fire insurance & protection	10,000	
		168,000
		$5,341,650.00
Superintendence, engineering, and contingencies 15%		801,247.50
		$6,142,897.50

The above estimate does not include the following items:

Cost of property.

Interest during construction.

This statement is a part of the application for a license made by the undersigned this 30th day of August, 1926.

Appalachian Electric Power Company,
By (Sgd.) N. M. Argabtire, *Vice President.*

43 Application for License—Exhibit O

Pursuant to Regulation 4, Section 15

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT OF TIME DESIRED FOR COMPLETING CONSTRUCTION WORKS

A period of one year from the date of license is desired for beginning construction of the project works and a period of four years from the date of license is desired for completing construction of the project works.

This statement is a part of the application for a license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) N. M. ARGABRITE, *Vice President.*

---

44 In United States District Court

[Title omitted.]

[File endorsement omitted.]

Answer

Filed June 3, 1925

To the Honorable JUDGE OF THE DISTRICT COURT OF THE UNITED STATES, WESTERN DISTRICT OF VIRGINIA:

For answer to the Bill of Complaint in the above-entitled cause, Appalachian Electric Power Company, the defendant above named, says:

1. Answering paragraph (1), defendant admits the allegations contained in said paragraph.

2. Answering paragraph (2), defendant admits the allegations contained in said paragraph.

3. Answering paragraph (3), defendant admits all of the allegations contained in said paragraph except that defendant avers and explains that the primary purpose for which it is constructing said dam is not to detain the flow of New River but rather to concentrate the fall thereof, i. e., to create a head which can be utilized in the generation of hydroelectric power and except that defendant specifically denies that it is unlawfully constructing said Radford project and says that it owns property rights derived and flowing exclusively from the State of Virginia and

that under and by virtue of said property rights and the laws of the State of Virginia it has complete and perfect right to construct and operate said Radford project.

4. Answering paragraph (4), defendant denies that New River is a navigable stream and says that New River is a nonnavigable interstate stream rising in North Carolina and flowing in a northerly and northwesterly direction across the State of Virginia
45 into West Virginia to its junction with the Gauley River at which point the said Gauley and New Rivers unite to form the Kanawha River, and that the Kanawha River flows in a northwesterly direction and discharges into the Ohio River at Point Pleasant, West Virginia, and defendant further says that the 60-mile section of New River which is furthest downstream, the upstream end of which section begins approximately 90 miles downstream from the Radford project, has physical characteristics such that it is known as the "Gorge," and says that throughout its entire length the physical characteristics of the channel of New River, including the rate of fall thereof, are such that it is not and never has been, used, and that it is not and never has been susceptible of being used, as a highway for interstate commerce.

Defendant denies that the said New and Kanawha Rivers constitute one continuous stream except in the sense that any river and any one of its tributaries constitute one continuous stream.

Defendant is advised that all of the allegations relating to the surveys made and records kept by plaintiff's agencies or relating to the flows of said New and Kanawha Rivers at the various times and places mentioned in said paragraph (4) are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay but without waiving the foregoing objections, defendant, answering, denies that it has any knowledge or information sufficient to form a belief as to surveys or records made and kept by plaintiff's agencies and as to the flows of said New and Kanawha Rivers at the various times and places and of the several durations alleged in said paragraph.

Defendant admits that it proposes to install, in its power house, machinery having an approximate aggregate capacity of 104,000 horsepower in four units of 26,000 horsepower each and that the hydraulic capacity of said installation is approximately 9,000 cubic feet of water per second.

46 Defendant denies the allegation that, in order to make use of said installed capacity, defendant must necessarily alternately impound and release large volumes of water and avers that the remainder of said paragraph consists solely of conclusions drawn by plaintiff from the last-mentioned allegation, hereinabove

denied. Defendant denies that, if and to the extent it might of its own volition, but not of necessity, cause some periodic variations in stream flow at the site of its dam and power station, such variations would cause substantial artificial variations in the flow of the Kanawha River or very great percentage variations from the natural flow of the Kanawha River, and further denies that such variations would or could diminish or impair or cause obstruction to the navigable capacity of any of the navigable waters of the United States, and avers that, even if, contrary to the fact, such variations did occur of necessity, then they would not and could not diminish or cause obstruction to navigable capacity anywhere.

5. Answering paragraph (5), defendant admits that the allegations as to gross storage capacity, utilizable storage capacity, and draw-down of defendant's proposed reservoir are substantially true. Defendant denies that, in making full use of the installed machinery, it would necessarily interfere with the natural flow of New River more than 95% of the time or that it would unreasonably interfere with the natural flow of the river at any time, and avers that at no time will defendant impound water so as to interfere with navigation on or the navigable capacity of the Kanawha River or any other stream. Defendant further avers that it intends not to operate, will not and could not operate said Radford project in any manner which would cause any interference with or obstruction to navigation or navigable capacity in violation of sections 9 or 10 of the Rivers and Harbors Act of March 3, 1899 (33 U. S. C. 401, 403); avers that defendant's intention so to construct and operate said project as not so to interfere or obstruct was expressly set forth in the Declaration of Intention for the said Radford project filed by
47 its predecessor, New River Development Company, with the Federal Power Commission on or about June 26, 1925; avers that it is entirely practicable and feasible from both engineering and economic points of view so to operate said Radford project; avers that Major-General H. Taylor, Chief of Engineers, U. S. Army, in a report dated December 2[illegible], 1925, to the Federal Power Commission respecting defendant's Radford project, stated that (even under the then-existing system of navigation dams) it would not be possible to operate the proposed project so as adversely to affect navigation on the Kanawha River; and avers that the Federal Power Commission has at various times recognized and admited the practicability and feasibility of constructing and operating the Radford project without causing interference with or obstruction to navigation or navigable capacity, and now merely claims, as set forth in the Bill, that after construction the project, if operated as defendant has disclaimed any intention of doing

(and the physical possibility of which defendant denies), might cause some interference with navigation or navigable capacity.

Defendant is advised that all of the remaining allegations of paragraph (5) relate to the sources of stream flow in the watersheds of the New and Kanawha Rivers and are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay, but without waiving the foregoing objections, defendant, further answering, denies that any periods of flow are critical from the viewpoint of navigation interests so far as concerns the Radford project; avers that Major General H. Taylor, Chief of Engineers, U. S. Army, in his report of December 29, 1925, to the Federal Power Commission, stated that the run-off from the drainage area below the Radford project is sufficient to supply the necessary water for navigation on the Kanawha River; and denies any knowledge or information sufficient to form a belief as to the allegations respecting the sources and proportions of stream flow during the months of October 1930 and September 1902.

48 6. Answering paragraph (6), defendant denies any knowledge or information sufficient to form a belief as to whether the Kanawha River, in its natural condition, was navigable; defendant specifically denies each and every other allegation contained in said paragraph except that defendant admits that plaintiff has substantially described the location of the Radford project and admits that some work was done by the United States within the two disconnected stretches of the New River specified by plaintiff in the attempted improvement thereof, but defendant avers that such work was done with the object of creating artificial navigability of a limited nature on the said disconnected sections of the nonnavigable New River, with no navigable connection whatever with each other or with any water of the United States over which interstate or foreign commerce could be conducted; that the work done upon these two isolated and disconnected sections of the nonnavigable New River was wholly ineffectual to create navigability by artificial means even upon such sections, and that it was found by plaintiff's agencies that such work was impracticable and ineffective and that its object had not been attained, whereupon it was abandoned by plaintiff.

Defendant avers and explains that between the two stretches of river of 26½ and 29¼ miles specified by plaintiff there intervenes a 60-mile stretch of falls, shoals, and rapids, which stretch likewise is nonnavigable and wholly precludes the connection of the two sections worked upon, even had they thus been made navigable, which they were not, and which 60-mile stretch lies downstream from the Radford project and within which plaintiff did not even attempt any improvement. Defendant further avers that the total expenditure by plaintiff in attempted but ineffective improvement of New River was less than $110,000.

7. Answering paragraph (7), defendant is advised that all of the allegations of said paragraph are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay but without waiving the
49 foregoing objections, defendant, answering, admits each and every allegation of paragraph (7) except as follows: Defendant denies that under the license issued to it by the State Corporation Commission of Virginia, defendant purports to have the right to impound as it sees fit the entire flow of the New River under the circumstances alleged by plaintiff or under any other circumstances and says that, although the said license by its terms purports to permit defendant to impound the flow of New River in the manner alleged in said bill of complaint, nevertheless neither the said license nor the Water Power Law of the State of Virginia (Chapter 424, Acts of Assembly, 1928, as amended in 1932), under which said license was issued, purports to permit any interference with navigation, that furthermore said Act expressly provides that nothing contained in said Act shall be so construed as to interfere with the exercise of lawful jurisdiction of the United States or its duly constituted agencies, and that in any event the Secretary of War has power summarily to remove any obstruction if any should occur; and defendant further says that it intends by the operation of the Radford project not to interfere with or obstruct, and that it will not interfere with or obstruct navigation or navigable capacity and alleges that it could not substantially interfere with or obstruct navigation or navigable capacity even if said project were operated without regard to any effect upon navigation or navigable capacity. Defendant denies that it has any knowledge or information sufficient to form a belief regarding the allegations as to flow of Little River except that defendant believes that the natural flow at the mouth of Little River would always be in excess of 25 cubic feet per second.

8. Answering paragraph (8), defendant admits that below the Radford project site plaintiff has in the past erected ten navigation dams in the Kanawha River, but says that the nearest of the said ten dams to the Radford project site was approximately 160 miles downstream therefrom and that only six of said ten dams are now in existence; and, on information and belief, avers that these remaining (downstream) six dams will be removed
50 within a reasonably short time and before the completion of the Radford project by defendant; that the four dams

no longer existing have been replaced by the two new and modern navigation dams of plaintiff at London and Marmet, which dams have been completed and are in operation; that three of said six remaining dams will be removed upon the completion of the construction of the Winfield navigation project which has been authorized by plaintiff and is now under construction, and that the other three of said six remaining dams will be removed upon the completion of the construction of the Gallipolis navigation project, which likewise has been authorized by plaintiff and is now under construction.

Defendant admits that the Kanawha River is at the present time a navigable river of the United States, and that plaintiff has adopted a plan for a nine-foot channel on the said river to connect with the Ohio River, but denies that said plan contemplates a nine-foot channel to Kanawha Falls, and avers that the head of navigation on the Kanawha River is at, and under the said plan will remain at, a point which is approximately five miles downstream from Kanawha Falls, approximately six miles downstream from the junction of the Gauley and the New Rivers and approximately 155 miles downstream from the Radford project.

Defendant admits that Congress authorized the War Department to construct the London and Marmet dams, but avers that said House Document No. 190, 70th Congress, First Session, should be introduced in its entirety, and made to speak for itself, and, if material in the pleadings, defendant prays leave to refer to said document for a correct statement of its contents.

Defendant admits all of the remaining allegations of paragraph (8) except that it denies any knowledge or information sufficient to form a belief as to the purpose or intent of the Congress in passing the Rivers and Harbors Act of July 3, 1930 (46 Stat. 928), which Act authorized the construction of the London and Marmet dams. Defendant avers that, even if the said remaining six dams should be in existence upon the completion of the Radford
51 project, the operation of said project would not interfere with navigation on or the navigable capacity of the Kanawha River; defendant avers that the said Winfield and Gallipolis navigation dams are planned by plaintiff to be of the same general design and character of construction as are the said London and Marmet navigation dams.

9. Answering paragraph (9), defendant denies each and every allegation of said paragraph except that defendant admits the present navigability of the Ohio River and the downstream 90 miles of the Kanawha River, and says that as regards New River and the other tributaries of the Kanawha River no navigation locks and dams are under construction and none has been authorized by Congress or even recommended by the War Depart-

ment, and further avers that, even if it were practicable and economical to improve New River for the purpose of creating navigation or navigability by artificial means, which defendant denies, nevertheless such improvement could not be made without acquiring defendant's property rights by due process of law and upon just compensation being paid defendant, and that the possibility of making all or any part of New River navigable by artificial means, if it existed, would not make the New River a navigable water of the United States.

10. Answering paragraph (10), defendant is advised that all of the allegations of said paragraph are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay but without waiving the foregoing objections, defendant, answering, avers that it is without knowledge as to whether the route mentioned in paragraph (10) of the Bill was ever recommended to Congress for improvement. Defendant says that the scheme apparently referred to in said paragraph involved solely artificial waterways, expected and intended to be created in large part by canalization of creeks and other nonnavigable steams and by the construction of canals over dry land, including the construction of a tunnel about eight miles long through the main range of the Allegheny mountains, and was in fact chimerical and was quickly so recognized, that no work was ever done or authorized thereon and that the scheme was abandoned.

52 Defendant denies that it ever was practicable or economical to develop a waterway between the James and Kanawha Rivers, and denies that it was ever practicable to make New River a useful part of the Mississippi River system of the navigable waters of the United States or any other system, and denies that it was ever, or is now, practicable to overcome the natural obstructions to navigation in New River by locks, canals, and dams, or otherwise, but says that, even if it were practicable to make New River navigable by artificial means, that possibility would not make New River a navigable water of the United States or affect the rights of the parties in this suit.

Defendant further avers that the scheme referred to in paragraph (10), even if it had been carried out, could have no bearing upon or relation to this alleged cause of action against this defendant for the reason that the Radford project site is approximately 90 miles upstream from any point on the alleged route.

11. Answering paragraph (11), defendant is advised that all of the allegations of said paragraph are immaterial, argumenta-

tive, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay but without waiving the foregoing objections, defendant, answering, denies that New River has always been recognized and treated by the plaintiff or by the State of Virginia or by the State of West Virginia as navigable. Defendant expressly avers that New River is not and never has been navigable-in-fact and is not and never has been a navigable waterway of the United States, and further avers that, even assuming that New River had at some time or another been recognized and treated by the State of Virginia or the State of West Virginia as navigable, which defendant, upon information and belief, denies, such fact would be irrelevant and have no bearing upon this alleged cause of action because the supposed navigability, if any, would have been such only under the laws of the respective States and would not constitute the
53 navigability-in-fact for interstate commerce which is the requisite for a navigable water of the United States and also because Federal navigability cannot be created by legislative fiat, whether State or Federal.

Defendant denies that the Congress ever recognized New River as navigable and says that the most that the Congress has ever done is to consider and attempt the creation of limited navigability in New River by artificial means, which attempts were never effective artificially to create local navigability even in isolated sections of said river. Defendant avers that subsequently the Congress formally abandoned such attempt to create such limited navigability by artificial means.

Defendant denies that it has any knowledge or information sufficient to form a belief as to the recommendations, or reasons for recommendations, if any, which the United States Geological Survey may have made for the purchase of lands under the Week Act within the watershed of New River or as to whether such recommendations, if any were ever made, were ever adopted or approved by Congress or as to the plaintiff's purchases in the Unaka National Forest, or as to the policy and plans of the National Forest Reservation Commission in respect thereto or as to whether such plans, if any, were ever approved or authorized by Congress. Defendant denies that any quantity of land even remotely approximating 54,000 acres has been so purchased within the New River watershed and defendant avers that nothing which defendant proposes to do or can do in connection with the Radford project can in any way affect the lands so purchased or impair the objects for which the same may have been purchased.

Defendant admits that Chiefs of Engineers of the United States Army from 1873 to 1913 made surveys and reports respecting New River but denies that plaintiff has fully or correctly stated the substance of such reports and if such reports be competent and material and properly referred to in the Bill of Complaint as defendant is advised they are not, then defendant prays leave to refer to official copies of such reports for a full and correct statement of their contents, and defendant denies that New River is now or ever has been a navigable waterway of the United 54 States and denies that New River has ever carried useful commerce, even intrastate, of any substantial character. Defendant further avers that plaintiff has failed to allege pertinent reports of engineers of the War Department respecting the navigability of New River, several of which expressly state that New River is nonnavigable, and some of which were made officially to the Federal Power Commission, at the instance of which this suit has been brought.

Defendant admits that between the years 1876 and 1886 Congress appropriated a total of $112,000, but denies any knowledge or information sufficient to form a belief as to whether Congress in so doing was acting on the recommendation of its engineers and avers that the purpose of said appropriation was artificially to create limited navigability on the nonnavigable New River.

Defendant admits that the greater part but not all of said appropriations was expended but denies that the purpose of said expenditures was other than as above stated and denies that the effect of said expenditures was to improve the New River for navigation from points in Virginia to points in West Virginia, or in any sections at all of its course. Defendant avers that the attempt to create artificial, local, and limited navigability on New River was found by Congress to be impracticable and uneconomical and that consequently Congress, by the Rivers and Harbors Act of June 13, 1902, repealed all previous provisions of law authorizing the work and ordered that all amounts theretofore appropriated and remaining unexpended be paid into the Treasury of the United States and says that the work done under such appropriations prior to their repeal was ineffective to make New River or any part thereof navigable in fact.

Defendant admits that careful search will still reveal some trace of plaintiff's attempts to create artificial navigability on New River but denies that such attempts were successful in creating artificial navigability.

Relying specifically to the allegations that certain channels are not now extensively used, defendant avers that they are not 55 used at all, that they were never practically useful for interstate commerce nor for local, intrastate commerce of any substantial character, and that any attempts to create artificial, limited, local, and intrastate navigability, if relevant, which defendant denies, were inconsequential and ineffectual. Defendant denies that the reason for lack of use of New River for navigation is competition of railroads and of commodities in other regions, and denies any knowledge or information sufficient to form a belief as to whether accumulations of silt, if any, could be easily removed, but denies that the accumulation of silt, if any, is the cause of the nonnavigable character of New River, and avers that New River because of its natural characteristics, and in spite of any attempt to modify them, is and always has been incapable of being used or useful in interstate or foreign commerce and that it would be impracticable and uneconomical to attempt to create artificial navigability.

Upon information and belief defendant denies that in 1872 any Board of Engineers acting under the authority of Congress made a report and recommendation on the feasibility of a canal and waterway utilizing and joining the James and New Rivers and avers that a Board of Engineers made a report in the year 1874 and, if the 1872 report alleged by plaintiff is an incorrect reference to the 1874 report and if such latter report is competent and material to this action, which defendant denies, then defendant denies that plaintiff has fully or correctly stated the circumstances surrounding or the substance of said report, and defendant says that, if said report is competent and material and properly referred to in the Bill, as defendant is advised and believes it is not, then defendant prays leave to refer to an official copy of said report for a full and correct statement of its contents. Defendant further avers that proof of the surrounding circumstances is essential to a proper understanding and interpretation of said report. Defendant further avers that, even were plaintiff's allegations concerning the said report sufficiently full and correct, nevertheless such report could have no bearing upon or relation to this
56 alleged cause of action against this defendant for the reason that the Radford project site is approximately 90 miles upstream from any point on the alleged fanciful canal and waterway scheme which never materialized.

Defendant upon information and belief denies that Congress has recognized New River as navigable by any special statute and says that in any event navigability is a question of fact and cannot be created by Congressional fiat.

12. Answering paragraph (12), defendant is advised that all of the allegations of said paragraph are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay but without waiving the foregoing objections, defendant, answering, admits the appointment of a commission, headed by John Marshall, but denies that plaintiff has fully or correctly stated the substance of that commission's report and defendant says that, if said report is competent and material and properly referred to in the Bill, as defendant is advised and believes it is not, then defendant prays leave to refer to an official or authenticated copy of said report for a full and correct statement of its contents.

Defendant admits that the General Assembly of Virginia besought the aid of Congress but denies the materiality thereof.

Defendant denies that the corporations, or either of them, which were aided, respectively, by the Acts of the General Assembly of the State of Virginia of February 24, 1823, and March 2, 1853 (not 1855), were formed "for the purpose of constructing the James River-Kanawha Canal," and avers, on the contrary, that the corporate purposes for which that corporation (the James River Company) referred to in said Act of 1823 was formed were to render the Great Kanawha River navigable for boats drawing three feet of water from the great falls thereof to the Ohio River, to improve the navigation of the James River by locks and navigable canals from tidewater to the mouth of Dunlaps Creek where
the City of Covington, Virginia, is situate, and to construct
57 a road from the mouth of Dunlaps Creek to the great falls
of the Kanawha River (an airline distance of about 70
miles—the actual distance would have been much greater), and avers that the corporate purpose for which that corporation (the James River and Kanawha Company) referred to in said Act of 1853 was formed to connect the tidewater of James River with the navigable waters of the Ohio River by one of three plans of improvement at the election of the company, viz, first, to continue the lower James River canal upstream to some point on said river not lower than Lynchburg, to construct a railroad from the western termination of that canal to some point on the Great Kanawha River below the great falls thereof, and to improve the Kanawha River thence to the Ohio, so as to make it suitable for steamboat navigation, or, second, to continue the James River canal as aforesaid and build a railroad from its western termination to the Ohio River, or, third, to build a railroad from Richmond to the Ohio River. Defendant avers that no work of attempted creation of artificial navigability was ever done by either of these corporations or anyone along any such route on either New River or its tributary the Greenbrier.

13. Answering paragraph (13), defendant is advised that all of the allegations of said paragraph are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay but without waiving the foregoing objections, defendant, answering, denies each and every allegation of said paragraph except that defendant admits the appropriation of $30,000 by the State of Virginia by an Act of the General Assembly passed December 18, 1861, as a war measure for the purpose of creating sufficient artificial navigability to permit the movement under urgent war necessity of military stores in batteaux from some point at or near the central depot on the Virginia and Tennessee Railroad to the mouth of the Greenbrier River, but defendant denies any knowledge or information sufficient to form a belief as to whether the said appropriation was so
expended and avers that any work done in this connection
58 was ineffective and utterly failed to create even artificial
navigability of a limited and local character. Defendant is without knowledge as to whether the Legislature of the State of West Virginia by a joint resolution of September 21, 1872, memorialized Congress in respect of a canal between the Kanawha and James Rivers, but avers that in any event no construction work ever resulted therefrom. Defendant avers that none of such expenditures and none of such legislative acts or resolutions resulted in the creation or establishment of any navigability in any part of New River.

14. Answering paragraph (14), defendant is advised that all of the allegations of said paragraph are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, except the allegations that New River and Kanawha River are navigable waters of the United States, which allegations are redundant and repetitious, and that hence none of said allegations need be answered.

Nevertheless, to avoid delay but without waiving the foregoing objections, defendant, answering, denies each and every allegation of said paragraph except that defendant admits that the Kanawha River is presently navigable but only up to a point about 5 miles downstream from Kanawha Falls; admits that there are falls, shoals, and rapids in the New River; and admits that the New River has been investigated by Chiefs of Engineers of the United States Army and by other engineers and that some of such engineers have recommended that work be done on the river in various stretches thereof, but defendant avers that others of such engineers of plaintiff have recommended that, because of the impossibility of creating artificial navigability therein by the expenditure of any reasonable sum of money, no work be done on said river.

15. Answering paragraph (15), defendant admits the allegations of said paragraph except as follows: Defendant denies that New River is a navigable river of the United States; defendant

denies that the operation of the Radford project will at any time result in leaving the bed of New River dry or practically dry; defendant denies that it could render navigation on New River impossible by any manner of operation of the Radford project, for the reason that New River in its natural and in its
59 present condition is nonnavigable and not susceptible of being used as a highway in interstate commerce; and defendant further denies that it is violating any law. Defendant avers that authorization by Congress or any other agency of plaintiff is not necessary for this project, but says that were any authorization under the Rivers and Harbors Act of March 3, 1899, necessary for defendant's project, which defendant denies, then said project has been authorized as provided by said statute. Defendant is informed and believes and, therefore, avers that the Chief of Engineers of the United States Army and the Secretary of War have, so far as the interests of navigation are concerned, approved the general plans upon which the defendant is now constructing its dam at the site of the Radford project and that the Federal Power Commission tendered the defendant a license for the construction of a water power project at the site of the Radford project upon the identical plans so approved as aforesaid and upon which plans the defendant is now constructing said Radford project. Defendant avers that neither the construction nor operation of its project will interfere with or obstruct navigation on or the navigable capacity of any navigable waters of the United States.

16. Answering paragraph (16), defendant admits that Kanawha River is a navigable water of the United States up to about 5 miles below Kanawha Falls and that within such present limits the navigability of that river is now under improvement. Defendant admits that intermittent storage and release of the waters of New River at the Radford dam could set up fluctuations in the flow which in rapidly lessening degree might be transmitted to portions of New River downstream from the dam and under some circumstances might be perceptible even to Kanawha River but not of such character or extent as to interfere with navigation or navigable capacity, and denies that it will intermittently store and release large quantities of water whenever it is profitable to do so and without regard to any needs of navigation or in violation of its declared intention not so to operate its project; and denies that in any case any fluctuations in flow from the Radford project will or can be trans-
60 mitted downstream so as to diminish, impair, or obstruct the navigable capacity of the Kanawha River or any other navigable water of the United States. Defendant admits that the construction of the Radford project has been started and

is being continued by it, that the dam will be across New River and that such construction has never been specifically authorized by Congress. Defendant avers that authorization by Congress or any other agency of plaintiff is not necessary for this project but says that were any authorization under the Rivers and Harbors Act of March 3, 1899, necessary for defendant's project, which defendant denies, then said project has been authorized as provided by said statute. Defendant is informed and believes and therefore avers that the Chief of Engineers of the United States Army and the Secretary of War have, so far as the interests of navigation are concerned, approved the general plans upon which the defendant is now constructing its dam at the site of the Radford project and that the Federal Power Commission tendered the defendant a license for the construction of a water-power project at the site of the Radford project upon the identical plans so approved as aforesaid and upon which plans the defendant is now constructing said Radford project. Defendant is advised and believes and therefore avers that plaintiff is not now attempting and does not even contemplate any attempt to improve the physical condition of New River in order to create artificial navigability.

Defendant denies each and every other allegation contained in said paragraph.

Defendant avers that neither the construction nor operation of its project will interfere with or obstruct navigation or the navigable capacity of any navigable water of the United States.

17. Answering paragraph (17), defendant admits all the allegations of said paragraph except that defendant denies that that it will operate said project in accordance with the so-called schedules authorized by the license issued to defendant by the State of Virginia if such method of operation would interfere with or obstruct the navigable capacity of any navigable
61 waters of the United States; avers that it intends to and will construct and operate said project in such a manner as will not so interfere with or obstruct; denies that there is any specific method of operation of the project prescribed in said State license except in the sense that the State Corporation Commission has required that downstream from the Radford project there shall always be at least a specified flow in New River; avers that the said State Water Power Act contains the requirement that defendant may not operate the project so as to interfere with the exercise of lawful jurisdiction of the United States; denies that New River is navigable; and further avers that, even if the minimum quantities of water set forth in said State license represented the actual quantities which would be so released, which defendant denies, nevertheless the quantities of water so

released would not be inadequate from the standpoint of navigability and would not result in diminishing or impairing or causing obstruction to the navigability of any navigable waters of the United States.

18. Answering paragraph (18), defendant admits every allegation of said paragraph except that the Declaration of Intention was filed on or about June 26, 1925, and not June 26, 1926, as alleged by plaintiff.

19. Answering paragraph (19), defendant admits every allegation of said paragraph.

20. Answering paragraph (20), defendant denies any knowledge or information sufficient to form a belief as to what investigations, examinations, and studies of defendant's project were made or caused to be made by the Federal Power Commission except that defendant admits that said Commission did request Chiefs of Engineers, United States Army, to report on said project described in the Declaration of Intention and admits that several Chiefs of Engineers made reports on and expressed opinions regarding said project and defendant avers that the finding made June 1, 1927, by said Commission, referred to in said paragraph (20), to the extent hereinafter set forth is contrary to and unsupported by the reports of the Chiefs of Engineers.

62 Defendant admits that a hearing was held by the Federal Power Commission March 2, 1926, and avers that on or about February 16, 1931, there was held another hearing but that the scope of such latter hearing was limited as hereinafter set forth.

Defendant admits that the Federal Power Commission purported to make a finding on June 1, 1927, and avers that that part of said finding which states that New River is not navigable waters truly states the fact in that regard and is correct, proper, and lawful but denies that that part of said finding which states that the interests of interstate or foreign commerce would be effected by the Radford project states a fact or is correct, proper. or lawful.

Defendant avers that at said hearing of March 2, 1926, the only evidence before the Commission as to the effect the said project would have on navigation was the report of the Chief of Engineers addressed to the Federal Power Commission, dated December 29, 1925, which report was read into the record of the hearing by counsel for defendant's predecessor, New River Development Company, and which report stated *inter alia* as follows:

"Therefore, so far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project.

"I, therefore, report that in my opinion New River in its present condition is not a navigable stream and that navigation on the Kanawha River will not be adversely affected by the proposed development";

and defendant avers that no other evidence was before said Commission at said hearing; and defendant avers that at said hearing counsel for said New River Development Company stated that, if there was any other evidence which the Commission might have, said Company was entitled to and desired an opportunity of examining and rebutting such evidence, and avers that at said hearing inquiry was made by defendant's predecessor as to whether the said report of the Chief of Engineers was to be questioned by the Commission, said predecessor company stating that in such event it desired to be heard further with respect to the same;
63 and defendant further avers that said Commission at said
hearing did not question the facts and conclusions stated in said report of December 29, 1925, and no evidence was offered or received in opposition to or contradictory of the facts and conclusions set out in said report.

Defendant avers that, if any evidence as to the matters involved (as they appear in the alleged finding of June 1, 1927) other than said report of the Chief of Engineers was ever taken, received, or examined by the Federal Power Commission prior to making its said finding, there was no proper, adequate, or lawful hearing thereon, in that such other evidence was taken or received secretly and ex parte and was examined ex parte by the Commission without giving to defendant notice or an opportunity to be heard, and avers that a finding based on evidence taken, received, and considered secretly and ex parte without giving the defendant notice or opportunity to be heard in connection with the same and without giving the defendant notice or opportunity to meet and refute such evidence is arbitrary, capricious, unlawful, void and a denial of due process of law in contravention of the Fifth Amendment of the Federal Constitution.

Defendant avers that, if no evidence other than said report of the Chief of Engineers was examined by said Commission, then, even though there may have been a proper and lawful hearing, there is no evidence to support the finding that said project would affect the interests of interstate or foreign commerce but, instead, said finding is clearly contrary to all the evidence and said finding is therefore arbitrary, capricious, unlawful, void, and a denial of due process of law in contravention of the Fifth Amendment to the Constitution of the United States.

Defendant avers that the said hearing of February 16, 1931, was not held for the purpose of considering any further evidence

or any evidence at all and was not a rehearing and that said hearing was limited to arguments concerning the extent of jurisdiction, if any, of the Federal Power Commission under the Federal Water Power Act and the Constitution of the United States over the Radford project located on the nonnaviga-
64 ble New River and involving no land or other property of the United States. Defendant is without knowledge as to any rehearing in regard to any evidence upon which the said Commission's finding of June 1, 1927, was based.

Amendment inserted before last paragraph in paragraph numbered 20 of the answer, pursuant to the order of December 9, 1935:

"Defendant admits that the Federal Power Commission purported to make a finding on October 12th, 1932, but avers that this alleged finding, whereby said Commission declared New River to be navigable within the meaning of Section 3 of the Federal Water Power Act, was made not only without an adequate or lawful hearing, but made without any hearing whatsoever and that said alleged finding was not based upon or made with reference to nor responsive to the declaration of intention theretofore filed by the defendant with said Commission, and that, as defendant is informed and believes and therefore alleges, said pretended finding was not based upon the reception and consideration of any evidence whatsoever, and was made without receiving or considering any evidence, but that such evidence, if any, as was taken or received with respect to said alleged finding was taken and received secretly and ex parte and was examined ex parte by the Commission without giving the defendant any notice or any opportunity to be heard, and defendant avers that said purported finding of October 12th, 1932, was merely a self-serving declaration made by said Commission after a suit had been instituted against the members of the Commission by the defendant herein to be thereafter offered and used in said suit as 'official' or 'record' or 'documentary evidence,' in behalf of said members in said suit; that a purported finding of a self-serving nature, based on evidence taken, received and considered secretly and ex parte (if based upon any evidence or consideration thereof at all) without giving the defendant notice or opportunity to be heard in connection with the same and without giving the defendant notice or opportunity to meet and refute such evidence, is arbitrary, capricious, unlawful, void, and a denial of due process of law, in contravention of the Fifth Amendment of the Constitution of the United States.

"Except as hereinbefore expressly admitted or alleged, defendant denies any knowledge or information sufficient to form a belief regarding any of the other alleged findings referred to in said paragraph 20 of the Bill as amended."

Defendant denies each and every other allegation in said paragraph.

21. Answering paragraph (21), defendant is without knowledge of any rehearing before the Federal Power Commission upon the facts or for the submission or taking of evidence and denies each and every other allegation of said paragraph.

22. Answering paragraph (22), defendant admits the allegations of said paragraph except as follows: Defendant is 65 without knowledge of any rehearing before the Federal Power Commission upon the facts or for the submission or taking of evidence. Defendant denies that the Federal Power Commission ever made a lawful finding that the Radford project would affect the interests of interstate or foreign commerce. Defendant denies that it intends to or will cause variations in stream flow at the site of said Radford project such as would cause interference with the flow of water into the pools created by any navigation dams or as would or could diminish or obstruct the navigable capacity of any of the waters of the United States and says that any variations in flow which may occur at the damsite will rapidly diminish in degree below the dam and that if any should ever be perceptible in Kanawha River they will be inconsequential and will not cause any interference with navigation works or pools or diminish or obstruct the navigable capacity of said river. Defendant denies that the construction or operation of the Radford project will violate any law.

23. Answering paragraph (23), defendant denies each and every allegation of said paragraph except that defendant admits that its predecessor filed a Declaration of Intention under Section 23 of the Federal Water Power Act and that said Declaration of Intention was subsequently on or about September 2, 1926, assigned to and thereupon adopted by defendant; and defendant admits that it requested a finding by the Federal Power Commission and says that defendant did so for the purpose of obtaining, in accordance with the clear facts, a finding that neither the construction nor operation of defendant's project would affect the interests of interstate or foreign commerce. Defendant admits that said agency of plaintiff purported to make a finding that the proposed construction would affect the interests of interstate and foreign commerce, but defendant says that said purported finding was and is unsupported by the evidence, contrary to all of the evidence received by or offered before the Federal Power Com- nission at any hearing regarding said Radford project, contrary to the fact, unlawful and void, a denial of due process of 66 law and, if said finding affects defendant's rights, a taking of defendant's property without due process of law, all ontrary to and in violation of the Fifth Amendment to the Con- titution of the United States.

24. Answering paragraph (24), defendant denies any knowledge or information sufficient to form a belief as to any amounts expended by plaintiff in the acquisition of riparian lands and admits that the London and Marmet dams have been constructed and that the Winfield dam is being constructed, and admits that the Federal Power Commission has issued a license to the Kanawha Valley Power Company for the generation of hydroelectric power at the London and Marmet dams. Defendant denies that the compensation to be paid by said licensee is based upon the flow of water at said dams available for producing power and avers that said flow could only have been one of a number of factors considered in fixing said compensation. Defendant admits that compensation under Section 10 (e) of the Federal Water Power Act (16 U. S. C. 803) in the future, i. e., 20 years after issuance of license, may be affected in accordance with variations in the volume and value of said flow for the purpose of generating hydroelectric power but defendant avers that the operation of the Radford project will not cause violent nor even detrimental variations in the volume and value of said flow or changes in the pool levels. Defendant denies each and every other allegation contained in said paragraph.

25. Answering paragraph (25), defendant denies each and every allegation of said paragraph except that defendant admits that it has begun the construction of the Radford project and is continuing the constructing of the same.

26. Answering paragraph (26), the defendant denies that the plaintiff has correctly construed or fully or correctly stated the purposes, terms, or substance of the Federal Water Power Act or of the other laws referred to in said paragraph. Defendant prays leave to refer to the texts of said Acts for a full and correct statement of their terms. Defendant further says that, if said Acts
could properly be construed as set forth by the plaintiff in
67 this paragraph, the application of such Acts to the project
of the defendant would deprive defendant of its property without due process of law and said Acts would be void as in contravention of the Fifth and Tenth Amendments to the Constitution of the United States. The defendant denies each and every other allegation contained in said paragraph.

27. Answering paragraph (27), defendant is advised that some of the allegations of said paragraph are immaterial, argumentative, irrelevant, impertinent, and evidentiary, even if competent as evidence, and hence need not be answered.

Nevertheless, to avoid delay but without waiving the foregoing objections, defendant, answering, denies any knowledge or information sufficient to form a belief as to the studies or plans which plaintiff has caused to be made or is considering and drafting for the development of what plaintiff terms a New-Kanawha River system.

Defendant denies that the proper development of said streams, or either of them, requires that the selection of dam sites and of structures to be located thereon and therein be coordinated under the control of the plaintiff, but is informed and believes and therefore avers that so far as its Radford project is concerned, the selection of the dam sites and the general plans of the structures to be located therein have, insofar as the interests of navigation are concerned, been approved by the Chief of Engineers of the United States Army and by the Secretary of War.

Defendant denies any knowledge or information sufficient to form a belief as to whether or not said Radford project is adapted to fit into the alleged but unspecified plans of plaintiff, including any plan which plaintiff may have to attempt to create artificial navigability on New River, but defendant avers that inasmuch as New River neither had nor has navigation nor navigable capacity in its natural or existing condition, there is no navigation which can be improved, and further avers that artificial navigability could be created only by the expenditure of an unjustifiable and prohibitive amount of money and by acquiring the necessary property rights of defendant and other riparian owners 68 along said New River upon the payment of just compensation.

Defendant denies that the construction and operation of its Radford project will interfere with the navigable capacity of the Kanawha River or plaintiff's present plans for improving the same.

Defendant admits that it has made no plans for the construction or operation of locks at its dam and proposes not to make any such provision, but defendant avers that the license tendered to defendant by the Federal Power Commission for said Radford project and refused by defendant contains no requirement for the construction of locks at its dam, and further defendant is informed and believes and therefore avers that the general plans for its dam, which plans contain no provision for locks, have, insofar as the interests of navigation are concerned, been improved by the Chief of Engineers of the United States Army and by the Secretary of War.

Defendant admits that it proposes not to contribute toward the construction of headwater improvements.

Defendant denies that it will interfere with any existing or prospective navigation or water-borne commerce or with the navigable capacity of any navigable waters of the United States.

Defendant denies each and every other allegation contained in said paragraph.

28. Answering paragraph (28), defendant denies each and every allegation contained in said paragraph.

29. Answering paragraph (29), defendant denies each and every allegation contained in said paragraph.

30. Answering paragraph (30), defendant admits that, if all of the allegations of the Bill of Complaint were true and a good cause of action were stated in favor of the plaintiff and against the defendant in said Bill, the plaintiff would be without adequate remedy at law, but defendant says no cause of action attempted to be stated in said Bill is well grounded; and the defendant denies every allegation of the Bill not expressly admitted by this Answer.

31. For a first separate and complete defense, defendant
69 avers that its Radford project requires and involves the use
or submerging in excess of 5,000 acres of land situated in and along the nonnavigable New River in Pulaski County, Virginia, that it now owns or controls substantially all of the requisite lands and rights and that by far the greater part of said lands are owned by defendant in fee simple; that said project requires the use of no land or other property of the United States; that said lands and rights are of great value and were acquired solely for the purpose of said water-power development at a cost in excess of $1,000,000; that the chief value to the defendant of such lands and rights resides in their adaptability and utility for water-power development; that as the owner of said lands and rights the defendant has a full, perfect, and complete proprietary right to construct the Radford water power project, subject only to such regulation as the State of Virginia may constitutionally exercise under its police power; that the right and permission to construct, operate, and maintain said Radford project are and have been conferred on the defendant by the laws of the State of Virginia and the defendant has complied with all the laws of Virginia necessary to the exercise of its proprietary right to construct, operate, and maintain said project; and that such compliance with the laws of Virginia constitutes full, adequate, and complete authority for the construction, operation, and maintenance of the Radford project, which is located wholly within the confines of the State of Virginia on the New River, a nonnavigable stream, and which does not involve the use of land or other property of the United States.

32. For a further separate and complete defense, defendant repeats and reavers each and every allegation contained in paragraph 31 and avers that neither the said Federal Water Power Act nor the said Rivers and Harbors Act of March 3, 1899, nor any other Federal statute authorizes or empowers the Federal Power Commission or any other agency of the United States to require

defendant under any circumstances to have or accept any Federal
license, permit, or other affirmative authorization whatso-
70 ever as a condition of exercising its property rights to con-
struct, maintain, and/or operate said Radford project which is located upon the nonnavigable New River and does not involve the use of any land or other property of the United States; and avers that, if said Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute be properly construed to confer upon the Federal Power Commission or any other Federal agency jurisdiction over the Radford project to require defendant to accept any Federal license permit or any other affirmative authorization as a condition of the exercise of its property rights to construct, maintain, and/or operate the Radford project, then each of said Acts, if so construed, is to that extent unconstitutional and void and in violation of the Fifth and Tenth Amendments to the Constitution of the United States.

33. For a further separate and complete defense, defendant repeats and reavers each and every allegation contained in paragraph 31 and avers that said Radford project is located on a nonnavigable stream, does not involve the use of any land or other property of the United States and will not cause any obstruction to the navigable capacity of any navigable waters of the United States, and that the Federal Power Commission has no jurisdiction, authority, or right to find that the interests of interstate or foreign commerce will be affected by the proposed construction mentioned in any Declaration of Intention filed under the provisions of the second paragraph of Section 23 of the Federal Water Power Act unless it shall first have determined that the project is situated in or upon navigable waters of the United States; that, when the Federal Power Commission made a finding that the defendant's Radford project was to be constructed, as it is being constructed, upon a nonnavigable stream, then said Federal Power Commisison had no jurisdiction, authority, or right to find that the interests of interstate or foreign commerce would or might be affected by the construction of said project; that, therefore, the purported finding of said power Com-
mission, that the construction of the defendant's Radford
71 project would or might affect the interest of interstate or
foreign commerce (even had it not been unsupported by the evidence and contrary to the evidence, as it was), was *ultra vires*, beyond the jurisdiction of said Commission, unlawful and void; and that any restriction of defendant's use of its property through or by virtue of such a finding is a taking of defendant's property without due process of law in contravention of the Fifth Amendment to the Constitution of the United States.

34. For a further separate and complete defense, defendant repeats and reavers each and every allegation contained in paragraph 31 and avers that, even if the Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute may properly be construed to confer upon the Federal Power Commission or upon any other Federal agency any jurisdiction over a proposed water-power development to be located on a nonnavigable stream and not involving the use of any land or other property of the United States, then, by the terms of said Acts and constitutional limitations upon Federal power, said jurisdiction can exist and attach only when and to the extent that it affirmatively and definitely appears that said water-power development will affect the interests of interstate or foreign commerce; that, in order to determine whether the Radford project, which is located on a nonnavigable stream approximately 155 miles above the head of navigation, which does not involve the use of land or any other property of the United States and which is being constructed and will be operated without any affirmative consent from the United States, violates the Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute, it is necessary to determine whether the intended acts of defendant substantially interfere with or obstruct navigation on or the navigable capacity of the Kanawha River, which is the only navigable water of the United States which conceivably could be affected; that New River Development Company, defendant's predecessor, for the purpose of obtaining, in accordance with the clear facts, a determination that said Radford project is not subject to the jurisdiction
72 of the Federal Power Commission under the Federal Water Power Act, filed with said Commission, pursuant to Section 23 of said Act, a Declaration of Intention to construct, operate and maintain its Radford project; that said Declaration of Intention includes the specific statement that

> "The proposed project will be constructed and operated so as not to impair the navigable capacity of the stream below, nor to affect the interests of interstate or foreign commerce";

that said declared intention has never been withdrawn or modified or changed in any respect and remains the actual and expressed intention of defendant; that said statement of intention was made in good faith; that the carrying out of said intention is feasible; that the intended acts of defendant show that there will be no interference with navigation on or the navigable capacity of any navigable waters of the United States; and that any restriction of defendant's use of its property by the plaintiff's agencies under the aforesaid facts constitutes a taking of defendant's property without due process of law in contravention of the Fifth Amendment to the Constitution of the United States.

35. For a further separate and complete defense, defendant repeats and reavers each and every allegation contained in paragraphs 31 and 34 hereof as though the same were set forth at length herein and avers that it would be physically impossible for the defendant to construct and/or operate the Radford project so as to create any obstruction to the navigable capacity of any navigable waters of the United States.

36. For a further separate and complete defense, defendant repeats and reavers each and every allegation of paragraphs 31, 34, and 35 and avers that, if the Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute be construed to confer jurisdiction upon the Federal Power Commission or any other Federal agency to require the defendant to have or accept a Federal license, permit or authorization of any character as a condition of the exercise of its property right to construct said Radford project, which is located on a nonnavigable stream, does not involve the use of any land or other property of the United States and does not affect the interests of inter-
73 state or foreign commerce, then each of said Acts, if so construed, to that extent violates the Fifth and Tenth Amendments of the Constitution of the United States and is unconstitutional and void.

37. For a further separate and complete defense, defendant repeats and reavers each and every allegation contained in paragraph 31 and avers that New River is a nonnavigable stream; that the part of the finding (made by the Federal Power Commission on or about June 1, 1927, and affirmed by an opinion and order of said Commission on or about April 3, 1931) which states that the New River in the part thereof involved in said Declaration of Intention is not "navigable waters" within the definition thereof as contained in said Federal Water Power Act is correct and proper; that the part of said finding (likewise made on or about June 1, 1927, and affirmed by the opinion and order rendered on or about April 3, 1931) which states that the interests of interstate or foreign commerce would be affected by such proposed construction is erroneous, unlawful, arbitrary, and wholly unsupported by the evidence, is contrary to the evidence and facts existing at the present time or at the time said finding was made and is contrary to the declared intention of defendant, and in any event said part of said finding is not conclusive or binding and, if material, is for determination de novo by this Court; that, if it should appear that said finding is supported by any evidence, which defendant denies, said finding is contrary to the manifest weight of the evidence; and that the part of said finding which

states that the interests of interstate or foreign commerce would be affected by such proposed construction constitutes a denial of due process of law and a taking of defendant's property in violation of the Fifth Amendment to the Constitution of the United States.

38. For a further separate and complete defense, defendant repeats and reavers each and every allegation of paragraph 31 and avers that, even if said Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute 74 may properly be construed to authorize and empower the Federal Power Commission or any other Federal agency to issue and to require the acceptance by defendant of any Federal license, permit or authorization as a condition of exercising its property right to construct, maintain and/or operate said Radford project, which is located upon a nonnavigable stream and does not involve the use of any land or other property of the United States, nevertheless said Federal license, permit or authorization must be limited to and contain conditions relating solely to the protection of the interest of the United States in interstate or foreign commerce, or, more specifically, to the protection of the navigable capacity of the navigable waters of the United States; that, if said Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute be construed to confer jurisdiction on the Federal Power Commission or any other Federal agency to issue to, and to require the defendant to accept, as a condition of its property right to construct, maintain, and/or operate said Radford project, a Federal authorization, permit or license (such as the license tendered defendant by said Commission on or about July 1, 1927, or the one tendered on or about May 5, 1931) containing conditions other than those relating solely to the protection of the interest of the United States in its navigable waters, then each of said Acts, if so construed, is to that extent unconstitutional and void and in violation of the Fifth and Tenth Amendments to the Constitution of the United States.

39. For a further separate and complete defense, defendant repeats and re-avers each and every allegation contained in paragraphs 31 and 38 and avers that on or about February 4, 1930, defendant, although challenging the existence of any jurisdiction in the Federal Power Commission over the Radford project, offered to accept a Federal license containing solely such conditions, regarding the manner of construction or operation of the project, as are necessary and appropriate to prevent any substantial interference with the navigable capacity of the Kanawha River such as would be unlawful under the Rivers and Harbors Act of March 3, 1899; that on or about September 22, 1930, the then Attorney General of the United States 75 in an official opinion advised the Federal Power Commission that it is not required by the terms of the Act to

insert in a license for defendant's project any conditions (except the 50-year limitation upon duration) which are not necessary or appropriate in the protection of navigation of the Kanawha River and that to insert such conditions would raise grave constitutional questions; that, notwithstanding the opinion of the Attorney General, the said Commission on or about April 3, 1931, issued an order which denied the defendant's application for a license containing solely conditions necessary or appropriate to protect the navigable capacity of any navigable waters of the United States and which ordered this defendant not to proceed with the construction of the Radford project unless and until it shall have received a standard form of license, containing *inter alia* all of the conditions provided by the Federal Water Power Act for projects on navigable waters of the United States and regardless of whether such conditions have any real or substantial relation to the protection of the navigable capacity of any navigable waters of the United States; that on or about the 5th day of May, 1931, the Federal Power Commission tendered such a license to defendant which license defendant refused to accept; that said tendered license contains many conditions which have no substantial or reasonable relation to the protection of navigable capacity of any navigable waters of the United States and which, if accepted, would seriously restrict defendant's use of its property, greatly depreciate the value thereof, and involves a consent that the property might be appropriated by the United States for very much less than its value when so appropriated; that said tendered license and each and every such condition thereof is beyond the jurisdiction, power, and authority of the Federal Power Commission or the Federal Government to issue to and/or require the defendant to have or accept as a condition of the exercise of its property right to construct, maintain, or operate the Radford project; that, for a fuller and better statement of the terms and conditions of said tendered license, the defendant prays leave to make profert of a true copy thereof; that, because of the 76 refusal of the defendant to accept said tendered license containing such unauthorized and unconstitutional conditions and requirements as a prerequisite to the exercise of its property right to construct and operate the Radford project, the present suit has been brought on the request of the Federal Power Commission; that, assuming the Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute properly construed does constitutionally authorize the Federal Power Commission or any other Federal agency to require defendant for its Radford project (located on a nonnavigable stream and not involving the use of any land or other property of the United States) to have or accept a Federal license, permit, or authorization containing such conditions as are reasonably necessary and appropriate to protect the navigable capacity of any navigable waters of the United States, which defendant denies, the refusal of plaintiff's appropriate agency to grant to defendant a Federal license, permit, or authorization, if necessary, for the construction and operation of said project and containing only conditions having a real and substantial relation to the protection of the navigable capacity of any navigable waters of the United States and likewise the refusal of the plaintiff through its appropriate agency to grant defendant any license at all, if necessary, for the construction and operation of said Radford project, unless the defendant would agree to the inclusion of unconstitutional conditions and restrictions, constitute a taking of the defendant's property without due process of law in contravention of the Fifth Amendment to the Constitution of the United States; and that if any relief should be granted plaintiff, which defendant denies, such relief should be limited by and conditioned upon the requirement that plaintiff through its appropriate agency grant, for the construction, maintenance, and operation of the Radford project, a Federal license containing only such conditions as have a real and substantial relation to the protection of the navigable capacity of the navigable waters of the United States.

40. For a further separate and complete defense, defendant repeats and reavers each and every allegation contained in 77 paragraph 31 and avers that, even if New River should be held to be navigable waters of the United States, which defendant denies, and, even if the Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute may properly be construed to authorize and empower the Federal Power Commission or any other Federal agency to issue and require the acceptance of a Federal license, permit, or authorization as a condition of defendant's exercise of its property right to construct, maintain, and/or operate said Radford project, nevertheless any Federal license, permit, or authorization imposed upon or issued to defendant by any appropriate agency of plaintiff must be limited to and contain conditions relating solely to the protection of the interest of the United States in interstate or foreign commerce or, more specifically, to the protection of the navigable capacity of the navigable waters of the United States; that, if the Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute be construed to confer on the said Federal Power Commission or any other Federal agency jurisdiction to issue and to require as a condition of defendant's

exercising its property right, to construct, maintain, and/or operate said Radford project, a Federal authorization, permit, or license (such as the license tendered defendant by the Federal Power Commission on or about July 1, 1927, or the one tendered on or about May 5, 1931) containing conditions other than those relating solely to the protection of the interest of the United States in its navigable waters, then each of said Acts, if so construed, is to that extent unconstitutional and void and in violation of the Fifth and Tenth Amendments to the Constitution of the United States.

41. For a further separate and complete defense, defendant repeats and reavers each and every allegation contained in paragraphs 31, 39, and 40 and avers that, assuming the Federal Water Power Act, the Rivers and Harbors Act of March 3, 1899, or any other Federal statute properly construed does constitutionally authorize the Federal Power Commission or any other Federal agency to require defendant, for its Radford project (located upon a stream assumed, for the statement of this defense 78 and contrary to defendant's contention, to be held to be navigable but not involving the use of any land or other property of the United States), to have or accept a Federal license, permit, or authorization containing such conditions as are cense, permit or authorization containing such conditions as are reasonably necessary and appropriate to protect the navigable capacity of any navigable waters of the United States, then the refusal of plaintiff's agency to grant to defendant a Federal license, permit, or authorization, if necessary, for the construction and operation of said project and containing only conditions having a real and substantial relation to the protection of the navigable capacity of any navigable waters of the United States and likewise the refusal of the plaintiff through its appropriate agency to grant the defendant any license at all, if necessary, unless defendant would agree to the inclusion of unconstitutional conditions and restrictions, constitute a taking of defendant's property without due process of law in contravention of the Fifth Amendment to the Constitution of the United States; and that, if the court, contrary to defendant's contention, should hold New River to be a navigable water of the United States, and, if any relief should be granted plaintiff, which defendant denies, such relief should be limited by and conditioned upon the requirement that plaintiff through its appropriate agency grant, for the construction, maintenance, and/or operation of the Radford project, a Federal license containing only such conditions as have a real and substantial relation to the protection of the navigable capacity of the navigable waters of the United States.

42. For a further separate and complete defense, defendant says, first, that New River is nonnavigable, that the plaintiff is estopped by the finding of its agencies, the Federal Power Commission and its Chiefs of Engineers (U. S. Army), made in relation to this very project, to question the nonnavigability of New River and, secondly, that the allegations of the Bill are insufficient to constitute a valid cause of action upon the ground of an alleged effect of defendant's Radford project upon the distant navigable waters of the Kanawha River, (a) 79 because the allegations in that respect show no act of the defendant in derogation of the authority of the plaintiff under the Constitution of the United States over interstate and foreign commerce or in violation of Section 9 or Section 10 of the Rivers and Harbors Act of March 3, 1899, or the Federal Water Power Act or any other law, (b) because they show no present damage to nor invasion of plaintiff's rights but only an assumed, hypothetical invasion thereof, (c) because they show that the alleged effect of the construction or operation of defendant's project upon interstate or foreign commerce (upon which alleged effect the supposed cause of action set forth in the Bill must wholly rest) is merely a speculative, conjectural and hypothetical effect which can be conceived to be produced only if the defendant were to operate its project at some future time in a fanciful and impracticable manner and because they fail to specify any act or statement of defendant showing any intention so to operate, whereas actually defendant not only has never proposed or threatened or intended to operate its project in such a manner, but has always asserted and still asserts it will not so operate its project, were it physically possible so to do, which defendant denies, (d) because the assumed possibility of producing an effect upon interstate or foreign commerce (upon which effect the supposed cause of action alleged in the Bill completely depends) is predicated solely upon a speculation and conjecture that the defendant physically could operate its project so as to affect interstate or foreign commerce, although it has never done so, has never proposed or threatened so to do and has expressly asserted and still asserts that it intends not to do so and will not do so, wherefore the Bill states no case or controversy but solely a moot case not within the jurisdiction of the Federal Courts, and (e) because, if the operation of the defendant's project could at some future time produce a real, rather than merely a conjectural, effect upon interstate or foreign commerce, nevertheless such effect would

be so indirect, collateral, and fortuitous that it would not come within the anticipatory jurisdiction of the Congress.

80 Now, therefore, having fully answered, this defendant prays that it may be hence dismissed, etc.

Appalachian Electric Power Company,
By Counsel.
(Signed) **M. F. Millihan**, *New York.*
Newton D. Baker,
Raymond T. Jackson,
Union Trust Building, Cleveland, Ohio.
A. Henry Mosle,
Creswell M. Micou,
Fraser M. Horn,
63 Wall Street, New York, N. Y.
John S. Draper, *Pulaski, Va.*
John L. Abbot, *Lynchburg, Va.,*
Solicitors for Defendant.

[*Duly sworn to by Graham Clayton; jurat omitted in printing*]

81 In United States District Court

[Title omitted.]

Order granting leave to amend complaint, etc.

Sept. 19, 1935.

This cause came on this day to be heard upon the motion of the plaintiff to strike the answer filed by the defendant herein, which motion had theretofore been filed in writing and set for hearing on this date;

And thereupon came the plaintiff, by its counsel, namely, Houston Thompson, Allen D. Jones, Oswald Ryan, Willard W. Gatchell, James [illegible] Lawson, and Wayne Williams, and came also the defendant, by its counsel, namely, Newton D. Baker, Raymond T. Jackson, John L. Abbot, Creswell M. Micou, Fraser M. Horn, Wendell W. Forbes, M.F. Millikan, and John S. Draper;

And thereupon came the State of Virginia by A. P. Staples, Attorney General of said State, and asked leave to appear amicus curiae, and came also the State of West Virginia, by Homer A. Holt, Attorney General of said State, and asked leave to appear amicus curiae, it being stated that said states of Virginia and West Virginia had material interest in the outcome of the litigation;

And thereupon, it is ordered that leave be granted to said A. P. Staples, as Attorney General of Virginia, and to Homer A. Holt, as Attorney General of West Virginia, to appear amicus curiae and file their briefs herein.

And thereupon the plaintiff filed in writing its motion to amend its bill of complaint in certain particulars as set out in said motion, and there being no objection thereto, it is ordered that said bill of complaint be amended in accordance with the motion of the plaintiff;

And thereupon the defendant asked leave that it be allowed to file such amendment to its answer as it may be advised to do,
82 in order to respond to said amended bill of complaint, and it is ordered that said leave be granted and the defendant allowed to file such amended answer as it be advised:

And thereupon argument was had before the Court by counsel for both the plaintiff and the defendant on the motion of the plaintiff to strike the answer of the defendant.

Enter:

(Signed) JOHN PAUL, *Judge.*

Received and entered September 27, 1935.

C. E. GENTRY,
Clerk.
By (Signed) LOUIS H. PRICE,
Deputy.

83 In United States District Court

[Title omitted.]

Petition of the Commonwealth of Virginia for leave to appear as amicus curiae

Filed Aug. 3, 1935

To the Honorable JOHN PAUL, JUDGE OF THE DISTRICT COURT FOR THE WESTERN DISTRICT OF VIRGINIA:

Now comes the Commonwealth of Virginia, by Abram P.
84 Staples, its Attorney General, and respectfully moves the court that it be granted leave to appear as amicus curiae in this case and orally and by brief to argue the same, or such questions arising therein as may affect its interests. In support of this motion the following grounds and reasons are assigned:

1. The purpose of this suit instituted May 9, 1935, by the United States of America, is to restrain and enjoin the defendant, Appalachian Electric Power Company, from the construction, opera-

tion, and maintenance of a certain dam in and across New River, in Pulaski County, Virginia. Said defendant is a Virginia corporation empowered by its charter to construct and operate said dam which is intended for the purpose of generating hydroelectric power for sale and distribution in the public service.

2. The Commonwealth of Virginia, by Acts of its General Assembly, has asserted its right, power, and purpose, to control and regulate the construction and operation of dams for the generation of hydroelectric power in and across all the rivers and streams in said Commonwealth, including streams navigable both in interstate commerce and in commerce wholly within the State. The State Corporation Commission of Virginia is the agency through which the said Commonwealth exercises such control and regulation. The jurisdiction of said Commission with respect to such projects and the extent of the powers of control and regulation which it exercises over them are in brief as follows:

(a) No dam may be constructed in any of the rivers of
85 Virginia for the purpose of generating hydroelectric energy without a license from the State Corporation Commission, obtained upon application and in the manner provided in the statute.

(b) A hearing shall be had upon the application for the license, and the Commission may grant or refuse same as applied for, or may modify the plans of development in such respect as to provide for the greatest utilization of the power of the stream, or as may otherwise be in the public interest.

(c) No license may be assigned without the Commission's approval.

(d) The Commission may sue to compel compliance with the terms of the license or for revocation thereof, if such terms are violated.

(e) The Commission may promulgate rules and regulations in the administration of the Act and require reports concerning the operation.

3. By the terms of said statute the Commonwealth of Virginia reserves the right at any time to take over by condemnation any development so licensed, and, after the expiration of the term of the license (fifty years), the Commonwealth may recapture same by purchase.

4. All of the statutory provisions hereinabove referred to are contained in Chapter 424 of the Acts of the General Assembly of 1928 (pp. 1099–1108), as amended by Chapter 346 of the Acts of the General Assembly of 1932 (pp. 683–686).

5. In addition to the powers asserted and exercised by the Commonwealth of Virginia over hydroelectric dams and developments, as provided in the statutes referred to in the preceding para-

86 graph, it has conferred by statute upon the State Corporation Commission, as its regulatory agency, the same general rate fixing and regulatory powers over electric power companies as are possessed by the Commission over other public service corporations.

6. On June 22, 1932, the said defendant, Appalachian Electric Power Company, recognizing the jurisdiction and power of the Commonwealth of Virginia to control the development of the hydroelectric power of its streams, applied to the State Corporation Commission of Virginia for and was granted by it a license pursuant to the statutes referred to in the fourth paragraph hereof, for the construction and operation of a dam in and across New River, in Pulaski County, Virginia, near the city of Radford, which is the dam complained of by the United States in this suit. The purpose for which said dam was licensed was the generation of hydroelectric power for sale and distribution in the public service.

7. Pursuant to and in accordance with said license so granted to it by the Commonwealth of Virginia, the defendant, Appalachian Electric Power Company, on or about the first of June 1934, began the construction of said dam, and has since continued and is now engaged in the work of building same.

8. For many reasons the Commonwealth of Virginia is deeply interested in the construction and operation of this and other similar developments on its streams. These plants provide work for the people of the State, and, by reason of the more 87 abundant and cheaper electric power flowing therefrom, industries of many kinds are encouraged to and probably will enter the State, resulting in increased employment and taxable values, and in the enhancement of the general prosperity and welfare of its citizens.

9. The grounds upon which the United States prays for an injunction to prohibit the construction and operation of this development are briefly:

(a) That the Federal Water Power Act, referred to in the Bill of Complaint, confers upon the Federal Water Power Commission exclusive jurisdiction to determine when and where and what kind of dams shall be built upon the entire New River; and how same shall be operated.

(b) That Congress in enacting said statute was empowered so to do by the Commerce Clause of the Constitution of the United States. The Bill seeks to bring the case within this clause of the Constitution by alleging, first, that New River is a navigable stream and this fact alone confers upon Congress the power to legislate as it pleases with respect to same; and, second, that if the stream be held to be not navigable at the place of the dam, nevertheless, the operation of the dam in the manner contemplated by the defendant power company will so substantially affect navigation on the Kanawha River (into which New River empties) at the point where actual navigation begins, which is 155 miles downstream from the site of the defendant's dam, as to constitute an interference with interstate commerce.

(c) That the Congress having asserted jurisdiction and entered this field, its authority is exclusive and the Commonwealth
88 of Virginia is without power, authority, or jurisdiction to authorize the construction of the dam or to regulate its operation.

10. The answer of the defendant, Appalachian Power Company, denies that the New River, at the site of the dam or elsewhere, is navigable in interstate commerce, or that it is a navigable stream; and denies that its dam, now in course of construction, will in any way affect or interfere with navigation in interstate commerce on the New River, the Kanawha River, or any other stream, and denies that either the construction or operation of its dam will in any way affect interstate commerce.

11. The Commonwealth of Virginia takes the position that it was and is acting within the reserved powers of the State in exercising its control and regulation of the development here in question, and that same does not have a sufficiently substantial relation to interstate commerce so as to bring it within the jurisdiction of Congress for any purpose; that even if a substantial relation to interstate commerce were shown to exist, the powers which the Federal Power Commission is undertaking to exercise over said development are in excess of those necessary to protect such interstate commerce, and constitute an unlawful interference with and infringement upon the reserved powers of Virginia as provided for in the Federal Constitution.

12. The Commonwealth of Virginia, through the statutory enactments of its General Assembly, asserts the right to condemn the development here involved, at any time, and to recapture
89 same by purchase after the expiration of fifty years. The Federal Water Power Act constitutes an assertion by the Congress of the right of the United States to recapture same after the lapse of a similar time.

13. The assertions of jurisdiction, authority, and power over the development in question being made by the Commonwealth of Virginia, and which it is now actually exercising, are in clear and direct conflict with the claims of jurisdiction, authority, and power over same which the United States is seeking to establish in this suit.

14. It is apparent, therefore, that the effect of granting an injunction in accordance with the prayer of the Bill of Complaint,

will be, not only to deny to the Commonwealth of Virginia the jurisdiction, authority, and power which its General Assembly has asserted, but also to interfere with the control now being exercised by the State Corporation Commission of Virginia to the end that the dam and development in question be constructed at such place, of such a type, and in such a manner as to utilize to the greatest possible extent the water power now latent in the stream.

15. For the reasons hereinabove stated, therefore, the said Abram P. Staples, Attorney General of Virginia, respectfully submits that the Commonwealth of Virginia is vitally interested in the decision of the questions, both of law and fact, which are involved in this suit, and in the decrees which may be entered herein respecting the exercise of the governmental powers which it is now asserting and exercising, and that it
90 should be permitted to be heard, both in oral argument and by written brief, when said questions come to be considered by the court.

Copies of this motion have been served upon counsel for both plaintiff and defendant, and notice of some appropriate and agreeable time for the hearing of same, should there be objection thereto, will be given.

Abram P. Staples,
Attorney General.

---

92 In United States District Court

[Title omitted.]

Petition of the State of West Virginia for leave to appear as amicus curiae

Filed Sept. 19, 1935

To the Honorable John Paul, Judge of the District Court of the United States for the Western District of Virginia:

Comes now the State of West Virginia, by Homer A. Holt, its Attorney General, and respectfully makes unto Your Honor the following representations.

93 (1) The above-styled suit was instituted in the District Court of the United States for the Western District of Virginia by the United States of America against the Appalachian Electric Power Company, a Virginia corporation, for the purpose of enjoining said corporation against the construction or opera-

tion of a certain hydroelectric project now under construction by the said defendant in and on the waters of New River, near Radford, Virginia, unless a license therefor be obtained from the Federal Power Commission; or, in the alternative, for the purpose of requiring the defendant to remove any part of said project which is within the limits of New River.

(2) New River, on the upper part of which the said project is being constructed, after flowing through the State of Virginia, enters the State of West Virginia and flows therethrough for a distance of approximately ninety miles to the mouth of Gauley River, where the confluence of said Gauley River and New River form the Great Kanawha River, which said Great Kanawha River is navigable waters of the United States from a point approximately seven miles below said confluence to the mouth thereof on the Ohio River.

(3) The theory of the bill of complaint of The United States is that The United States has constitutional authority to fully prohibit or control the said project and that the Federal Water Power Act is a constitutional congressional enactment which inhibits the construction and operation of said project unless such construction and operation be licensed by the Federal Power Commission; and upon the further theory that said project is being constructed in violation of Sections 9 and 10 of the Rivers and Harbors Act of 1899.

94 (4) Due to the geographical situation of the State of West Virginia there is included within its boundaries a large area in the higher altitudes of the Allegheny Mountains which is the source of numerous nonnavigable streams flowing into the Kanawha, Ohio, Monongahela, and Potomac Rivers. Because of the precipitous nature of the country which said nonnavigable rivers traverse, many of such streams have a rapid fall capable of producing large water power—at this time largely undeveloped—but of great value to the State and to its citizens.

(5) Since 1913 it has been the policy of the State of West Virginia, declared by its legislature, that the State of West Virginia control and supervise the development of water power from the streams within its boundaries.

(6) The bill of complaint herein contains allegations that New River throughout its course, and particularly so far as this petitioner is concerned, that part flowing through West Virginia, is navigable waters of the United States, and refers to certain official actions of the State of West Virginia as recognizing such alleged navigability.

(7) Petitioner does not believe that New River, or any part thereof, particularly that part in West Virginia, is navigable waters of the United States, and certain official investigations of

legally constituted agencies of the State of West Virginia have so found with respect to extended sections thereof.

95 (8) The bill also contains allegations that the construction and operation of said project will affect the navigability of the Great Kanawha River.

(9) Petitioner, on information, does not believe that the construction and operation of said project can possibly materially affect the navigability of the Great Kanawha River, and believes that the proposed and intended operation of said project will not affect the navigability of the Great Kanawha River.

(10) The defendant has filed its answer to the plaintiff's bill denying that the New River is navigable waters of the United States and denying that the construction and operation of said project either can or will affect the navigability of the Great Kanawha River; and the plaintiff has filed its motion to strike the said answer of the defendant, together with a brief purporting to support said motion. Said motion is predicated upon the theory that the Court will take judicial notice that New River throughout its course is navigable waters of the United States and judicial notice that the construction and operation of said project will affect the interests of interstate commerce in that it will affect the actual navigability of the Great Kanawha River.

(11) The State of West Virginia, believing as aforesaid that New River is not navigable waters of the United States, is interested that New River be not adjudicated to be navigable waters of the United States, and, particularly, is interested that such alleged navigability, contrary to the interests of the State
96 of West Virginia, and which petitioner believes not to be
a fact, be not determined by judicial notice, and is interested that it be not judicially noticed that a proper construction and operation of hydroelectric projects upon New River and other nonnavigable streams in West Virginia tributary to navigable waters of the United States, will so affect the navigability of the Great Kanawha River and other navigable waters of the United States, which petitioner believes is not the fact, as to prevent the construction and operation of projects in the State of West Virginia such as that here under consideration, in the State of Virginia, unless subject to all the laws, rules, and regulations of the Federal Power Commission.

(12) Petitioner believes that the Federal Water Power Act in its entirety, and if not in its entirety, so far as it is sought to be applied to nonnavigable waters, is an unconstitutional attempt to usurp for the Federal Government powers not vested in the United States by the Constitution thereof, but reserved to the states or to the people by the Tenth Amendment to the Federal Constitution.

(13) There are presented in this case many questions involving the interpretation and constitutionality of federal statutes which are of great and direct importance to the judicial determination of the respective sovereign rights, powers, and duties of the Federal Government and of the States, and your petitioner is vitally interested therein, not only by reason of its interest in New River, but also because of its interest in other streams within its borders, for the control of which, for the purpose of the development
97 of water power, precedents may be established in this case.

Wherefore, your petitioner, the State of West Virginia, prays that it be granted leave and permitted to appear in this case as amicus curiae and to be heard by written brief and oral argument in the consideration by Your Honor of the questions in this case which will involve the interests of the State of West Virginia either directly or indirectly.

(Signed) **Homer A. Holt,**
Attorney General of the State of West Virginia.

---

98 In United States District Court

[Title omitted.]

Motion for leave to take deposition

Filed Aug. 26, 1936

Comes now the defendant, pursuant to equity Rule 47, and showeth as follows:

1. That on June 13, 1936, Newton D. Baker, of counsel for the defendant, wrote a letter to the Secretary of War in the words and figures following, to wit:

Honorable **George H. Dern,**
The Secretary of War, War Department, Washington, D. C.

My Dear Mr. Secretary: The case of United States v. Appalachian Electric Power Company is set for hearing beginning on July 13, 1936, before the Honorable John Paul, District Judge at Roanoke, Virginia, in the Western District of Virginia. The case involves engineering questions upon which the defendant believes that the following officers, as witnesses, would be helpful to the Court: Lt. Col. John F. Conklin, present United States District Engineer for the Huntington District (Ohio River Division); Lt. Col. Fred W. Herman, immediate predecessor of Col. Conklin; and Lt. Col. E. D. Ardery, predecessor of Col. Herman.

None of these officers is within the judicial district or within one hundred miles of the place of trial and they are not, therefore, subject to subpoena. Their depositions could, of course, be taken, but in the belief that their personal attendance would make them more helpful to the Court, the defendant respectfully requests that the War Department by suitable orders authorize their personal appearance, all at the cost and expense of the defendant as to travel and maintenance. The defendant will endeavor to minimize the inconvenience and shorten the absences of these officers from their stations by arranging for their attendance only while actually giving their testimony

The defendant believes that favorable action upon this request will further the administration of justice in a matter important alike to it and to the United States.

With great respect,
Sincerely yours,

NEWTON D. BAKER.

99 2. That in response to the aforesaid letter, S. D. Embick, Acting Secretary of War, replied to the above letter on June 22, 1936, in the words and figures following, to wit:

Honorable NEWTON D. BAKER,
Union Trust Building, Cleveland, Ohio.

MY DEAR MR. BAKER: Receipt is acknowledged of your letter of June 13, 1936, requesting the War Department to authorize the personal appearance of three Army officers, whom you have designated, to testify on behalf of the defendant in the case of the United States v. the Appalachian Electric Power Company at the hearing beginning on July 13, 1936, before the honorable John Paul, District Judge at Roanoke, Virginia, in the Western District of Virginia, provided the expense of attendance of the officers be borne by the defendant.

It is the policy of the War Department not to authorize officers to testify as to matters, knowledge of which they have gained through official channels, except upon a certificate of a court having jurisdiction over a particular case that their evidence is necessary in the interests of justice in the pending case. Upon receipt of such a certificate, which should include a statement of the information expected from the officers, the Secretary of War will authorize the officers to testify unless in his judgment it would be contrary to the public interest to disclose such information. This policy is equally applicable whether the officers appear personally in the court to testify or whether their testimony is to be given by deposition, and conformably thereto the certificate of the court should be furnished to the Secretary of War for his determination as to whether the officers will be authorized to testify.

If upon receipt of the above referred to certificate it appears the officers named should be permitted to testify to matters of their personal knowledge, they, if their services can be spared, will be authorized to appear in person at the hearing beginning July 13, 1936, before Honorable John Paul, District Judge, Roanoke, Virginia, provided no expense to the Government is incurred and the defendant shall arrange with the officers for the payment of their travel expense from their stations to the Court and return and for their maintenance.

The foregoing is predicated upon the assumption that the testimony of the officers named in your letter is desired as to matters within their personal knowledge. If, however, it is contemplated using these officers as expert witnesses you will appreciate that the War Department would not be justified in furnishing such witnesses to testify against the Government.

Sincerely yours,

S. D. Embick,
Acting Secretary of War.

3. That upon the application of the defendant, by counsel, the Judge of this Court addressed the Secretary of War on June 26, 1936, a letter which was as follows, to wit:

100 Honorable George H. Dern,
Secretary of W[illegible] Washington, D. C.

My Dear Mr. Secretary: There is pending before this Court the case of the United States vs. Appalachian Electric Power Company, which is set for hearing before me beginning on Monday, July 13, 1936, at Roanoke, Virginia. The defendant desires that there be present for examination as witnesses at an appropriate stage of the trial certain officers of the United States Army, hereafter named. None of these officers are within the judicial district or within 100 miles of the place of trial and they are, therefore, not subject to the process of this court. The officers in question are:

Lieutenant Colonel John F. Conklin, present United States District Engineer for the Huntington District (Ohio River Division);

Lieutenant Colonel Fred W. Herman, immediate predecessor of Colonel Conklin; and

Lieutenant Colonel E. D. Ardery, predecessor of Colonel Herman.

One of the material issues in the pending suit is whether or not the New River is a navigable water of the United States. Another material question involves the effect on the navigation or navigable capacity of the Kanawha River, of which the New River is a tributary, of the proposed erection by the defendant of a dam across the New River near Radford, Virginia. I have been advised and am of opinion that, due to their connection with and their knowledge of the New and Kanawha Rivers, the officers above named are in a peculiarly advantageous position to give material testimony touching the questions involved. The New and Kanawha Rivers are both within the Huntington District and so, of course, are the navigation dams recently construed or in course of construction upon the Kanawha River. The testimony expected to be given by these officers would be that arising from their peculiar knowledge of the issues involved in this case and would comprise all material testimony which they are competent to give upon these issues.

I, therefore, certify that the material testimony which the above-named officers appear to be competent to give on the said issues is necessary in the interests of justice in the pending case, and request that they be made available provided suitable arrangements shall be made with the above-named officers by the defendant for the payment of their travel expense from their stations to the Court and return, and for their maintenance while en route and in attendance.

The precise time of attendance can be arranged subsequently, but is now expected to be around August 1st, or shortly thereafter. In that respect, I shall see that everything will be made to suit the convenience of the War Department or the Chief of Engineers and the officers themselves.

I have a copy of a letter of June 22, 1936, from S. D. Embick, Acting Secretary of War, to the Honorable Newton D. Baker, of counsel for the defendant. In respect of that letter, it seems to me that any limitation upon the scope of the testimony of such officers, so long as material to the case and competent, would not be compatable with the interests of justice.

Very respectfully,

(Signed) JOHN PAUL,
District Judge.

101 4. That in response to the letter last hereinbefore set forth the Judge of this Court received the letter, which in words and figures was as follows, to wit:

JULY 17, 1936.

Honorable JOHN PAUL,
District Judge, United States District Court,
Western District of Virginia, Roanoke, Virginia.

DEAR JUDGE PAUL: Careful consideration has been given to your letter of June 26, 1936, requesting that Lieutenant Colonel John F. Conklin, Lieutenant Colonel Frederick W. Herman, and Colonel Edward D. Ardery, all of the Corps of Engineers, be made available by the War Department to appear as witnesses at the trial of the case of the United States against the Appalachian Electric Power Company and to testify on behalf of the defendant about the first of August.

You have stated:

"One of the material issues in the pending suit is whether or not the New River is a navigable water of the United States. Another material question involves the effect on the navigation or navigable capacity of the Kanawha River, of which the New River is a tributary, of the proposed erection by the defendant of a dam across the New River near Radford, Virginia. I have been advised and am of the opinion that, due to their connection and their knowledge of the New and Kanawha Rivers, the officers above named are in a peculiarly advantageous position to give material testimony touching the questions involved."

It is the understanding of the War Department that the determination of whether a body of water is navigable must be arrived at under the rule stated in United States v. Holt State Bank (270 U. S. 49, thus, p. 56):

"The rule long since approved by this Court in applying the Constitution and laws of the United States is that streams or lakes which are navigable in fact must be regarded as navigable in law; that they are navigable in fact when they are used, or are susceptible of being used, in their natural and ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade or travel on water; and further that navigability does not depend upon the particular mode in which such use is or may be had—whether by steamboats, sailing vessels, or flatboats—nor an absence of occasional difficulties in navigation, but on the fact, if it be a fact, that the stream in its natural and ordinary condition affords a channel for useful commerce." The Montello, 20 Wall. 430, 439; United States v. Cress, 243 U. S. 316, 323; Economy Light and Power Co. v. United States, 256 U. S. 113, 121; Oklahoma v. Texas, 258 U. S. 574, 586; Brewer-Elliott Oil and Gas Co. v. United States, supra, p. 86.

If the testimony of the officers is desired for the purpose of establishing the fact that the waters in question are or have been used as highways of trade and travel in the customary modes of trade and travel on water, it would seem that there should be many witnesses available to establish this fact.

It appears from your letter, however, that the testimony of these officers is desired not for the purpose of establishing
102 the past or present use of these waters for the purpose of
navigation but for the purpose of giving their opinion as experts as to the navigability of New River and the effect of the proposed dam across New River on the navigable capacity of the Kanawha River.

The War Department is fully aware of its obligation to make available Army officers to testify as to any facts within their personal knowledge which are material to the issues involved in litigation, even where the United States is a party to the litigation and where the testimony of such officers would be against the United States, provided the testimony of such officers does not involve the revelation of confidential matters or military secrets which public policy dictates should not be disclosed. However, the War Department feels it would not be justified in making the above-named officers available to appear at Roanoke for the purpose of giving their opinions as expert witnesses for the defendant in a case in which the United States is the plaintiff.

It is regretted that the War Department is unable to accede to your request.

Sincerely yours,

(Signed). **Harry H. Woodring,**
Acting Secretary of War.

5. That the defendant is advised and therefore believes that if the above-mentioned Lieutenant Colonel John F. Conklin, present United States District Engineer, War Department, Huntington District (Ohio River Division), were made available and allowed to testify he would give valuable testimony as to matters concerning the existing dams on the Kanawha, the new dams under construction, and the operation of both the old and the new dams.

103 6. That defendant is advised and therefore believes that if the aforesaid Lieutenant Colonel Fred W. Herman, who was U. S. District Engineer, War Department, immediately preceding Colonel Conklin, were made available, and were permitted to testify in this case, he would testify that in his opinion New River is not susceptible of practical use by boats capable of carrying any substantial trade or commerce; that in his opinion it is not susceptible of practical use by boats; that in his opinion New River was not in its natural condition and is not now susceptible of navigation; that to the best of his knowledge the series of artificial "waves" released in March 1930 by repeatedly discharging and refilling the entire available pondage at Byllesby and Buck hydro stations on New River did not cause interference with navigation on nor the navigable capacity of the Kanawha River nor did the fluctuation in flow due to those hydro stations cause any such interference during the low-water period beginning September 1930 (when his term of office as U. S. Engineer, Huntington District, began) or at any time afterward during his term as District Engineer ending in 1934; that with the existing and proposed "high" roller gate dams there will be less possibility of interference with navigation on or the navigable capacity of the Kanawha

River than with the old wicket type dams; that the 1930 artificial "wave" tests show that a substantial degree of variable or peak carrying operation of power stations is feasible without interfering with navigation on or the navigable capacity of the Kanawha River; that it would be possible to operate the Radford project variably but nevertheless so that no interference with navigation on or the navigable capacity of the Kanawha River would result with either the old or the new dams.

7. That the defendant is advised and, therefore, believes that if the aforesaid Lieutenant Colonel E. D. Ardery, who was U. S. District Engineer, War Department, immediately preceding Colonel Herman, were made available and permitted to testify, he would testify that in his opinion New River is not susceptible of practical use by boats capable of carrying any substantial trade or commerce; that in his opinion it is not susceptible of practical use by boats; that in his opinion New River was not in its natural condition and is not now susceptible of navigation; that power waves from the Buck and Byllesby dams during the period of 1927–1930, did not cause any interference with navigation on or the navigable capacity of the Kanawha River; that during the power-wave tests conducted in March 1930 from the Buck and Byllesby plants there was no interference with navigation on or the navigable capacity of the Kanawha River nor with the operation with navigation works; that there are numerous fluctuations due to natural conditions (rains) which in the case of
104 the old wicket type dams, would require lowering of wickets in absence of any power waves; that there would be less possibility of interference in the future with existing and proposed high roller-gate dams than there were when the old wicket dams were in operation; that after the new Winfield and Gallipolis roller-gate dams are in operation, substantially larger waves than the test waves of 1930 could occur without adversely affecting navigation or the navigable capacity of the Kanawha River; that a substantial degree of variability or peak carrying operation of power stations is feasible without interference with the navigable capacity of the Kanawha River; that it would be possible to operate the Radford project variably but nevertheless so that no interference with navigation on or the navigable capacity of the Kanawha River would result with either the old or new dams; specifically that it is feasible for the Appalachian Electric Power Company to carry out its declared intention.

8. That the trial of this case was begun on the 13th day of July 1936, and has continued down to the present time, plaintiff having rested its case on the 13th day of August, and the defendant being now engaged in the presentation of its case with the prospect of completing it in the very near future.

9. That whereas it had been hoped that Secretary of War would not persevere in his oppressive and inequitable ruling but instead would make available the above-mentioned officers, who, on account of their more intimate contact with the situation were, and are, in a position to know more about certain of the facts and matters involved in this case than any other persons, nevertheless said officers have not been made available, and no assurance or even intimation has been given either by the Secretary of War or counsel for the Government that they would be made available despite the representations made by the defendant and the Judge of this Court with respect to them; that although, in view of the ruling of the Secretary of War, it is not desired to embarrass the officers in question by asking their opinions and expending the time of this court and causing delay in this trial by necessary habeas corpus proceedings for the purpose of requiring the full and unrestrained testimony of the aforesaid officers, and while certain matters of fact within the knowledge of certain the afore-
said officers appear otherwise in this proceeding, neverthe-
105 less there are certain matters of fact which the defendant
is advised and believes Colonel Ardery will testify to which may be necessary to its case, which matters of fact are:

(a) The power waves from Byllesby and Buck in 1927–30 did not cause any interference with navigation on or the navigable capacity of the Kanawha River.

(b) During the power wave test of March 1930 there was no interference with navigation on or the navigable capacity of the Kanawha River, and there was no interference with the operation of the navigation works.

In consideration whereof, for the good and exceptional cause hereinabove set forth, defendant prays that it may be allowed to take the deposition of the aforesaid Lieutenant Colonel E. D. Ardery, at present, Engineer, Fifth Corps Area, Fort Hayes, Columbus, Ohio, touching the matters of fact last above mentioned in the city of Columbus, Ohio, on the   day of August 1936, before a Notary Public or other authorized officer, at such place to be designated by the defendant, notice of which place and the hour of taking such deposition to be given counsel for the plaintiff on or before 10 o'clock A. M. on August 27, 1936, in order that said deposition may be taken and expeditiously returned and filed in this court and may be read by the defendant as a part of its evidence in this case, and the defendant moves accordingly.

APPALACHIAN ELECTRIC POWER COMPANY,
By (Sgd.) JOHN L. ABBOT, *of Counsel.*

[*Duly sworn to by John L. Abbott; jurat omitted in printing.*]

In United States District Court

[Title omitted.]

Order

Entered Aug. 26, 1936

The defendant, pursuant to Federal Equity Rule 47, having filed its verified motion for the purpose of taking the deposition of Lieutenant Colonel E. D. Ardery, Engineer, Fifth Corps Area United States Army, Fort Hayes, Columbus, Ohio, and good and exceptional cause having been shown by the defendant for the taking of said deposition at the time and place hereafter set forth.

It is ordered that the defendant be and it hereby is authorized and permitted to take the deposition of said Lieutenant Colonel E. D. Ardery before Kenneth L. Sater, a Notary Public, in and for Franklin County, Ohio, at the office of Sater & Sater, 50 East Broad Street, Columbus, Ohio, on August 28th, 1936, beginning at 11 o'clock in the forenoon of said day with respect to the following matters:

(a) Whether or not power waves from the Byllesby and Buck Hydro Stations during the years 1927–30 caused any interference with navigation on or the navigable capacity of the Kanawha River.

(b) Whether or not during the power wave test conducted during March 1930 there was interference with navigation on or the navigable capacity of the Kanawha River and whether or not there was interference with the operation of the navigation works, and

It is further ordered that the defendant be permitted to apply to the United States District Court for the Southern District of Ohio, Eastern Division or to such proper officer as the defendant may be advised for a subpoena to compel the attendance of said Lieutenant Colonel E. D. Ardery at the time and place aforesaid.

(Signed) JOHN PAUL,
District Judge.

Dated Aug. 26, 1936.

9

106a In United States District Court

[Title omitted.]
[File endorsement omitted.]

Stipulation relating to plaintiff's request for findings of fact and conclusions of law

Filed Dec. 2, 1938

It is stipulated by the parties hereto that the attached restatement of plaintiff's request for findings of fact and conclusions of law now may be filed in the District Court and may be included in the transcript of record on appeal in this cause in lieu of plaintiff's original request for findings of fact and conclusions of law and plaintiff's supplemental request for findings of fact and conclusions of law filed in the District Court on the 4th day of March 1937, and the 10th day of August 1937, respectively.

This 17th day of November 1938.

JOHN W. AIKEN,
John W. Aiken,
Special Assistant to the Attorney General,
WILLARD W. GATCHELL,
Willard W. Gatchell,
Principal Attorney, Federal Power Commission,
Solicitors for Appellant.
WENDELL W. FORBES,
Solicitor for Appellee.

107 In United States District Court

[Title omitted.]

Plaintiff's suggested findings of fact and conclusions of law and plaintiff's supplemental requested findings of fact and conclusions of law as renumbered and rearranged for purposes of appeal.

The plaintiff, United States of America, requests the Court to make the following findings of fact and conclusions of law in this case:

FINDINGS OF FACT

I. History of the Controversy

1. A brief recital of the proceedings before the Federal Power Commission shows that the defendant's predecessor in interest, the New River Development Company (wholly owned subsidiary

of the Appalachian Electric Power Company), filed a declaration of intention under the provisions of Section 23 of the Power Act, which declaration could only have been filed for the purpose of securing a determination by the Commission in accordance with the terms of that section.

2. The defendant's predecessor filed a declaration of intention under the provisions of Section 23 of the Federal Water Power Act of June 10, 1920, which declaration was assigned to and accepted by the defendant. Subsequent to such declaration, the defendant filed an application for license, which at its request was considered by the Federal Power Commission in connection with the declaration of intention previously filed. 108 Pursuant to such declaration and under the terms of Section 23, the Federal Power Commission made the investigation called for and found that such proposed construction would affect the interests of interstate commerce. No license for such construction has been accepted by defendant under the terms of that Act.

3. After public hearings held March 2, 1926, the declaration of intention, with the consent of the Commission, was assigned and transferred to the defendant, which at the same time, September 4, 1926, filed an application for license for the proposed development. Pursuant to the terms of the Act, the Commission proceeded with the investigation called for by Section 23 and on June 1, 1927, found that the New River "in the part thereof involved in said declaration of intention is not "navigable waters" within the definition thereof in said Act," but that "the interests of interstate or foreign commerce would be affected by such proposed construction." This finding was made after the Commission had afforded to the defendant every opportunity to argue and present any evidence it desired at an open hearing in opposition to a recommendation by the Executive Secretary that the Commission find that the proposed project would affect the interests of interstate or foreign commerce. Should the Commission find that a proposed project, made the subject of a declaration of intention, under Section 23, would not affect the interests of interstate and foreign commerce and such project when constructed actually affected lower navigable reaches of the stream involved, the owner of such project would not be required to secure a license or other authorization for said project, because Section 23 itself carries the consent of Congress under such circumstances. An examination of Section 23, therefore, leaves no doubt that it was the intent of Congress to afford stream developers uncertain as to the extent of Federal jurisdiction, a means of securing an authoritative finding from the Commission prior to the expenditure of funds in actual construction.

In this conception of Section 23 a declarant is not entitled, as a matter of right, to a public hearing before the Commission
109 makes the finding required by that Section.

4. At the time the Commission made its finding of June 1, 1927, it had before it reports from the Chief of Engineers and his subordinates upon both the declaration of intention and the application for license; affidavits submitted by the defendant; transcripts of hearings before it and before the United States District Engineer at Radford, the latter hearing being upon the application for license, which, at the request of the defendant, was considered at the same time as the declaration of intention. In addition, the Commission had before it certain wave studies which had been made at its direction upon the Pit and Sacramento Rivers in California and other proceedings before it involving proposed use of the upper New River. The record before the Commission shows that the defendant had the fullest opportunity to present factual evidence and legal argument before the Commission acted but failed to present any evidence whatever as to the effect of the operation of the proposed project, contenting itself with numerous briefs.

5. The Commission about July 1, 1927, forwarded to the defendant copies of the license which it proposed to issue for the development, which license the defendant refused to accept. On April 26, 1928, the defendant again notified the Commission of its unwillingness to accept the tendered license and requested the Commission to obtain from the Attorney General of the United States an opinion upon certain legal questions respecting the powers, authority, and jurisdiction of the Federal Power Commission. At its meeting held on May 28, 1928, the Commission: (a) declined to refer to the Attorney General the questions set forth in defendant's letter of April 26, 1928; and (b) declined to modify the form of license as requested in defendant's letter of March 1, 1928.

6. The defendant again on February 4, 1940, requested the Commission to reconsider its finding of June 1, 1927, and on October 6, 1930, applied to the Commission for a so-called
110 "minor part" license under the provisions of Section 10 (i)
of the Power Act. On December 22, 1930, the Commission was reorganized and thereafter on February 16 and 15, 1931, held a hearing relative to the extent of its jurisdiction over defendant's project and on the defendant's request of February 4, 1930. After consideration, the Commission declined to reverse the finding of the former Commission as to the effect of the proposed project upon the interests of interstate or foreign commerce and refused to issue a so-called "minor part" license to the defendant and ordered the defendant not to proceed with construction until it

had received and accepted a standard form license. This order was superfluous, as the provisions of Section 23 carried the same restraint after the finding of the Commission.

7. The Chief of Engineers and the Secretary of War approved the revised plans for the proposed project about December 7, 1930, without, however, advising the Commission the form of license which the Commission could or should issue. The conditions recommended by the Chief of Engineers for incorporation in the license related only to navigation, and did not touch those other matters to which the defendant has objected, namely, recapture, accounting, and conditions relating to power development.

II. Navigability of New River

8. New River is unusual in that its direction of flow is from south to north. Thus the direction of early migration from the Eastern Seaboard was squarely across the river instead of being parallel to it. This fact to a large extent explains the absence of general use of the river in connection with the early settlement of that section of the country. The products of the lead mines and iron furnaces located on the upper New, in passing to the eastern markets, would find little advantage in moving in a northerly direction down the river. With respect to the market at St. Louis or Cincinnati, utilization of the river for purposes of transportation would necessitate navigation of the "gorge," located
111 far down the river between Bowyer's Ferry and the mouth of the Gauley, wherein navigation, although possible—it had been navigated downstream by both the John Marshall Commission, and the Moore & Briggs Expedition—was too difficult and hazardous to encourage regular commerce, especially in heavy cargoes such as lead and iron. Furthermore, in so far as the reach from Allisonia to Hinton is concerned, there was little occasion for the use of New River as a means of transportation prior to the Civil War. The countryside was sparsely settled, and there was no railway connection until the Atlantic, Mississippi & Ohio Railroad crossed the river at Radford in 1856, and the Chesapeake & Ohio at Hinton in 1872.

9. The length of New River from the mouth of Wilson Creek (mile 252) to the junction of the New and the Gauley is 252 miles. The average fall throughout is 7.1 feet per mile. The width of the river increases from 300 feet at the mouth of Wilson Creek to approximately 900 feet at Hinton (mile 62.5). Below Hinton the width decreases considerably. At summer or low stages, the discharge is approximately as follows: at Wilson Creek (mile 252), 1,000 c. f. s.; Lead Mines (mile 190), 1,200 c. f. s.; Radford Dam Site (mile 151), 1,500 c. f. s.; Hinton (mile 62.5),

1,700 c. f. s.; at mouth of the New, 2,000 c. f. s. The average discharge at the five points named is as follows: Wilson Creek, 1,800 c. f. s.; Lead Mines, 2,500 c. f. s.; Radford Dam Site, 3,211 c. f. s.; Hinton, 6,400 c. f. s.; and mouth of the New, 10,000 c. f. s. Considering the river in its natural state, with conditions of flow approaching extreme low, the average depth over the controlling bars or shoals is from nine to twelve inches in the upper reaches—Wilson Creek to Lead Mines; twelve inches in the middle reaches—Lead Mines to Hinton; while in the lower reaches—below Hinton—the depths are considerably increased. During periods of low flow the depths in the pool sections of the river are from five feet to six feet. During periods of mean flow, all depths are increased by a minimum of one foot above those obtaining at low flow. The velocity of the current in the upper reaches is one mile per hour in the pools, three miles per hour over the shoals, and five miles per hour over the rapids. In the reach between
112 Radford and Hinton, the velocity in the pools is one mile per hour, while over the shoals and rapids it varies from a minimum of 1.9 miles per hour to a maximum of 4.4 miles per hour.

10. From the mouth of Wilson Creek (mile 252) to the Lead Mines (mile 190), a distance of 62 miles, the width of the river increases from 350 feet to 450 feet. The fall throughout this reach is approximately eight feet per mile, while natural depths of from nine to twelve inches, over the controlling bars, are found with conditions of flow approaching extreme low. Such depths are increased during stages of mean flow by a minimum of one foot. The discharge during low flow is 1,000 c. f. s. at Wilson Creek and 1,200 c. f. s. at Lead Mines, while the average discharge at Wilson Creek is 1,800 c. f. s. and at Lead Mines 2,500 c. f. s.

11. From Lead Mines (mile 190) to Hinton (mile 62.5) the width of the river increases from 450 feet to 900 feet. The average fall throughout this reach of 127.5 miles is 4.3 feet per mile. With conditions of stream flow approaching extreme low, the average natural depth over the controlling bars in this reach is twelve inches, which depth is increased during mean stages of flow to a minimum of two feet. The discharge at Radford Dam Site (mile 151) and at Hinton (mile 62.5) during periods of low flow, is 1,500 c. f. s. and 1,700 c. f. s., respectively, while the discharge at these points, during mean stages, is 3,211 c. f. s. and 6,440 c. f. s., respectively. In this reach of the river the Virginia-West Virginia state line is crossed at mile 87.25.

12. From Hinton to the mouth of the Gauley River, the average fall per mile is 11.3 feet, while the average discharge is 6,440 c. f. s. at Hinton and 10,100 c. f. s. at the mouth of the river. The width of the river in this reach being less than in the reach immedi-

ately above, and the discharge having been increased by the flow of the Greenbrier, depths at all stages of flow are naturally considerably increased.

13. The so-called "falls" on the New River, and more especially in that reach between Allisonia, Virginia, and Hinton, West Virginia, should be more appropriately termed "rapids." Only
113 infrequently is there found a perpendicular drop and when so found, the fall is rarely more than 18 inches. Within this reach—Allisonia to Hinton—no "fall" extends entirely across the river, there always being found a natural sluice, as is evidenced by the fact that this reach was navigated by boats of shallow draft—12 inches to three feet—as early as 1819, as recently as 1936, and on innumerable occasions between these two dates. Yet there is no record of a portage of a boat ever having been necessary, although there is mention of two or three instances, during periods of extreme low water, when it became necessary to lighten the cargo.

14. In the reach between Allisonia and Hinton the proportion of shoal water to pools is 15% shoals and 85% pools. The low-water depth in the pools ranges between four and five feet.

15. The physical characteristics of the section of the river between Radford and Glen Lyn demonstrate that instead of being a nonnavigable reach, it possesses the same susceptibility for navigation found in the reaches immediately above and below it, that is, Allisonia-Radford and Glen Lyn-Hinton, admittedly navigable "locally." The fall per mile is identical, being 4.4 feet per mile throughout these three reaches, the stream flow somewhat more than Allisonia-Radford and somewhat less than Glen Lyn-Hinton, the natural depths the same—by actual measurement at summer low flow a minimum of two feet was found over all shoals between Glen Lyn and Radford with five exceptions, at each of which a minimum of at least one foot was found.

16. Possessing the same fall, stream flow, and natural channel depths as the reaches immediately above and below it, and actually having been navigated for many years prior to the completion of the railroad in 1883—even a regular passenger line by bateaux having been maintained between Radford and Eggleston Springs—this reach from Radford to Glen Lyn, had it not been paralleled by a railroad in 1883, would doubtless have experienced continued substantial navigation, as did the adjacent reaches between Hinton and Glen Lyn and Radford and Allisonia,
114 until the years 1920–1925.

17. Between 1877 and 1889 Congress appropriated and the War Department expended the sum of $110,000 in improving certain reaches of New River between Hinton and the North Carolina line, thereby increasing navigable depths in the reaches so

improved to two feet at lowest water. The project as originally recommended by the War Department, and approved by Congress, contemplated continuous improvement to effect such navigable depths from Hinton to the mouth of Wilson Creek. The total distance actually improved was approximately 63 miles, consisting of a reach 26½ miles in length extending from Hinton upstream and across the Virginia-West Virginia state line, another reach 29¼ miles in length extending upstream from New River Bridge (Radford) to Pine Creek, mile 175.5, and a third reach eight miles in length extending upstream from the Lead Mines. The object of this improvement was to facilitate navigation on New River by bateaux and to provide minimum navigable depths of two feet at lowest water, thereby making it possible for the bateaux, loaded to capacity, to operate during all seasons of the year. Before the project as originally contemplated was completed, the unimproved reaches of the section under consideration, that is, from Glen Lyn to Radford and from Pine Creek to Fries, Virginia, had been paralleled by the New River Division and the Cripple Creek Branch, respectively, of the Norfolk & Western Railroad. Thereafter, Congress failed to make further appropriations and the project as originally contemplated was not completed.

18. The channel improvements carried on by the Federal Government in the years 1877 to 1883 in the reaches of the river from Hinton, West Virginia, to Wiley's Falls, Virginia, and from Radford, Virginia, to Pine Creek produced good results. The upper portion of the improvement in the reach above the Lead Mines where the fall of the river is approximately 20 feet per mile was ineffective.

19. As far back as the oldest witnesses can recall, to wit, in the early 60's, New River was being navigated commercially by
115 bateaux or keel-bottom boats, both upstream and downstream, throughout the entire reach from Allisonia, Virginia, to Hinton, West Virginia. These river craft were from 60 feet to 80 feet in length, eight feet wide, and, fully loaded to capacity of 10 tons, drew approximately two feet of water. Partially loaded, they were able to navigate in depths of only 12 inches. This traffic, much of which moved between the States of Virginia and West Virginia, continued regularly and without interruption from the early 60's until approximately 1920, although subsequently to 1900 it was confined in large measure to the reach between Hinton, West Virginia, and Glen Lyn, Virginia, and the reach between Radford, Virginia, and Allisonia, Virginia.

20. From Civil War days until the building of the railroad paralleling New River between Glen Lyn and Radford in 1883, there was substantial, regular, and continuous river traffic between Allisonia, Virginia, and Hinton, West Virginia, shipments being

made by bateaux or keel-bottom boats having a capacity of from 7 to 12 tons. These bateaux, "plenty of them" went up and down the river between Radford and Hinton "constantly." Timber and products of the farm were shipped down the river, and store merchandise, sugar, coffee, molasses, etc., were shipped up river. This traffic continued until the coming of the railroad "cut the boat business out." The evidence touching this period discloses that this section between Radford and Glen Lyn instead of being a "nonnavigable reach" was navigated regularly just as were the reaches above and below it, until the coming of the railroad made river traffic thereupon unprofitable. It would hardly be expected that shallow draught river traffic could long survive railway competition. The case of the Snake River in Washington and Idaho abundantly illustrates this point.

21. Even after the paralleling of the river between Glen Lyn and Radford by the Norfolk & Western Railroad in 1883, the evidence discloses considerable traffic on this reach of the river for approximately 15 years.

116 22. As for the reaches between Hinton, West Virginia, and Glen Lyn, Virginia, and between Radford, Virginia, and Allisonia, Virginia, both of which remain unparalleled by railroads today, the evidence is overwhelming as to regular and continuous river traffic thereupon at all seasons of the year except when the river was frozen, and at all stages of water except in flood. This traffic has existed from the time the oldest witnesses could remember—Civil War days—down to the years 1920–1925, when the boats were supplanted by auto trucks. For a period of approximately 45 years, an average of seven to ten million feet of timber annually was transported down the New River from as far up as Narrows, Virginia, to Hinton, West Virginia, and to points below. "Millions of pounds" of tobacco, "loaded at the mouth of East River," Virginia, were transported on the river to Hinton, West Virginia. The witness Tomkies personally handled three million staves annually for a period of five years, all of which were transported to Hinton on New River. A. Knabb & Company owned five stave mills on New River and manufactured and shipped to Hinton by boat 40 thousand staves a day. This company operated every day in the year except during bad weather. The witness Owen, working for Reed Island Iron Company, transported 48 tons of pig iron per week from Reed Island Furnace to Radford. The witness E. W. Lilly personally shipped 100 carloads of timber per year for a period of 15 years from his plant at Hinton, all of which timber was transported down New River. The witness Stover during a period of six years personally handled 150 carloads of staves per year, all of which came down the river. In the single year 1880, 1,250 tons of wheat, 104 tons of

corn, and 400 tons of leaf tobacco were shipped by rail from Hinton, practically all of which came down the river by boat. This activity was not confined to downstream traffic. In 1882, immediately following a period of extreme drought, the following commodities were imported to New River Valley, coming by rail to Hinton from whence the far greater portion was transported on the river to valley destinations: Merchandise, 530 tons; sun-
117 dries, 300 tons; corn, 300 tons; flour, 190 tons; hay, 100 tons.

23. From 1880 to 1920, in the reach of the river from Radford, Virginia, to Hinton, West Virginia, an average cross ties, logs, and saw timber, was transported on New River annually by bateaux, rafting, and loose-logging. In addition thereto, large quantities of timber were transported on other reaches of the river, and throughout the entire reach from Allisonia, Virgiania, to Hinton, West Virginia, a heavy tonnage of grain, tobacco, and other commodities was transported, annually, both in upstream and downstream traffic. In 1883, 25 bateaux were in operation on this reach of the river, and as late as 1912, 12 bateaux were operating between Hinton, West Virginia, and Glen Lyn, Virginia.

24. This traffic on the river was not confined to exceptional conditions or to periods of temporary high water. On the contrary, it was carried on at all seasons of the year except when the river was frozen, and at all stages of water except in flood.

25. The defendant's own witnesses establish substantial traffic on the reach of New River between Allisonia, Virginia, and Hinton, West Virginia, from as early as 1872 well on into the Twentieth Century.

26. Many of the inhabitants of New River Valley in the period 1870–1925 made their livelihood working as boatmen on New River.

27. In addition to these individuals who earned their living as boatmen, many corporations and other individuals regularly made use of New River as a medium of transporting their merchandise, products, and other materials.

28. Navigation on New River was not dangerous or hazardous, especially in that reach between Allisonia, Virginia, and Hinton, West Virginia, as is demonstrated by the fact that the record discloses no fatality in all the history of navigation on the river with the exception of the two intoxicated men who were drowned at the Giles-Pulaski county line.

118 29. A portion of the reach from Hinton to the mouth of the river was navigated by John Peter Salley in 1742, while the entire reach was navigated in 1812 by the John Marshall Party, in 1815 by Laomi Baldwin, and in 1819 by the Moore and Briggs Party, a short portage being required only

at Sandstone Falls. This entire reach was also used for many year in floating loose logs, while the reach from Hinton to Bowyer's Ferry has been navigated to a considerable extent in both upstream and downstream traffic by bateaux.

30. The reach of the river from Wilson Creek to Lead Mines, at mean and higher stages, is susceptible to navigation by light-draught boats, loose logs, and rafts and has been so used.

31. The treatment of New River by the States of Virginia and West Virginia and by the Federal Government is indicative of its navigable capacity.

32. In the Radford project basin, title to the bed of New River is not held by the owners of riparian lands, but is reserved to the State of Virginia.

33. Defendant's Radford Project is located at mile 151 on New River, between Allisonia, Virginia, and Hinton, West Virginia.

34. The New River from the mouth of Wilson Creek to the mouth of the Gauley River, in its natural and ordinary condition, is capable or susceptible of being used as a highway for commerce over which trade and travel may be conducted, among the several states, in the customary mode of trade and travel on water, and, in fact, has been so used. I find that its susceptibility to such use is not confined to exceptional conditions or to short periods of temporary high water.

35. The New River from the mouth of Wilson Creek (mile 252) to the foot of Foster's Falls (mile 183), in its natural and ordinary condition, is capable or susceptible of being used as a highway for commerce over which trade and travel may be conducted among the several states in the customary mode of trade and travel on water, and has been so used. I find its susceptibility to such use is not, and its actual use was not, con-
119 fined to exceptional conditions or to short periods of temporary high water.

36. The New River from Foster's Falls, Virginia (mile 183), to Hinton, West Virginia (mile 62.5), in its natural and ordinary condition, is capable or susceptible of being used as a highway for commerce over which trade and travel may be conducted between the States of Virginia and West Virginia in the customary mode of trade and travel on water, and was, in fact, actually so used for many years. I find that its susceptibility to such use is not, and its actual use was not, confined to exceptional conditions or to short periods of temporary high water, but that it is susceptible of such use, and was used, throughout the entire year, with the exception of short periods, occurring only rarely, during which the river is frozen.

37. The New River from Hinton (mile 62.5) to its mouth, in its natural and ordinary condition, is capable or susceptible of being used as a highway for commerce over which trade and travel may be conducted among the several states in the customary mode of trade and travel on water, and has been so used. I find its susceptibility to such use is not, and its actual use was not, confined to exceptional conditions or to short periods of temporary high water.

120 III. Effect of the Operation of Defendant's Project on Any Navigable Waters

38. The Radford power project now under construction by defendant will have a usable storage capacity of approximately 100,000 acre-feet and a dead storage capacity in addition thereto of approximately the same volume which will not be used after the reservoir is filled. It is proposed to install machinery in the power plant with hydraulic capacity of about 9,000 cubic feet of water per second. On the average there is a flow of 9,000 second-feet or more in New River past the site of the proposed dam for only twelve days a year and a flow of 3,000 second-feet or more for not more than 141 days per year. By reason of the variance between the hydraulic capacity of the machinery and the amount of water available, it will be necessary to operate the power plant on an irregular or varying schedule, shutting it down for such intervals of time as will be required to store water in sufficient volume to operate the power plant at capacity, and then opening the plant sufficiently to permit utilization of all water available during the period of operation consonant with the maintenance of storage in the reservoir. During flood times the flow of this river at the site of the Radford project has been higher than 60,000 second-feet.

39. Practically all of the engineering witnesses testified that it would be physically possible to operate the proposed project without injuring navigation on the New-Kanawha River downstream from the project or otherwise affecting any interests of interstate commerce, but there was sharp division of opinion between engineers respecting the probable method of operation. Witnesses for the defendant expressed their opinion that the defendant would "self-regulate" the proposed project and the discharge of water passed the dam so as not to cause substantial impairment of navigability of the Kanawha River. Such opinions have no weight with this Court in determining the jurisdictional question which looks to potential operations of the project under consideration. It seems apparent that the economic interest of the defendant would encourage the use of

the large storage capacity available in that manner which would best serve the public utility system with which the Radford Project will be interconnected, and such economic self-interest
121 may, in the future, cause wide variations in the discharge through the powerhouse at times of low water. At any rate the Court cannot find that "self-regulation," as promised by the defendant, is sufficient to oust the Federal Government of jurisdiction.

Although the United States is bringing this suit against the Power Company to enjoin the construction and operation of the proposed development, manifestly, since a license in some form has been offered and is in effect again tendered in the bill of complaint, the Government cannot now be heard to say that the power development should not under any circumstances be permitted because of its effect upon the interests of interstate commerce, and the Court does not so find. Nor is it necessary for this suit that the most economic method of operation be examined by the Court to determine the extent of the effect which this project will have on lower navigation. It is sufficient for the Court to find, and it is well established by the evidence, that under ordinary practice, as the witness Schneidenhelm said, the large storage capacity available would be used to store water during times of high flow and to release it during times of low flow. Furthermore, a hydroelectric plant of this capacity (9,000 c. f. s.) located on a stream with a flow for ninety percent of the time of only about 1,200 c. f. s. and serving as a part of a large public-utility power system, would operate, it was agreed, on a peak-load basis, shutting down either wholly or nearly so some portion of each day and on week ends and operating for several hours a day at as near full capacity as the water supply, including the use of stored water, would permit.

40. Irregular operation of the power plant will be the normal method and will discharge past the dam, varying flows during those periods of the year when the flow is less than 9,000 second-feet, the irregular discharge ranging from a complete shut-off to as high as 9,000 second-feet or more, and will occur for over 96 percent of each year. The interconnection of the Radford project with the other hydroelectric and steam-generating plants of the defendant's electric transmission system justifies such available or peaking operation of the Radford power plant as a
122 feasible and economical method of supplying the load of that system during those hours of each working day when the power demand is heavy.

41. From the statements of the last-mentioned and other witnesses the Court finds that the flow past the Radford dam in times of low water may vary from a flow approaching zero to a max-

imum of 9,000 c. f. s. and the principal adverse effect upon the river below will be caused by such variation in flow. It seems to be agreed that the normal operation of the proposed project would, in times of low water, result in an average flow substantially higher than the recorded minimum low-water flow at the dam site which would increase the low-water flow in the Kanawha and Ohio Rivers into which it flows. The Court further finds that if the high flows are stored in the reservoir and released during low-water periods, a beneficial effect which must follow will be the consequent deepening of the navigable channel below at such times of release. As a sequitur, the Court finds that if the Radford storage reservoir is available for catching flood waters, as it may well be in normal operation, there may be substantial lessening of flood heights below. All of these effects will be reflected in the commercial use of the lower waters, and hence will affect the interests of interstate commerce.

42. There was further conflicting testimony as to the probable extent and effect of intermittent operation of the Radford power project and the opinions of engineering witnesses on both sides were supported by involved calculations. It was agreed, however, that if the flow past the proposed dam should be considerably increased within the range of possibilities for that short period of hours necessary for daily peak-load operation during low-water stages, there will be a variation in flow on the presently used portion of the New-Kanawha River and that by reason of the large contribution made by the drainage area above Radford to the flow at Kanawha Falls during low-water periods such variations of the New River flow at Radford will affect the navigability and the navigable depth of the Kanawha River. It follows as a matter of course that the concomitant effect on the intervening stretch of New River from the dam to Kanawha
123 Falls will be greater than that on the Kanawha itself.

43. The flow of New River from above the Radford dam site of the defendant furnishes a large proportion of the flow of the Kanawha River at the head of steamboat navigation thereon, and in times of low flow has contributed as high as 70 percent of the flow of the Kanawha at its mouth. The official records show that during many months of low flow from one-half to three-fourths of the flow of the Kanawha River at its mouth originated above the Radford dam site. During 30 periods of record 54 percent of the entire Kanawha River flow came from this source. During six months of the year 1930, from June 1st to November 30th, inclusive, 58 percent of the flow of the Kanawha River was contributed by the New River above Radford.

44. During low-water seasons the flow of the Kanawha River is generally large in comparison with that of the upper Ohio River

at their junction. During the week of August 24th to 31st, 1918, the flow out of Kanawha River was almost four times the flow of the upper Ohio River, and during other periods in that year was twice as large as the flow in the Ohio River. In the years 1920, 1923, 1929, and 1932, the flow out of Kanawha River and into the lower Ohio River at times substantially exceeded the flow from the upper Ohio River. No less than 22 per cent of the flow sustaining navigation on the Ohio River above Cincinnati during thirty critical low-water periods of the fifteen years from 1918 to 1932 inclusive, came from above the Radford dam site. During annual low-flow periods on the Ohio and Kanawha Rivers the entire flow of New River, unimpeded, is necessary for navigable purposes in the Kanawha and Ohio.

45. Slack-water navigation is maintained on the Kanawha River by means of two concrete roller-gate dams, one located at Marmet and one at London, and six wicket dams, three of which will be removed when a third concrete dam with roller gates is completed at Winfield. Another concrete dam with roller gates is under construction on the Ohio River at Gallipolis downstream
124 from the mouth of the Kanawha, which will complete the improvement increasing the channel depth from six feet to nine feet throughout. Below the Gallipolis dam, slack-water navigation on the Ohio River is maintained by means of wicket-type dams now in operation. There is considerable leakage through the wicket dams, and it is necessary to continually caulk and "needle" the wicket dams to maintain the water level in the upstream pools above such dams for navigation.

46. Navigation on the Kanawha and Ohio Rivers will be interfered with by the great variations in flow due to operation of the Radford project on peak loads. Power waves will be transmitted by peak load operation of the Radford power plant from Radford, Virginia, to the Kanawha River and there pass through the slack water pools behind the London, Marmet, and Winfield dams maintained at closely fixed levels, thence through the pool which will be created by the Gallipolis dam now under construction and so into the pools behind the wicket dams in the Ohio River below Gallipolis. Such irregular artificial fluctuations due to peak loading cannot be anticipated by navigators on either the Kanawha or Ohio Rivers and either an increasing or decreasing flow caused thereby will interfere with the operation of boats on those streams. Such artificial variations in flow on the Kanawha and Ohio Rivers will make it difficult to enter locks located at the dams or to pass through chutes or narrow places in the river channel of the Kanawha River and must be checked by constant operation of the gates on the dams, and if not checked will cause groundings in boats operating on the rivers.

47. It is reasonable to expect that the location of the defendant's proposed power plant with a usable storage of 100,000 acre feet at Radford, Virginia, with the ability to fluctuate the pool levels of the presently used Kanawha River will cause apprehension among prospective shippers on the Kanawha River, resulting in retarded development of such shipping facilities and hence will affect an interest in interstate commerce.

48. The defendant has not secured the consent of Congress or the approval of the Secretary of War and Chief of Engineers required under the Rivers and Harbors Act of March 3, 1899,
125 for the construction and operation of its Radford Project.

49. The power output of the two power plants at London and Marmet, located on dams owned and constructed by the United States, must necessarily be dependent upon the flow of water reaching those dams from above and upon the time such flow reaches these plants. If the flow of the Kanawha River should be varied as the Court finds it may be varied by the Radford project, the property interests of the United States in the power developments on the Kanawha River would be affected.

50. A comprehensive plan for the first step in Federal improvement of the New-Kanawha River is shown by the purchase of large tracts of land in the upper drainage basin and the proposed acquisition of additional loads and in the recommendations of the Chief of Engineers and Secretary of War to Congress contained in Ex. 145. The comprehensive character of such river development needs no support in engineering testimony, but witnesses for both sides testified to the desirability of coordinated operation of developments on this river.

51. The construction and operation of the defendant's Radford project will obstruct the navigable capacity of navigable waters of the United States, namely: The New River, the Kanawha River, and the Ohio River.

52. The construction and operation of the defendant's Radford project will alter and modify the condition and capacity of the channel of navigable waters of the United States, namely: The New River, the Kanawha River, and the Ohio River.

53. The construction and operation of the defendant's Radford project will affect the interests of interstate commerce as related to navigable waters of the United States, namely: The New River, the Kanawha River, and the Ohio River.

54. The flood flow on New River above the Radford project is at times so great as will necessitate the synchronized control and operation of the Radford project in conjunction with other projects on the New and Kanawha Rivers under Federal license in order to lessen the dangers and destruction by floods on these rivers.

126 CONCLUSIONS OF LAW

1. New River from the mouth of Wilson Creek to the mouth of the Gauley River is in fact and in law navigable waters of the United States.

2. New River from the mouth of Wilson Creek (mile 252) to the foot of Foster's Falls (mile 183) is in fact and in law navigable waters of the United States.

3. New River from Allisonia, Virginia, to Hinton, West Virginia, is in fact and in law navigable waters of the United States within the meaning of the Act of Congress of 1899, Chapter 425; 30 Stat. 1151. Irrespective of whether the river is navigable below Hinton or above Allisonia, the reach between these points, wherein is located defendant's Radford project, provides an avenue of commerce between the States of Virginia and West Virginia, and is, therefore, navigable waters of the United States.

4. New River from Hinton (mile 62.5) to its mouth is in fact and in law navigable waters of the United States.

5. The erection of defendant's Radford Dam and other works without approval of the Secretary of War and without the consent of Congress is in violation of the Act of 1899, Chapter 425; 30 Stat. 1151, and of the Federal Water Power Act as amended.

6. The construction and operation of the defendant's Radford project is without specific authority of law, and in violation of Sections 9 and 10 of the Rivers and Harbors Act of March 3, 1899.

7. Construction of the defendant's Radford project is in violation of the provisions of the Power Act.

8. New River at the site of the proposed Radford dam is a stream subject to the jurisdiction of Congress under its authority to regulate commerce with foreign nations and among the several states.

9. The finding of the Commission of June 1, 1927, that the construction and operation of the Radford project would affect an interest in interstate commerce is fully supported by the evidence and should not be disturbed.

127 10. For the safest, most efficient, and useful control of the flow of the New and Kanawha Rivers for flood, navigation, power, and other public uses, a synchronized control of all dams and power projects on New River from the North Carolina state line north under a Federal license is necessary, and requires the defendant to operate its Radford project under a federal license.

11. The Commission upon the evidence and the law is entitled to a decree requiring the defendant either to accept the license

tendered or remove the obstruction which it has placed in the channel of New River above Radford.

Respectfully submitted.

HUSTON THOMPSON,
Special Assistant to the Attorney General.
JOHN W. AIKEN,
WAYNE C. WILLIAMS,
ALLAN D. JONES,
Special Assistants to the Attorney General.
OSWALD RYAN,
General Counsel, Federal Power Commission.
WILLARD W. GATCHELL,
Attorney, Federal Power Commission.
CHARLES GOETZ,
Attorney, Federal Power Commission.
JOSEPH H. CHITWOOD,
United States District Attorney.

I hereby certify that the foregoing is a true and correct copy of a paper filed by counsel on December 2, 1938, under the jointly signed stipulation of counsel for use as therein specified, and to be included in the transcript of the record in lieu of plaintiff's original request for findings of fact and conclusions of law, and plaintiff's supplemental request for findings of fact and conclusions of law, filed in this court on March 4, 1937, and the 10th day of August 1937, respectively.

C. E. GENTRY,
Clerk, U. S. District Court.

From the foregoing restatement of plaintiff's requested findings of fact have been omitted the supporting record references originally included for the benefit of the District Court.

133 In United States District Court for the Western District of Virginia, at Roanoke

In Equity No. 8

THE UNITED STATES OF AMERICA

vs.

APPALACHIAN ELECTRIC POWER COMPANY, A CORPORATION

On final hearing of a suit in equity to enjoin the construction of a dam and electric power plant on New River in the State of Virginia.

Before PAUL, District Judge.

Harry W. Blair, Assistant Attorney General; Huston Thompson, Special Assistant to the Attorney General; John W. Aiken, Wayne C. Williams, Allan D. Jones, Special Assistants to the Attorney General; John A. Skiles, L. A. Gellis, Special Attorneys; Oswald Ryan, General Counsel, Federal Power Commission; Willard W. Gatchell, Attorney, Federal Power Commission; Joseph H. Chitwood, U. S. District Attorney, *for the Plaintiff;* Newton D. Baker, Raymond T. Jackson, of Cleveland, Ohio; M. F. Millikan, of New York City; A. Henry Mosle, Creswell M. Micon, Fraser M. Horn, Wendell W. Forbes, of New York City; John S. Draper, of Pulaski, Va.; John L. Abbott, of Lynchburg, Va., *for the Defendant;* Abram P. Staples, *Attorney General of Virginia (for the State of Virginia)*; Homer A. Holt, *Attorney General of West Virginia (for the State of West Virginia).*

134 OPINION BY THE COURT

THE NATURE OF THE CASE AS STATED IN THE BILL, AND THE ANSWER THERETO

The cause of action set out in the bill of complaint, stated briefly and in substance, is as follows: That the defendant, a Virginia corporation, engaged in the business of producing, distributing, and selling electric power, has begun and is continuing the construction of a dam across the New River near Radford in Pulaski County, Virginia, for the purpose of impounding the waters of that river and utilizing the same for generating electric power. That the New River is a stream which arises in the northwestern part of the State of North Carolina and flows in a general northerly and northwesterly direction across the State of Virginia, into the State of West Virginia, in which latter state, after joining with the Gauley River, it becomes known as the Kanawha River and, under the latter name, continues to flow in a general northwesterly direction until it discharges into the Ohio River at Point Pleasant, West Virginia. It is alleged that the New River and the Kanawha constitute one continuous stream and that it is a navigable interstate stream constituting a navigable waterway of the United States and that the New River, at the point where defendant's dam is being constructed, is a navigable water of the United States and said dam is being constructed in and across a navigable water of the United States. It is alleged that the plaintiff has recently expended and is continuing to expend large sums in improving the conditions and facilities of navigation in that portion of the stream known as the Kanawha River. That defendant's project at Radford would, by impounding the waters of New River, not only render New River impossible of navigation during long periods of each year but would seriously impair navigation upon the Kanawha River.

It is alleged that the defendant, before proceeding with the construction of its Radford project, applied to and obtained from the State of Virginia a license to construct the same, and that defendant is proceeding under the purported authority of said license. But that the acts of defendant are being

performed without the consent of Congress and without any permission or authority of the Secretary of War and without having obtained any license from the Federal Power Commission and that such acts are in violation of the laws of the United States, and particularly in violation of what is known as the Rivers and Harbors Act of March 3, 1899 (33 U. S. C. 401, 403) and of the Federal Water Power Act of June 10, 1920 (16 U. S. C. 791–823).

It is further alleged that in June 1926 there was filed before the Federal Power Commission by the New River Development Company, a predecessor in interest of defendant, a declaration of intention to construct the dam at Radford and that in September 1926 the New River Development Company transferred its rights in such declaration of intention to the defendant, which thereafter continued the presentation of the same to the Federal Power Commission. That the Commission, after causing an investigation to be made and considering the plans of defendant's project, made a finding that said project would affect the interests of interstate commerce. That notwithstanding said finding, the defendant, without obtaining a license from said Federal Power Commission, began its construction of said dam, on or about June 1, 1934, and is proceeding with the same.

Based upon its allegations that the stream in which the dam is being constructed is a navigable water of the United States and that the construction of the dam will obstruct and impair interstate commerce on the New River and on the Kanawha River and will affect the interests of interstate commerce, the bill prays (a) That the defendant be enjoined from constructing or maintaining its project otherwise than under a license to be issued by the Federal Power Commission, or in the alternative (b) That the

Court issue a mandatory order requiring the defendant to remove any and all parts of the project from the limits of New River.

In addition to the essential facts above recited, the bill contains much matter in recital of evidential facts upon which it bases the contention that the New River is navigable and that the construction of this dam will impede navigation on it and on the
136 Kanawha. This matter need not be recited here. So far as it is proven by evidence and is material, references will be made to it in the later discussion.

The Answer

The answer, briefly summarized, avers in substance the following matter in defense to the bill of complaint: The defendant admits that it has begun and is continuing the construction of the project at Radford. But denies that such construction is in any way unlawful. It denies that New River is a navigable stream over which the United States has jurisdiction and control but, on the contrary, avers that it is a nonnavigable stream and, at the point of the proposed project, is subject only to the jurisdiction and control of the State of Virginia. It avers that the defendant now owns the lands which will be affected by the construction of the dam and that the project does not require or involve the use of any lands or other property of the United States; and that, being the owner of all lands affected, the defendant has a full and complete proprietary right to construct its water power project, subject only to such regulations as the State of Virginia may impose. That permission to construct said dam has been granted by the State of Virginia, in pursuance to application therefor, and that said project is being constructed pursuant to a license granted by the State of Virginia and in conformity to the conditions and restrictions imposed by said State.

Defendant admits that the Kanawha River, lying wholly within the State of West Virginia and into which New River flows, is a navigable stream and that the plaintiff has developed the Kanawha for the improvement of navigation thereon. But it avers that the head of navigation, even with this development, is at a point in the Kanawha downstream from the point of inflow of the New River, that the New River is not and never has been navigable and that the project of defendant is located on the New River approximately 155 miles upstream from the head of navigation on the Kanawha. Defendant avers that neither the construction nor operation of its project will interfere with or obstruct navigation or the navigable capacity of

any navigable water of the United States; that the defendant intends and has declared its intention to so operate its proj-
137 ect as not to interfere with or obstruct such navigation or navigable capacity and that, even if this were not true, it would be impossible for said project, in the course of any known or practicable method of operation, to interfere with or obstruct or in any way adversely affect navigation or the navigable capacity of any navigable waters of the United States. That the laws of Virginia under which the license from that state was issued protect any rights of the United States and that in any event the Secretary of War has power summarily to remove any obstruction if any such occur.

The answer further states that it is true that New River Development Company, predecessor in interest of defendant, filed a declaration of intention with the Federal Power Commission in respect to the Radford project, but says the date of such filing was on or about June 26, 1925, and not June 26, 1926, as alleged in the bill. And admits that all rights and obligations under said declaration of intention were transferred to defendant on September 2, 1926, and that defendant continued presentation of the same before the Commission. It states this declaration of intention was presented for the purpose of obtaining a finding that neither the construction nor operation of defendant's project would affect the interests of interstate commerce. It avers that on June 1, 1927, the Federal Power Commission made a finding that the portion of the New River involved by defendant's project is not "navigable waters" within the meaning of the Federal Water Power Act, which finding was correct. But, it avers, the Commission also made a finding that the proposed construction would affect the interests of interstate commerce, which latter finding, the defendant avers, is erroneous and arbitrary, is unsupported by evidence and contrary to the evidence and facts before the Commission. That the defendant, although challenging the existence of any jurisdiction in the Federal Power Commission over the project, nevertheless offered to accept Federal license containing such conditions relating to the manner of construction and operating such project as are necessary and appropriate to prevent interference with the navigable capacity of the Kanawha River. But that the Commission refused to issue such a license and insisted that defendant should accept a license containing the conditions provided by the Water Power Act for projects located on navigable waters, contrary to the finding of the Commis-
138 sion that the project was upon a nonnavigable stream.

That the license tendered by the Commission, known as the standard form license, contained many conditions which have no substantial or reasonable relation to the interests of interstate commerce or to the protection of the navigable capacity of any navigable waters of the United States; that these conditions are beyond the power of the Federal Power Commission of the Federal Government to impose as a condition to defendant's right to build and operate its project. That the tendered license contains unauthorized and unconstitutional conditions and requirements which have no relation to the protection of navigation or navigable capacity and which would restrict defendant's use of its property and depreciate the value thereof; and that defendant refused to accept the tendered license. That, even if it be held that defendant's project is located upon a navigable stream or is so located as to affect the navigable capacity of a navigable water and that a license from the Federal Power Commission is required therefor, the conditions of such license must be limited to those having a reasonable relation to the protection of navigation or navigable capacity and cannot include conditions having no relation to such matters.

The defendant avers that the Federal Power Commission and the Chief of Engineers of the United States Army, as agencies of the plaintiff, have made findings that New River is not a navigable stream and that plaintiff is thereby estopped to question its nonnavigability. And finally the defendant avers that no valid cause of action is stated by the bill because it shows no present damage to or invasion of plaintiff's rights but only an assumed and hypothetical invasion; that the alleged effect of the construction and operation of the project upon interstate commerce is merely a speculative hypothetical and conjectural effect which could be produced only if defendant, at some future time, were to operate its project in a fanciful and impracticable manner, and that there is no showing of any intention on the part of defendant to operate in such manner; that the assumed possibility of producing an effect on interstate commerce by operation of the project is predicated solely upon conjecture that it is physically possible for defendant so to operate it, although it has never done so, has never porposed to do so and has expressly asserted
139 that it intends not to do so.

Upon the filing of the answer the plaintiff submitted a motion to strike it upon the usual ground of insufficiency. Argument upon this motion was at length and covered substantially every issue of law involved in the case. The Court, being of opinion that an accurate and proper application of the pertinent legal principles could be arrived at only after full development of all facts, denied the motion to strike the answer. Upon argument of this motion the State of Virginia and the State of West Virginia, appearing by their respective Attorneys General, who alleged that these states had a material interest in the litigation, were granted leave to appear amici curiae and filed briefs.

Upon the trial of the case, the testimony of witnesses and the exhibits introduced produced a record voluminous beyond description. For this the Court is, no doubt, in some measure responsible. In an effort to ascertain all pertinent information bearing on the issues involved, much latitude in the introduction of evidence was allowed. And industrious counsel armed with every facility for research, historical and scientific, responded to the opportunity offered. The result is a record of evidence so extensive that no effort to recount it or even to summarize it is possible. Such references as are made to the evidence must necessarily refer to it in the most general way and to facts established by the weight of it.

The Streams Involved

It appears necessary to a proper consideration of the issues involved in this case that there should first be determined whether New River is a navigable stream. To this end a description of the course of the New and Kanawha Rivers, their physical characteristics and other facts pertinent to the questions involved is desirable.

The New River has its sources in two mountain streams in the northwestern part of the State of North Carolina, known as the north and the south forks of the river. These, uniting to form the New River at a point near the North Carolina-Virginia state line, flow into Grayson County, Virginia. A mile or so after en-
tering Virginia, they are joined by Wilson Creek. Most of
140 the maps, profiles, etc., introduced in evidence show the
course of the river to the vicinity of Wilson Creek and that
point may be said to be taken as the head of the River for the purposes of this case. References to distances, etc., hereafter made will treat the mouth of Wilson Creek as the head of New River. Beginning at the mouth of Wilson Creek, the flow of the river is practically due east for about 25 miles. It then turns in a generally northeasterly direction for approximately 100 miles, during which it passes through portions of the counties of Grayson, Carroll, Wythe, and Pulaski. Below Radford, in Pulaski County, the river turns generally northwestward through Giles County and crosses the Virginia-West Virginia state line at a point about 160 miles below its head (the mouth of Wilson Creek). After crossing into West Virginia, it flows north for about 25 or 30 miles to the City of Hinton and thence inclines to the northwest and flows about 65 miles in that general direction to Gauley in Fayette County, West Virginia, where it forms a junction with the Gauley

River, which comes in from the east. Below this point the stream resulting from the junction of the New and the Gauley is known as the Kanawha River, which continues in a northwestward direction about 95 miles to junction with the Ohio River at Point Pleasant, West Virginia. Immediately below the junction of the New and the Gauley (1 or 1½ miles below) is the point known as Kanawha Falls, which will hereafter be frequently referred to. Kanawha Falls is a precipitous rapid with a fall of 16 feet. This point may be said to be the head of the Kanawha River and the planned head of navigation on the Kanaw*ah* is just below Kanawha Falls. For convenience, the stream below the junction of the New and the Gauley will be referred to as the Kanawha River; the designation New River will apply to the stream commonly known by that name and extending from the mouth of Wilson Creek to the junction with the Gauley River. The distance from the mouth of the Kanawha up to the mouth of Wilson Creek is approximately 347 miles; and from the mouth of New River (at Gauley) up to the mouth of Wilson Creek is about 252 miles. These distances are measured in the course of the stream which, particularly in New River, is marked by many large bends or loops.

141 The elevation above sea level at the mouth of Wilson Creek is about 2,440 feet; at the mouth of New River (at Gauley) 651 feet; at the mouth of the Kanawha about 500 feet. The elevation at Kanawha Falls, head of navigation on the Kanawha, is 620 feet. It will thus be seen that the fall in the Kanawha from Kanawha Falls to the Ohio River is 120 feet in a distance of 96 miles, or 1.25 feet per mile; while the fall in New River from the mouth of Wilson Creek to Gauley is 1,789 feet in a distance of 252 miles, or 7.1 feet per mile. The slope in New River, however, is not uniform throughout its length. For example, from Wilson Creek down stream for about 40 miles the fall is fairly uniform at a rate of about 5.7 feet per mile, while in the next succeeding 18 miles there is a fall of 260 feet, an average of 14.4 feet per mile. Nor are the steeper slopes of the river confined to its upper reaches, for we find that in that portion of the river between its mouth and the gauging station at Caperton, West Virginia, 17 miles above, there is a fall of 289 feet, or 17 feet per mile. These variances in slope occur throughout the course of the stream. The project of defendant which is the subject of dispute is located at a point about 5 or 6 miles upstream from the town of Radford, Virginia, and is approximately 100 miles below the mouth of Wilson Creek and about 152 miles above the mouth of New River. It is at an elevation of about 1,730 feet above sea level. In this portion of the river, and for some miles above and below, the slope of the river is fairly uniform at from 5 to 8 feet per mile.

The variations in the slope occur at short intervals and the river, throughout its entire length, consists of a series of pools of comparatively still water separated by shoals or rapids. The pools vary in length from a few hundred yards to as much as several miles, with a probable average length of less than a mile. The rapids also vary in extent and also in the degree of fall. Rapids of 2,000 feet are not uncommon and some are of much longer extent. In some of them the water falls almost vertically for from 3 to 6 feet. The slope of the river is such as tends to a rapid run-off of the water and to high velocities in the current of the stream, particularly through the shoals or rapids. Throughout its length the bed of the stream is rocky, being across ledges of limestone and sandstone and, at many places, with boulders
142 and jutting rocks above the surface of the water. In the course of a report made by the Secretary of War to the House of Representatives in 1935 (74th Congress, House Document No. 91) there is contained the following general description of New River which is here quoted because of its brief but accurate description of the general characteristics of the stream.

"Throughout almost its entire length the river flows through a rugged mountainous country. Its valley is narrow, the flood plain being very little wider than the low-water channel, which varies in width from about 200 to 1,000 feet. In many places the banks are sheer bluffs rising from the river's edge. Ledges of limestone, sandstone and shale crossing the river at frequent intervals create rapids and waterfalls. The waterfalls vary in height up to about 18 feet. Between the ledges there are usually short pools of varying depths. The low-water depth in the channel varies from a few inches to more than six feet."

In its course the New River has a number of tributary streams. The principal ones of these are Reed Creek, Reed Island Creek, and Mack Creek which enter above the site of defendant's project, and Little River, Walker Creek, Indian Creek, and Bluestone River which enter between the site of defendant's project and the City of Hinton, West Virginia. At Hinton the New River receives Greenbrier River, its largest tributary. Between Hinton and the mouth of New River there are few, if any, tributaries of any moment. One peculiarity of the river is that the section from Hinton to the mouth of the river is more steep, rough and rugged than any other section. A few miles below Hinton the river enters what is known as the gorge through which it flows for approximately 45 miles in a narrow and tortuous channel between high mountains. The bed is a mass of sharp ledges and boulders and through this, with the steepest slope in its entire course, the water rushes with great velocity.

The drainage area of the entire New River is 6,918 square miles. The drainage area at the site of defendant's project is 2,400 square miles. Due to seasonal variations in precipitation and the slope of the stream there is a wide fluctuation in the volume of flow. At the site of the defendant's project, the average flow over a period of 28 years ending September 30, 1935, was 3,211 cubic feet per second, but the flow is less than this for sixty-five percent of the time. The lowest flow know at this point was 521 second-feet on
September 6, 1930. The greatest flows known at this point
143 occurred during floods in 1878 and 1916 and were estimated
to be about 155,000 second feet and 146,000 second feet respectively. At the mouth of New River, the average flow over a period of years is stated to be 10,100 cubic feet per second, and the average flow of the Gauley River at its mouth 2,600 feet per second. At Kanawha Falls which, as stated, is the head of the Kanawha and immediately below the junction of the New and the Gauley, the records for 56 years show an average flow of 13,000 second-feet, a maximum of about 270,000 second-feet on September 14, 1878, and a minimum of 640 second-feet on August 15, 1930. The drainage area at Kanawha Falls is 8,300 square miles.

From these figures it will appear that, while the flow in New River is subject to wide variation, the river carries a large volume of water in the course of a year. There is no denial that the volume of water passing through the stream over any extended period would be sufficient for purposes of substantial navigation provided other conditions obtained which made it available for that purpose.

The Kanawha River, extending about 95 miles from Kanawha Falls to Point Pleasant, carries the waters delivered by the New and the Gauley rivers as well as that of tributary streams entering below Kanawha Falls. While there is some variation in the slope of the Kanawha, it is faily uniform and comparatively small, averaging about 1.25 feet per mile throughout its course. It is conceded that Kanawha is at present a navigable stream, and that the Federal Government has developed, and is developing, its navigable capacity by a series of dams and locks which will permit of substantial navigation to a point shortly below Kanawha Falls.

QUESTION OF THE NAVIGABILITY OF NEW RIVER

In regard to the navigability of New River, the following, each briefly and generally stated, are the contentions upon which the plaintiff appears mainly to rely:

(1) That the names Kanawha and New are names given to different portions of the same stream and that they comprise one

stream which must be treated and dealt with as a whole. That its actual and conceded use for purposes of navigation (in the lower reaches) imparts to the stream as a whole the status of a
144 navigable water over which the Federal Government has control.

(2) That the states of Virginia and West Virginia have dealt with and treated the New River as a navigable stream. That the Federal Government has done likewise and has, in the past, appropriated and expended funds for the improvement of the navigable capacity of the river.

(3) That New River has in fact, in past years, been used for the movement of commerce in substantial amounts between the states of Virginia and West Virginia and that it is now available for and susceptible to such use.

(4) That, aside from the question of actual present use in interstate commerce, the New River is susceptible of development for the purpose of commercial navigation.

Lack of Navigability Below Hinton

The matter set out in (1) above needs only brief discussion. The Kanawha and the New rivers are one stream only in the sense and to the extent that this is true as to any stream and its largest tributary; but the fact that any river may in any portion of its course be navigable and subject to such control as the United States may have over navigable waters does not invest every tributary of such river with the same status. To hold otherwise would be to extend the status of a navigable water, with all the consequences thereof, to the remote sources of the tributary streams, the mountain brooks and spring branches which are the ultimate sources of so many of our great rivers. In the instant case, it happens that a sharp difference in the physical characteristics of the Kanawha and the New rivers serves to emphasize the fault in plaintiff's contention. The Kanawha is a comparatively placid stream, fairly deep, and with a slope of only 1.25 feet per mile. The limit of these characteristics is distinctly marked by Kanawha Falls. Above that point is the New River, running over a bed of rocks and ledges, a stream of irregular but steep descent and of high velocity. The lack of identity for purposes of navigation is further emphasized by the fact that the lower portion of the New River (for about 50 miles above Kanawha Falls) is the most turbulent and precipitous of the entire river and forms a barrier between the navigable Kanawha and any possibly navigable waters of the New.

145 It is this stretch from the mouth of the New River up to near Hinton which was described as "an impetuous and

almost resistless torrent" in the course of a report to the Secretary of War in 1828 and transmitted to the House of Representatives. In other portions of the same report it is said: "Numerous falls and rapids occur, over which the water rushes with deafening impetuosity." And in a report to the Chief of Engineers, made by N. H. Hutton, Assistant Engineer, in 1876, it is said of certain portions of this stretch of New River that: "the masses of rock cumbering the waterway appear at times almost to have absorbed the river * * *." In 1912, Major F. W. Altstaetter, Corps of Engineers, reported to the Chief of Engineers:

"From Hinton to the head of slack water in the Kanawha, a distance of 64 miles, the fall is almost 750 feet. There are many bridges and steep rapids along this portion, including Kanawha Falls, which is about 16 feet high. This whole section is unfavorable for navigation and *the river above it could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount. The navigation between Hinton and Radford must therefore be considered as having no outside river connection.*" [Italics by this Court.]

From these reports, as well as from other evidence in the case, I think it clear that that portion of the New River from Hinton (or a few miles below) to Kanawha Falls is not navigable and never has been and is not practicably susceptible of being made navigable. I find also that while, some 60 or 70 years ago, investigations were made and tentative plans suggested for canalizing this portion of the river for purposes of navigation, no steps were ever taken for this purpose and no attempts to render it navigable have ever been made and none are now in contemplation. Due to the plainly nonnavigable character of the New River from its mouth up to Hinton, it is evident that there is and can be no connection between navigation on the Kanawha and any alleged or actual navigation on the New River; and that the plaintiff's contention that New River is a navigable water of the United States must rest on evidence that the river possesses that character from Hinton upward.

146 Evidence as to Navigability above Hinton

In fact, the evidence introduced by plaintiff, and its argument thereon, as to the navigability of New River relate to that portion of the river extending from some distance above defendant's project to Hinton, in the course of which the river flows from Virginia into West Virginia. It is this stretch of the river which plaintiff seeks to prove has been used and is available for the movement of interstate commerce. The evidence offered on this issue by both parties is varied and voluminous. It consists of histories, tales of exploration, the reports of commissions, acts of Congress and of state legislatures, official reports made by the Corps of Engineers of the United States Army, maps, profiles, photographs, etc., to which is added the oral testimony of old inhabitants and other persons. No attempt can be made to recite it, even in brief.

I am unable to agree with plaintiff's contention that the early historical descriptions of New River show its availability for navigation in its natural state. These descriptions, beginning with the exploring trip of John Peter Sally in 1742, are of trips of exploration or investigation along the course of New River and, in some cases, of its tributaries. They indicate that the explorers were impressed with the size of the stream and the wild beauty of the scenery along its course, and also that they were impressed with the rapid flow of the stream and its precipitous fall. It is true that large parts of these exploring trips were made by boat along the river, but there is nothing to indicate that the boats used were anything larger than was necessary to hold a few men and their limited and scanty supplies. And even so, these accounts are replete with recitals of the difficulties encountered by the rapids in the river and of frequent portages to overcome them.

No doubt since persons first settled along this river they have had small row boats which they have used to move about on the river adjacent to their lands, for purposes of fishing or to cross the river for business or social errands, but this is not navigation in commerce. The first knowledge of anything which could
147 be construed as commercial navigation is the reference to
the use of keel boats in various portions of the river. Just when such use began is not known, but we have knowledge of it following the Civil War and prior to 1873. In 1872 Congress provided for a survey or examination to be made of New River from the mouth of the Greenbrier River at Hinton, West Virginia, to the lead mines in Wythe County, Virginia, which latter point is about 30 miles up-stream from defendant's project. Pursuant to this such survey was made and a report thereof made to the Chief of Engineers by inferior officers assigned to the work. This report included a general description of the course and character of the stream and a mile to mile description of the portion surveyed. In this report, reference is made to "the present system of transportation on this portion of the river by keel boats, which carry from two to three tons, and are floated down the river and poled up," and it is stated that an expenditure of $100,000 "would greatly ameliorate the condition of the river for this trade, and would enable the trips to be made with so much more certainty as to induce a considerable increase of trade." Additional surveys and reports were made, resulting finally in the adoption of a plan

to create a channel 30 feet wide and 2 feet deep at low water, suited for the "keel boats now in use." It will thus be seen that keel boats were in use on the river prior to any Federal improvement and that the improvements were proposed for facilitating the use of these boats.

In 1876 Congress appropriated $15,000 for work on New River and appropriations were continued (although not each year) until 1886, the total appropriations amounting to $112,000. Pursuant to these some work was done in each of the years from 1877 to 1882, inclusive, and a small amount in each of the years 1885 and 1889. The work was confined to making channels through shoal portions of the river, but did not include all of the shoals or falls, and on some of the more precipitous ones no work was done. Neither was the improvement continuous in extent but was divided along three different sections of the river. One of these sections, described by the engineers as the "Lower or Greenbrier Division, extended up-stream from Hinton. The next section, referred to as the "Middle or New River Bridge
148 Division," began about Radford, Virginia, and extended
up to the lead mines in the neighborhood of Austinville, in Wythe County, Virginia. The third section, known as the "Upper or Lead Mines Division," was from the lead mines toward the head of the river.

On the lower or Greenbrier Division some work was done each year from 1878 to 1882, inclusive, and by the latter year had reached as far as Wiley's Shoals, which is about 26 miles above Hinton. No further work was done on this division above this point and no work was done after 1882. On the middle division, work began at New River Bridge, some 54 or 55 miles above the state line between Virginia and West Virginia, and some work was done in each of the years 1877, 1878, 1880, 1881, and 1882, in the course of which the work reached a point approximately 30 miles upstream to the vicinity of Allisonia. Work on this division was also discontinued in 1882. On the upper division, a small amount of work was done in each of the years 1881, 1885, and 1889, the total of which was only 7.9 miles. After the work done in 1889 on this portion of the river, there remained an unexpended balance of several thousand dollars of the appropriation allocated to this division and, upon the recommendation of the local engineer that further expenditure was inexpedient, this balance was not expended. It was later returned to the Treasury upon the repeal of the act providing for the prosecution of the work.

The keel boats, sometimes referred to as bateaux, mentioned in the evidence are described as flat-bottomed boats from 50 to 70 feet long, with a width of 6 to 8 feet, and a draft of about 2 feet.

They were moved by poling or towing. They are variously referred to as having a carrying capacity of from 2 to 3 tons up to 10 to 12 tons. In use it is probable that the load varied with the stage and velocity of the stream flow and probably the carrying capacity increased with the improvements made in the channel. The evidence indicates that the use of these boats was local, by which it is meant that they were not used in continuous trips throughout the course of the river, but were used on separated stretches of the river where conditions made their use permissible 149 and desirable. The range of their movement was determined by the extent of the pools and the absence of steep shoals in that particular section of the river. For example, from Hinton upward for 23 or 24 miles the river has the least gradient in its course, about 4 feet per mile, with considerable pool water and few precipitous shoals. The same conditions obtain to a more or less extent on the section of the river for 25 or 30 miles above Radford. It was in these separated stretches of the river that practically all of the bateaux navigation took place and only on them that there was any appreciable trade or commerce by boat. It is not meant to say that continuous movement of such boats between Hinton and the vicinity of Radford was impossible or did not occur. There is evidence which indicates that it did occur, but there is a vagueness about the extent to which it occurred and indications that such trips were irregular, were attended with difficulty, and formed no appreciable part of any commercial transportation which took place on the river. The most definite evidence of the extent of navigation on the river are the reports of the government engineers both before and after beginning improvement of the river in 1877, and these reports repeatedly state that the commercial navigation was local to separated stretches of the stream and that there was no continuous navigation.

It is difficult to determine the extent to which the volume of the keel-boat traffic was affected by the improvements made on the river, but it does appear that the work done by the Federal Government in no way altered the local character of this navigation, and apparently it was not intended to. As stated, no attempt was made to create a continuous channel throughout the course of the river. The work was confined to improvement in each of several separated sections and was with a view to facilitating the keel-boat traffic in the limited localities where it already existed. The reports of the engineers in charge of the work indicate that their main object was to facilitate the carrying of local products by boat to the railroad outlet for that locality. In the annual report of the Chief of Engineers in 1883, after the work on the lower and middle divisions of the river had terminated, it is said:

150 "It has hardly been practicable to accomplish at any one of the very many points needing improvement all that has been desirable, but the worst places have been worked upon to the greatest extent and efforts thus been made to increase the available navigability of the river over as long stretches as possible, and to increase the facilities for access of the greatest number to the railroads touching the river, and thus connecting with the eastern and western markets districts otherwise much isolated and hitherto dependent on teaming to railroad stations over long and bad roads."

In the same report, it is stated that there were then seventeen keel boats in the lower division of the river above Hinton and 8 keel boats in the improved stretch of the middle division above Radford. Most of the boats in the lower division were engaged in transporting logs and lumber from mills along the improved portion of the river to Hinton where the railroad touched the river. Some grain, tobacco, etc., was shipped down to Hinton by boat. References in this report to boat traffic on the lower division make no mention of any traffic originating in Virginia or at any point higher up than 24 miles above Hinton. The traffic was clearly local to that stretch immediately above Hinton and entirely within the State of West Virginia. Similarly the eight boats in the middle division were in a traffic local to that section. The railroad shipping point there was at New River Bridge, just above Radford, and the principal traffic was boating pig iron down to this point from several small furnaces located 25 or 30 miles upstream.

The above somewhat detailed description of the local nature of transportation on New River has been thought desirable because of the emphasis which the plaintiff places on the pig iron shipments to New River Bridge, and upon the volume of lumber, etc., delivered by boat to Hinton. Conceding the accuracy of the testimony in this regard, it is clear, I think, that in each instance the traffic was purely intrastate. It occurred in two widely separated stretches of the river, one over a distance of 25 miles or more entirely in Virginia, and the other over approximately the same distance in West Virginia; and between the two was a stretch of about 60 miles over which there was no appreciable commercial traffic, and little of any sort.

151 Throughout the annual reports of the Chief of Engineers during the progress of the work on the river there are repeated statements emphasizing the local nature of the boat traffic and pointing out that facilities do not exist for continuous traffic. And, particularly in the later years, it is reported that the latter condition could be obtained only by the adoption of a more general, more radical, and more expensive plan of permanent improvement than that attempted.

In addition to traffic by keel boats evidence was introduced as to steamboats on New River. This attempt at steam navigation was likewise purely local and notably unsuccessful. Several such boats, more or less improvised, all of shallow draft, were built at Hinton and attempted to navigate the pool water immediately above that point. They seem never to have gone further than about 10 miles above Hinton and then only when the river was above normal stage. At least one boat propelled by a gasoline engine was built at Radford for attempted use on the improved stretch of the river above that point, but never got further from its home port than 6 or 8 miles upstream. This boat was about 50 feet long and 7 or 8 feet wide, with a flat bottom and drawing only 4 or 5 inches of water unloaded; when loaded the draft was about 12 inches. After about a year of sporadic and unprofitable operation around Radford, with various misadventures, the owner decided to take this boat down to Hinton where he had heard that there was a stretch of 8 or 10 miles of still water where conditions for operation were better. Waiting for a rise of 5 or 6 feet in the river, he floated the boat through. The owner's description of the difficulties of that trip strongly deny the availability of the river as an avenue of transportation. No better luck with the venture was had at Hinton and, after a few weeks, the boat was sold for a trivial sum to someone who took it off the river. These attempts represent the history of navigation on New River by boats mechanically propelled. In each instance they were local to short stretches of improved portions of the river and were of short duration. They were merely the manifestations of a spirit of impractical optimism, with perhaps a tinge of curiosity.

152 Whether the purpose of those who originally inspired and promoted the plan of improving New River with Federal funds was to make the river navigable throughout its course is not clear. But it is clear, I think, that the work done had no such purpose, but was confined to improving separated stretches of the river to aid in local transportation to railroad points. After the work started, its scope was modified by making channels of lesser depth and lesser width than mentioned in the original plan; and as the work progressed the engineers in charge emphasized in their reports that no attempt was being made to make possible continuous navigation, and that such a result could be accomplished only by some plan different, and more elaborate than that attempted.

The annual reports of the Chief of Engineers, containing reports made by engineers who were in charge of work on New River, or otherwise familiar with it, are of great value in determining the character and extent of navigation on the river, and the effect of the improvements made. I quote from some of them.

In the report for 1879, Captain J. W. Cuyler, engineer on the work, stated that, while the project of improving the river was practicable, it was necessary even for bateaux navigation and rafting.

"to adopt a more general and radical method to effect a permanent improvement than has heretofore been tried."

In the report of 1883 it is said:

"The navigation of the river not being continuous as yet, it is practically a feed to the railroads which cross it and run along portions of it"

In 1885 it was reported that, from appropriations for the improvements on New River, there was a balance of $3,000 specially designated for use in the upper or Lead Mines Division above Foster's Falls "which are not passable." That it had not been expended because there was no need for it so long as these falls were impassible, but that when the railroad up Cripple Creek had been completed, boats could touch this railroad above Foster's Falls. And the report for 1886 says:

"Hitherto the obstruction offered to navigation by Foster's Falls, about 6 miles below the mines, almost rendered it useless to expend the money appropriated for the division under consideration. The construction of the Cripple Creek Railroad,
153 however, abrogates this and puts this division on a par
with those of Greenbrier and New River Bridge, for its objective point is a railroad as well as that of the other two * * *."

The report of the Chief of Engineers for 1887 contains the following:

"As Congress has never given such a sum of money as would justify the proper beginning of a connected project for a continuous navigation from the North Carolina border to Hinton, the effort has been to apply such funds as were supplied in ameliorating the condition of the river."

And the view is expressed that, because of the unlikelihood of necessary appropriations, "it is supposed that the same policy should continue of partial improvement in connection with the railroads."

In the same report, Colonel Craighill, in charge of the work, says:

"For reasons often mentioned in annual and special reports, no attempt has been made to give a continuous navigation on New River to Hinton * * *."

In 1891, the following appears in the course of a report made by Colonel Craighill to the Chief of Engineers:

"The last directions of Congress have been practically complied with by the expenditure of 75 percent of the last appropriation. The last work done, however, under those directions was a subject of ridicule by the community near its locality because of its evident uselessness, except to put money into the pockets of a few men, and to lead to the probable control of a few votes. The expenditure of the remaining balance almost entirely in the excavation of rock on the limited part of the river to which it is specifically applicable under the law would not accomplish the smallest useful result, and would in my judgment be a shameful waste of public money. It is recommended that it be covered into the Treasury as no longer required for expenditure."

In 1894, citizens of West Virginia, complaining that ore washings deposited in New River at mines in Virginia polluted the water, rendered it unfit for domestic use, destroyed fish and defaced scenery, invoked the aid of the Federal Government to stop the practice. The matter was the subject of sporadic controversy over many years, during which the War Department repeatedly pointed out that the matter was one of local concern justifying no action by the Federal Government. In 1916 the Chief of Engineers addressed a communication to the Secretary of War reviewing this controversy, and the action of his predecessors thereon, and specifically agreeing with their findings. From this the following excerpts are quoted. Of the first complaints made the then Chief of Engineers said:

154 "The interests of navigation are not involved in this matter; the controversy is one purely of local concern." * * *

"These are important matters to the people of West Virginia, and the injury inflicted is doubtless of a serious nature; but it is submitted that the General Government can afford no relief and provide no remedy in the premises. The control of Congress is conferred by the commerce clause of the Constitution of the United States, and is to be exercised for the preservation and protection of navigation and the protection of commerce only. The existing laws were enacted, and are to be executed for this purpose only.

"Congress has passed no statute to protect the fish or the scenery of New River, or the purity of its water, and unquestionably such a statute if passed would be invalid."

The controversy was then dormant for some years, but in 1910 it was renewed by a petition which added to the previous grounds of complaint the allegation that the ore washings caused deposits in the Kanawha River thereby decreasing the navigable depths of the Kanawha and that they otherwise interfered with and obstructed navigation on the Kanawha. After investigation of this renewed complaint, the Chief of Engineers stated in part:

"While this action is desired ostensibly in the interest of navigation on the Kanawha River, it is probable that the real basis of the request is the desire to preserve for the people of the State the use and enjoyment of the waters and scenery of New River."

* * * * *

"There has been no useful navigation on New River at any time, and none is possible under existing natural conditions, nor without the expenditure of vast and prohibitive sums in improvement work. While the discharge of ore washings in New River may produce conditions in the Kanawha injurious and obstructive to navigation, in the various ways alleged by petitioners, it is probable that in most instances the effect is too remote, and too much complicated with other causes to warrant the action desired by the petitioners * * *."

These quotations are made at length in controversion of the contention that the Federal Government has, over a long period of years, recognized New River as a navigable stream and asserted its authority over it as such; and to show that throughout this extended controversy the navigability of New River was clearly denied by these officers of long experience and acquaintance with it. Even the complaining citizens made no assertion of the navigability of New River but only that navigation in the admittedly navigable Kanawha was affected.

In 1913 the report of the Chief of Engineers on an examination
of New River from Radford to Hinton was transmitted to
155 Congress by the Secretary of War (House Document No.
1410, 62d Congress, 3d Session). After reviewing the character of the stream and the work previously done on it, it is said:

"About $110,000 has been expended on this river in improving the bars by building chutes or sluiceways through them. This afforded possible light-draft navigation and was used to some extent a number of years ago. But little has been done on the river since 1882. There is a very small commerce carried on in the lower part of the reach under consideration by the use of so-called keel boats, which are towed or poled. There being no connection with the river below, the commerce is local."

* * * * *

"There is very little commerce on this river at present, and as there are no commercial or mining industries of importance, no material increase could be expected even if it were improved. Physical conditions are such that it could not be improved for useful navigation except at prohibitive cost."

On December 29, 1925, the Chief of Engineers made a report to the Federal Power Commission, wherein, after stating his understanding of what constitutes a navigable stream (and his definition is accurate), he says:

"Having this rule in mind, I am of the opinion that the data and information disclosed in the Department's records and reports do not support the conclusion that New River affords a channel for useful commerce or that it is navigable in fact. That section of the river between its mouth and the town of Hinton, having a fall of about 735 feet in a distance of less than 60 miles, may be dismissed from discussion. This Department has reported that the whole section is unfavorable for navigation and could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount."

He then recites that surveys have been made of that portion of the river from Hinton upstream to the mouth of Wilson Creek, a distance of about 190 miles, partly in West Virginia and partly in Virginia; and after reciting the reports that the general characteristics of the river are those of a mountain stream, with alternating pools and rapids and with a rocky bed obstructed by boulders, he says:

"The detailed, mile by mile, data given in the reports fully justify these concrete statements, and it seems unquestionable that the river was not navigable in fact in its original natural condition.

"It is my opinion that these natural conditions were not changed by subsequent improvements, to the extent of making the river a highway for commerce."

After reciting those improvements and their local nature, he says:

"It is evident that the work executed by the Government during the years 1877–1882 did not materially change the natural non-
navigable conditions of the river. The improvement ef-
156 fected was at most slight and fragmentary, and the small
channels worked over are reported to have deteriorated due
to the natural action of ice and the current. Continuous navigation on the river has never been possible, and whatever commerce has existed has been altogether local, apparently confined to the 25 mile section in West Virginia, ending at Hinton."

I have chosen to quote at length from the contents of these various official reports because of the weight which I consider they should have on the issue here involved. They were made by responsible officers of the War Department in the course of their official duties and under conditions involving no thought of litigation or controversy. The facts recited are based upon actual knowledge of the river gained by surveying it, observing it, and directing the work upon it. So far as their statements may be said to be expressions of opinion, their source gives value to the opinion, for they are given by men scientifically trained and experienced and one of whose larger duties is in dealing with the navigable waters of the country; men who are acquainted with comparable streams and who know of the requirements for commercial navigation and the engineering problems necessary to establish it where it does not naturally exist.

Official findings and corresponding action on the part of the War Department are significant on the question of navigability. United States v. Oregon, 295 U. S., at p. 23.

Finally, it may be said that, in response to the declaration of intention filed before it with respect to the project now in question, the Federal Power Commission made a finding on June 1, 1927, that:

"Said river in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said Act." (Referring to the Water Power Act.)

It is clear that the question of navigability is one of fact which must be determined by the Court upon all the evidence and that this duty cannot be abdicated; nor is it performed by mere acceptance of the findings or opinions of other persons no matter how competent. But the determination of the issue of navigability permits a wide range of testimony and coming permissibly within this range, I think, are the opinions of persons who by training and experience are competent to speak. So far as the official reports from which quotation has been made express opinions 157 on the navigability of the river, they are accepted merely as the opinions to be considered with the other evidence and given such weight as they may be deemed entitled to. With the same thought in mind, the Court permitted witnesses to testify at the trial, giving their opinions on the issue of navigability.

In past times various dams and bridges have been constructed in or across New River and in some instances persons contemplating such constructions sought permission or approval therefor from Congress or the War Department. I find no instance where this was refused when sought. This appears to have been done merely as a matter of precaution on the part of those sponsoring these projects, and to clothe them with a supposed authority for what it might be worth. As tending to show recognition of Federal control over the stream, this evidence loses any value due to the fact that in a like number of instances dams and bridges have been constructed without seeking the permission of Federal authority. And where this was done I find no instance where the Federal Government has sought to interfere with or prevent it. In other words, if permission was sought, it was granted; if permission was not asked, no question was raised.

I find also the following facts, pertinent to this and other phases of the case. That there is at present no commerce or navigation on New River or, if any, it is entirely local and in a trivial and unnoticeable amount. That the Federal Government has made no improvements on the river since those heretofore discussed and that it does not have in contemplation any improvements affecting the navigable condition of the river. That it does have in contemplation certain projects for flood control, including the erection at a point a few miles above Hinton of what is referred to as the Bluestone Dam, the proposed purpose of which is to impound the waters of New River and control their flow in times of flood and in the aid of navigation upon the Kanawha.

The Law as to Navigability

The cases which have arisen in this country involving the navigability of water courses are myriad in number. And, apparently,
industrious counsel have cited all of them. Except as the
158 decided cases have laid down general principles and have
made clear the limitations upon them, it is rarely that one case can be greatly helpful upon the issue of navigability in any other case. Navigability is a question of fact, to be determined by the facts shown in each case.

No power of control over navigable waters is specifically granted to the United States by the Constitution. In cases where it exists, it derives from the power in the Federal Government "to regulate commerce with foreign nations, and among the several states * * *." This power to regulate commerce being limited to that which is foreign or interstate, it follows that the boundary of Federal control over navigable waters is the regulation and protection of commerce of a similar nature.

What is probably the most frequently quoted and the most acceptable definition of navigable waters is that laid down in the case of The Daniel Ball, 10 Wallace 557:

"Those rivers must be regarded as public navigable rivers in law which are navigable in fact. And they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water. And they constitute navigable waters of the United States within the meaning of the acts of Congress, in contradistinction from the navigable waters of the states, when they form in their ordinary condition by themselves, or by uniting with other waters, a continued highway over which commerce is or may be carried on with other states or foreign countries in the customary modes in which such commerce is conducted by water."

The rule stated in The Daniel Ball has frequently been repeated and approved down to the present time. United States v.

Rio Grande D. & I. Co., 174 U. S. 690; Leovy v. United States, 177 U. S. 621; Brewer-Elliott Oil & Gas Co. v. United States, 260 U. S. 77; United States v. Holt State Bank, 270 U. S. 49; United States v. Utah, 283 U. S. 64; United States v. Oregon, 295 U. S. 1; and others.

Obviously navigable waterways may lie entirely within the borders of a state and the navigation upon them be entirely intrastate; or they may extend across state lines and be the avenues of commerce betwen the states. The test of whether the waterway is navigable is the same in each case; but the source of governmental control, is vastly different. As clearly indicated in The Daniel Ball, a navigable river is one which meets certain
*159 conditions as a highway for commerce; a navigable water of the United States is one which, fulfilling the same conditions, is a highway for commerce between the states. It is of the latter only that the Federal Government has plenary control, and this authority flows from its power to regulate commerce between the states.

The rule defining navigability above quoted from The Daniel Ball has never been essentially modified. Later cases have taken occasion to explain or clarify or interpret the language used, but not to alter it. In The Montello, 20 Wallace 430, the rule of The Daniel Ball is quoted, approved and applied, but it is made clear that the true criterion of navigability is the capability of use by the public for purposes of transportation and commerce, rather than the extent and manner of that use; that capability for use by steamboats and sailing vessels is not required, but only that the stream should be capable of being used for commerce in any mode that commerce may be conducted. At the same time, it is pointed out that navigability is not imparted by the ability to float small boats such as skiffs or canoes, but that it must be generally and commonly useful for purposes of trade.

In Leovy v. United States, 177 U. S. 621, the definition of the term "navigable waters" given in The Daniel Ball is again quoted, as well as the language used in The Montello, and the Court says:

"It is a safe inference from these and other cases that the term 'Navigable Waters of the United States' has reference to commerce of a substantial and permanent character to be conducted thereon."

The Court further condemned an instruction given by the trial court that implied that navigability was created by the ability to float any boat; saying that the mere capacity to pass skiffs and small luggers from one state to another did not render a stream a navigable water of the United States and, if it were so held, there would be scarcely a creek or stream in the entire country not included in the term. I do not take this decision to modify

the holding in the case of The Montello, but on the contrary to confirm it. Nor do I understand either of the cases to alter the holding in the case of The Daniel Ball, but only to interpret it. There is no need to review the many cases in which the rule has
been restated. As late as United States v. Oregon, 259 U. S.
160 1, we find it repeated that the test of navigability is whether
the body of water in question, in its natural and ordinary condition, is susceptible for navigation in the customary modes of trade and travel over water and has capacity for general and common usefulness for trade and commerce. It follows that in order to constitute it "navigable waters of the United States" the trade and commerce referred to must be of an interstate or foreign character.

The plaintiff stresses those cases in which it has been held that it is not necessary that the condition of the stream should be such as to permit the passage of boats at all portions of the stream and that occasional interruption or retardation of navigation by falls, rapids, or other unfavorable conditions does not necessarily render the river nonnavigable. There are cited such cases as The Montello (supra); St. Anthony Falls, etc. v. St. Paul Water Commissioners, 168 U. S. 349; Economy Light & Power Co. v. United States, 256 U. S. 113. There can be no question about this general proposition nor about its applicability in these instances where the general test of navigability is met. And all the cited cases hold is that occasional interruptions or difficulties to navigation from rapids, bars, or other conditions do not render a stream nonnavigable where it appears that in fact it is used or is susceptible of use for navigation in spite of such difficulties. For example, in the case of The Montello, involving the Fox River, Mr. Justice Davis, referring to obstructions in the river, says:

"This is true and these obstructions rendered the navigation difficult * * *. But with these difficulties in the way commerce was successfully carried on, for it is in proof that the products of other states and countries were taken up the river in its natural state * * *."

Much also has been said about the susceptibility of developing New River as a navigable waterway through artificial aids to navigation and it is argued that a stream may still be classed as navigable even though it is found necessary or desirable to alter the natural condition of the river by means of dams, canals, or other structures at points throughout its course. Ashwander v. Tennessee Valley Authority, 297 U. S. 288, is cited. There is no need to discuss the cases in which such a question has arisen; nor to
define the limits within which necessary artificial aids to
161 navigation measure the navigability or nonnavigability of a
stream. See Brewer Elliott Oil & Gas Co. v. United States,
270 Fed. at p. 103. It is obvious that there are limits. Otherwise

every stream with any considerable flow of water would be classed as navigable. The practically unlimited skill and resourcefulness of the engineering profession can, by the use of dredging and the building of dams, locks, canals, etc., turn any stream into an avenue of transportation providing someone is willing to pay for it. Narrow, steep, and rocky mountain streams which are rushing torrents in winter and spring and in times of great rainfall, but which for most of the year are completely dry, could be made navigable by enlarging the stream bed and building dams in sufficient size and number to impound water in pools. But by no stretch of the imagination could such streams, in their natural condition, be termed navigable or reasonably susceptible of navigation.

In 1874 General Barnard, reporting to the Chief of Engineers on the practicability of establishing navigation on the New River from Hinton to its mouth, as part of a route for transportation by water between the Atlantic seaboard and the trans-Allegheny states, stated that this could be done only by a "pure lock and dam" system whereby boats would transfer "directly from pool to pool," and that in this stretch of the river alone 60 dams would be required. He further states that, "as an engineer * * * I cannot * * * affirm its practicability, though I have no doubt that, so far as mere construction is concerned, it is so." He reported further that it would be more practicable to build "an independent canal" for this part of the route. I have already quoted a report of the Chief of Engineers in 1910 stating that no useful navigation is possible on New River without the expenditure of "vast and prohibitive sums." The Ashwander case has no application to such a situation as is depicted here and where all thought of making the stream navigable has been abandoned when investigation showed its impracticability.

As stated by Mr. Justice Pitney in United States v. Cress, 243 U. S. at p. 321, "it has become well established that the test of navigability in fact is to be applied to the stream in its natural condition, not as artificially raised by dams or similar structures." Even more certainly is this true where the dams
162
or similar structures necessary to creat navigability have never been built, are not contemplated, and have been found impracticable.

The plaintiff relies upon the fact that the Federal Government has made expenditures for the improvement of New River as establishing and recognizing its navigability, and in its brief it is said:

"The Government maintains that Congress once having spent money to improve navigation on a river has never abandoned the part so improved except by direct affirmative legislation in which it specifically abandons that part of the river as being nonnavigable."

The fault in this argument is obvious. Navigability is a matter of fact and if a river is not in fact navigable it cannot be given that status by legislative declaration; United States v. Cress, 243 U. S. at p. 322; much less by the mere appropriation of money to be used to determine whether it can be made navigable. Congress, under importunities from various sources, has made appropriations for expenditures on a great variety of water courses in the country in past years and for various purposes. To say that the expenditure of such funds, ipso facto, invested each and all of these water courses with the status of navigable waters is beyond reason and fact. Indeed, a substantial part of such expenditures have been made in vain attempts to create navigability in streams not navigable and found to be impracticable of being made so. As was said of a like situation in United States v. Brewer-Elliott Oil & Gas Co., 249 Fed. at p. 618, in relation to Federal appropriations for improvements on the Arkansas River:

"Such acts should be assigned weight, in view of the power of legislative inquiry and judgment. But their force is not to declare a river navigable in its natural state * * * and none of these acts purport to do so. A project for river improvement may be to create navigibility, or, however prudently formed, may be necessarily experimental, and result in practical abandonment at a given section. * * * While the acts are proper for consideration, they are in any event inconclusive, and leave the fact of actual navigability quite open to proof."

Agreeing that consideration should be given to this fact of Federal expenditures upon New River, I think it not illogical to give consideration also to the fact that after small local expenditures had been made all effort at further improvement was abandoned and that the Chief of Engineers expressed it as his opinion that the improvements made had "not materially changed the natural nonnavigable condition of the river" and advised against further attempts at improvement.
163

The volume of the evidence introduced before the court has permitted discussion of only the most pertinent features of it and then only in general terms. From a consideration of all of it, the conclusion is reached that New River is not and never has been navigable, either in its natural condition or after the improvements made, except in certain short and isolated stretches to each of which the navigation was local and confined within the limits of a single state; and that it has never been used, and has never been susceptible of use, as an avenue of interstate or foreign commerce. It is, therefore, found that defendant's project is not situated upon a navigable water of the United States.

THE EFFECT OF DEFENDANT'S PROJECT UPON NAVIGATION IN THE KANAWHA RIVER

In 1802 the State of Virginia, by an act of its General Assembly, reserved to the state ownership of the beds of rivers and creeks in the western part of the state, by the following terms:

"Whereas, it hath been represented to this present General Assembly that many persons have located, and lay claim in consequence of such location, to the banks, shores and beds of the rivers and creeks in the western parts of this Commonwealth, which were intended and ought to remain as a common to all the good people thereof: Be it therefore enacted, that no grant issued by the register of the land office for the same, either in consequence of any survey already made, or which shall hereafter be made, shall be valid or effectual in law to pass any estate or interest therein."

The broad language of this act might well inspire a question as to what were the limits of the "western parts" of the state. But there seems no question that New River was considered as being in this indefinite territory and the act was applied to it, with the result that riparian owners along this river hold title only so far as the bank of the stream and ownership of the bed is recognized as being in the state.

The plaintiff has cited this act as a recognition of the navigability of New River. But the language of the statute discloses no such intent. That portion of the state was then largely unsettled and the state was the proprietary owner of great 164 areas of land of which it was, from time to time, making grants to individuals. That it should see fit to reserve the beds of streams, in order that they should remain under ownership of the Commonwealth to be controlled for the public good, was not unusual. But the power to do so was not dependent on the navigability of the stream. The power was that of any owner to grant what he chose and keep what he chose.

It would seem plain that the state, holding ownership and control of this river for the benefit of its citizens, has the right to make such use of it as it may see fit, subject to any paramount rights of the United States. See United States vs. Rio Grande Irrigation Co., 174 U. S. at p. 703. One of these paramount rights is that which the United States may have as a riparian owner; the other is the right to protect the navigability of navigable waters of the United States. The first is not involved here, for no property of the United States is affected by defendant's project. It is upon the second named limitation upon the power of the state that the plaintiff relies. It is contended that, irrespective of whether New River is navigable, the erection of defendant's dam should be enjoined for the reason that the erection and operation of the project will impair the navigable capacity of the Kanawha and Ohio rivers.

This likewise involves an issue of fact to be determined by evidence.

"The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact." United States v. Rio Grande, etc., Supra, at p. 709.

On this issue, as on that of navigability, the evidence is voluminous, and permits of no detailed description beyond reference to pertinent established facts, and to the substance of the evidence in its more important features.

The project for which the defendant has obtained a license from the State of Virginia involves a dam with an over-all height of approximately 130 feet, creating a reservoir with a maximum utilizable storage capacity of 100,000 acre feet, and with a power installation which when operated at maximum capacity will utilize about 9,000 cubic feet of water per second.

In the course of its improvements on the Kanawha River the Federal Government has erected a number of dams across 165 that stream which, to use an engineering term, will completely "canalize" that river; meaning thereby that the Kanawha will consist of a succession of adjacent pools created by these successive dams. The uppermost of these dams on the Kanawha is known as the London dam, which is about 12 miles below Kanawha Falls; and the London pool extends up to about 4 miles below Kanawha Falls. About 15 miles below the London dam is the Marmet dam. About 37 miles below Marmet is the Wingfield dam, which is about 30 miles up from the point where the Kanawha empties into the Ohio. There is also being constructed a dam at Gallipolis, Ohio, on the Ohio River below the mouth of the Kanawha, and the pool of the Gallipolis dam will extend up to Wingfield. The primary purpose of all these dams on the Kanawha is for the improvement of navigation by the creation of navigable pools, and they are equipped with locks for the transfer of boats through the dams. However, each of them have installations for the production of electric power in large volume. The power facilities are operated by private interests under lease from the Government. London, the uppermost of these dams, is approximately 170 miles below the site of defendant's project.

The alleged interference with navigation on the Kanawha from defendant's project is based upon the operation of that project after completion. Obviously the mere erection of defendant's dam would not affect the navigable capacity of the Kanawha.

Water, in the volume supplied by nature, would run through New River just the same, with the difference that it would run over the top of defendant's dam at that point instead of in the stream bed. It is in the alleged manner in which that flow would be transmitted to the Kanawha through the operation of defendant's power plant that the plaintiff asserts navigation on the latter stream would be impaired.

The principal contention is that the operation of the plant will create an irregularity of flow in the river, involving periods when there will be little or no water released at plaintiff's dam, followed by periods when water will be turned loose in large volume; that these irregularities will create alternating rises and falls in the pools on the Kanawha, and would cause oscil-
lations in the pools, all of which would hamper and ob-
166 struct navigation in these pools. There is also the conten-
tion that the flow at Radford might be cut off at low water seasons, depriving the Kanawha of its normal supply of water. And a further contention that defendant's project would interfere with the operation of the flood control and power dam which the Federal Government proposes to build at Bluestone.

As to the first of these, it is urged that the periodical discharges of large volumes of water in the operation of the defendant's plant will create tides or waves in the river below, which will be transmitted through its course and into the Kanawha creating rises and falls in the pool levels and oscillation of the water in them. A vast amount of evidence was introduced as to the behavior and effect of these tides or so-called "power waves," including charts, graphs, and diagrams of all sorts. It was in large measure theoretical, representing the estimates and opinions of witnesses on assumed methods of operating defendant's power plant. The evidence was sharply contradictory and, in many respects, uncertain and confusing. From the plaintiff's standpoint, it was evident that the testimony throughout was based upon the assumption of conditions which offered the greatest degree of possibility of the results which they assertedly feared. In other words, witnesses testified as to what might happen under certain conditions, but without regard to whether such conditions were likely to occur. Apparently witnesses for the plaintiff based their testimony on the assumption that the defendant's plant would be operated at all times as a peak-load carrier and at its maximum hydraulic capacity. That it would operate for 12 or 15 hours with a discharge of 9,000 cubic feet per second, and for the remainder of the twenty-four hours there would be no discharge; and that power waves of great volume would be caused by this operation, with the resultant harmful effect on navigation in the Kanawha, 170 miles below.

The evidence of the defendant was that there was no basis for the assumed conditions pictured by plaintiff's witnesses. That the defendant had no intention of operating the plant in any such method and that the water supply of the stream made it impossible; and that even were it possible it was an economically impracticable and unsound method of operation. I think the evidence fully sustains this latter proposition and, in fact,
167 I do not understand plaintiff's witnesses to claim the method of operation assumed by them to be one which they themselves would approve or adopt. The defendant, however, insists that even if the project were operated in the manner assumed by plaintiff's witnesses, there would be no such results in the Kanawha as is claimed, and no interference with navigation there. I think also that the evidence supports this contention. In support of it there is offered evidence of tests made in the year 1930 to determine the nature and effect of power waves. At that time engineers of the defendant, in cooperation with engineers of the Federal Government, conducted tests with waves created at the Byllesby dam, a plant situated about 48 or 50 miles upstream from the proposed Radford dam. Waves of varying magnitude were created and the results on the rivers below, including the Kanawha, were observed. Discharges of a maximum of 14,000 feet per second were obtained with an average of probably 8,000 second-feet. Apparently the effect of these waves in the Kanawha was negligible. The flattening out of the waves in the passage of the water through New River caused it to enter the Kanawha in such manner as that the rise in that river was so gradual as not to be observable to the eye. The testimony of defendant's engineer who participated in the tests was that they had no effect on the navigable capacity of the Kanawha. The Government engineers who participated in these tests were not made available as witnesses by the plaintiff, but it was admitted that, if present, they would testify to the same effect. While these power waves originated some 48 or 50 miles higher upstream than the site of defendant's project, and proper allowance must be made for this fact, nevertheless the result of these tests strongly negative the testimony of plaintiff's witnesses. Further denial of the plaintiff's contentions as to the effect of the so-called power waves was furnished by the testimony of a number of witnesses, engineers of learning and experience, who gave it as their opinion that the operation of defendant's project could have no such effect as asserted by the plaintiff. In this respect, it is the Court's opinion that the evidence submitted by defendant far outweighed that of the plaintiff's witnesses. In explanation of this statement, I think it necessary to say that the witnesses who furnished
168 the bulk of plaintiff's testimony on the subject of power

waves displayed a bias, an evasiveness and an unwillingness to admit even obvious facts hostile to their contentions, to such an extent as to deprive their testimony of much value.

I think it deserves comment here that it appears in the evidence that at the London, Marmet, and Winfield dams, built by the United States Government for the improvement of navigation in the Kanawha, the power plants at each of these dams have substantially the same maximum hydraulic capacity as defendant's proposed project, namely, 9,000 cubic feet per second. The discharge from these power plants empties directly into the navigation pools. It is not to be presumed that the Government, having built these dams for the improvement of navigation, would at the same time have installed power plants, the operation of which would destroy navigation. And if the navigable capacity of these pools is not impaired by the discharge of waves directly into them from the operation of these plants, it is difficult to see how it could be harmed by waves emanating from a plant of similar capacity located 170 miles upstream. Nor does plaintiff's evidence take into consideration the dam recently erected and in operation at Hawk's Nest, about 6 miles above the mouth of New River, the reservoir of which would have a marked effect on the dampening of any power waves originating above it.

The contention of possible harm to navigation on the Kanawha from a cutting off of the stream flow by defendant's project at low water season needs only brief comment. It is a mere suggestion of what possibly could be done with a dam if the defendant were to operate in complete disregard of its own interest. The suggestion is that defendant might empty its reservoir in periods of low water and shut down for the purpose of refilling it. The evidence is that such a happening is beyond reason and that under no reasonable or accepted method of operation could such a thing happen, and the plaintiff admits that such operation would be contrary to accepted and proper practice. The Court cannot base an injunction on such speculative and improbable grounds as this.

Considerable evidence was heard on the alleged effect of defendant's project on the operation of the proposed, but as yet unbuilt, Bluestone dam. This dam is planned to be erected
169 across New River at a point 3 or 4 miles above Hinton, in
West Virginia. Plans for the dam have been prepared, its construction has been authorized and proceedings to acquire the necessary lands along the river have been instituted. There is every probability that the dam will be built and the evidence was on this assumption. The project is allegedly for purposes of flood control and in the interests of navigation on the Kanawha and Ohio rivers and is one of magnitude. The dam is to be approximately 150 feet high. The dead storage will rise about 66 feet;

above this will be 49 feet of usable draft storage; and 35 feet above this will be reserved for freshets and flood control. The utilizable storage will be 245,200 acre-feet, about 2½ times the like storage of the defendant's project at Radford, and the storage capacity reserved for floods will be more than 2½ the utilizable storage of the Radford dam. It is planned to install at the Bluestone dam a power plant with a maximum hydraulic capacity of 10,000 or 11,000 cubic feet per second. It will thus be seen that the project at Bluestone is much larger in all respects, and particularly in the important matter of storage capacity, than defendant's project. Speaking generally, the purpose of the Bluestone dam is to impound the waters of New River in a great reservoir from which the flow can be regulated and can also be used in the production of electric power. Under normal conditions, the dam will impound 356,800 acre-feet of water, of which about 112,000 acre-feet will be dead storage and about 245,000 acre-feet will be utilizable storage. This will be used for producing electric power and also to furnish sufficient water for navigation on the Kanawha by releasing it for that purpose, it being proposed that a minimum regulated flow of 2,000 feet per second will be furnished for navigation. The upper 35 feet of the dam, with a storage capacity of approximately 268,000 acre-feet, will normally hold no storage but will be reserved to catch and hold the water arising from freshets and floods and release it more gradually into the stream below.

The plaintiff is not at all clear in its contention as to how the Bluestone project can be adversely affected by defendant's dam at Radford. The evidence on this subject, entirely theoretical, is vague, contradictory, unreasonable, and unconvincing. It is not
seen how defendant's project could have the slightest harm-
170 ful effect on the operation of the Bluestone project. On the
other hand, if the Bluestone dam is to be built as plaintiff insists, and as appears probable, this fact removes all possibility of the alleged disturbance of the Kanawha by power waves from the Radford dam, even if there were otherwise any danger from this standpoint. It is obvious even to the lay mind that any waves created by discharge from the defendant's plant will be absorbed and lost in the vast reservoir of the Bluestone dam. The entire discharge of water from defendant's project operating at maximum capacity without interruption for two weeks would not fill the reserve storage of the Bluestone dam, even if no water whatever were passed through the latter during that time. The entire utilizable storage capacity of defendant's dam could be twice emptied into the Bluestone reservoir and still leave 68,000 acre-feet of the latter's reserve storage capacity unfilled. In the face of these facts, the assertion of plaintiff's witnesses that power

waves from Radford would pass through Bluestone and on down to the Kanawha cannot be given serious consideration.

I am unable to find anything in the evidence that indicates a probability that the operation of defendant's project will impair the navigable capacity of the Kanawha or any other navigable water. The only suggestion to which serious consideration could be given is the matter of the power waves heretofore discussed. If the Bluestone dam is built as planned the possibility of harm from this source disappears. And it seems reasonably certain that a dam will be built at Bluestone—if not by the Government, then by the defendant itself. But even if no dam is ever built there, I think the evidence shows that navigation on the Kanawha will not be impaired or hampered in any way by power waves or any other causes due to the operation of defendant's plant at Radford.

The plaintiff has raised further question, and has argued, that the building of defendant's dam will interfere with a general and comprehensive plan of the Federal Government to regulate the flow of New River for the control of floods and the prevention of soil erosion. These questions need only brief comment. In the first place, it seems clear that the power of the National Government is limited to the protection of such interest as it has
171 the constitutional duty and power to protect. There is no provision of the Constitution giving the United States plenary control over all streams for the sole purpose of controlling floods or preventing erosion of the soil, and none from which such power can be inferred. In the second place, the plaintiff rests on a mere assertion of an interference with its plans. Such evidence as there is leads to a contrary conclusion, namely, that the defendant's dam will be helpful in these respects. New River is a stream of steep and irregular gradient, with a flow of high velocity and varying volume. In any such stream, it may be said, generally speaking, that the erection of any dam which impounds the flow of the stream with means for controlling its release, is a helpful factor in overcoming the effects of flood waters. There is no evidence that plaintiff's dam will have other than this usual effect. On the other hand, there is every reason to think it will be helpful.

Since New River, as the Court has hereinbefore found, is not itself a navigable water of the United States, it is evident that any valid objection to the erection of defendant's project must rest upon the right of the United States to protect the navigable capacity of the Kanawha (a navigable water of the United States) and, as a means to such protection, to prevent any obstruction in New River which would impair the navigable capacity of the Kanawha. The applicable statute is the Act of March 3, 1899, known as the Rivers and Harbors Act; 30 Stat. 1151. It now appears in Title 33 U. S. C. Secs. 401 et seq. The act provides

(Sec. 10), 33 U. S. C. 403, that "The creation of any obstruction, not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited * * *." This act superseded the Rivers and Harbors Act of September 19, 1890, 26 Stat. 454, Sec. 10, which was under discussion in United States v. Rio Grande Irrigation Co., 174 U. S. at p. 707.

The language of the two statutes is substantially the same in effect so far as it relates to the act to be prohibited. There is this difference, however, in their provisions as to remedies. The former act provided that proceedings might be instituted by the Attorney General of the United States to prevent by injunction the creating or continuing of any such obstruction 172 and to cause the same to be removed, where the obstruction was threatened or existed. This was the act before the court in the Rio Grande case, supra. The present act provides that injunction may be used to enforce the removal of any obstructing structure erected "in any district where the same may exist." A surface construction of the language of the respective statutes indicates that it was the purpose of Congress, in the present act, not to authorize proceedings by way of injunction against the creation of obstructions or those which were merely threatened, but to authorize such remedy only where the structure had been erected and it had been found that an obstruction existed. This in itself might raise question as to the right of the plaintiff to ask for injunction in this case, where erection of the dam has merely been started. However, the question is not of importance here. Even if it be conceded that the plaintiff under the general principles of equity jurisdiction has a right to seek injunction against a threatened danger, it is apparent that such relief is dependent upon a reasonable showing that the proposed structure will have the harmful effect attributed to it. No such showing has been made here. The most that has been shown is a theoretical possibility of interference with navigation in the Kanawha based upon the supposition that defendant's plant would be operated in a manner which is impractical, not economically sound, and not in accordance with established and approved practice. And it is denied by the much greater weight of evidence that any harm could result even from the theoretical and improbable conditions pictured by the plaintiff. Stated briefly, the plaintiff has shown no probability of harm, but only a theoretical possibility; and even this possibility is denied by the evidence.

In United States v. Rio Grande, etc., Supra, it is said, speaking of the prayer for injunctive relief:

"Of course, when such proceedings are instituted it becomes a question of fact whether the act sought to be enjoined is one which fairly and directly tends to obstruct (that is, interfere with or diminish) the navigable capacity of a stream. It does not follow that the courts would be justified in sustaining any proceeding by the Attorney General to restrain any appropriation of the upper waters of a navigable stream. The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact."

173 As intimated in the quotation above, the fact that the plaintiff is the United States Government does not alter the legal principles applicable. The Federal Government, as other plaintiffs, is entitled to relief only when its rights are invaded and this invasion must be established not by mere assertion but by proof. The mere averment that rights of the United States are endangered is not sufficient. If it were, then the National Government might, by that mere averment, prevent citizens from making legitimate use of their property and strip the states of all control of any streams within their borders. It is to be remembered that not only does the defendant here have extensive property rights which it seeks to utilize in its business and which are of little or no value to it except as so utilized, but the State of Virginia has important interests involved in its right to develop its natural resources in the interest of its citizens. The Virginia statute, entitled for the "Conservation and Development of Water Courses and Water Resources," Va. Code, Chap. 139A, Secs. 3581 (1) et. seq. provides:

"In order to conserve and utilize the otherwise wasted energy from the water powers in this state, it is hereby declared to be the policy of the state to encourage the utilization of the water resources in the state to the greatest practicable extent and to control the waters of the state, as herein defined, and also the construction or reconstruction of a dam in any rivers or streams within the state for the generation of hydro-electric energy for use or sale in public service, all as hereinafter provided."

The statute then defines what shall constitute "waters of the state," this including streams which by legislative enactment had theretofore been declared to be navigable, streams used or suitable for use in interstate commerce, and streams "the bed of which is owned by the Commonwealth." It is provided that no dam shall be erected in any "water of the state" except upon application to the State Corporation Commission and after the granting of a license therefor by said Commission, after hearing, and finding that the public interest will be promoted thereby or not detrimentally affected.

Pursuant to this statute the defendant made application to the State Corporation Commission for a license, submitting its plans and other pertinent data and, after an extended hearing, the Commission, on October 25, 1932, issued a license reciting that "the general public interest will be promoted by the consummation of the proposed development," and in which it set forth 174 the terms and conditions upon which the project should be built and operated.

It is conceded that the right of the state to provide for the development of its water powers must be exercised in submission to the paramount interests of the United States to protect its navigable waters. But to deprive the state of its rights in this respect it is necessary that there should exist facts which create a reasonable belief that the interests of the National Government will be interfered with. A mere averment of such interference, or a nebulous and remote possibility, is not sufficient. In this case there is no such showing of any existing or potential interference with navigation on the Kanawha as would justify a court in issuing an injunction which would deprive the defendant of the use of its property and tie the hands of the state in the development of its natural resources. And particularly is this true when it is borne in mind that the plaintiff is not foreclosed from compelling removal of the dam if in the future it should at any time prove a detriment to navigation in the Kanawha.

THE FEDERAL WATER POWER ACT AND ITS BEARING UPON THE RIGHTS OF THE PARTIES

What has been said heretofore may be said to be based upon general principles of law which have received the sanction and approval of the courts of this country over a long period of time. However, the facts stated must be examined in the light of the provisions of the Act of Congress enacted June 10, 1920, 41 Stat. 1063, under the title of the Federal Water Power Act and later, on August 26, 1935, re-enacted with some amendment under the title Federal Power Act (49 Stat. 863) and now appearing as Sec. 791a et seq. of Title 16 U. S. C., and which plaintiff invokes as determinative of the rights which it has asserted.

History of Proceedings Before Power Commission

Before entering upon any discussion of the applicability of the Federal Power Act, it seems desirable to state the history of the proceedings before the Federal Power Commission in relation to defendant's project. In June 1925, the New River Development Company, predecessor of defendant, filed with the Federal Power Commission a declaration of intention to construct the project at Radford. This declaration of intention was, in September

175 1926, assigned to the defendant, which continued the presentation of the declaration on the same plans. This declaration of intention was filed, so defendant asserts, for the purpose of obtaining from the Commission a declaration that, since New River was not navigable, there is no jurisdiction over the project under the Federal Water Power Act.

It is difficult to ascertain the extent of such investigation as was made by the Power Commission as a basis for a finding as to the effect of defendant's project, as prescribed by Sec. 23 of the Power Act; but it appears that a request was made of the Chief of Engineers for information upon the stream and upon the effect of the proposed project. Under date of August 20, 1925, General Taylor, Chief of Engineers, made a report to the Commission, giving a general description of New River and of the expenditures made on it in 1876–1882, but his statements as to the effect of defendant's project upon navigation in the Kanawha were quite indefinite. He states in substance that any possible adverse effect was not such as to warrant refusal to allow the proposed construction, if control of it were maintained by the United States, and that proper regulation of the flow would be of benefit to navigation. He made a general recommendation that any license granted should subject the operation of the plant to such regulations as the Secretary of War might prescribe. It is clear from this report that General Taylor assumed that because Federal expenditures had at one time made on the river, the Federal Government had jurisdiction over it. He ends by saying that "no sufficient reason is seen why the Federal Power Commission should not exercise jurisdiction over the proposed project."

Because of the lack of definiteness in this report, the Chief of Engineers was requested by the Power Commission, at the instance of counsel for defendant, to render a further report dealing specifically with (1) the navagability of New River and (2) the effect of the proposed project on the navigable capacity of the Kanawha River. Under date of December 29, 1925, such further report was made, reciting that a careful study had been made of all available data pertaining to the river. The physical features of the river throughout its course are described and, after recognizing the error involved in assuming a status of navigability because
176 of the one-time expenditure of Federal funds in attempted improvements, the report states the conclusion that the river was not navigable in fact in its original natural condition, that the improvements made did not suffice to make it navigable, and that it is not now a navigable water of the United States.

He reports further that, in his opinion, the proposed project would not and could not interfere with the navigable capacity of the Kanawha. He says that under normal operation of the project, the fluctuations in the stream flow "would be so attenuated by the time they reached the Kanawha, 155 miles distant, as to preclude the probability of any adverse effect upon navigation on that river." He states that even assuming the possibility that the plant at Radford might be shut down indefinitely in a period of low water, the run-off from the drainage area below Radford would supply sufficient water for navigation on the Kanawha. He says that so far as can be predicted from available data "it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River."

"I, therefore, report that in my opinion, New River in its present condition is not a navigable stream and that navigation on the Kanawha will not be adversely affected by the proposed power development."

On March 2, 1926, the Power Commission had a hearing on defendant's declaration of intention. The record of this hearing shows that the only evidence before the Commission was the report of the Chief of Engineers of December 29, 1925. No other evidence was offered or referred to. There were present counsel for the defendant, the Attorney General of Virginia, and counsel for the State Corporation Commission of Virginia, all of whom urged the Commission to act upon General Taylor's report and leave the defendant free to proceed with its project under the regulation of the State of Virginia. The defendant offered to produce further evidence to support the finding of the Chief of Engineers, if the Commission should desire to hear it. No action was taken at this hearing. The records of the Commission do not show that any further hearing was had or any other evidence taken—at least none of which the defendant was informed or that was made a matter of record. Nevertheless, after considerable delay, the Commission made a finding on June 1, 1927, that the New River was not a navigable stream within the meaning of the Power
177 Act, but that the interests of interstate and foreign commerce would be affected by the construction of the project.

It would be needless and tiresome to recount all the details of what transpired between the defendant and the Power Commission during the several succeeding years. Pertinent facts only need be stated. Following the finding of the Commission of June 1, 1927, the defendant indicated its willingness to accept from the Power Commission a license containing conditions for the protection of navigation on the Kanawha. The Commission, however, indicated that any license issued must be what is referred to as a standard form license, containing numerous conditions, some of which were pertinent to the protection of navigation and many of which were not. Among the conditions of the standard form license were those which provided for supervision by the Power Commission of the defendant's financing and accounting methods in connection with the construction and operation of the plant; provided that the licensee should establish amortization reserves out of any surplus earned; fixed the amount of such reserves and, in effect, authorized the Commission to determine the fair earnings on the plant. Among other conditions were those prohibiting any lease of the property without prior approval of the Commission and giving the United States the right to take over the project at the expiration of the license period. To these conditions and others having no relation to the protection of navigation the defendant objected and asked that they be eliminated as not within the power of the Commission to impose. The defendant requested issuance of what is termed a minor part license (under Sec. 10 (i) of the Power Act), limiting its conditions to those necessary for the protection of navigation. In the course of the controversy, at the request of defendant, the Attorney General of the United States was requested by the Commission to give an opinion as to the right to issue a minor part license. In response to such request, the Attorney General, on September 22, 1930, rendered an opinion in which, after reviewing the facts, he states:

"Upon the facts stated by the Commission in this case the United States has no power to prevent the construction of the proposed project on the New River unless its operation will tend to impair the navigation on the Kanawha by changing the regular and normal flow of the stream; and the only interest which the United States has to protect, and for which it may be justified in issuing a license, is a very minor part of the complete project, viz, the manner in which the flow of the stream
178 below the dam is affected by the operation of the water
power. I am advised by a representative of the Commission that under a license providing merely for proper control of the retention and release of water, this project will tend to improve the navigability of the Kanawha Rvier. Under these circumstances every purpose within the power of Congress may be accomplished by the issuance of a minor part license under paragraph (i) of Section 10.

* * * * *

This interpretation appears necessary in order to avoid serious questions regarding the constitutionality of the Act * * *."

Shortly after the rendition of this opinion by the Attorney General, and before any action was taken on it, the personnel of the Power Commission was changed. The records do not show that the new Commission gave any consideration to the opinion of the Attorney General, and on April 3, 1931, it formally denied the application for a minor part license, tendered the defendant a standard form license and ordered that construction of the project should not be started until such standard form license had been accepted.

The defendant thereafter, and as hereinbefore recited, made application to and received authorization from the State of Virginia to construct the project and indicated its intention to proceed with the construction. Thereafter, at a meeting held on October 12, 1932, the Federal Power Commission, without any further hearing and without any additional evidence, so far as the record shows, reversed the finding of the old Commission that the stream was not navigable and made a formal finding and declaration that the "New River, from the mouth of Wilson Creek, Virginia, north, is navigable waters within the definition * * * of the Federal Water Power Act." The reason of this action was apparently to strengthen the position of the Commission in any litigation aimed at preventing the construction.

Effect of the Federal Water Power Act

The argument of counsel on the Federal Water Power Act has taken a wide range. Much of it, on the part of plaintiff, has been upon the premise that New River is navigable waters of the United States. The defendant, while submitting some argument based on the contingency that such a finding might be made, has steadfastly maintained that the river is not navigable and the mass of its argument is upon that basis. The finding of the
Court that the river is not navigable waters eliminates the
179 necessity for discussion of much that has been said in the
briefs of counsel.

Prior to the enactment of the Federal Water Power Act in 1920, the statutes specifically providing means for the protection of navigation were the Rivers and Harbors Acts. The Act of September 19, 1890, 26 Stat. 454, provided (so far as pertinent here):

"Sect. 7. That it shall not be lawful to build any wharf, pier * * * dam * * * in any navigable water of the United States, * * * without *permission of the Secretary of War* * * * in such manner as shall obstruct or impair navigation. * * *"

"Sect. 10. That the creation of any obstruction, *not affirmatively authorized by law*, to the navigable capacity of any *waters in respect of which the United States has jurisdiction*, is hereby prohibited * * *."

It was Section 9 of this act which was before the court in United States v. Rio Grande, etc., supra, and which the court construed to prohibit the erection of a dam in a nonnavigable stream where the effect thereof was to so interfere with the flow as to impair the navigable capacity of a navigable river of which the obstructed stream was a tributary.

The River and Harbors Act of March 3, 1899, 39 Stat. 1151; 33 U. S. C. 401, et seq., which is still in effect, provides:

"Sect. 9. It shall not be lawful to construct * * * any bridge, dam * * * in any * * * navigable water of the United States until the *consent of Congress* to the building of such structure shall have been obtained * * *."

Sect. 10. The creation of any obstruction not affirmatively *authorized by Congress*, to the navigable capacity of any of the *waters of the United States* is hereby prohibited; * * *"

Sect. 7 of the Act of 1890 and Sect. 9 of the Act of 1899 refer to structures in navigable waters of the United States (physically present therein). Aside from some change of wording and sentence structure, the only essential difference between the two acts is that in the former the consent of the Secretary of War was necessary for the construction, while in the Act of 1899 the authorization of Congress is required. The italics in the quotations above have been supplied by the Court for the purpose of indicating the amendments.

Sect. 10 in each act refers to obstructions to the navigable capacity of a navigable water, covering the situation where the obstruction may be physically located outside of the navi-
180 gable water, but be of such nature as to interfere with navigation in the latter. The amendments here made are in changing the words "authorized by Law" (in the Act of 1890) to "authorize by Congress" (Act of 1899), and in amending the words "waters in respect of which the United States has jurisdiction" to read "waters of the United States." We are not concerned with the effect of or reasons for the first of these amendments and, as to the second, it seems clear that there was no attempt at extension of authority, but merely an effort to eliminate an unusual phrase, and substitute a synonymous one of more accepted usage.

As the act now stands, it prohibits (in Sect. 9) the erection of any structure in a navigable water of the United States, without authority obtained therefor, without reference to the effect of such structure on navigation or otherwise. This is apparently on the theory that the United States has the plenary power over its navigable waters to forbid the erection of any structure therein, without regard to the purpose or effect of such structure.

But when it comes to dealing with structures located in nonnavigable streams, no such plenary power exists, nor is it assumed by the act. That portion of the act (Sect. 10) relating to the obstruction to navigable capacity places a ban upon any structure, anywhere, if its effect is to interfere with the navigable capacity of a navigable water. But the condition of the prohibition is that the structure should so interfere. If it does not so interfere, the act sets up no prohibition against it, and requires no authority for its erection. The authority of the United States in such cases, i. e., of structures located outside of navigable waters, goes only to insuring that there be no interference with navigation in waters that are navigable, and only to the extent necessary to protect such navigation, and may be invoked only upon proof of the fact of such obstruction. This is, I think, the plain meaning of the Rio Grande case.

I am unable to see that the application of these principles has been altered by the Federal Water Power Act of 1920. That act appears to be not primarily for the protection of navigation, but rather to provide conditions under which the water power of navigable streams might be developed for the production of electric power. The title of the act indicates this object and the Commission created for carrying out its purpose is designated
181 the Federal Power Commission. In the Code, the act is published under the title Conservation, not under Navigation and Navigable Waters; nor does it repeal the Rivers and Harbors Act of 1899, which provides for the protection of navigable waters.

The provisions of the act pertinent to this case are the following. After creating the Federal Power Commission and defining the meaning of terms used in the act, it is provided that the Commission, among other powers, is authorized (Sect. 4 (d)):

"To issue licenses to citizens of the United States, * * * or to any corporation * * * for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, powerhouses, transmission lines, or other project works necessary or convenient for the development and improvement of navigation, and for the development, transmission, and utilization of power across, along, from, or *in any of the navigable waters of the United States*, or upon any part of the public lands and reservations of the United States." [Italics supplied.]

Sect. 10 of the act sets forth the conditions upon which licenses shall be issued. These conditions are substantially those which the Commission sought to impose upon the defendant in the so-called standard form license. Among them is the condition (Sect. 10 (c)) that the licensee shall "so maintain and operate said works as not to impair navigation." There are many other conditions having no relation to navigation.

In subsection (i) of Section 10, it is provided that—

"In issuing licenses for a minor part only of the complete project * * * the commission may in its discretion waive such conditions, provisions, and requirements of this Act, except the license period of fifty years, as it may deem to be to the public interest to waive under the circumstances * * *."

The most important provisions of the act for the purpose of this case and the ones around which dispute centers are those in the second paragraph of Sect. 23, reading as follows:

"That any person, association, corporation, state, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several states, may in their discretion file declaration of such intention with the Commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person * * * shall not proceed with such construction until it shall have applied for and shall have received a license under the
182 provisions of this Act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with state laws."

The real question at issue is whether the power of the Commission to require a license is limited to those projects proposed to be constructed in navigable waters or whether it extends to projects located in nonnavigable streams but which will, in the opinion of the Commission, obstruct the navigable capacity of a navigable water. Counsel for plaintiff appears to concede that the Power Act undertakes no enlargement of governmental powers over those granted in the Rivers and Harbors Act of 1899, for it is said in plaintiff's brief:

"Section 9 of the Rivers and Harbors Act of 1899, referred to above, operated as a regulation of the use of navigable streams for the purpose of creating power, because its necessary effect was to require a person who desired to use a navigable stream for that purpose to obtain the consent of Congress. Until 1920 the only way in which that consent could be obtained was by applying to Congress itself for the passage of a special act of authorization. The Power Act of 1920 provided an alternative method of obtaining congressional consent by applying to the Commission for a license, which the Commission was authorized to issue on the terms and conditions specified in the Act."

It is then argued, apparently, that the same reasoning applies as to Sect. 10 of the Act of 1899, i. e., that the necessary effect of that section was to require the consent of Congress to the construction of a dam in a nonnavigable stream, if such structure impaired navigable capacity elsewhere, and that the Power Act of 1920 provided that this consent be obtained in the form of a license from the Power Commission. The implication is that Congress had a right to require its previous authorization before there could be constructed in a nonnavigable stream a dam which would impair navigable capacity elsewhere, and that it has simply delegated this power to the Commission; and has further empowered the Commission to make final determination of whether such dam will obstruct the navigable capacity elsewhere.

I do not think such argument is tenable, nor that the case of United States v. Rio Grande, etc., which is cited to sustain it, bears such a construction. The Act of 1899 does not require a license for the construction of a project in a nonnavigable stream nor does it make such a project unlawful per se without the authorization of Congress. Such a contention was
183 made in the Rio Grande case where an injunction was
sought against the construction of the project on the ground that, not being previously authorized by Congress, it was unlawful. The court in effect denied such contention. It refused to enjoin the construction simply because it had not been previously authorized, and held that only upon proof that the operation of the project would interfere with navigation elsewhere could it be prohibited. The mere construction, or proposed construction of a dam in a nonnavigable stream does not authorize the exercise of Federal jurisdiction. That jurisdiction may be exercised only upon proof that through operation of the project, by appropriation of the water or otherwise, there is an actual interference with the navigable capacity of a navigable water. And the Federal control over operation of the project goes only to the extent necessary to protect navigable capacity in such navigable waters as are affected. It is to be remembered that the jurisdiction of the United States in all such instances grows only from the power to protect interstate commerce and is limited to the steps necessary for that purpose.

A consideration of the language of the Water Power Act, as well as of the circumstances attending its enactment, leads to the conclusion that the construction contended for by the plaintiff cannot be upheld, but that on the contrary Congress did not intend to confer authority to require a license for a project in a nonnavigable stream. The language of the act which is the source of controversy is that portion of Sect. 23 (heretofore quoted) which provides that persons who desire to erect a dam in "any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce * * * among the several states, may in their discretion, file declaration of such intention * * *." And that if the Commission shall find that the interests of interstate commerce would be affected by the proposed construction, the declarant shall obtain a license "under the provisions of this Act."

The defendant urges that Sect. 23 was enacted to provide for the situation where the erection of a dam was contemplated in waters, the navigable status of which was in doubt; and in order
184 that, before proceeding with the construction, the declarant
might obtain from the Commission a finding as to whether it held the stream to be a navigable water. It must be said that the language used is somewhat lacking in clarity, but I think the interpretation now urged by the defendant finds support not only in the legislative history of the act but also in a study of all its terms. This part of Sect. 23, (the 2d paragraph) was added to the original bill as a Senate amendment (being considered as amendment No. 58). When the bill came from conference, the report of the Managers on the part of the House stated: (House Document 910, 66th Congress 2d Session):

"This amendment seeks to prescribe how a stream of doubtful navigability may be determined as within the provisions of the law, and in substance it provides that the Commission shall ascertain whether the interests of interstate commerce are affected; if not, permission is granted to construct in accordance with the state laws."

During the course of the Senate debate, Senator King, of Utah, stated (59 Cong. Rec. 1103):

"I am afraid that under this bill and under the definitions to which I have called the Senator's attention it will be asserted by those having the administration of the bill that every little stream or rivulet that finds its way directly or indirectly into a larger stream which may become navigable is under the jurisdiction of this commission, so that no man may go upon these little streams and utilize the waters therein flowing for power or other purposes contemplated by this bill, or within the scope of this bill, without obtaining permission from the commission which is created by this bill."

To which Senator Nelson, referring to Sect. 23, answered:

"I think the apprehensions of the Senator from Utah are not warranted. If the whole paragraph be read and considered as an entirety, it will appear that it relates only to navigable streams. It starts out here with the phrase 'over which Congress has jurisdiction.' The authority of Congress over streams relates to utilizing them for navigation for commercial purposes under the interstate commerce clause of the Constitution. This covers streams either in their natural condition or streams that Congress by appropriation has improved and made navigable. They are all subject to the provisions of this bill.

"I want to call the attention of the Senator in this connection to another provision of the bill in Sect. 23, which relates to construction of dams over portions of streams that are not navigable. The commission in that case is authorized to investigate and if it finds that they are local streams, not navigable, not used for interstate commerce, it can grant authority for the improvement of the streams subject to state laws."

Further in the debate, Senator Jones, referring to Section 23, said (59 Cong. Rec. 7729):

185 "May I suggest further in connection with this matter that the Senate placed amendment No. 58 on the bill, under which it provides a way by which a person or company or corporation may get the judgment of the commission with reference to whether a stream is navigable, if they desire to do it. That is for the protection of any person who contemplates putting a dam in a navigable stream. If they exercise the right given to them in this section of the bill, the commission will first make an investigation to see whether or not the stream is navigable and they cannot put their dam in it if the commission says that it is navigable; but if the commission says that it is not navigable, then permission is granted to put the dam in. However, there is nothing which requires them to come to the commission in the first instance and ask their judgment as to whether the stream is navigable or not."

These quotations, and others that might be made, indicate that the purpose of Congress was to delegate to the Power Commission the right to approve the erection of structures in navigable waters, an act which had theretofore, under Sect. 9 of the Act of 1899, required Congressional approval in each case. As said by Senator Walsh of Montana in the course of the debate:

"This is the purpose of the bill. Under the existing law anyone who wants to put any obstruction whatever in a navigable stream must come to Congress and get a special act. The pending bill is a general act, granting the power to give permits through the Commission. That is the purpose of it." (59 Cong. Rec. 7729.)

They indicate further that the purpose of Sect. 23 was to give a person contemplating such construction an opportunity to have the judgment of the commission as to whether the stream in which he proposed to erect his project was a navigable water, and thereby determine whether it would require a license. But they do not indicate an intention on the part of Congress to require a license for a structure in a stream not in itself navigable, nor to invest the Commission with any powers greater than those which Congress itself exercised.

Indeed the Power Commission itself seems, in the early days of its existence, to have had no doubt about the purpose of the act nor as to the limits of its powers, for in its First Annual Report, the Commission states as to its jurisdiction.

"The Federal Water Power Act did not propose to bring any new streams within the authority of the Federal Government. It proposed rather to provide a method whereby the status of doubtful streams could be determined, and to set forth in definite form the conditions under which rights upon such streams could be acquired."

186 And again in 1924, in its Fourth Annual Report, the Commission states:

"The Commission has not been given general authority to protect navigation or power interests."

Not only do these expressions in the Congressional debate and the expressions of the Commission itself as to the extent of its authority deny the rights to require licenses for structures on nonnavigable streams, but it does not appear that the language of the Power Act justifies such an interpretation. If Congress had intended to take any such far-reaching step, had intended to invest the Commission with the powers which the latter now claims and which are greater than any powers which Congress itself had attempted to exercise, surely it could, and no doubt would, have found language to make its intention clear. As before stated, Sect. 23 was inserted as an amendment to the original bill. Omitting this amendment, it is found that the remaining portions of the statute are consistent and unvarying in their reference to navigable waters only. Had it not been for this amendment there could be no question that Congress was providing a procedure applicable to navigable waters alone. The section of the act (Sect. 4 (d)) which empowers the issuance of licenses authorizes them only as to projects on navigable waters or upon public lands of the United States. If it had been meant by Sect. 23 to give the Commission a similar power over nonnavigable streams, it seems that Sect. 4 (d) would have been correspondingly amended to authorize the issuance of licenses on such nonnavigable streams. But this was not done and the only direct authorization in the act for the issuance of licenses confines them to projects located in navigable waters or on public lands and reservations.

It will be noted that the filing of a declaration of intention under Sect. 23 was discretionary on the part of the person contemplating erecting a dam. This fact argues strongly against the interpretation now claimed by the plaintiff. If it had been intended to give

the Commission a power as to nonnavigable streams equal to its authority over navigable waters, why should the filing of a declaration of intention be left discretionary? If plaintiff's contention as to the interpretation of Sect. 23 is correct, we have this situation: That one person might file a declaration of intention and, as it sought in the instant case, be prevented from proceeding with the construction until he had accepted the
187
conditions imposed by the Commission. Another person might proceed with the construction without ever approaching the Commission and could not be halted because the act itself authorized him to use his discretion. Only after he had begun operation and it appeared that his project formed an obstruction to navigable capacity elsewhere could the Federal Government intervene by resort to the courts and then only to the extent necessary to protect navigation. United States v. Rio Grande, etc., supra. All of which but adds strength to the view that the purpose of Sect. 23 was merely to furnish a means whereby a person contemplating erection of a structure in a stream of doubtful navigability might, for his own protection, obtain the judgment of the Commission as to whether a license was required. It is true that in 1935, since this controversy arose, the act has been amended so as to require declarations of intention to be filed. But this, in my opinion, carries no different implication as to the intention of Congress as to the issuance of licenses on nonnavigable streams. The requirement for a declaration of intention in the present act is necessarily in terrorem merely. If it were ignored, the only power of the Federal Government would be to go into court and, upon showing that the operation of the project interfered with navigable capacity, compel the operation to be so regulated as not to interfere.

It is not believed that Congress intended to invest the Power Commission with any authority over the erection of power projects in nonnavigable streams different and greater than Congress itself possessed under existing law. Under the Act of 1899, the authorization of Congress is required as a prior condition to the erection of any structure in navigable waters of the United States. The duty of granting such prior authorization Congress delegated to the Power Commission. But no such prior authorization by Congress was required as to projects in nonnavigable streams and Congress had never assumed that it had the power to require it. It is hard to believe that Congress intended to invest the Commission with powers which Congress itself had never undertaken to exercise or assumed to possess.

It is upon this failure to realize the difference between
188
the extent of the Congressional power over a navigable water of the United States and its power over a nonnavi-

gable stream that the contention of the plaintiff is at fault. Its position is summed up in the following quotations from its brief:

"The question raised by Section 23 is whether the power to require Congressional consent is as absolute and unqualified when exercised with respect to a project which impairs navigable capacity as the power is when it is exercised with respect to a project located in a navigable stream."

* * * * *

"The pertinent decisions of the Federal courts support the argument that the power of Congress to grant or to withhold consent is just as wide in scope when it is exercised with relation to a project which impairs navigable capacity as it is when exercised with relation to a project located in a navigable stream."

It is upon this argument that the plaintiff seeks to justify not only the right of the Commission to require a license as a prior condition to the erection of a dam in a nonnavigable stream, but also its right to embody in that license all of the various condition to a project which impairs navigable capacity as it is when stream, including those which have no relation whatever to the protection of navigation or navigable capacity. Enough has already been said to make it clear that this Court does not find itself in accord with this view of the law. It is not necessary here to discuss or to define the extent of the powers of the United States in its navigable waters. Whether they are unlimited, as plaintiff implies, is not for decision here. But as to nonnavigable waters they are not unlimited. Such authority as the United States has over waters that are not navigable exists only because of its right and duty to protect navigation in waters that are navigable, and this power may be exercised only when it is shown that a nonnavigable water is so utilized as to interfere with navigation in a navigable water, and only to the extent necessary to protect such navigation.

The plaintiff contends, as I understand it, that the Power Commission has the right to determine in advance whether a structure to be erected in a nonnavigable stream will affect navigable capacity elsewhere, and that, if it does so determine, then the proposed structure is to be treated in all respects as if it were to be erected in navigable waters, and the Commission may 189 impose as a condition of its erection the acceptance of a license containing any and all conditions which might be imposed on projects in navigable waters, even though these conditions may have no connection with or relation to the protection of navigation. And it is further contended that the finding of the Commission on the question of whether the proposed structure will interfere with navigable capacity elsewhere is final, and not subject to review by the courts.

If the Water Power Act were construed as having this effect, there would, in my opinion, be no escape from the conclusion that Congress had exceeded the powers granted it by the Constitution. It is a well settled principle that any legislative enactment should be construed, where it is reasonably possible to do so, in such manner as to avoid a holding of unconstitutionality or even to raise serious question of constitutionality. Interstate Commerce Commission v. Oregon-Washington, etc., Co., 288 U. S. 14; Crowell v. Benson, 285 U. S. at p. 62. It is not meant that, in order to uphold constitutionality, a court is justified in adopting a strained and illogical construction at variance with the plain meaning of the act. If the unconstitutional purpose is clear, the statute must fall. But in this case the Court is not facing the problem of seeking a means to uphold the constitutionality of the law. No such search is necessary. It is presumed that the Congress knows the constitutional limits of its powers and intends to keep within them. As has been stated, the antecedent history of this legislation, the declarations made on the floor of Congress in the course of the proceedings wherein it was enacted, and the reasonable meaning of the language of the act itself, all indicate a purpose within the recognized powers of Congress. That purpose was to vest in the Power Commission the authority to grant permits for, and to exercise supervision over, the construction and operation of projects in the navigable waters of the United States, a power which Congress itself had previously exercised; and, as incidental thereto (as provided by Sect. 23) to furnish an opportunity to persons contemplating the erection of dams or other structures to have it determined in advance of such construction whether the proposed structure was one over which the Commission would seek to exercise control.

190 To give the act the interpretation now claimed for it would require a strained and unnatural construction and one contrary to every proper presumption. It would be to say that the Power Commission, merely by its own declaration (not appealable or reviewable) that the interests of interstate commerce could be affected, could prohibit the erection of any dam or other structure in any stream in the United States, no matter how small or remote, unless and until the owner of the project agreed to build and operate it upon such conditions as the Commission imposed and that these conditions might include supervision over the financial operations of the builder and regulation of his earnings from the project. Under such conditions citizens would be deprived of the use of their property and the power of the states to develop their natural resources as they might deem best for the welfare of their people would be completely throttled. Individuals, municipalities, and sovereign states could exercise

their most valuable property rights only at the will of an agency of the Federal Government and would be powerless to resort to the courts for protection against any arbitrary and ill-founded finding of such agency. Facing such a situation, it is not [illegible] natural that the Attorney General of Virginia should state in his brief that

"The Commonwealth of Virginia denies the right and vigorously protests the attempt of the Plaintiff to prevent, burden, or retard the development of her water resources in contravention of the established policy of the State * * *."

It is my opinion that the powers which the Commission now seek to exercise cannot be inferred from the provisions of the statute. That they are based upon inferences drawn by the Commission itself is shown by a statement made in the Tenth Annual Report (1930) of the Commission, after this controversy had arisen, and apparently in explanation of its position, where it is said:

"The law contains no express authority for the issuance of licenses for such projects on nonnavigable streams, but the authority to do so seemed a suitable inference from the provisions of Section 23."

I think it pertinent to point out that the record of this controversy before the Commission strongly suggests the completeness and finality of the control which the Water Power Commis-
191 sion might exercise over the streams of the country through
the exercise of the arbitrary and uncontrolled powers claimed. After the filing of the declaration of intention, the Commission, pursuant to the statute, undertook an investigation as to the character of New River and the effect of the project and requested a report from the Chief of Engineers in this respect. In his final report, the Chief of Engineers reported that New River was not a navigable stream and further that the project would not interfere with navigation on the Kanawha. In spite of this the Commission, while adopting the report as to navigability, found that the project would interfere with interstate commerce. Possibly it had evidence other than the report of the Chief of Engineers but, if so, the nature of that evidence does not appear. The defendant then agreed to every condition which the Commission proposed for the protection of navigation, but the Commission, ignoring the advice of the Attorney General, still refused permission to proceed unless the defendant would accept other conditions having no relation to navigation. And finally the Commission, with no additional evidence, abruptly reversed the finding of its previous personnel and held that the river was a navigable water of the United States.

Surely the courts have right to review proceedings of this sort where the constitutional rights of citizens and states in the use and enjoyment of their property are concerned. I wish to make it clear that the plaintiff has not contended that the Commission has the final power to determine whether a stream is navigable or not. But it does contend for the final power to determine whether a structure in a nonnavigable stream will interefere with navigable capacity elsewhere. I can see no difference in principle as between the two situations. Each involves the determination of a fact upon which constitutional rights depend. In the first instance, that fact is whether the stream is a navigable water of the United States. Neither Congress nor any agency created by it can make a stream a navigable water of the United States by declaring it to be such. It is too well settled to require citation of authority that the determination of facts upon which constitutional rights depend cannot be taken from the courts.

In the second instance, the fact upon which the Federal power is dependent is that the structure interferes with the navigable
192 capacity of a navigable water of the United States.
Upon the existence of that fact the constitutional power of Congress to intervene depends. And inasmuch as upon that fact depends the constitutional right of citizens to the use of their property, it follows that they cannot be deprived of the rights to resort to the courts for their protection. As said in Crowell v. Benson, 285 U. S. 22 (at p. 56–60):

"It is the question whether the Congress may substitute for constitutional courts, in which the judicial power of the United States is vested, an administrative agency * * * for the final determination of the existence of the facts upon which the enforcement of the constitutional rights of the citizen depend."

* * * * *

"In cases brought to enforce constitutional rights, the judicial power of the United States necessarily extends to the independent determination of all questions, both of fact and law, necessary to the performance of that supreme function."

A summary of my conclusions as to the proper interpretation of the Water Power Act and its application may be thus stated:

That it was not intended by the act to authorize the Power Commission to exact licenses as a prior condition to the erection of a power project, unless the project is to be located in a navigable water of the United States or upon some part of its public lands or reservations; and that the asserted power of the Commission to require a license as a prior condition to the erection of a project in a nonnavigable stream is not contemplated in nor authorized by the statute.

That if the act were construed (contrary to what, in my opinion, is its manifest purpose) to authorize the Commission to require a license as a prior condition to the erection of a project in a nonnavigable stream, there would be grave question of its constitutionality.

That even if the act could be construed to authorize the Power Commission to exact a license for a project upon a nonnavigable stream, and could be constitutionally upheld as to that power, such power could go no further than to impose upon the operation of the project such conditions as were reasonably necessary to the protection of navigation and that the exaction from the licensee of compliance with conditions having no relation to the protection of navigation would render the act unconstitutional in that respect.

193 That findings made by the Commission, either as to the navigability of a stream or as to the effect upon interstate commerce of a project located in a nonnavigable stream, are not final, but are in each case the subject of determination de novo by the courts when such findings are challenged.

Other conclusions both as to facts and upon the law have been stated in the course of this opinion and need not be restated here. As has previously been stated, the Court has, upon the evidence before it, found it to be a fact that defendant's project is not located upon a navigable water of the United States nor upon any public lands or reservations of the United States. It has further found as a fact that neither the construction nor operation of defendant's project will obstruct the navigable capacity of the Kanawha River or any other navigable water of the United States and that it will not involve any lands or other property of the United States. It follows that since the facts show that no interest of the United States will be involved or affected, the United States has no authority to interfere with or attempt to regulate or control the construction or operation of the project through the agency of the Power Commission or otherwise; and that the defendant is free to proceed with the construction of its project under authorization of the State of Virginia.

By this it is, of course, not meant to hold that all rights of the United States to complain of this project are forever barred. If at any time in the future the project should be operated in such manner as to interfere with the navigable capacity of the Kanawha or any other navigable water (a contingency which appears most improbable) the United States will not be barred from asserting its right to protect this navigable capacity by compelling a removal of the structure or such modification of its operation as is necessary. But I am convinced that the evidence in this case does not disclose grounds for the issuance of an injunction at this time and the prayer for an injunction will be denied and the bill dismissed.

JOHN PAUL, *District Judge.*

APRIL 22, 1938.

194 In United States District Court

[Title omitted.]
[File endorsement omitted.]

Findings of fact and conclusions of law

Filed May 2, 1938

In accordance with the views expressed in its written opinion rendered herein, and in addition to the matter therein stated, the Court sets out the following findings of fact and conclusions of law to be entered as a part of the record in this cause:

Findings of Fact

1. The defendant is a corporation duly organized and existing under the laws of the State of Virginia and is engaged in the business of producing, distributing, and selling electric power.

2. The defendant has begun and is proceeding with the construction of a hydroelectric development on New River in the State of Virginia near the City of Radford in Pulaski County in said state and intends to operate the same when completed. The project consists of a concrete dam in and across New River with the usual machinery, equipment, and appurtenances for the generation of electric power.

3. The project is situated wholly within the State of Virginia and does not involve the use of any lands or other property of the United States.

4. The bed of New River at the site of the project is owned by the State of Virginia and all lands adjacent to the river which will be affected by the project have been acquired by and are now owned by the defendant.

5. The defendant has acquired a license or permit for the construction and operation of said project from the State of Virginia and is proceeding in accordance with the terms and
195 conditions of said license.

6. The defendant, prior to the institution of this suit, filed before the Federal Power Commission a declaration of intention to construct and operate said project.

7. The Federal Power Commission made a finding that the interests of interstate or foreign commerce would be affected by the project and sought to require defendant, before proceeding with construction thereof, to accept a license from said Federal Power Commission and tendered to the defendant a license therefor.

8. That the license tendered by said Federal Power Commission contained, among others, certain conditions having no relation to the protection of navigation, in any navigable water of the United States, but which undertook to control and regulate the financial operations of the defendant in the construction and operation of its project. The defendant indicated its willingness to accept a license containing conditions for the protection of navigation in any navigable water of the United States, but objected to and refused to accept a license containing conditions having no relation to the protection of navigation.

9. The defendant having refused to accept the license tendered by the Federal Power Commission and the said Commission having refused to modify the terms of the license tendered by it, the defendant proceeded with and is continuing construction of its project without a license or permit from the Federal Power Commission or from any other agency of the United States.

10. That, following the beginning of said construction, the plaintiff brought this suit, praying that the defendant be enjoined from constructing or operating its project until it had procured from said Federal Power Commission a license in the form and containing the conditions required by said Commission or, in the alternative, that the defendant be required to remove any part of its project already constructed.

196 11. The New River has its sources in the northwestern part of the State of North Carolina and flows in a general north and northwesterly direction through the counties of Grayson, Carroll, Wythe, Pulaski, and Giles in the State of Virginia and, after crossing into the State of West Virginia, flows in a general northwesterly direction for a distance of approximately 90 miles to Gauley in Fayette County, West Virginia, at which point it joins with the Gauley River, and these combined streams form the Kanawha River, which flows for approximately 95 miles across to Point Pleasant, West Virginia, where it empties into the Ohio River.

12. The Kanawha River, from its mouth to a point 7 or 8 miles below the junction of the New and the Gauley rivers is a navigable water of the United States.

13. The New River is not a navigable water of the United States, either at the site of defendant's project or elsewhere

throughout its course. The site of defendant's project is approximately 152 miles above the mouth of New River and approximately 160 miles above the head of navigation on the Kanawha River.

14. The defendant's project is not located in or upon any navigable water of the United States nor upon any public lands or reservations of the United States.

15. The construction of the defendant's project will not obstruct the navigable capacity of the Kanawha River or of any navigable water of the United States. And the operation of defendant's project in any normal, rational, or probable method of operation will not obstruct or impair the navigable capacity of the Kanawha or any navigable water of the United States and will not affect the interests of interstate commerce.

16. No property of the United States will be damaged by the construction or operation of the project.

Conclusions of law

1. New River is not a navigable water of the United States.

2. Findings made by the Federal Power Commission, either as to the navigability of a stream or as to the effect upon inter-
197 state commerce of a project located in a nonnavigable stream, are not final, but in each case are subject to determination by the courts.

3. Under the provisions of the Act of Congress of March 3, 1899, 30 Stat. 1151, 33 U. S. C. 401 et seq., known as the Rivers and Harbors Act, the United States is empowered to compel the removal of a dam or other structure or project from a nonnavigable stream only upon proof that the same obstructs the navigable capacity of a navigable water of the United States, and the said Act does not authorize the exaction of a license for the construction of such project.

4. The Federal Power Act does not repeal the Rivers and Harbors Act so far as the latter relates to nonnavigable streams and Congress did not intend nor propose, by the provisions of the Federal Power Act, to vest in the Federal Power Commission the authority to require a license as a prior condition to the construction of a project in a nonnavigable stream.

5. That the Federal Power Act authorize the Federal Power Commission to exact licenses as a prior condition to the construction of a power project only when the project is to be located in a navigable water of the United States or upon the public lands or reservation of the United States.

6. That the Federal Power Commission, in attempting to impose a license for the erection of defendant's project in a nonnavi-

gable stream and where no property of the United States is involved, exceeded the powers granted to it by the Act of Congress.

7. That even if, contrary to conclusions numbered 4 and 5 above, the Federal Power Act could be construed as vesting authority in the Federal Power Commission to require a license as a prior condition to the erection of a project in a nonnavigable stream, the conditions of any such license must be limited to those designed for the protection of navigation and the Federal Power 198 Commission is without authority to embody in said license conditions having no relation to the protection of the navigable capacity of any navigable water of the United States. That the Federal Power Commission is without the constitutional power to require the defendant to accept a license in such form as tendered by the Commission and containing conditions not designed for and having no relation to the protection of navigation.

8. That even if the Federal Power Commission has the authority to require any license for a project on a nonnavigable stream, its action in seeking to impose upon defendant a license containing conditions, which is has no constitutional right to impose, bars its right to the relief prayed for, and its bill of complaint is without equity.

9. That a decree should be entered dismissing the bill of complaint.

(Signed) **John Paul,**
Dist. Judge.

April 29, 1938.

199 *In United States District Court*

[Title omitted.]

Final decree and order

May 10, 1938

This cause having come on for final hearing upon the Bill of Complaint as amended and Answer as amended and other pleadings filed, upon the evidence of witnesses taken in open court and by deposition and upon the exhibits filed in evidence and upon arguments of counsel, both by written briefs and orally; and the Court having rendered its opinion in which are embodied its findings of fact and conclusions of law which were intended to stand for the findings of fact and conclusions of law required by Equity Rule 70½, and the Court having subsequently, in view of the decision of the Supreme Court in Interstate Circuit, Inc., et al. *vs.* United States, — U. S. —, decided April 25, 1938, also made and entered of record additional separate findings of fact and conclusions of law under Equity Rule 70½;

Now, therefore, upon consideration of the same and for the reasons which have been stated in a written opinion of the Court, which is hereby made a part of this record and upon the findings of fact and conclusions of law embodied in said opinion of the Court and upon the additional separate findings of fact and conclusions of law made and entered of record by the Court under Equity Rule 70½, it is the opinion of the Court that the Bill of Complaint is without equity and that the prayer thereof should be denied, and it is, therefore, accordingly ordered that the prayer of said Bill of Complaint be, and the same is hereby, denied and that the Bill of Complaint be, and the same is hereby, dismissed.

200 It is further ordered that an exception is hereby granted to the plaintiff to the entry of this decree, to each finding of fact, and conclusion of law made by this Court in its opinion and in its findings of fact and conclusions of law and to the failure of the Court to affirm and adopt each of the findings of fact and conclusions of law presented and requested by counsel for the plaintiff.

Enter:

(Signed) JOHN PAUL, *Judge.*

201 In United States District Court

[Title omitted.]

Assignment of errors, as amended

And now, this 29th day of July 1938, the United States of America, plaintiff in the above entitled case, complains that in the proceedings had in such case and in the final decree entered therein on May 10, 1938, the District Court committed manifest error to the prejudice of the said plaintiff as more particularly specified in the following assignment of errors upon which the plaintiff relies to sustain the appeal prayed for to the United States Circuit Court of Appeals for the Fourth Circuit:

(1) In denying plaintiff's motion to strike defendant's answer;

(2) In entering its final decree dismissing the bill of complaint and denying the prayers for relief contained therein, in that the evidence as a whole failed to support the findings of fact made and entered by the Court, the conclusions of law drawn therefrom and the decree based thereon;

(3) In failing to adopt each of the findings of fact numbered 1 to 54, inclusive, presented and requested by plaintiff; all of which were in accord with the clear weight of the evidence, error being

assigned separately to the failure and refusal to make each of said proposed or requested findings;

(3A) In failing to make each of the conclusions of law 202 numbered 1 to 11, inclusive, presented and requested by plaintiff; all of which were based upon applicable provisions of the Rivers and Harbors Act of March 3, 1899, and of the Federal Water Power Act of June 10, 1920, as amended, correctly construed in the light of the clear weight of all of the evidence; error being assigned separately to the failure and refusal to make each of said proposed or requested conclusions;

(4) In making each finding of fact embodied in the opinion filed on the 22nd day of April 1938, and adopted by the Court as part of its findings of fact on the 10th day of May 1938, hereinafter designated in assignments numbered 6 to 27, inclusive, 29 to 37, inclusive, 39 to 44, inclusive, 66 and 67, in that each of said findings is not supported by the evidence and is contrary to the clear weight of the evidence, error being assigned separately to the making of each of said findings.

(4A) In making each conclusion of law embodied in the opinion filed on the 22nd day of April 1938, and adopted by the Court as part of its conclusions of law on the 10th day of May 1938, hereinafter designated in assignments numbered 40 and 44 to 50, inclusive; error being assigned separately to the making of each of said conclusions;

(5) In making each of its findings of fact numbered 3, 8, 13, 14, 15, and 15 in the additional findings of fact entered of record on the — day of May 1938, in that each of said findings is not supported by the evidence and is contrary to the clear weight of the evidence; error being assigned separately to the making of each of said findings;

(5A) In making its conclusion of law No. 1 in the additional conclusions of law entered of record on the — day of May 1938, and its conclusion of law embodied in the opinion hereinafter designated in assignment numbered 28, in that said conclusions (1) are predicated upon findings of fact which are not supported by the evidence and which are contrary to the clear weight of the evidence, and (2) are not supported by and are in conflict with the findings of fact made by the Court; error being assigned separately to the making of each of said conclusions.

203 (5B) In making its conclusions of law numbered 2 to 9, inclusive, in the additional conclusions of law entered of record on the — day of May 1938; error being assigned separately to the making of each of said conclusions;

(6) In making the following finding of fact embodied in the opinion:

From a consideration of all of it [the evidence], the conclusion is reached that New River is not and never has been navigable, either in its natural condition or after the improvements made, except in certain short and isolated stretches to each of which the navigation was local and confined within the limits of a single state; and that it has never been used, and has never been susceptible of use, as an avenue of interstate or foreign commerce. [Brackets supplied.]

(7) In making the following finding of fact embodied in the opinion:

The evidence indicates that the use of these [keel] boats was local, by which it is meant that they were not used in continuous trips throughout the course of the river but were used on separated stretches of the river where conditions made their use permissible and desirable. The range of their movements was determined by the extent of the pools and the absence of steep shoals in that particular section of the river. For example, from Hinton upward for 23 or 24 miles the river has the least gradient in its course, about 4 feet per mile, with considerable pool water and few precipitous shoals. The same conditions obtain to a more or less extent on the section of the river for 25 or 30 miles above Radford. It was in these separated stretches of the river that practically all of the bateaux navigation took place and only on them that there was any appreciable trade or commerce by boat. *It is not meant to say that continuous movement of such boats between Hinton and the vicinity of Radford was impossible or did not occur. There is evidence which indicates that it did occur,*[1] but there is a vagueness about the extent to which it occurred and indications that such trips were irregular, were attended with difficulty, and formed no appreciable part of any commercial transportation which took place on the river. The most definite evidence of the extent of navigation on the river are the reports of the government engineers both before and after beginning improvement of the river in 1877, and these reports repeatedly state that the commercial navigation was local to separated stretches of the stream and that there was no continuous navigation. [Brackets and italics supplied.]

(8) In making the following finding of fact embodied in the opinion:

References in this report [Chief of Engineers, 1883, Government Exhibit 39] to boat traffic on the lower division make no mention of any traffic originating in Virginia or at any
204 point higher up than 24 miles above Hinton. The traffic
was clearly local to that stretch immediately above Hinton

---

[1] In the assignments of error referable to findings of fact embodied within the opinion those portions appearing in italics are included only in the interest of clarity and are not objectionable per se.

and entirely within the State of West Virginia. Similarly the eight boats in the middle division were in a traffic local to that section. The railroad shipping point there was at New River Bridge, just above Radford, and the principal traffic was boating pig iron down to this point from several small furnaces located 25 or 30 miles upstream. [Brackets supplied.]

(9) In making the following finding of fact embodied in the opinion (R. —):

The above somewhat detailed description of the local nature of transportation on New River has been thought desirable because of the emphasis which the plaintiff places on the pig-iron shipments to New River Bridge and upon the volume of lumber, etc., delivered by boat to Hinton. *Conceding the accuracy of the testimony in this regard*, it is clear, I think, that in each instance the traffic was purely intrastate. It occurred in two widely separated stretches of the river, one over a distance of 25 miles or more entirely in Virginia, and the other over approximately the same distance in West Virginia; and between the two was a stretch of about 60 miles over which there was no appreciable commercial traffic, and little of any sort. [Italics supplied.]

(10) In making the following finding of fact embodied in the opinion (R. —):

In 1876 Congress appropriated $15,000 for work on New River and appropriations were continued (although not each year) until 1886, the total appropriations amounting to $112,000. Pursuant to these some work was done in each of the years from 1877 to 1882, inclusive, and a small amount in each of the years 1885 and 1889. The work was confined to making channels through shoal portions of the river, but did not include all of the shoals or falls, and on some of the more precipitous ones no work was done. Neither was the improvement continuous in extent but was divided along three different sections of the river. [Italics supplied.]

(11) In making the following finding of fact embodied in the opinion (R. —):

It is difficult to determine the extent to which the volume of the keel-boat traffic was affected by the improvements made on the river, but it does appear that the work done by the Federal Government in no way altered the local character of this navigation, and apparently it was not intended to. As stated, no attempt was made to create a continuous channel throughout the course of the river. The work was confined to improvement in each of several separated sections and was with a view to facilitating the keel-boat traffic in the limited localities where it already existed. The reports of the engineers in charge of the work indicate that their main object was to facilitate the carrying of local products by boat to the railroad outlet for that locality. [Italics supplied.]

(12) In making the following finding of fact embodied in the opinion (R. —):

205 Whether the purpose of those who originally inspired and promoted the plan of improving New River with Federal funds was to make the river navigable throughout its course is not clear. But it is clear, I think, that the work done had no such purpose, but was confined to improving separated stretches of the river to aid in local transportation to railroad points. After the work started, its scope was modified by making channels of lesser depth and lesser width than mentioned in the original plan; and as the work progressed the engineers in charge emphasized in their reports that no attempt was being made to make possible continuous navigation, and that such a result could be accomplished only by some plan different and more elaborate than that attempted.

(1) In making the following finding of fact embodied in the opinion (R. —):

Agreeing that consideration should be given to this fact of Federal expenditures upon New River, I think it not illogical to give consideration also to the fact that after small local expenditures had been made all effort at further improvement was abandoned, and that the Chief of Engineers expressed it as his opinion that the improvements made had "not materially changed the natural nonnavigable condition of the river," and advised against further attempts at improvement.

(14) In making the following finding of fact embodied in the opinion (R. —):

Throughout the annual reports of the Chief of Engineers during the progress of the work on the river there are repeated statements emphasizing the local nature of the boat traffic, and pointing out that facilities do not exist for continuous traffic. And, particularly in the later years, it is reported that the latter condition could be obained only by the adoption of a more general, more radical, and more expensive plan of permanent improvement than that attempted.

(15) In making the following finding of fact embodied in the opinion (R. —):

These quotations are made at length in controversion of the contention that the Federal Government has, over a long period of years, recognized New River as a navigable stream, and asserted its authority over it as such; and to show that throughout this extended controversy the navigability of New River was clearly denied by these officers of long experience and acquaintance with it.

(16) In making the following finding of fact embodied in the opinion (R. —):

I have chosen to quote at length from the contents of these various official reports because of the weight which I consider they should have on the issue here involved. They were made by responsible officers of the War Department in the course of their official duties, and under conditions involving no thought of litigation or controversy. The facts recited are based upon actual knowledge of the river gained by surveying it, observing it, 206 and directing the work upon it. So far as their statements may be said to be expressions of opinion, their source gives value to the opinion, for they are given by men scientifically trained and experienced, and one of whose larger duties is in dealing with the navigable waters of the country; men who are acquainted with comparable streams, and who know of the requirements for commercial navigation and the engineering problems necessary to establish it where it does not naturally exist.

(17) In making its finding embodied in the opinion that the New River crosses the Virginia-West Virginia State line at a point about 160 miles below the mouth of Wilson Creek (R. —).

(18) In making its finding embodied in the opinion that at the site of defendant's project and for some miles above and below the slope of the River is from five to eight feet per mile (R. —).

(19) In making the following finding of fact embodied in the opinion (R. —):

In the course of a report made by the Secretary of War to the House of Representatives in 1935 (74th Congress, House Document No. 91) there is contained the following general description of New River which is here quoted because of its brief but accurate description of the general characteristics of the stream.

"Throughout almost its entire length the river flows through a rugged mountainous country. Its valley is narrow, the flood plain being very little wider than the low-water channel, which varies in width from about 200 to 1,000 feet. In many places the banks are sheer bluffs rising from the river's edge. Ledges of limestone, sandstone, and shale crossing the river at frequent intervals create rapids and waterfalls. The waterfalls vary in height up to about 18 feet. Between the ledges there are usually short pools of varying depths. The low-water depth in the channel varies from a few inches to more than six feet."

(20) In making the following finding of fact embodied in the opinion (R. —):

A few miles below Hinton the river enters what is known as the gorge through which it flows for approximately 45 miles in a narrow and tortuous channel between high mountains. The bed is a mass of sharp ledges and boulders and through this, with the steepest slope in its entire course, the water rushes with great velocity.

(21) In making the following finding of fact embodied in the opinion (R. —):

The lack of identity [between the New and the Kanawha] for purposes of navigation is further emphasized by the fact that the
lower portion of the New River (for about 50 miles
207 above Kanawha Falls) is the most turbulent and precipitous
of the entire river and forms a barrier between the navigable Kanawha and any possibly navigable water of the New. [Brackets supplied.]

(22) In making the following finding of fact embodied in the opinion (R. —):

From these reports, as well as from other evidence in the case, I think it clear that that portion of the New River from Hinton (or a few miles below) to Kanawha Falls is not navigable and never has been and is not practicably susceptible of being made navigable. I find also that while, some 60 or 70 years ago, investigations were made and tentative plans suggested for canalizing this portion of the river for purposes of navigation, no steps were ever taken for this purpose and no attempts to render it navigable have ever been made and none are now in contemplation. Due to the plainly nonnavigable character of the New River from its mouth up to Hinton, it is evident that there is and can be no connection between navigation on the Kanawha and any alleged or actual navigation on the New River; and that the plaintiff's contention that New River is a navigable water of the United States must rest on evidence that the river possesses that character from Hinton upward.

(23) In making the following finding of fact embodied in the opinion (R. —):

In 1874 General Barnard, reporting to the Chief of Engineers on the practicability of establishing navigation on the New River from Hinton to its mouth, as part of a route for transportation by water between the Atlantic seaboard and the trans-Allegheny states, stated that this could be done only by a "pure lock and dam" system whereby boats would transfer "directly from pool to pool," and that in this stretch of the river alone 60 dams would be required. He further states that, "as an engineer * * * I cannot * * * affirm its practicability, though I have no doubt that, so far as mere construction is concerned, it is so." He reported further that it would be more practicable to build "an independent canal" for this part of the route.

While failing to find that General Barnard's four comembers of the special board designated by Congress to make this survey collectively and individually reported that the project—including the New River section thereof—was entirely practicable.

(24) In making the following finding of fact embodied in the opinion (R. —):

I am unable to agree with plaintiff's contention that the early historical descriptions of New River show its availability for navigation in its natural state. These descriptions, beginning with the exploring trip of John Peter Sally in 1742, are of trips of exploration or investigation along the course of New River and, in some cases, of its tributaries. They indicate that the explorers were impressed with the size of the stream and the wild beauty of the scenery along its course, and also that
208 they were impressed with the rapid flow of the stream and its precipitous fall. It is true that large parts of these exploring trips were made by boat along the river, but there is nothing to indicate that the boats used were anything larger than was necessary to hold a few men and their limited and scanty supplies. And even so, these accounts are replete with recitals of the difficulties encountered by the rapids in the river and of frequent portages to overcome them.

(25) In making the following finding of fact embodied in the opinion (R. —):

In past time various dams and bridges have been constructed in or across New River and in some instances persons contemplating such constructions sought permission or approval therefor from Congress or the War Department. I find no instance where this was refused when sought. This appears to have been done merely as a matter of precaution on the part of those sponsoring these projects, and to clothe them with a supposed authority for what it might be worth. As tending to show recognition of Federal control over the stream, this evidence loses any value due to the fact that in a like number of instances dams and bridges have been constructed without seeking the permission of Federal authority. And where this was done I find no instance where the Federal Government has sought to interfere with or prevent it. In other words, if permission was sought, it was granted; if permission was not asked, no question was raised.

(26) In making the following finding of fact embodied in the opinion (R. —):

That the Federal Government has made no improvements on the river since those heretofore discussed and that it does not have in contemplation any improvements affecting the navigable condition of the river. That it does have in contemplation certain projects for flood control, including the erection at a point a few miles above Hinton of what is referred to as the Bluestone Dam, the proposed purpose of which is to impound the waters of New River and control their flow in times of flood and in the aid of navigation upon the Kanawha.

(27) In making the following finding of fact embodied in the opinion (R. —):

It is clear from this report [Government Exhibit 92] that General Taylor assumed that because Federal expenditures had at one time been made on the river, the Federal Government had jurisdiction over it. [Brackets supplied.]

(28) In making the following conclusion of law embodied in the opinion (R. —):

It is, therefore, found that defendant's project is not situated upon a navigable water of the United States.

(29) In finding that the defendant has no intention of operating its power plant as a peak load carrier and that the defendant will not discharge a large volume of water for a portion 209 of each day and close the plant down entirely, or nearly so, for the balance of the day, thus supplying the public utility system of the defendant with electric power from the Radford plant for only a portion of every 24 hours and causing violent fluctuations in the flow of New River; and that this method of operation would be uneconomical, impracticable, and unsound (R. —).

(30) In finding that even if the defendant's project were operated in the manner assumed by plaintiff's witnesses, there would be no such results in the Kanawha as claimed, and no interference with navigation thereon; and that contention of the plaintiff was that the operation of the defendant's plant will create an irregularity of flow in the river, involving periods when there will be little or no water released at defendant's dam, followed by periods when water will be turned loose in large volume, that these irregularities will create alternating rises and falls in the pools on the Kanawha and would cause oscillations in the pools, all of which would hamper and obstruct navigation in these pools and that the flow at Radford might be cut off at low water seasons, depriving the Kanawha River of its normal supply of water (R. —).

(31) In finding that the defendant has no intention of operating the plant as a peak load carrier and that water supply of the stream made this method of operation impossible, and even if it were possible it was an economically impracticable and unsound method of operation (R. —).

(32) In finding that the power waves transmitted down New River during certain tests in 1930 apparently had negligible effect on the flow of the Kanawha River (R. —); but in failing to find that these wave tests were made during a period of relatively high water and not during a period of moderate or low flow and in failing to find that the flow into navigable waters from tributary streams is of greatest importance during periods of moderate or low flow.

210 (33) In finding that the witnesses who testified for the defendant as to the effect of power waves were engineers of learning and experience (R. —), but that the witnesses who furnished the bulk of the plaintiff's testimony on the subject of power waves displayed a bias, an evasiveness, and an unwillingness to admit even obvious facts hostile to their contention, to such an extent as to deprive their testimony of much value (R. —).

(34) In finding, in effect, that the navigable capacity of the pools created on the Kanawha River by the construction of the London, Marmet and Winfield dams is not and will not be impaired by the discharge of waves directly into such pools from the operation of the power plants constructed at those dams (R. —); but in failing to find that the navigable capacity of these pools is maintained by holding the pools at fixed levels and in failing to find that when the pool levels are maintained constant the power plant operations on the Kanawha River and at the Kanawha Falls dam have caused injury to navigation on the pools below.

(35) In finding that the dam recently erected and in operation at Hawks Nest, West Virginia, about six miles above the mouth of New River, would have a marked effect on the dampening of any power waves originating above it (R. —).

(36) In finding that under no reasonable or accepted method of operation could the defendant empty its reservoir in periods of low water and shut-down for the purpose of refilling it (R. —); and failing to find that periods of shut-down of the defendant's plant would normally occur in months of low and moderate flow and that such withholding of water in the defendant's reservoir would have serious detrimental effect upon the flow of New River, the Kanawha River and the Ohio River and would alter and modify the condition, course, and capacity of New River, the Kanawha River and the ~~Ohio~~ River in periods of low flow.

211 (37) In finding that construction and operation of the so-called Bluestone project on New River just above Hinton, West Virginia, will remove all possibility of the alleged disturbance of the Kanawha River by power waves from the Radford dam (R. —); and in failing to find that if the pool of the Bluestone project is maintained at a constant elevation any waves released from the Radford dam will pass through the Bluestone reservoir without substantial alteration.

(38) In failing to find that construction of the Bluestone dam and reservoir will restore to present commercial usefulness the portion of New River immediately above Hinton by creating a reservoir extending into the State of Virginia, and that the navi-

gable capacity of this reservoir will be obstructed and its condition altered and modified by the operation of the defendant's project at Radford.

(39). In finding that the defendant's project could not have the slightest harmful effect on the operation of the Bluestone project (R. —).

(40) In finding that there is no provision in the Constitution giving the United States plenary control over all streams for the sole purpose of controlling floods or preventing erosion of the soil, and none from which such powers can be inferred; and that defendant's dam will be helpful in connection with the general and comprehensive plan of the Federal Government to regulate the flow of New River for the control of floods and the prevention of soil erosion; and in finding that any dam which impounds the flow of a stream with means for controlling its releases is a helpful factor in overcoming the effects of flood waters (R. —).

(41) In failing to find that the Federal Government must control the flow of tributaries of navigable waters for the purpose of reducing and preventing floods and, so far as possible, reducing the erosion of the soil along the banks of tributaries, and the transportation of sediment by tributaries in order to reduce the silting of navigation channels below; and that such control can only be exercised by the Federal Government in a compre-
212 hensive plan for entire river system such as the Ohio
River system including the New-Kanawha River as a tributary; that the operation of storage reservoirs on nonnavigable tributaries of navigable waters must be controlled in harmony with the comprehensive plan of the Federal Government in order to be effective below for flood control purposes; and that operation of the defendant's project will seriously interfere with the national and comprehensive plan of the Federal Government for the development and improvement of navigation on the Ohio River system including the New-Kanawha River if not subject to Federal control.

(42) In finding that there has been no reasonable showing that the proposed project of the defendant will have the harmful effect attributed to it, but that the most that has been shown is a theoretical possibility of interference with navigation based upon the supposition that the defendant's plant would be operated in a manner which is impracticable, not economically sound, and not in accordance with approved practice (R. —).

(43) In finding that in this case there is no such showing of any existing or potential interference with navigation on the Kanawha River as would justify the Court in issuing an injunction (R. —).

(44) In finding that the plaintiff is not foreclosed from compelling removal of the defendant's dam if in the future it should at any time prove a detriment to navigation on the Kanawha (R. —); but in failing to find that such removal could only be compelled under the authority of Congress over the flow of New River at Radford, Virginia, as being essential to maintenance of navigable capacity below, and therefore in failing to find that New River at Radford, Virginia, is subject to the jurisdiction of Congress, and hence the injunction sought by the plaintiff should be granted.

(45) In finding that the Federal Water Power Act of 1920 is not primarily for the protection of navigation, but rather to provide conditions under which the water power of navigable streams might be developed for the production of electric power (R. —); and in failing to hold and decide that this statute is for 213 the comprehensive development and improvement of all streams, navigable and nonnavigable, under Federal control for the benefit of navigation, and for the protection and improvement of the interests of interstate or foreign commerce on navigable waters.

(46) In finding that Federal jurisdiction may be exercised upon projects in nonnavigable streams only upon proof that through operation of the project, by appropriation of the water or otherwise, there is an actual interference with the navigable capacity of a navigable water, and that Federal control gives only to the extent necessary to protect navigable capacity in such navigable waters as are affected (R.—); and in failing to find that in order to protect the navigable capacity of New River the Kanawha River and the Ohio River, Federal control is necessary to prevent operation of the defendant's project in a manner which will periodically or irregularly store and release the flow of New River and store for indefinite periods the entire flow of New River at Radford, Virginia, during times of moderate and low flow.

(47) In finding that Section 23 of the Federal Power Act was enacted in 1920 to provide for the situation where the erection of a dam was contemplated in waters the navigable status of which was in doubt, and in order that, before proceeding with the construction, the declarant might obtain from the Commission a finding as to whether it held the stream to be a navigable water (R.—).

(48) In finding that there would be grave question of the constitutionality of the Power Act if it should be construed to authorize the Commission to require a license as a prior condition to the erection of a project in a nonnavigable stream (R.—).

(49) In finding that findings made by the Commission as to the effect upon interstate commerce of a project located in a non-

navigable stream are not final, but are subject to determination de novo by the courts when such findings are challenged (R.—).

(50) In finding that the State of Virginia has the right to make such use of New River as it may see fit, subject to the paramount rights of the United States (R.—).

214 (51) In failing to find that the State of Virginia has no power or authority to control the flow of New River as an interstate stream so as to injure or affect the interests of interstate commerce or the interests of the State of West Virginia, or to authorize other parties to exercise such control.

(52) In failing to find that the flow of Little River, which empties into New River immediately below the defendant's project, will be more than sufficient to furnish that flow in New River which is required every 24 hours under the terms of the license issued by the State of Virginia for the defendant's project, and for three-fourths of the time will be sufficient to furnish that flow in New River which is required every week under the State license; and that by reason of such flow from Little River, it will be possible for the defendant to control the flow of New River past its dam at Radford, Virginia, so as to completely stop the passage of water for indefinite periods of time; and that under the license granted by the State of Virginia the defendant can fluctuate the flow of New River at will during low-water periods.

(53) In failing to find that New River at the site of the defendant's project is a stream subject to the jurisdiction of Congress under its authority to regulate commerce with foreign nations and among the several States.

(54) In failing to find that the construction and operation of the defendant's project will obstruct the navigable capacity of navigable waters of the United States, namely: New River, the Kanawha River, and the Ohio River.

(55) In failing to find that the construction and operation of the defendant's project will alter and modify the condition and capacity of the channel of navigable waters of the United States, namely: New River, the Kanawha River, and the Ohio River.

(56) In failing to find that the construction and operation of the defendant's project will affect the interests of interstate commerce on New York, the Kanawha River, and the Ohio River.

215 (57) In failing to find that the construction and operation of the defendant's project will affect the operation of the navigation locks and dams which the plaintiff has constructed and is constructing on the Kanawha River at London, Marmet, and Winfield, on the Ohio River at Gallipolis, below the mouth of the Kanawha River, and the existing dams on the Ohio River below the Gallipolis dam and that the plaintiff will be put to addi-

tional expense in operating its said locks and dams to the detriment and damage of the plaintiff.

(58) In failing to find that the construction and operation of the defendant's project will materially alter the flow of the New River at its mouth and hence will affect the operation of the hydroelectric power plants which have been constructed with the consent of the plaintiff at its dams at London, Marmet, and Winfield on the Kanawha River, and that the revenue which the plaintiff receives from the lease of such power plants may be materially affected by such change in the flow of the Kanawha River.

(59) In failing to find that the plaintiff is entitled to an injunction under the Act of Congress of March 3, 1899, when it appears that the construction and operation of the defendant's project will obstruct the navigable capacity of navigable waters of the United States, or will alter or modify the condition and capacity of the channel of navigable waters of the United States.

(60) In failing to find that the Act of Congress of March 3, 1899, requires the consent of the United States for construction and operation of the defendant's project and that such consent of the United States may be given by the Federal Power Commission through the issuance of a license under the Federal Power Act.

(61) In failing to find that New River at the site of the defendant's project is a stream over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several states; and that the defendant's project will have hydraulic machinery and a storage reservoir of sufficient size to completely control the flow of New River past the dam
216 for indefinite periods during time of low or moderate flow;
that the control which the defendant may thus exercise over the flow of New River will affect the interests of interstate commerce; that the defendant filed a declaration of its intention under Section 23 of the Federal Power Act to construct this project and the Commission found that the interests of interstate commerce would be affected by such proposed construction, and that construction and operation of the defendant's project without a license would be in violation of the terms of Section 23 of the Federal Power Act, and that construction and operation of the defendant's project may be enjoined under the provisions of the Federal Power Act.

(62) In failing to find that so far as the interests of navigation are concerned periods of low and moderate flow are critical and that during such periods a portion of the New Kanawha watershed lying above the defendant's dam is more productive of run-off than the portion of such watershed lying below such dam, and therefore the upper portion is of greater importance to navigation

interests on New River, on the Kanawha River, and on the Ohio River.

(63) In failing to specify what conditions in the license tendered by the Federal Power Commission are not authorized by the Federal Power Act and what conditions in the license tendered by the Federal Power Commission are not constitutional and valid.

(64) In failing to find that the flow of New River from above the defendant's project furnishes a large proportion of the flow of the Kanawha River at the head of navigation thereon and that during dry periods has contributed as high as 70 percent of the flow of the Kanawha River at its mouth, and that the flow of New River from above the defendant's project has furnished during low-water periods, as high as 32 percent of the flow of the Ohio River below the mouth of the Kanawha River.

(65) In failing to find that control by the United States over the flow of New River at the site of the defendant's project is necessary to insure maintenance of the navigable capacity 217 of navigable waters of the United States, namely: New River, the Kanawha River, and the Ohio River.

(66) In finding that the average flow of New River at the site of the defendant's project is around 3,211 cubic feet per second (R. —), but in failing to find that the flow at this place is less than this average for 65 percent of the time; in failing to find that during low-water periods from 30 percent to 70 percent of the flow of the Kanawha River at its mouth comes from the New River above the site of the defendant's project; that during the low-water periods the New River above the site of the defendant's project has contributed as much as 32 percent of the flow of the Ohio River below the mouth of the Kanawha River, and that the flow of New River at the site of the defendant's project is essential for the maintenance of the navigable capacity of the Kanawha River and the Ohio River.

(67) In finding that the defendant proposes to install electric generating machinery in its project with hydraulic machinery capable of passing 9,000 cubic feet of water per second when in full operation, and that the reservoir in the defendant's project will have a usable capacity of 100,000 acre-feet (R. —); but in failing to find that this usable capacity is sufficient to enable the defendant to operate its power plant, particularly during periods of low and moderate flow in an irregular manner, so as to discharge past the dam varying flows ranging from a complete shutoff at the dam to a release of as high as 9,000 cubic feet per second or more, and that this irregular operation can occur during such periods as the flow of New River into the reservoir in the defendant's project is less than 9,000 cubic feet per second; that the flow of New River into the reservoir in the defendant's project

will be less than 9,000 cubic feet per second for over 96 percent of the time and that the flow has been 3,000 cubic feet per second or more for only 141 days a year during the years of record.

(68) In failing to find that although only 29 percent of the drainage area above Kanawha Falls lies above the defendant's dam site, during periods of low and moderate flow the part
218 of the New-Kanawha watershed lying above the defendant's
dam is more productive of run-off than the part of said watershed below said dam site, and that the periods of low and moderate flow are critical periods so far as navigation interests are concerned.

(69) In failing to find that the usable storage capacity of the defendant's reservoir is sufficient in periods of low and moderate flow to permit the defendant to impound the entire flow of the river continuously for many days.

(70) In failing to find that the defendant's project, if not under license of and controlled by the United States, is not adapted to the plans of the United States for the comprehensive development of the New-Kanawha River system and for the development of navigation, flood control, prevention of soil erosion, development of water power, and other public uses on said stream system, in that it will alternately and periodically and for a large part of the time restrain the full flow of New River and release damaging waves of water and will withhold the flow of New River in its reservoir; that the defendant seeks to avoid the requirement in the Federal Power Act that it shall contribute in proportion to its benefits toward the construction of headwater improvements considered in the comprehensive plan of the United States and contemplated by the Federal Power Act; and that, in so far as the operation of the defendant's project will be intermittent or inconsistent and not coordinated with other projects and developments under the control of the United States, it will interfere with existent and prospective commerce on New River, on the Kanawha River and on the Ohio River, and with the operation of the works constructed by the United States for the purpose of improving navigation on said streams.

(71) In failing to find that construction and operation of the defendant's project, if not under license of and controlled by the United States, will interfere with the reforestation and soil conservation program of the United States for the protection of the watershed of navigable streams, which program has been proceeding under the so-called Weeks Act approved March 1, 1911,
219 36 Stat. 961, and other acts of Congress, and more particu-
larly through the purchase of large areas of lands in the Unaka National Forest and in the Monongahela National Forest within the New River watershed.

(72) In failing to find that the power and authority of the United States over interstate and foreign commerce extends to the flow of all navigable waters of the United States and to all acts wherever performed or however done which may reasonably relate to or affect the flow of such navigable waters; that the United States may grant or withhold its consent for the erection of structures in nonnavigable tributaries of navigable waters of the United States, which structures may be used or operated to alter, modify, or obstruct the course, condition, or capacity of such navigable waters or structures in such nonnavigable tributaries as will affect the interests of interstate commerce or navigable waters of the United States; and that in nonnavigable tributaries the flow of which is essential to the maintenance of navigation on navigable waters of the United States the erection of structures which will alter, modify, or obstruct the course, condition, and capacity of navigable waters of the United States or structures which will affect the interests of interstate commerce on navigable waters of the United States, where such structures are erected without the consent of the United States are unlawful and their construction and operation may be enjoined.

(73) In failing to find that the defendant's project is being constructed on a stream at a site where the flow is essential to the maintenance of navigable capacity of navigable waters of the United States, namely: the navigable New River, Kanawha River, and Ohio River.

(74) In failing to find that the defendant's project will alter, modify, and obstruct the flow of the New River and in turn the navigable capacity and the flow of the lower New River, the Kanawha River, and the Ohio River.

(75) In failing to find that the defendant's project will alter, modify, and obstruct the flow of the New River and in turn will affect the interests of interstate commerce on New River, the Kanawha River, and the Ohio River.

220 (76) In refusing to admit evidence offered on behalf of the plaintiff as follows:

Q. (By Mr. McClernan.) Did you ever make any experiments in order to determine the persistence of power-plant waves, such as these we have been discussing?

A. (Mr. Kramer.) I have observed waves created by power plants, at my request.

Q. Where did you do that?

A. The first case was on the Pit and Sacramento Rivers in California, in 1925. Also on the Klamath River in California, 1927 and 1935.

By Mr. McClernan. Now I propose to ask the witness for the result of his experiments.

By the COURT. I don't believe I can allow you to do that.

By Mr. McCLERNAN. Exception.

Offer of proof. By Mr. McCLERNAN. The Government now offers to prove by the witness on the stand that as a result ~~of his~~ observations on the Pit and Sacramento Rivers in 1925, he found that waves created at the Pit-3 Power Plant, already mentioned in the witness' testimony, persisted below the point of generation to a substantial degree for a distance of 128 miles, namely, to the Red Bluff Gage, and further offers to prove by the same witness that while the Pit and Sacramento Rivers are not in every respect comparable to the New and Kanawha Rivers, there are substantial stretches in the Pit and Sacramento Rivers that are substantially comparable to like substantial stretches in the New and Kanawha Rivers and sufficiently so to enable an experienced hydraulic engineer to form a reliable opinion from observation such as were made by this witness on the Pit and Sacramento concerning what would be the distance and degree of persistence of similar waves on the New and Kanawha Rivers.

Defendant's objection to the offer of proof was sustained and exception duly entered (R. —).

(77) In refusing to admit evidence offered on behalf of the plaintiff as follows:

By Mr. McCLERNAN. For the purposes of the record I now offer to prove by this witness (Mr. Kramer) the results of his observations made on the Klamath River, particularly with reference to the distances of the persistence downstream of the power waves observed.

The defendant's objection having been sustained, plaintiff duly excepted and made the following offer of proof:

The Government offers to prove by the witness on the stand that as a result of his observations on the Klamath River in 1927, he found that the waves created at the Copco Power Plant, located on the Klamath River about 198 miles above its 221 mouth, already mentioned in the witness' testimony, persisted below the point of generation to a substantial degree, for a distance of 133 miles, namely to the Somes Bar Gage, and further offers to prove by the same witness that while the Klamath River is not in every respect comparable to the New and Kanawha Rivers, there are substantial stretches in the Klamath River that are substantially comparable to like substantial stretches in the New and Kanawha Rivers and sufficiently so to enable a hydraulic engineer to form a reliable opinion from observations such as were made by this witness on the Klamath River concerning what would be the distance and degree of persistence of similar waves on the New and Kanawha Rivers.

The defendant's objection to the offer of proof having been sustained, the plaintiff duly excepted.

By Mr. McClernan. The Government now offers to prove by the witness on the stand that as the result of his observations on the Klamath River in 1935, he found that the waves created at the Copco Power Plant located on the Klamath River about 198 miles above its mouth, already mentioned in the witness' testimony, persisted below the point of generation to a substantial degree for a distance of 198 miles, namely, to the Requa Gage and further offers to prove by the same witness that while the Klamath River is not in every respect comparable to the New and Kanawha Rivers, there are substantial stretches in the Klamath River that are substantially comparable to like substantial stretches in the New and Kanawha Rivers and sufficiently so to enable a hydraulic engineer to form a reliable opinion from observations such as were made by this witness on the Klamath River concerning what would be the distance and degree of persistence of similar waves on the New and Kanawha Rivers.

The defendant's objection to the offer of proof having been sustained, the plaintiff duly excepted.

(78) In refusing to admit as substantive evidence plaintiff's exhibits numbered for identification 95, 103, 104, and 105, the same being documentary reports of plaintiff's witness Kramer relating to power-wave action on the Pit and Klamath Rivers;

(79) In refusing to admit evidence offered on behalf of the plaintiff as follows:

Q. (By Mr. Thompson.) Now, Mr. Sherman, under the Weeks Act, has there been a purchase of any lands in the State of Virginia and West Virginia?

Objection by Mr. Jackson.

By the Court. The objection will be sustained. You may avow what you expect to prove by the witness.

By Mr. Thompson. If the Court please, we offer the testimony by the witness E. A. Sherman for five purposes:

1. To show that the land purchased under the Weeks Act by the Federal Government in the past, present, and future, will restore stream flow in the New River, improve stream 222 flow in the Kanawha River, improve the New River and the Kanawha River for navigation and make the New River susceptible for improvements in its navigable capacity.

2. That the reforestation of the lands purchased in the past on the headwaters of the New River, being purchased at the present time and proposed for purchase in the future, will, when purchased, hold back the run-off from the New River watershed letting it return into the channel of New River gradually, so that

in low water times it will improve the navigable depth of New River over its shoals for navigable purposes.

3. That Congress having from 1876 to 1886 appropriated one hundred and twelve thousand dollars to improve navigation conditions of New River, with approximately one hundred and nine thousand dollars of that sum having been spent by Congress in improving the channel in New River for navigation.

That Congress, by its purchases in the past, at this time, and as the agricultural department proposes to purchase forest areas on the watershed of New River for reforestation is showing by these acts that Congress is desirous of improving the navigable capacity of New River and of making the navigable capacity of New River more susceptible for improvements, and is seeking and by this act is indicated that Congress has not abandoned the navigable capacity of New River for improvements.

4. That by the purchase of forest lands for reforestation on the head waters of New River, Congress is seeking to carry out flood-control programs on the Mississippi River, and its tributaries, including the Ohio River, the Kanawha and the New Rivers, in order that in flood times these reforestative areas will hold back sudden run-off and thus assist in preventing floods on New River, Ohio River, Kanawha River, and the Mississippi River.

5. To further sustain, on the part of the plaintiff, the issues in this case as made by the pleadings herein, to this end we offer by this witness to prove that Congress appropriated in 1912, and the Department of Agriculture has expended from that time, monies for the purchase of land to be reforestated, located on the upper reaches of New River, in what is termed Unaka National Forest.

(Other related subjects proposed to be covered by the testimony of this witness as avowed by Mr. Thompson are not reproduced herein due to the length of same.)

By Mr. Thompson. I understand then that you rule against the admission or the offer of any testimony further by this witness.

The Court. I think so.

Mr. Thompson. Exception.

(80) In refusing to admit as substantive evidence plaintiff's Exhibit No. 94, a documentary report of Colonel Tripp relative to the effect of the operation of defendant's Radford project.

223 (81) In refusing to admit on behalf of plaintiff exhibit market for identification No. 270, the same being a report signed by Major Ardery relating to the effect of power waves on the New and Kanawha Rivers.

Wherefore the plaintiff prays that the decree aforesaid may be reversed and for such other and further relief as to the Court may seem just and proper.

(Signed) **Joseph H. Chitwood**,
United States Attorney,
(Signed) **John W. Aiken**,
Special Assistant to the Attorney General,
(Signed) **Willard W. Gatchell**,
Attorney, Federal Power Commission,
Solicitors for Appellant.

224

In United States District Court

[Title omitted.]

Order extending time for transcript of record

Good cause appearing therefor and upon motion of solicitors of record for the appellant herein, it is hereby ordered by the undersigned, the Judge who signed the order allowing the appeal and issued the citation herein, that the appellant be and it is hereby granted until the 10th day of November 1938, within which to file the certified copy of the record on appeal herein in the office of the United States Circuit Court of Appeals for the Fourth Circuit.

Dated at Roanoke, Virginia, this 29th day of July 1938.

(Sgd.) **John Paul**,
United States District Judge.

225

In United States District Court

[Title omitted.]

Order extending time for transcript of record

Filed Sept. 15, 1938

An appeal to the Circuit Court of Appeals for the Fourth Circuit having been allowed in this case upon petition of Appellant on the 29th day of July 1938, at which time, due to the great length of the record made in the trial of the case, and upon request of counsel for both Appellant and Appellee, the time for filing the record on appeal was extended to the 10th day of November 1938.

And it now appearing to the Court that a further extension of the time within which to file the record on appeal is necessary.

And it further appearing that in the preparation of the record on appeal both Appellant and Appellee have been conforming to the Equity Rules now in effect, as distinguished from the Rules of Civil Procedure to become effective on the 16th day of September 1938.

It is therefore found by the Court that in the preparation of the record on appeal in this case it is not feasible for the parties to follow the said Rules of Civil Procedure becoming effective on September 16, 1938, and it is so ordered.

226 It is further ordered that the time for filing the record on appeal in the Circuit Court of Appeals be and the same is hereby extended from November 10, 1938, to December 15, 1938.

Given under my hand this 15th day of September 1938.

(Sgd.) **John Paul,**
United States District Judge

227 In United States District Court

[Title omitted.]

Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on appeal

Entered Nov. 30, 1938

This day came the appellee by counsel and filed its written motion for an enlargement of time for filing its amendments to the statement of evidence as lodged by the appellant, on November 17, 1938, and for an enlargement of time for filing the record on appeal in the Circuit Court of Appeals.

In consideration whereof it is adjudged, ordered, and decreed that the time for filing the appellee's amendments to the statement of evidence as lodged be and it hereby is enlarged up to and including the 10th day of January 1939, and it is further adjudged, ordered, and decreed that the time for filing the record on appeal is enlarged up to and including the 25th day of January 1939.

Given under my hand this 30th day of November 1938.

John Paul,
Judge of the District Court of the
United States for the Western District of Virginia.

By Consent.

John W. Aiken,
Willard W. Gatchell,
Solicitors for Appellant.

228 **In United States District Court**

[Title omitted.]

Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on appeal

Entered Dec. 21, 1938

This day came the appellee by counsel and filed its written motion for an enlargement of time for filing its amendments to the statement of evidence as lodged by the appellant, on November 17, 1938, and for an enlargement of time for filing the record on appeal in the Circuit Court of Appeals.

In consideration whereof it is adjudged, ordered, and decreed that the time for filing the appellee's amendments to the statement of evidence as lodged be and it hereby is enlarged up to and including the 1st day of February 1939, and it is further adjudged, ordered, and decreed that the time for filing the record on appeal is enlarged up to and including the 15th day of February 1939.

Given under my hand this 21st day of December 1938.

JOHN PAUL,
Judge of the District Court of the United States for the Western District of Virginia.

By consent.

JOHN W. AIKEN,
WILLARD W. GATCHELL,
Solicitors for Appellant.

229 In United States District Court

[Title omitted.]

Order extending time

The appellee, Appalachian Electric Power Company, on yesterday, the 1st day of February 1939, having duly presented and filed its amendments and objections to the appellant's statement of the evidence pursuant to the Equity Rule and the order extending the time for such filing heretofore duly entered, and said amendments and objections having been modified or amended by agreement of the parties: upon consideration thereof, the court, being now of opinion that the amendments and objections suggested, as so modified, are well taken, doth so adjudge and order, and,

(1) The appellant is directed to make such changes, additions, and corrections in its statement of the evidence as to embody the said amendments and objections, as so modified, and to present the statement of the evidence, so changed and corrected, to the Judge of this Court on or before the 24 day of February 1939, for approval and authentication.

(2) It is further ordered that the time for filing the Transcript of Record on appeal in the Office of the Clerk of the Circuit Court of Appeals for the Fourth Circuit be, and it hereby is, extended to the 1st day of March 1939.

February 2, 1939.

(Sgd.) JOHN PAUL,
Judge of the District Court of the United States for the Western District of Virginia.

230 In United States District Court

[Title omitted.]

Order extending time

It is ordered that the time within which the record in this cause on appeal to the Circuit Court of Appeals for the Fourth Circuit may be filed in the Clerk's Office of said Court be, and the same is hereby, extended until the 15th day of March 1939.

(Sgd.) JOHN PAUL,
United States District Judge.

231 In United States District Court

[Title omitted.]
[File endorsement omitted.]

Stipulation as to printing record under rule 23

Filed Nov. 17, 1938

It is hereby stipulated and agreed that the Clerk of the District Court shall make up a transcript of the record on appeal in the above-styled cause and transmit the same to the clerk of the United States Circuit Court of Appeals for the Fourth Circuit at Richmond, Virginia, and that the record on appeal shall be printed under the supervision of the Clerk of the Circuit Court in accordance with Rule 23.

This 17th day of November 1938.

(Sgd.) John W. Aiken,
John W. Aiken,
Special Assistant to the Attorney General,
(Sgd.) Willard W. Gatchell,
Willard W. Gatchell,
Principal Attorney, Federal Power Commission,
Solicitors for Appellant.
(Sgd.) Wendell W. Forbes,
Solicitor for Appellee.

232 In United States District Court

[Title omitted.]

[File endorsement omitted.]

Stipulation re original exhibits

Filed Nov. 17, 1938

It is stipulated by the parties hereto that all original exhibits filed in the District Court during the trial of this cause, or such copies of originals as may have been substituted therefor by leave of the Court, shall constitute a part of the statement of evidence to be filed by the appellant under Equity Rule 75, but neither party shall be deemed to have waived any objection as to the admissibility or materiality of any exhibits by force of this stipulation; nor does either party hereby concede the propriety of inserting in the statement of evidence the objections and exceptions of the other party.

It is further stipulated that copies of said exhibits need not be attached to appellant's statement of evidence but that said original exhibits shall be and they are, by reference thereto, hereby made a part of the statement of evidence.

The Clerk of the District Court is requested to send up to the Circuit Court of Appeals all of the original exhibits as a part of the statement of evidence and a part of the record on appeal.

This 17th day of November 1938.

John W. Aiken,
Special Assistant to the Attorney General,
Willard W. Gatchell,
Principal Attorney, Federal Power Commission,
Counsel for Appellant.
Wendell W. Forbes,
Counsel for Appellee.

233 In United States District Court

[Title omitted.]

Order re transmittal of original exhibits

Entered Feb. 2, 1939

Pursuant to stipulation heretofore entered into between counsel for the parties, it is adjudged and ordered that all original exhibits, which are not copied in full in the statement of the evidence to be filed in this case be, and they hereby are, made a part of the transcript of the evidence and are hereby directed to be transmitted by the Clerk of this Court, after duly identifying each such exhibit individually, to the Clerk of the Circuit Court of Appeals of the United States for the Fourth Circuit, along with the certified transcript of the record.

February 2, 1939.

(Signed) **John Paul,**
Judge of the District Court of the
United States for the Western District of Virginia.

---

234 In United States District Court

[Title omitted.]

Order approving statement of evidence

Feb. 24, 1939

It appearing to the Court that the foregoing statement of the evidence contained within fourteen volumes of testimony—pages 1 to 2649, inclusive—and five volumes of exhibits—pages 2650 to 3405–D, inclusive—is true, complete, and properly prepared and, together with the original exhibits hereinafter enumerated, includes all the evidence necessary for a decision of the questions presented by the appeal, the same is hereby approved and ordered filed as a statement of the evidence to be included in the record on appeal in the above-styled cause, all as provided for in Equity Rule 75.

The original exhibits hereinbefore referred to are numbers 1–13, incl.; 32; 39; 43; 47–87, incl.; 89; 90; 90–A; 95; 97; 105; 106; 106–A; 106–C; 107–116, incl.; 117A–117F, incl.; 158–161, incl.; 163–189, incl.; 189–A; 190–200, incl.; 200–A; 200–B; 201–205, incl.; 207–221, incl.; 221A–221E, incl.; 223; 226–229, incl.; 229–A; 230; 230–A; 231–238, incl.; 240–252, incl.;
235 118–123, incl.; 123–A; 132–141, incl.; 143–156, incl.; 500–

507, incl.; 509–517, incl.; 519–526, incl.; 534; 536; 539–A; 540–A; 540–B; 543; 544; 549–557, incl.; 558A–558G, incl.; 561–563, incl.; 567; 254–261, incl.; 264A–264C, incl.; 265; 266; 271–275, incl.; 569; 572; 573; 574–C; 575; 576; 578–A; 578–B; 580; 584; 585; 589–592, incl.; 599–608, incl.; 610.

This 24th day of February 1939.

(Sgd.) JOHN PAUL,
United States District Judge.

Memorandum by the Clerk: The following original Exhibits, required by the foregoing order to be certified up, viz: Exhibit No. 230; Exhibit No. 249; Exhibit No. 250; Exhibit No. 251; Exhibit No. 252; Exhibit No. 265; Exhibit No. 500; Exhibit No. 501; Exhibit No. 502; Exhibit No. 503; Exhibit No. 504; Exhibit No. 512; Exhibit No. 519; Exhibit No. 521; Exhibit No. 576; Exhibit No. 604; Exhibit No. 605; Exhibit No. 606; Exhibit No. 608; are missing from the papers in the record and therefore the order cannot now be complied with as to them. However, as it is thought that copies will be supplied by counsel before the hearing, these Exhibits are carried in the index.

C. E. GENTRY, *Clerk.*

236 In United States District Court for the Western District of Virginia

In Equity No. 8

UNITED STATES OF AMERICA, PLAINTIFF

vs.

APPALACHIAN ELECTRIC POWER COMPANY, A CORPORATION, DEFENDANT

Statement of evidence under equity rule 75

Be it remembered that the above entitled case came on regularly for trial before the above Court sitting in equity on the 13th day of July 1936 upon the issues formed by the bill of complaint as amended and the answer thereto as amended. The hearing was concluded September 5, 1936.

Both plaintiff and defendant offered oral testimony and introduced documentary evidence as hereinafter appears.

Appearing as counsel for the plaintiff were Messrs. Huston Thompson, Wayne C. Williams, Allan D. Jones, Henry McLernan, and John W. Aiken, Special Assistants to the Attorney General; Oswald Ryan, General Counsel, and Willard W. Gatchell, Attorney, Federal Power Commission; John A. Skiles, Special Attorney, Department of Justice; and J. H. Chitwood, United States Attorney. Appearing as counsel for the defendant were Messrs. Newton D. Baker, Raymond T. Jackson, John L. Abbot, Fraser M. Horn, Wendell W. Forbes, M. W. Belcher, Jr., John S. Draper, and Wallace Ould.

237 *Section 1. Plaintiff's Main Case*

Fred D. Bradford testified upon Direct Examination as follows:

I am Chief Draftsman of the Federal Power Commission at Washington, D. C.

The map marked for identification, plaintiff's "Exhibit 1" is a map which I prepared of the New and Kanawha Rivers from the United States Geological Survey maps. The heavy line running through the middle of the map is New River greatly enlarged in order to make the river stand out conspicuously. (Map filed and marked "Exhibit 1".[2] Said exhibit was offered[3] and received in evidence for the limited purpose of giving a general picture of New River which might be useful to the witnesses in connection with their testimony and to the court in understanding it, but not as proof of any of the physical locations or characterizations shown on said map. The rest of the map is drawn to an approximate scale. The increase in the width of the New River and the Kanawha River, on this map, runs all the way from the Ohio down to the mouth of Wilson Creek approximately on the map. It is proportioned generally all the way through so as to make it stand out at a distance, but no measurements are placed on it. The same width of the river has been preserved all the way through approximately. Feet and inches do not enter into a map of this class.

The railroads are still farther away from the river than is actually shown on the map. Its scale is about 2½ miles to the inch.

Lewis Harvey testified upon Direct Examination as follows:
I live in the City of Radford, Virginia, on New River.
238 I was born and raised in Montgomery County within a
mile or two of the dam project at Radford. I am 75
years old and have lived on or near the New River all my life.
I operate a farm six miles up the river right at this project.

I have seen boats all up and down the New River, mostly back fifty years ago. These were of different makes, some of them keel bottoms, some flat bottoms, and some crude boats made and operated by the farmers. These boats carried commerce, bringing down New River all the grain, bacon, lumber, pig iron, and promiscuous stuff that came from way up the New River, which was the only source of outlet we had fifty years ago. At that time we had no roads.

---

[2] Plaintiff's or Government's exhibits are herein designated by the numbers from 1 to 275 and Defendant's exhibits are designated by the numbers from 500 to 611.

[3] Hereafter when it is stated that an exhibit was "offered in evidence" it means that such exhibit "was offered and received in evidence" unless otherwise indicated.

Q. How frequently would you see boats going up and down that river?

A. Pretty much every day.

The boats were of various lengths, sizes, and capacities. Some had two men and others had four men on them. They were propelled with a pole. In going down stream one man stood in front and steered the boat and the other one was behind. These boats ran fifty to seventy-five feet in length; some were eight feet wide, and some were larger. Some of them drew four feet of water.

Q. How long did you continue to see boats going up and down this river?

A. They haven't been used much in the last decade you might say. As we got better roads and railroads and other things, of course, this traffic lessened.

Q. Do you know or can you give the name of any boat man who used to be on that river?

A. If I had time to figure it out, I might, but I just couldn't give it to you just off handed.

I did not do any shipping myself on any of these boats. The Norfolk and Western Railroad came to Radford about the time of the beginning of the Civil War.

There was a mill called General Wharton's Mill across the
river from Radford. This mill was the shipping point for boats
for all of that country. It was a flour mill, a merchant
239 mill of about fifty-barrel capacity, run by water power.
Nearly every boat which came down the river stopped at
the mill at Radford across the bridge from the Norfolk and
Western. My farm is right between the mouth of Little River
and New River, about a mile from the property of the Appalachian Electric Power Company.

All the timber above that country for miles and miles was rafted down the river.

Q. State whether or not any of it passed where the Radford project is located?

A. Yes, sir; it all had to come through there.

I have seen logs and all manner of stuff floating down the river. New River Depot was a shipping point. There was a sawmill there at which the logs were sawed and made into merchandise.

Q. Over how long a period did you see these boats coming down and up the river?

A. I just don't know how to answer that question. All my boyhood days and up until most of my young life we lived on the river, and there was a lot of traffic of all sorts went on, but I just couldn't tell you about any dates.

I should say that these boats came up and down the river for some thirty years.

Upon Cross-Examination the witness testified as follows:

I was born in Montgomery County 76 years ago last March, about a mile or two from New River, in a straight line and five or six miles from there by road. Boats were going up and down the river daily for a period of thirty years. I didn't go to the river every day. I couldn't say how often I went to the river.

Q. Do you mean to tell his Honor that all the iron from the Mack's Creek furnace was boated down the river?

A. No, sir; I wouldn't say all.

Q. Well, how much?

A. I couldn't answer that.

240 Q. Did you ever see any iron boated down the river from the Mack's Creek Furnace?

A. Yes, sir.

Q. Where were you?

A. I was along the river.

Q. Were you at the Mack's Creek Furnace?

A. No, sir.

Q. Did you ever come down from Mack's Creek Furnace to Radford or New River bridge on a boat loaded with iron?

A. No, sir.

Q. How many boats loaded with pig iron did you ever see unload at Radford?

A. I couldn't answer that question because I wasn't interested in that and consequently I don't know.

Q. I believe you said you never used New River for shipping purposes?

A. No, sir.

The general source of the old road in my neighborhood called the Lead Mines Road is west after it leaves Snowville. It goes to Mack's Creek furnace, which was a sort of junction point because during the Civil War they made iron at this place and supplied the Confederacy with iron from this furnace and the mail route from Christiansburg went there.

Q. Do you assume to tell the Court that the Mack's Creek Furnace was operated during the war?

A. Yes, sir.

Q. You do state definitely and positively that the Mack's Creek Furnace, or Radford Furnace, was operated during the Civil War?

A. No, sir; I don't.

Q. You just said that a minute ago?

A. Yes; I might have said that, but I don't believe a man should be too positive about anything. I am here to tell you the truth as far as I know it.

Q. Do you mean to say then that the Mack's Creek-Furnace, or Radford Furnace, was not operated during the Civil War?

241 A. I understand it was. For instance, I was only five years old at Lee's surrender, and of course my memory don't date back very far, you see.

Q. So, of course, you don't know how the iron was taken away from there?

A. I know a lot of it came down the river, but I couldn't tell you how much.

Some of these boats drew four feet of water, I think; I did not ride on them.

I have forded New River on horesback as a young man. We would jump on a horse and cross it anywhere. There is a ford near Ingle's Falls, and also at Howe's Fall, about two miles above this dam project. I was about the river every day or every few days.

Pig iron is a chunk about eighteen inches long [indicating] and weighing about one hundred pounds. Some pigs were four inches in diameter and some were six. We saw the pig iron in these boats where it was unloaded and loaded in box cars on the railroad. I saw pig iron stacked at New River bridge, which was the shipping point, but saw pig iron everywhere. They told me it was pig iron. I don't know that I saw the pigs actually unloaded at New River from the boats.

By the Court:

Q. How did they get these keel-bottom boats back up the river?

A. A keel bottom will carry 150 bushels of wheat and two men could guide them down the river, but it took four men to take them back. They put the poles against their shoulders, two on each side, and they polled them up.

Q. I understood you to say they were 70 or 80 feet long?

A. They were.

Q. And did they pole them back up the river?

A. Yes, sir; two men to the side. Two brought them down and four took them back; it took two to the side.

J. W. **Flannagan** testified upon direct examination as follows: I have lived at Radford, Virginia, on New River, about 242 thirty years, and am 68 years old. I was born and raised on New River about five or six miles below Radford.

I have seen quite a few keel-bottom boats on New River but not many flat-bottom boats. The keel-bottom boats plied up and down the river, down as far as Hinton and back up to Allisonia and throughout that country. I was raised near Pepper's Ferry and saw these boats going up and down the river on what is called the "Horseshoe," the bend in the river. The farm on which I was born was about three hundred yards from the river and I lived there for thirty-three years.

Q. State whether or not you saw boats going up and down the river during those 33 years?

A. Yes, sir.

Q. What were these boats doing, going up and down the river?

A. They were hauling lumber, wheat, corn, groceries of all descriptions, and lumber and crossties.

Q. Did any of these boats stop at your farm?

A. Yes, sir; they often stopped there. There was one crew on these boats that lived right back of our farm.

Q. And when they would stop there, did you ever see the boats?

A. Yes, sir; I would see them. I was a little fellow—I was not more than 12 years old.

Q. How would you know when the boats were coming?

A. I would hear them sound the bugle horn. They would get to what was known as Barnett's Falls, and there was a swift current there and, unless they used poles, they could not pole through there, and they would stir around there for quite a bit, and so when it went to go through there, they would blow the horn, and I was a little fellow, and I was listening for the horn and, when I heard it, I would go get my hat and go down to the river and see them.

Q. How frequently did these boats appear on the river, so far as you know?

A. I could not tell you about that—very often. They usually went as far as Hinton, and they would stay on a trip there for a week before they would get back, and sometimes, if the 243 river got up, they would have to stay longer, just according to the water that was in the river.

Allisonia is located on the North Carolina branch. My father owned a farm there but I was never on it. I remember that he sawed quite a lot of fencing plank and two-by-fours and siding plank and shipped them on boats down home to our farms to use.

I have seen pig iron unloaded from boats in New River. It was put on the bank near the Norfolk and Western Railroad station on New River and transferred onto the Norfolk and Western freight cars.

I recall the Federal Government doing work on the channel of the New River south of Newbern, east of Pulaski, and not very far from Pulaski, when I was about twelve years old. The work included blasting and clearing of the channel.

There were boats on the river both before and after this work was done. There were no railroads and the roads were bad so that pig iron was often loaded in boats and shipped down New River on keel-bottom boats. I know the names of some of the boat crews. One boat crew lived close back of our farm. Their names were Myers—Chapman and Bill.

The witness on cross-examination testified as follows:

I should say that I have seen from one to as many as four or five keel-bottom boats on New River at the same time. I am positive that I have seen as many as three boats on the river at one time but would not say positively that I have seen as many as four at one time.

Q. You have seen more than two on the river at the same time, have you?

A. Yes, sir.

Q. Do you remember testifying in Radford some months ago, when you were called by the Government and gave your deposition in this case?

A. Yes, sir.

Q. I asked you, on cross-examination, in those depositions at page 398: "How many boats did you see on the river at the same time"; and your answer was: "Well, I would say two." Is that correct?

A. It is; yes, sir. These boats would come kind of together as much as they could, and some of them would be, I would
244 imagine, more than two.

Q. The question is not what you imagine, Mr. Flannagan, but I am asking you what you saw.

A. I have seen two and three—I will go that far and be positive about that.

Q. So, when you answered the question before, you were giving us, I suppose, then what you thought was correct?

A. Of course; I was just thinking that I had seen boats quite often. Sometimes there might have been more.

Q. The point is this: you said that you had seen as many as two boats on the river at the same time, a few months ago, and you have come here and said that you saw four or five, and later corrected that and said that you saw about two or three, and you are positive of that.

A. Yes, sir.

Q. You said before that you had seen as many as two, and now you say that you have seen as many as how many, and I want you to be positive about it.

A. I will say that I have seen three on there, to be positive. I may have seen more, but that has nothing to do with that part of it.

Q. Then the statement that you made in your deposition was incorrect, was it?

A. How many did I say?

Q. Two.

A. I will say two, now.

Q. You said three awhile ago?

A. I said two or three.

Q. Will you say as many as four?

A. No, sir; I will not say that.

Q. Who was running the three boats?

A. That is a different proposition. They had crews from all up the river, and some of them I didn't know.

Q. Did you see them every day?

A. No, sir; not every day; they did not go by every day.

245 Q. Every time the bugle would blow, you would go and grab your hat and go to the river to see it?

A. Yes, sir; boylike. I fished most of the time on the river and it was quite a sight for me to see the boats and these men poling the boat up and down the river.

Q. You saw them practically every time they passed down, didn't you?

A. Yes, sir; I would; yes, sir.

Q. Did you know who was running the other boat—who the other boatmen were?

A. No, sir; I wouldn't know the boats' crew. They had them scattered up the river all along, and the ones that lived there near home, I knew—such as the Harts and that bunch, and they had others there at different places. There was Lew Smith, an old darky that ran one of the boats, and there was another——

Q. (Interrupting.) Did Lew Smith run on the boat with the Myers?

A. Sometimes, I think, and there was sometimes a white fellow or two. They had to pick them up as they could get them. They were not regular crews.

Q. They were not regular crews?

A. No, sir; I would not say they were. If a man got sick, he would get someone else to go in his place.

Q. Where did Major Kent live, with reference to where you were born?

A. He lived northwest, not very far off.

Q. The boat that you spoke of that Chap and Bill Myers operated, was that Major Kent's boat?

A. I don't know whose it was.

Q. You testified about bringing lumber down from Allisonia?

A. Yes, sir.

Q. Do you recall how much lumber that was?

A. Quite a lot.

Q. Do you recall what your father did with it?

A. He built fences and buildings, and so forth.

246 Q. You say he built buildings; was it more than a barn that he built?

A. I don't know about the barns, but it was 2 by 4's and lumber for the farm; it was general lumber that my father used for sheeting and everything else.

Q. Do you mean that you were on the boat that brought the lumber?

A. I was on the bank. They put the lumber off and they had to haul it away to keep it from washing away. It was put up in our barn lot. As well as I remember, there were three big stacks that were piled up there; I don't know how many thousands of feet, but it was quite a lot.

Q. One boat brought it, did it?

A. Different boats brought it; they could not have hauled it all on one boat; and we had another farm north of Radford and he sent lumber down there on a boat, too. I didn't state that before—I didn't think about it, but that was true. He used a good deal of fence and plank.

Q. Where did you see cross ties on the river?

A. They were going down on the boats; I saw them.

Q. Going down on the boats?

A. Yes, sir.

Q. When you were a boy, you saw them going down on the boats, did you?

A. Yes, sir.

Q. About how old were you when you saw that?

A. I don't know, sir; I could not state that. I didn't know they would ask this. When they had no railroads, they hauled that stuff down on the boats—to build the railroad and the bridge stuff. They didn't have no way of getting it from Hinton on over the Norfolk and Western that way.

Q. Do I understand you to tell His Honor that these bridge timbers and cross ties for the Norfolk and Western Railroad were taken down the river on the river?

A. Some was moved other ways.

247 Q. Did you ever see a bridge timber go down the river for the Norfolk and Western bridges?

A. Yes, sir; they were shipping stuff there all the time.

Q. I am talking about bridge timbers.

A. I saw the lumber on there and it looked like bridge timbers to me.

Q. Do you know that it was bridge timber for the framing of the bridges for the railroad?

A. No, sir.

Q. And it was at the time the railroad was being built that you saw the cross ties you mentioned?

A. Yes, sir.

Q. That were being shipped on bat*toes* in the keel boats?

A. Yes, sir; some of them were keel-bottom boats.

Q. When was this?

A. It was lumber for cofferdams and things like that that went down. There was no other mode of transportation to get that lumber there. They had to use it.

Q. There were roads down there, weren't there?

A. Well, there was roads, but you had to go so far back to get to the river again; you had to go miles and miles around.

Q. Don't you know, as a matter of fact, that the supplies for the building of the New River division of the Norfolk and Western Railroad Company were hauled out on the cars—that they laid the track progressively and that the material was taken out on the road?

A. They had to have a place to start with.

Q. They started at New River Bridge, didn't they?

A. Some of them did; yes, sir.

Q. Isn't that where the whole railroad——

A. (Interrupting.) No, sir; the saw mills were along the river there. They would haul that timber and put it in the saw mill and it was put on cars and shipped to where the railroad wanted it.

248 Q. This boating of the lumber and the cross ties that you speak of was between some inaccessible point on New River, and where the railroad or road struck the river?

A. Well, I would say that they brought the lumber where they could get the kind of lumber they wanted in there; when it comes to bridge timbers, this is usually of Georgia pine, and it has got to be brought in, but there was other timber that they was using to put in dams and everything of that kind. I will tell you my experience: I hauled railroad iron to help build the railroad and hauled it across with teams and delivered it at the end of the tunnel; it was not very far up there where it was unloaded. I believe I unloaded it. That was on New River and we hauled it there and ferried it across at Pepper's Ferry to build the bridges.

Q. You are now speaking of the cut-off from Walton?

A. Yes, sir.

Q. And I believe the bridge goes to the tunnel across the river?

A. Yes, sir.

Q. And there is no road into the tunnel—it is inaccessible?

A. Yes, sir.

Q. And for that reason you hauled your iron to Pepper's Ferry?

A. We hauled stone and iron, too. The river is inaccessible, when it comes to that; it is inaccessible clear to Hinton. You will find places 10 or 15 miles that you cannot go on the side of the river with wagons.

Q. The timber and supplies that you speak of as being sent along the river there, were being carried down there from some inaccessible point to a place where it could be handled?

A. It is this—that lumber, I believe or supposed, was unloaded off the railroad and, after the railroad crossed at New River and was hauled there on boats along down the river. I don't know if Captain Ingles—I think he surveyed that road, but they had to have supplies in there. They run boats up and down the river hauling all that stuff and everything else. You could not get up with a wagon; I am sure you could not.

249 Q. And you were on your place when you saw the boats hauling this material?

A. At different places, I saw it. I have stood on New River, on the bank, and saw the boats coming down and the pig iron was in the bottom of the boat and it was unloaded there.

Q. Did you ever see any pig iron hauled on the river, or only unloaded at the bank of the river?

A. I saw the boats come down and run to the bank and unload it, and I happened to be there. We didn't have many stores in the country then, and it was a good way to a store in the country.

Q. When was it that you saw the pig iron unloaded?

A. I don't know.

Q. How many boats did you see unloaded at New River Bridge?

A. I don't know; there were boats that unloaded there; it might have been two or three or one or different numbers.

Q. I am asking you how many boats you saw unload with pig iron at New River Bridge?

A. These boats were coming up there all along. The question of how many were coming there and the ones that I saw unload, I don't know. I have seen them putting it on the bank of the river.

Q. What year was that?

A. I could not tell you; I don't know. I am 68 years old and you take a boy of 12 years old, and a thing like that makes an impression on him that he will never forget. I remember things when I was 12 years old that I cannot remember 12 months ago now.

Q. How old were you when you saw the boats unloaded with pig iron?

A. I was a little bit of a fellow, big enough to go to the store, about 12 or 14 years old.

Q. Did you ever go to Hinton on one of these boats?

A. No, sir.

Q. The statement that you made on direct examination that the boats went to Hinton was based on what people told you, was it?

A. They all told me that it went to Hinton; that is all I
250 know, but they would be gone several days, and it would probably take them nearly a week to make the trip down the river and push these boats back, and sometimes they would have to tie these boats up at Hinton and sometimes they might be gone for probably two weeks before they could get back any more. Freshets on the river made it so they could not bring the boats back.

Q. This is also based on what people told you, is it?

A. I saw it myself. I didn't see them all the way down, but I figured when the boats came back, according to the river. When these Negroes got drowned, that part of the river was up considerably and I knew they were going down on the boat. They went down the river and the river was pretty deep and it was swift and they could not do anything with their poles. They had to lay their poles down and the current of the river was very swift and it shoved it over on the rocks and they could not work off of the rocks. Those rocks were sticking up there, and you can see those rocks at any time there now. That is only a channel there for boats to go through. I have been on New River all my life and I know as much about it as any man in this country. Sometimes the river deposits sand and gravel and rock and these sluices fill up and have to be cleaned out. Sometimes the river will move it over to one side and deposit the rock and gravel and sand on one side and sometimes on the other. When the river gets up, it will move it until the river gets up to the next stage. You cannot figure on that.

Q. The point that I want definitely is: That the statement you made that the boats went to Hinton was a matter of hearsay. It was not something that you know yourself?

A. Those darkies would tell me that they were going to Hinton. I didn't ride on the boat there; I did not have any occasion to do so, but there is no question but that they went to Hinton.

By Mr. Abbot. If Your Honor please, we move to strike the testimony of this witness as to where the boats went.

By the Court. What effect will that have?

By Mr. Abbot. We want to be in the position of not accepting hearsay evidence. That is all.

Q. Let's get it straight where you live. There are two horseshoes below Radford, are there not?

A. No, sir; there is only one that I know of. My brother and
myself did own that. I have another brother that lives
251 directly across on the other side. This horse-shoe bend is
a bend in the river that runs around in that kind of shape.

Q. Yes, sir.

A. (Continuing.) And it is one of the very best farms, I reckon, on New River; it is supposed to be. What will happen to that farm when you take the water out and it diminishes—you take the water out of the river, what is to become of the fences and the livestock below there—below the dam?

Q. Is that in response to some question that I asked you?

A. I don't know, sir. I just wanted to tell you that we owned that farm, and I lived there all my life, and I want to know what——

Q. (Interrupting.) Is that the farm that you were born on?

A. No, sir; the farm I was born on is across the river on the other side from that.

Q. Where is the old Radford place?

A. It is up the river across down below Radford at Walton.

Q. That is where the river begins to bend, is it?

A. Yes, sir. Radford is built on the Radford land.

Q. Below that farm—where is Rockford?

A. It is right across from Walton, the first bend in the river.

Q. It is the Radford farm, is it?

A. Yes, sir.

Q. Where is Major Kent's farm?

A. Down the river below what we called the Horseshoe, right across the river, only at the lower end of it.

Q. Where is Whitethorne?

A. Right across the river from the Horseshoe.

Q. Right across the river from where you were born?

A. You would have to cross the river twice to get there.

Q. That is the Horseshoe that you are talking about at Tom's Creek—Tom's Creek is on the other side of the river?

A. It is according to where you start from.

Q. Where is it with reference to Pepper's Ferry?

A. Well, it is north of Pepper's Ferry.

252 Q. It is down the river?

A. Yes, sir; it is down the river and, down at the Norfolk and Western tunnel, you would have to cross the river, and, if you are going to Whitethorne, you would have to cross the river again to get to Whitethorne. It comes in a perfect bend.

Q. And that is the Horseshoe were you were born?

A. No, sir; I was born on the other side. My father's old home is on the other side—right across the river from the Horseshoe.

Q. Did you testify about some boating from Pepper's Ferry to the mouth of the tunnel on your direct examination?

A. I didn't boat any there. I testified that I hauled a lot of stuff there, either for the railroad or the contractor. I hauled railroad iron down there to build that railroad through the tunnel. They could not get anywhere.

Q. They could not get into that point except by water, could they?

A. I throwed it off up the river and they loaded it on boats and took it down.

Q. You threw it off at Pepper's Ferry.

A. No, sir; I unloaded down near the tunnel.

Q. You unloaded down near the tunnel?

A. Yes, sir; I could not get down there with the wagons. How they got it away, I don't know.

Q. You unloaded it between the mouth of the tunnel and Pepper's Ferry in the flat there?

A. Yes, sir.

Q. How far is it from Pepper's Ferry to the mouth of Pepper's tunnel, by river?

A. I expect it to be—I never surveyed it, but it would be about 2 miles or 2½ miles there.

Q. And so, on that stretch, you assume that this iron was boated?

A. Yes, sir; I unloaded that iron on the Einstein place—the old Cofer place, and they had a commissary there and they could not get the commissary any further down.

253 Q. How far was that beyond the road that crosses at Pepper's Ferry?

A. Which?

Q. The commissary on the Einstein place?

A. I suppose that was 2 miles or 2½ miles.

Q. You think it was 2 or 2½ miles below there?

A. Somewhere along there.

Q. The road that goes through there that goes down to the right wasn't on the river from the Pepper's Ferry road?

A. Down on the left bank is where I hauled this railroad iron for the railroad company.

Q. You hauled it down to the left bank of the river as you look down the river?

A. Yes, sir; as you look down the river. I know that, because I got my finger mashed all to pieces, is the way that I am able to recall it.

T. W. COLEMAN testified on Direct Examination as follows:

I have resided at East Radford for 62 years. My age is 66.

I have seen several boats on New River when I was a boy. They used to come to my father's place which was over in Horse-shoe just across from Radford. It goes right around East Radford and comes back into Pepper's Ferry again. It is downstream from Radford, I believe one-half or three-quarters of a mile to the south of it, when it turns back and then goes to the main Horse-shoe below that.

These boats which I saw were carrying coal downstream. I can't say that I saw anything but coal carried except for one load of lumber which I saw. I was from ten to twelve years old at the time. I should say that I continued to see these boats running for about a year. I don't think it was over a year.

Mack Creek Furnace is something like twelve or fifteen miles above Radford, about a mile up the creek from New River. I have seen Mack Creek Furnace in operation making pig iron. I have seen boats from Mack Creek carrying pig iron which was unloaded at New River and put on the cars of the Norfolk and Western Railroad.

254 I have run a steamboat on New River from Pepper's Ferry down to what they call Pepper's Tunnel to take stone and supplies for building the cut-off of the Norfolk and Western. I have carried twenty-five tons on this boat and it might carry thirty. The boat carried stone, dynamite, and commissary provisions, and ran back and forth for about two miles. The stone was hauled from a place called Schooler on the Norfolk and Western Railroad on cars and unloaded on wagons and hauled to Pepper's Ferry for use by the railroad.

I couldn't say what the size of the pig iron was which I saw boated to New River depot, as I was just a boy.

I operated the steamboat six or seven months, I judge, in 1900 during a time when they were building a railroad. The steamboat was built by a fellow named Hodge at New River right across from where Radford is now. We floated it down on the water to where I was.

I have seen several little motorboats and taken one to Hinton which belonged to McWane in 1901, I believe. There were three or four of us. I took it by New River all the way down to Hinton from Radford. Indian Creek is [illegible] Crump's Bottom, around twenty, or maybe eighteen or twenty miles below Glen Lyn on the river in West Virginia.

Q. Did you ever know of any boat operating between Hinton and Indian Creek, any steamboat or motorboat?

A. They operated that one there a few days—not long.

Q. Who operated it?

A. I stayed down there four or five days and left then and I don't think they kept it there very long.

Q. Why did you stay there?

A. They asked me to stay there.

Q. And you operated the boat while you were there?

A. Yes; I think it was four or five days.

Q. Was this the boat you brought down from Radford?

A. Yes, sir.

Q. This boat was motivated by steam, was it, or gasoline?

A. Gasoline.

Q. How many passengers would this boat carry?

A. Oh, I reckon it was sufficient to carry twenty-five or thirty or something like that.

255 Q. Had you ever been down New River from Radford to Hinton before you took that trip?

A. I have been along there several times but never a boat.

Q. So that you didn't know the channel? The channel was new to you?

A. I didn't know the channel.

Q. Who was the pilot of the boat?

A. We had a fellow on there by the name of Dudley.

Q. You don't know whether he had ever been over it?

A. I know he hadn't.

Q. You know he had not?

A. Yes.

Upon cross-examination the witness testified as follows:

I have seen pig iron hauled down to New River bridge or New River Depot which it was said came from the Mack Creek Furnace. Lots of pig iron was stored there after the furnace went out. I have seen pig iron unloaded but I did not see it come down the river, as far as I know.

I have seen two or three small motor boats on the river. When I saw them they were just running up and down the river, as far up as Towe's Ferry, about eight miles above Radford. I remember I saw one up that far. I never saw one any farther down the river than the one we were taking to Hinton.

I think that it was in the Spring of 1901 that I took this motor boat from Radford. I was accompanied by McWane, a fellow named Dudley, and old man Grayson. Dudley and I were in charge of the boat. I handled the steering wheel part of the way and let Dudley handle it part of the way. It went upstream under its own power and we never had to push it from Hinton up. We had to help it over what they call Bull Falls but we never had to push it up around Radford. It would draw anywhere from eighteen to twenty inches loaded.

I think we had about a five-foot tide and the current was pretty swift in places but we went along smoothly without trouble, starting from Radford between eight and nine in the morning, stopping at Crump's Bottom about five o'clock, and going on to Hinton the next morning, arriving there, I am sure, before twelve o'clock.

256 Q. Did Mr. Grayson and Mr. McWane and Mr. Dudley accompany you from Crump's Bottom on down to Hinton?

A. No; they come back home.

Q. They left you at Crump's Bottom?

A. Yes, sir; they come back home.

Q. So you went on down to Hinton by yourself?

A. Well, they had two fellows there that were going to handle this boat and they got me to stay with it, you know.

Q. They were two new men that hadn't been on before?

A. They was old boatmen, keel-bottom boatmen but they hadn't ever been on a gasoline boat.

Q. What was your destination at Hinton? What were you going to do when you arrived at Hinton?

A. Just hauled eggs and butter and stuff like that from up there.

Q. You mean you picked up a cargo of eggs that morning after you had arrived at Crump's Bottom on the night before?

A. We didn't take much stuff down the first morning.

Q. You say you didn't take very much stuff. You mean you took some eggs, however?

A. Yes; two or three crates of eggs.

Q. You took two or three crates of eggs; and where did you take the eggs?

A. I don't know where they took them. I just went with the boat.

Q. What did you do at Hinton that day?

A. I couldn't tell you that, what I done at Hinton even.

Q. Well, did you see anyone making further trips with the boat? Were you in charge from that point?

A. No; the man that bought the boat was in charge of it and he got me to go there to help break these fellows in.

Q. Who bought the boat?

A. There was a doctor, they told me, bought the boat and that is all I know, from Red Sulphur Springs.

Q. You don't remember his name?

257 A. No; I don't remember his name.

Q. Did you see him?

A. Yes; I saw him.

Q. Can you remember what he looked like? I mean could you describe him?

A. He was a fleshy man. I don't know hardly. I couldn't hardly describe him, but I remember him being a pretty good-sized man. He was as large a man as I am.

We came back up to Crump's Bottom after having landed at Hinton some time on the second day. The following day we went to Hinton and returned to Crump's Bottom that evening, continuing in this way for a period of four or five days.

I think the boat was forty or forty-five feet long and was made on the order of a flat-bottom bateau. Bateaux are keel-bottom boats, that is, they have a keel on top and under the water. Part of the boat where the keel stopped is bound to be flat. This flat part is around five and one-half or six feet wide. The flat part of the bottom of the gasoline boat which I took down to Hinton was at least five feet wide. The top was six inches or a foot wider, so the top of the boat might be six or six and one-half feet wide and the flat part of the boat resting on the water would be something like five feet.

I said I saw pig iron unloaded at New River Depot. That is occasionally during that period of time; as many as four or five, or possibly six, different occasions.

I said we had an uneventful trip from Radford to Hinton—as I recall it a smooth trip and no difficulty. I do recall a little block come loose on the side. All they had to do was slip that back in. I did testify at Radford last February that we had an accident on the trip from Radford to Hinton. I say we just knocked a little block loose on the side, but I did not count that any difficulty to amount to anything—five minutes' work put the block back in place, although we might have been there thirty or forty minutes.

Q. Do you recall that you testified at Hinton last winter that it took you about thirty or forty minutes to fix this boat at Radford?

A. It didn't take us that long.

258 Q. I will read what you said. You were asked how long did that take you, referring to this incident that you have just described, and your answer was "just about thirty

or forty minutes. It was built of blocks set in there and it just shoved one in."

A. That is what it done. It might have been thirty or forty minutes. I don't know because it didn't amount to anything. I know that.

Q. You are under the impression it wasn't a mere five-minute job, aren't you?

A. It oughtn't to take over five minutes. We might have been there thirty or forty minutes.

Q. What was it that knocked this block out?

A. A rock.

Q. There was a rock in the bed of the river?

A. A rock in the channel.

The Hodge boat that I mentioned drew twenty or twenty-five inches of water with a load. Before this boat went down to Pepper Tunnel there was a channel but it was too narrow for the boat and some work was done to widen the channel so the boat could get through. I did not come down on the boat from Radford to Pepper's Ferry. It was not necessary for me to come down because I lived right across the river from Pepper's Ferry.

Q. But the boat itself, in order to come down from Radford to Pepper's Ferry, had to have this channel blasted out?

A. No; it didn't have to have any channel. It just had this channel on account of the load, by loading it down from Pepper's Ferry down where they done the hauling.

Q. You hauled it down light, hauled it to Pepper's Ferry light?

A. Yes; went down light.

Q. I mean so far as you know, it was hauled to Pepper's Ferry light. You didn't see it?

A. I didn't see it but they taken it down there and the engine and everything was put on it after they got down there.

The boat had an engine which I had put on it myself. It was necessary to dig the channel out for the two miles between
259 Pepper's Ferry and Pepper Tunnel before any hauling could be done. Material was ferried from one side of the river to the other, after having been hauled to Pepper's Ferry by wagon. The ferry or this little steamboat received material which had been brought by wagon to Pepper's Ferry and took it two miles across the river to Pepper's Tunnel, which could not have been reached by road because they wouldn't let anyone go through the farm.

The witness testified on Redirect Examination as follows:

This was not a ferry boat. I had not known of loads of from twenty to thirty tons being hauled down that channel before.

The channel was made for keel-bottom boats and was not as wide as this boat which had a width of about twelve feet on the bottom. Its width at the top was about the same with straight gunwales while the keel boats were something like five or six feet in width.

I saw boats loaded with pig iron come down the stream and dock at New River depot. The boat which I mentioned having been at Towe's Ferry came in while I was there. It was a little gasoline boat.

The witness testified as follows on Recross Examination:

I testified that I had seen boats unload pig iron at New River Depot. I had not seen the boat coming in but saw it when it was landing there, when it was being unloaded. The motorboat which I saw as high up as Towe's Ferry was the same one we took to Hinton and used to haul people and stuff back and forth to Towe's Ferry—a regular pleasure boat. I never saw it but once. It was a good-sized skiff with a motor in the rear end. There were three such skiffs in all with motors in them, on the same order as a rowboat.

I took only one trip on the McWane boat while I was at Radford. Mr. McWane asked me to go along with him to Hinton and employed me for the trip; he paid me but I don't know how much. I think this boat was built in Lynchburg and shipped up there. I won't be positive about that, though; I think so.

The coal which was hauled on the river was carried in a keel-bottomed boat and was going downstream. I don't know where the coal came from. I saw it at only one point. I saw several bateaux carrying coal, as many as ten, probably at different times.

260 The witness testified as follows upon Redirect Examination:

The boats I saw carrying pig iron came in at New River Depot and landed. I guess the "Gueeassen" type of motorboat would haul four or five people.

Walter H. Towe testified on Direct Examination as follows:

I live at East Radford. I am a jeweler, 49 years old. I was born at Towe's Ferry in Pulaski County about twelve miles above Radford on New River and lived at Towe's Ferry from 1887 until 1901.

I saw a motorboat at Towe's ferry which came up there in 1899 or 1900. It was driven by a gasoline engine and built on the type of a keel-bottom boat. They said it came from Radford and it made quite a few trips up there and back. Sometimes it would stay at the Ferry during the night and other times it would come and go back the same day. This boat came up and down the river, I would say, for two years. At the time my father ran the ferry the people who brought the boat up there, I think it was Mr. McWane, would put merchandise up there for my father to sell for them and take in produce and they brought the produce away with them. They had two boats. They dismantled the first one and built another one. I would say the first boat was forty-five or fifty feet long. It had a cabin on it with windows and the men would sleep in the boat which was driven by a gasoline engine with a paddle wheel on the rear. The produce which they brought up consisted of sugar, coffee, oil, and so forth.

I saw one keel-bottom boat on the river which passed by at Towe's Ferry. On one trip it went up the river about two miles above where we lived, which, I would say, would be fourteen miles above Radford.

When they were building a bridge at the ferry in 1900 some logs were floated down the river.

The second boat which I mentioned was much like the first one but not quite as large or as long and was used for a passenger boat as the other one was. I know that on one trip they came up to the ferry with the first boat tied on behind the second, on which there was a keg of oil. Either the first or second carried passengers. They issued a schedule or bulletin for the second boat as to the certain places at which they would stop. I
261 would say that this boat ran on the river for twelve months
but am not positive. My father carried horses and wagons, sheep and cattle, anything that might come along, on the ferry which he operated. He moved there in 1881 and stayed until 1901.

On Cross-Examination the witness testified as follows:

I don't know what keel boat it was that I saw pass Towe's Ferry or what year. I just remember seeing it pass. It looked to be about fifty feet long, with five or six men on board who were polling the boat going up the river. I never saw it come down the river. Mr. Robert C. McWane, who used to be connected with the Pipe Shop in Radford, was in the boat when it came up.

Mr. McWane had two boats. The first one had a superstructure and a motor in it. Later they took the superstructure off and took the motor out and put it in a new boat. Two boats came up at the same time, one towing the other. They said the one being towed or pushed was the hull of the first boat. I thought that its hull was the same size and shape as that of the original boat. Mr. McWane owned and operated the boats but did not take every trip.

The witness on Redirect Examination testified as follows:

I would say this passenger boat would haul twenty to twenty-five passengers.

The witness on Recross Examination testified as follows:

The boat would haul twenty to twenty-five passengers. On the occasion when I went up above the ferry there were not that many passengers but I think possibly there were five.

E. H. Linkous testified on Direct Examination as follows:

I have resided at East Radford since 1892 or 1893. I am past sixty-eight years old and have lived on New River pretty much all my life. I lived across from Pepper Tunnel and have seen boats on New River going up and down the river cross from the tunnel. They were round-bottom boats called keel bottom.

262 I would not want to say what their length or width was, or what their capacity was. I was small, not over eight or ten years old.

Q. How long did you see these boats going up and down the river, how many years?

A. I would say from the time I remember distinctly—must have been about three years or four.

Q. How old were you when you remember distinctly?

A. I could not tell you that. I was small and I didn't think anything about it, you know.

Q. Did you move away from New River?

A. Well, we moved a little distance away; yes, sir.

Q. Was it just in your boyhood you saw these boats going up and down?

A. The N. & W. built a road up there, the Pocahontas through there, and the boats stopped, you never saw any more of them.

Q. After the N. & W. built the boats stopped?

A. Yes, sir.

Q. But up to that time you saw the boats?

A. Yes, sir; I did.

Q. Do you know a place on the river called White Thorne?

A. That is where I live.

Q. Is that where you saw the boats?

A. Yes, sir.

Q. How far is that from the town of Radford?

A. I suppose about three miles across.

Q. Three miles from Radford?

A. You would have to cross about twice, it is not over three miles, I don't think.

Q. How far is it from Radford up the river?

A. It might be as much as twenty miles, it goes around what they call the "horse shoe."

I remember some of the old slave negroes who navigated these boats. They were old slave negroes, Frank Bannister, Calvin Bannister, Roland Stuart, George Brown, and a Lewis 263 negro. The boats would pick up produce as they went along up and down the river. They would blow a bugle as they passed by. I sold eggs to them. My father raised corn, wheat, and oats on his farm, some of which he hauled to New River and some of which he sold around home. He did not put it on boats at New River. He had a ferry.

Q. This produce you sold, did it go up the river or down the river?

A. Went down.

Q. Down where?

A. Said they was boating from New River to Hinton.

By Mr. Abbott. We object, if your Honor pleases, to what people told him.

I think the greatest number of boats I ever saw at one time was four. As they passed down by our house I would see the crews at White Thorne and afterwards would see the same boat with the same crew again several days later when the boats came up the river. I never sold them any cargo or produce or knew of them taking on any coming up the river.

The witness on Cross Examination testified as follows:

My father had a farm and raised ordinary farm products but never shipped them on the water.

Q. How often would you see these boats pass?

A. I hardly could give you an estimate of how often. Probably I would see them two or three times or three or four times during the summer.

Q. Did you ever see them in the winter or fall?

A. I don't think I ever saw them in the winter. I am sure I did not.

Q. You saw the boats pass three or four times a year?

A. Yes, sir.

Q. And I understand you are hazy about how long that time covered. You were small at the time you said, and you didn't know whether it was one, two, three, or four years. Is that right?

A. What do you mean?

Q. I will ask you this question. How many years did you see those boats pass; was it three or four times a year?

A. Yes, sir.

Q. And for how many years did you say?

A. Something like about three years I suppose. I wouldn't say exactly; I wouldn't like to say.

264 E. P. Hartsock testified on Direct Examination as follows:

I live at East Radford. I am thirty-five years of age and have been employed as a common laborer on the Norfolk and Western Railway since 1918. I have worked all the way from Bristol into Roanoke and into Bluefield, including the branch in the confluence of the Little and New River. This branch line runs out from the main line a little over four miles up to Little River Quarry from Radford and crosses Little River. On one side it goes up the river a piece and then across the river. The place at which I worked is a little over four miles upstream from Radford.

I was loading ties there which came from all parts of the country. Part of them came down the river by boat during all the years between 1919 and 1923. I could see the boat from the bank and around for about a mile from where I was located. I could see the Radford dam site which was, I suppose, one-half a mile upstream. The boats which came down the river passed the Radford dam and carried a load of fifty or more ties. These boats came once a day, arriving between twelve and two o'clock and carried a crew of from four to six men. They unloaded the ties on the river bank and transferred them to the loading dock of the Norfolk and Western for inspection and they were taken up by the Harrison Tie & Lumber Company. The ties were 7 x 9 x 8½ feet long, of oak, and weighed around 200 to 250 pounds a piece.

I only saw one small motorboat which I saw back of my home at East Radford. It was running up and down the river when I was just a child.

The boats coming down the river hauled around fifty or more ties on a load almost every day during the summer season for a period of four years between 1919 and 1923.

On Cross-Examination the witness testified as follows:

I was one of the right-a-way men for the Norfolk and Western. I was on the branch up to the quarry all the time from 1919 to 1923, working there practically every day. I was up at the Little River practically all the time. When I was not loading ties I did other work, leaving my home at seven o'clock in the morning and departing again at about two-thirty.

265 I never did any work lower down along the river.

I saw only one boat at a time. The same boat, I believe. I don't know whether the same people were working on it or not. The boat crew consisted of four to six men. The boat was propelled by polling by manpower.

The small motorboat which I saw from my house was just a canoe like one with a motor on it.

The ties were brought down and piled on the bank and then they would be piled on the loading dock to be put on the cars.

The boat came down between twelve and two o'clock when I was there. Except for the ties which I saw unloaded at the river bank there was no way to tell which ties came down the river and which came from Snowville and elsewhere by road. The ties which I saw on the river amounted to between fifty and sixty a day, a little over fifty. The boat would come down New River and would go up about a thousand feet on Little River which comes into New River just below the Rock Quarry.

The witness testified on Redirect Examination as follows:

I saw some rough lumber hauled down the river sometimes, down to where I was, by the same boat.

R. L. Howard testified on Direct Examination as follows:

I reside in East Montgomery County, just across the Roanoke line on the Lee Highway. I am 74 years of age and engaged in farming. I was born and raised 250 yards from New River, in the Southwestern part of Pulaski County, on the northern or northwestern side about a mile below Allisonia as you go up by the river. My father's farm joined the place called Clark Mines. There was an iron mine there which in later years became sort of worked out and the Bertha Mineral Company opened it as a zinc mine and operated it until the zinc ore was exhausted.

The iron ore from the Clark Mine when it was first opened was hauled directly down to the river at a kind of wharf built along the river bank and was loaded at the wharf into keel bottom boats and boated down the river to the mouth of Mack's Creek where it was loaded on wagons. It was something like six miles from where they put the ore on boats down to 266 Mack's Creek. After the ore was taken off the keel bottom boats at the mouth of Mack's Creek it was hauled about two miles up the creek to the furnace and smelted into pig iron. The smelter was known as Mack's Creek Furnace. Some called it Radford Furnace.

They had a ferry at the mouth of Mack's Creek by which the pig iron was hauled across to Dublin and there loaded on a train. I couldn't say whether or not they ever boated any of this pig iron down the river from Mack's Creek furnace.

I have seen boats going up and down the river dozens—hundreds of times. I have been thousands of times, I reckon, at Boom Furnace, where iron ore was smeltered into pig iron.

Q. And what become of that pig iron, if you know?

A. When they first opened the furnace for a first short period, it was hauled across the river and across Draper's Mountain down to what was known as Martin's Tank—Pulaski City it is now, but it was Martin's Tank at that time. I had a verbal contract with the Superintendent of the furnace when we weren't busy with the teams on the farm that we would send them there regardless of any other talk, take a load or two and sometimes two to five, but we would stop across the mountain at Pulaski. That was right in the beginning of the opening of the Reed Island Iron Company Furnace or Boom Furnace.

Q. How long did that continue?

A. Hauling it?

Q. Yes.

A. Well, across the moutain it kind of slacked up directly because they put in boats and boated it down the river to New River Depot, but occasionally there would some man take a load across the mountain.

Q. Why didn't you continue to take it over Draper's Mountain to Pulaski?

A. Well, I did occasionally, but a great deal of it I hauled to the mouth of Reed Island and dumped it off on the river bank where the boats come up there and they would load it on and sometimes I would go to the furnace after a load of iron and bring it down there and when I would get down to the ferry the boats would be there loading the iron and I would unload it, have my helper and me unload it off of the wagon right 267 on to the boat in place of throwing it off on the ground and then picking it up again.

Q. Do you know which was the cheaper way of moving that iron—by Draper's Mountain or by the river?

A. Nothing only from observation. They paid me $3.75 a ton for hauling No. 2 and $4.00 a ton for hauling No. 4 iron from the Boom Furnace to Pulaski City. They gave me a dollar a ton if I hauled it from the furnace down to the river and throwed it off there.

Q. And what did it cost, if you know, to take it down the river?

A. Well, that would be just supposition with me. I don't know that I ever heard anyone say. It taken three men to operate one of those keel-bottom boats and about six tons was a load for it. They would take it down the river, go down in one day and ordinarily they could get back in another day, take about two days for three men to put six tons from the mouth of Reed Island on to the ground at New River Depot.

Q. State, if you know, what percentage, approximately, of the pig iron went down the river?

A. Oh, I would guess after they got the boats under way, 80 percent of it.

Q. And for how many years did that continue?

A. I just can't remember, but I would say offhand about eight years or something like that. I was familiar with all of the conditions there at the furnace, hauling iron and all like that.

I could not say how far it was to New River bridge from where the pig iron was put on the boats. It was right close to thirty miles from the Boom Furnace down to New River Depot. The furnace was not on the river. I would say it was twenty-six miles from where the iron was loaded on the boats at the river at the mouth of Reed Island.

Q. Do you know where the Appalachian Electric Power Company dam site is?

A. Yes, sir.

Q. Would those boats have to pass that dam site to get down to New River bridge?

268 A. Yes, sir.

Q. Do you know whether the company that was producing this pig iron had any boats?

A. They had four.

Q. And how frequently were they using those boats?

A. They used them regularly. It was a part of the equipment of operating the furnace like they had teams in a coaling ground, you know, and they operated them regularly. I didn't unload iron off of my wagons regularly because very frequently I would go to the furnace and get a load of iron and come back to the ferry and there would be no boat there. I would take it then and go on.

I have seen other keel boats on the river. They had no regular schedule but came at intervals from Radford. They would bring up stuff before the Boom Furnace ever was built. Between the forks of the creek there was a country store to which they would bring up goods frequently. Big Reed Island Creek and Reed Island Creek came together into New River about a half mile from the river forming a creek which flowed into the river downstream. I was born and was raised right across the river nearly opposite from where they came into the river. The boats which I spoke of were keel-bottom boats. I first saw them on the river probably when I was ten years old. That would be sixty-four years ago.

Q. How long did you continue to see the boats running on the river?

A. I expect they continued on until the Cripple Creek Railroad was built. There were three niggers operated a boat there pretty regularly and they would come up there and bring stuff and there was a large trade in what was known as white pine shingles at that time. That was in the pine region of Carroll County and they hauled them down to this store and hauled them at accessible points along New River and there was hundreds of thousands of them boated down the river.

Groceries and salt and other stuff brought in from some wholesale point was taken up the river. The store was located between the forks of the Big and Little Reed Island Creeks and the groceries and things of that kind were brought up the river to that store. The three negroes I referred to would take the boat 269 up almost within wheelbarrow distance of the store. On the return trip they would invariably bring down more or less shingles.

A man named Charles Kirkwood, who lived near Pepper's Ferry, got me to go with him over there and he bought twenty-five thousand white-pine shingles at Camp Stevens, which was located right between the creeks at the point of the store. The shingles were loaded on a keel-bottom boat operated by three darkies. They got shingles at various times and took them to Charles Kirkwood's farm down about Pepper's Ferry, which is north of Radford and downstream from it. I would say it was thirty miles, at least, from Reed Island Creek to Pepper's Ferry by river.

A man named Bob Woolwine was superintendent of the poor for the Newbern district, located at what is known as the old Woolwine place, some fifteen or sixteen miles below where we lived on the south side of New River. At one time I know he came there and bought a lot of corn which my father shelled out and loaded on a keel-bottom boat. It was taken down for the paupers of that district.

I have no idea of the number of shingles altogether which I saw taken down the river by boat. It would take a Soloman to estimate that—hundreds of thousands of them. Generally they were taken to Radford and other points like where Mr. Kirkwood and Mr. Allen Eskridge lived on the Lee Highway above where I live. I remember once he came there and bought twenty-five thousand shingles and they were boated down to the nearest point from his house which they could not get to exactly.

I remember when the Cripple Creek branch of the Norfolk and Western Railroad was built, something like 1880. This railroad has a bridge across the river. The stone for the piers for the New River bridge was quarried on my father's farm and hauled down to the river from the quarry, about half a mile, and loaded on keel-bottom boats there and boated down to where the pier was built. This was about four miles by road but the river makes nearly a horseshoe bend about two miles below where we lived, and I think it would be five miles down the river. The boats were keel-bottom boats. I am not clear about how much was carried at a time but I should say it was about two yards and a half or three yards of stone which weighed forty-eight hundred pounds to the yard. I think two and a half or three yards was about a boat load.

270 I never measured one of the keel-bottom boats, but I was familiar with them and would guess their length to be around seventy feet. The width varied. Some of them were eight feet from gunwale to gunwale on the top. I would guess that the depth of the boat inside was three feet or three and a half. I think these boats ordinarily carried about six and seven tons and real large ones would carry, I expect, eight in normal times. Three men operated these boats both upstream and downstream.

A ferry called Howard's Ferry belonged to my father, and I operated it time after time. We carried anything that you would get on the ferry—teams, tools, cattle, sheep—everything. The ferry was located just west of the mouth of Reed Island Creek on New River.

Q. Did you ever see any work done in the channel of the stream at any time?

A. Yes, sir.

Q. When?

A. I am not clear about that date. It was in the early eighties.

Q. Where?

A. That that I observed was between where we lived and Allisonia, in that mile stretch there.

Q. What kind of work was being done?

A. They were cleaning up the channel, blasting out ledges and moving them out, moving the rock and dirt out of the channel.

Q. You have testified that you saw boats in your early childhood. Did you see boats after the channel was cleared out on the river?

A. Yes, sir.

Q. What effect, if any, did the clearing of that channel have so far as the boats were concerned?

A. I just couldn't say. I don't remember that I ever heard any one say. If a boat was loaded heavy, it helped. There was no doubt about that because it give more current.

Q. From your observation did it or did it not help?

A. I would think it helped; yes. That is my opinion of it. When the river was real clear you could be on the hillsides

271 along anywhere on either side of the river, and you could see the channel in the river plainly and tell where it was cut at.

When the blasting was done on the river Colonel Smith was in charge and Jim Weigal was the foreman. They worked for the Federal Government.

I think it was somewhere around 1886 when the first train came up on the Cripple Creek division of the Norfolk and Western.

The furnaces which were accessible right at New River were called Mack's Creek, Boom Furnace, Barren Springs, Foster Falls, and Ivanhoe. They were all right along the river and all of them were operated before 1886. Before that year there was no rail connection between these furnaces and their markets.

The witness testified on Cross Examination as follows:

I worked at sharpening steel on the Cripple Creek construction right across the river opposite where I lived the first year when they worked on the grade. I don't recall the year. They laid the track two or three years after that. Along in July, I think it was, they quit and put away their tools and came back again after a year or eighteen months and finished the grade. By the first train which was run on the Cripple Creek division in 1886, I mean the first train that was run past my place. I think it was operated lower down some time prior to that, probably a construction train or something. I think that in 1886 the railroad was completed only to Foster Falls. The Boom Furnace was built some time before that, I can't say definitely.

After the railroad began operation I think iron was hauled or boated away from Boom Furnace, either down the river or hauled across to Pulaski. I do not recall when Boom Furnace went out of blast as I had moved to where I now live. It was merged into the Virginia Iron, Coal and Coke Company which put out of blast all furnaces which they came into possession of in Southwest Virginia.

This boating of iron from Boom Furnace started later than the beginning of the first operation of the furnace, but a little bit later the Reed Island Iron Company had four keel bottom boats built by a gentleman at Radford. It might have been Mr. Hodge. I knew virtually all of the persons who boated the iron from Boom Furnace. I don't know if I remember now. One of the boats had three negroes on it and two lived on my
272 father's farm—Ed Bland and John Johnson and Ed Hall. These three made one boat crew and Bob Whitt and two of the O'Dells and Mr. Jim Owen had charge of it. A man named Farris helped, and there were others whose names I do not recall. I seem to have a faint recollection of a Mr. John Canode having charge of the boating at one time.

My father had a standing contract with the Boom Furnace to haul pig iron by wagon to Pulaski. A man named Taylor who lived a mile and a quarter west of us also had such a contract. Other people hauled, but whether they had any stipulation about loading I don't know. We had a contract covering any time we wanted to send a team, no matter when, to take a load to Pulaski City. That arrangement kept up until the railroad was built.

It is partially true that the hauling of iron kept up to Pulaski until the railroad was built. There was a little iron hauled across the mountain even when there was boating there. The Boom Furnace had thirty or forty head of horses and mules. I don't think these teams were utilized in hauling iron to Pulaski. I can't recall that I ever saw the company's team take a load of iron to Martin's Tank. I reckon they hauled at first, but after they started the boats the company's teams did the hauling to the river, Allisonia, and Reed Island and unloaded it there. All of the teams did that. Our contract was to unload there when there was a boat at the river, and we got one dollar a ton. All the teams engaged in hauling hauled iron to the boats that way and hauled some and crossed up at Barren Springs.

The company's teams operated a number of years on the opposite side of the New River from the furnace, and would leave the furnace, going to the coaling ground after a load of coal and put in a couple of tons of pig iron on a two-horse team and unload there and go back and get a load of coal and go back to the furnace. I don't know that the furnace put out any more iron than it did before. I think it was about a ten-ton furnace and that was about all it could put out. They had to have teams. They had to haul feed. They didn't raise any feed and had thirty head of big stock. They had to get feed all over the country wherever they could buy it and I guess it virtually taken two teams to haul feed.

Q. Have you got any basis for guessing that 80% of the iron from Boom Furnace went down the river; you said you
273 would guess 80%; that is just a guess?

A. Sure. I didn't weight it or take any tally or keep a tab of it, but I know in a general way there was time after time hauled there and boated from the mouth of Reed Island and Allisonia both, and I would guess from the amount of teams that ran there was at least 80% of the iron from Boom Furnace taken down the River. I think that would be the assumption of any man familiar with the conditions around the furnace.

Of the people who operated the boat which I saw when I was a boy a negro named Ed Armstrong, Ed Floyd and Whit Tate operated a boat pretty frequently from Radford up there, I should say once a week at least, probably not quite so often, but they made regular trips.

Q. Wouldn't it be about twice a month and then it would be three months before it would come again?

A. I don't think it was over a period of three months. I know this negro Armstrong had an old fashioned tin bugle and he would always blow when he got up to the mouth of the creek and we noticed that. We had a hundred acres of New River bottom land and farmed it continuously and we would see them come and go. I didn't try to keep no tab on it, because I had no reason to do so, and they made frequent trips up there, as other citizens of my age would tell you. There was hundreds of thousands of white pine shingles taken down the river.

Q. How much corn did your father send down to Mr. Woolwine's on the boat?

A. Fifty bushel at that time.

I have probably ridden on a keel bottom boat on the river for short distances. I never did go down on a boat from Clark's ore bank to the mouth of Mack's Creek or down the river on a boat from the mouth of Big Reed Island to Radford. I can't recall in what year ore was hauled from Clark's ore bank by boat to the mouth of Mack's Creek. It was right after the furnace was built and opened up. They would haul ore down from the ore bank to the river and shove it off the wharf there and take it down to Mack's Creek. I never took that trip on a boat.
274 I do not recall in what year Mack's Creek furnace was built. This hauling of ore from Clark's ore bank to the mouth of Mack's Creek was not long after the furnace was built. It was before the Government improved the channel in the river.

At one time ore was boated from Clark's ore bank down two miles to Breeden's Hollow and hauled over the mountain by wagon to Mack's Creek and then it was boated lower than that by the company at Mack's Creek. I don't recall who the boatmen were. I was never at Mack's Creek when the boats were there but I saw them load on the wharf a little over a mile below where I lived time after time. Some of it may have been hauled down to the foot of Breeden's Hollow which was known locally as Spencer's Hollow but some went down to the mouth of Mack's Creek. I never was there when they took the ore there but I saw a man who did see it taken there.

Q. You said that this hauling of iron from the Boom Furnace kept up for eight years?

A. I would guess that is right, I kept no tab on it.

Q. If the Boom Furnace was constructed in 1881 and the railroad got up there in 1886, would that change your ideas about the period of time the iron was boated down the river?

A. I don't know when the furnace was erected and put into blast. I know when it was done but I don't know what year.

Q. I said if it were 1881 that the furnace was constructed then it wouldn't have been but for five years the iron was hauled down the river on boats?

A. I would have to be convinced it was 1881, when it was built. Eighty percent of the iron was hauled down the river by boats from the time they began to boat until the Cripple Creek road was built. It might have been seventy-five percent or eighty-five percent. That was just an estimate.

I could not fix the time exactly how long after the furnace was constructed before they began hauling the iron by boats down the river. It wasn't a great while. It might have been six months or a year. I commenced hauling iron away from there right after they started making iron and I kept it up until they built the Cripple Creek Railroad. Some years later they built the Betty Baker branch right at Reed Junction
275 and there was no hauling done anywhere. They loaded the iron right onto the train. There is a ford in New River about a mile below Howard's Ferry, where I used to live, that is, right where Allisonia is now. I do not know that they ever hauled iron across that ford which was a fairly good one. Where they cleaned out the channel people claimed the ford got mighty deep and I experienced that myself. The cleaning out of the channel didn't ruin the ford but it added something to the depth near the middle of the river. The ford is there yet. About the only observation you could make was that the water would come up further on your wagon or horses. There was no sudden drop off.

Q. I believe you testified these keel-bottom boats had a draft of three and a half feet, a depth or three and a half feet?

A. Three or three and a half. I never had any occasion to pay any particular attention, but I would guess three or three and a half feet.

Q. Would that be the distance below the surface of the boat when moving on the river?

A. No, no; they was loaded down, six or seven ton would put them down that far [indicating with hand].

Q. That far is how many inches?

A. Well, my acquaintance with them would be, it wouldn't be safe to load a keel-bottom boat, or it wouldn't make a shoal more than two or two and a half feet under the water, the draft.

Q. But you indicated now much of the boat would be out of the water on your arm, what in inches was that distance?

A. I would say twelve inches anyway, you strike places in New River, if you never was on a boat going up there, that the waves would run over the "gunnels" from the sides, if you got over that, twelve or fifteen inches would have to be above the surface of the water.

I hauled some stone from the quarry to the ferry and put it on boats and my impression is that about two and a half or not over three yards of stone was loaded on the boat. Pure limestone weighs 4,800 pounds to the cubic yard.

By the COURT:

Q. You spoke about these boats that brought the shingles down the river and came back loaded with supplies from that store?

276 A. Uh huh.

Q. That store, as I understand, is up at the junction of Big Reed Island Creek and Little Reed Island Creek?

A. Yes, sir.

Q. Did this boat come on up Reed Island Creek to the store?

A. Sometimes under normal conditions it could go up the two creeks to the fork and turn to the left and go up Big Island Creek within 300 yards of the store.

Q. That was several miles from the river, wasn't it?

A. No; the two creeks, the junction of the two creeks, I would guess is a half mile.

Q. But this boat would come up the river and go up Big Island Creek within a few hundreds yards of the store; is that right?

A. Yes, sir; normally. Now in hot August and September and along, the creeks would get very low and they could not get up there, but they would come up to the mouth there to the ferry. I remember one occasion they come up after shingles when Cafee and Stephens operated the store and had to haul the shingles by wagons and load them on the boat.

The witness testified on Redirect Examination as follows:

Mack's Creek enters the river five or six miles farther downstream than Big Reed Island Creek.

The Boom Furnace had one of the finest mines in Southwest Virginia, dumped it right over the cliff. You could throw a rock from there into the furnace.

The ore from the Clark mine was operated and the Mack's Creek Furnace Company opened and developed the mine and used the ore exclusively for Mack's Creek.

The pig iron made at Boom Furnace is the iron we have been talking about which went down on boats all the time to New River Depot. I never saw boats coming into New River Depot but saw them unloading pig iron which came from some furnace. The two negroes on the boat which was unloading it lived on my father's place and worked for him when they wasn't at something else. They lived on his farm at New River Depot. They worked on boats which came from Boom Furnace and brought pig iron from the Boom Furnace.

If you wanted to cross the ford above my father's place from the north side to the south you would get on a horse 277 and ride across the river. You could ford at this point with about a twelve-inch tide in normal times. The water came up on his side if there was any tide much.

William Collins testified upon Direct Examination as follows:

I live at Salem, Virginia. I will be sixty-four years old in September. I was born in Pulaski County on New River about four miles above Towe's Ferry and something like twenty miles above Radford. I lived there above Towe's Ferry until I was at least twenty years old. Then we came down to Howe's Farm which is just above Little River on Dunkert's Bottom. I lived about four miles above where the Appalachian Electric Power Company's dam site is.

I have seen boats on New River from Mack's Creek plumb through all the way to Hinton. Hinton is on New River on the C. & O., in Summers County, West Virginia. I have seen keel-bottom boats on New River from sixty to sixty-five feet in length and about eight feet wide. They used to run from eight to ten of these boats from Mack's Creek on New River down to New River and from New River to Hinton.

I have made the trip from our place down to Hinton by boat with my father when I was quite small. These boats hauled wheat and corn and goods, that is merchandise, up and down the river. My father ran one boat of which he was the manager and I have taken the trip back up the river in the boat.

I have seen logs and rafts on New River. I have helped my father raft logs from up at Dunkert's Bottom, along above Towe's Ferry, to New River bridge and to Hodge's saw mill.

The boat called the Hodge boat was about seventy-five feet long and used for a steamboat to ride up and down the river. It went up above Radford to Howe's. Howe's farm, I believe, is about seven miles above Radford and above Dunkert's Bottom on the right side of the river going upstream.

I have seen log rafts coming down the river and have gone up the river for the rafts above Towe's Ferry which is something like twenty miles above Radford.

The keel-bottom boats which I have mentioned hauled pig iron from Mack's Creek to New River Bridge Depot. I have been on these boats on a few trips with my father who ran one of them. We started from Towe's and went to Mack's Creek Furnace. On return my father would come to New River and then have trips on through to Hinton. These boats would unload the pig iron at New River Depot. We unloaded it on the wagons and then put it on the train. I have seen grain carried on these boats from different farms up the river and hauled 278 down the river, unloaded, and then hauled to Grayson's Mill on wagons.

Q. How many trips did you make to Hinton?

A. I just cannot recall. I never did make but very few. I was small at that time, and I just can remember good.

Q. On your way down to Hinton were there any stops made?

A. According to what they were loaded with.

Q. When you were along, where did they stop?

A. They would stop down at the Narrows and Crump's Bottom and different places.

Q. Where is Crump's Bottom?

A. That is down below East River.

Q. In what State is it?

A. That is in West Virginia.

Q. And where is Narrows?

A. I reckon that is in Virginia.

Q. How many men ran these boats, if you remember?

A. Four.

Q. Have you ever seen any cross ties brought down the river in boats?

A. Yes, sir.

Q. Have you ever seen any floated down the river?

A. I have seen them rafted.

Q. And how far up the river did you go for the cross ties?

A. Something like 20 miles, I expect.

Q. Did you ever see any staves brought down the river?

A. Not from up in that country, but I have seen them down below Narrows, and seen them taken from there to Hinton.

Q. Many of them?

A. Lots of them.

Q. Can you give the names of some of the men that ran on these boats?

A. Yes, sir.

Q. Please give them.

A. My father, Floyd Collins, Whit Tate, Ed Floyd, and a man by the name of Dotson.

279 Q. Do you remember a man by the name of Graham?

A. Yes, sir.

Q. And Harv Gunn?

A. Yes, sir; and Steve Thornton.

The witness testified on Cross-Examination as follows:

I was born in 1878 four miles above Towe's Ferry and lived there until I was twenty years old. Then we moved to Howe's Farm and I lived there until I was thirty years old. At that time we came to Radford where I lived until I moved to Salem ten years ago. I work as a night watchman at the Salem Tannery now.

Q. When was it, Mr. Collins, that you went down to Hinton on the boat with your father?

A. I was about eight or ten years old, small.

Q. What were you doing on the boat?

A. Just riding with my father.

Q. And you were eight or ten years old at that time?

A. Yes, sir; something like that; I just can remember it.

Q. Have you been to Hinton since that time?

A. No; I have not; not since I was a boy or a young fellow.

Q. How many times did you go down there?

A. I just couldn't recall—not very many times.

Q. As many as two times?

A. I reckon I know of that much.

Q. Then as near as you can remember, you went down there twice?

A. Yes, sir.

Q. Do you remember the difficulties your father had in getting over the falls between Radford and Hinton?

A. How is that?

Q. Do you recall the difficulties your father had in getting over the falls?

A. No; but he had very little, I reckon.

Q. How much tide was there in the river?

280 A. They went all the time, that is, unless the river was up too much, they ran those boats. There was a sluice through there, and they ran them all the time.

Q. You say there was a sluice through the falls, between Radford and Hinton?

A. Yes, sir.

Q. Where is the sluice in the falls at the Narrows?

A. I think it is near the middle of the river, the best I can remember.

Q. Do you remember the falls of the Narrows?

A. Yes, sir.

Q. How high are those falls?

A. It is not a very high falls.

Q. What do you mean by "not very high"? Give us an estimate in feet.

A. Just ledges.

Q. But what is the difference in the level of the river after you get over the falls and up at the falls, below and above the falls?

A. I cannot say just what it is.

Q. Is it as much as a foot?

A. Yes, sir; I imagine it is more than that.

Q. What would you imagine it is?

A. I imagine it is probably two or three feet; I couldn't say exactly.

Q. You say this sluice is in the middle of that falls?

A. I think so.

Q. Is it pretty well marked?

A. It is supposed to be, there is wing dams on each side of the sluices.

Q. Do you recall Shumate Falls?

A. I cannot remember that.

Q. Do you recall Wiley's Falls?

A. No, sir.

281 Q. Do you recall Bull Falls?

A. No, sir.

Q. Do you recall the Big Falls?

A. No, sir.

Q. All of those falls, as I understand it, had wing walls, channels, and sluices through them?

A. Yes, sir.

Q. And you went on through like that?

A. Yes, sir.

Q. Did I understand you to say that you boated some staves, or your father boated some staves from Narrows to Hinton?

A. They boated the staves to the Narrows and from there to Hinton, from different places, from some sawmills and stave mills.

Q. You say "they." Who do you mean by "they"?

A. My father, Thornton, Whit Tate, and Dotson.

Q. Did they boat them when you were down there on that trip?

A. Yes, sir.

Q. Were you going down to West Virginia to spend the summer boating?

A. No, sir; but they would take a load of stuff to different places, and if they had stuff they would pick it up and take it to Hinton.

Q. What would be the purpose of boating staves from Narrows to Hinton after the railroad was there?

A. I don't know that they boated any after the railroad was through there.

Q. You say you were ten years old at the time you went down there?

A. Yes, sir.

Q. And that is when the staves were boated from Narrows to Hinton?

A. I don't remember about just at the Narrows, whether they were loaded or not, it was along down the river, it might have been below there.

Q. Do you remember a place called Sulphur Spring Branch?

A. No; I don't believe I do.

Q. You don't undertake to tell the Court where those
282 staves were shipped from down the river, or whether it
was just down near Hinton that they were shipped on the
river?

A. I couldn't recall just where they were picked up.

Q. I meant to ask you where they were loaded, and you said you were not sure, but it was down the river near Hinton that they were loaded?

A. Somewhere in that country, I just cannot recall where it was.

Q. How old were you when this pig iron was being boated down the river?

A. I was very small.

Q. Were you smaller than you were when you took this trip to Hinton?

A. I just can remember that my father hauled pig iron down the river.

Q. Were you smaller then than when you went to Hinton?

A. About the same. It has been so long, I cannot remember back so as to exactly tell you about it.

Q. Where did you father run the boat from?

A. They kept a couple or three boats about Howe's farm and when there was hauling to do they would haul pig iron, corn, and wheat.

Q. Was he regularly engaged in boating pig iron from Mack's Creek?

A. Yes, sir; and all kinds of stuff.

Q. Did I understand you to say that boats would come down and stop at your father's place?

A. A heap of times they would.

Q. The boats would tie up there for the night?

A. Sometimes they would if they were late.

Q. And then ship a new crew and go on down the river?

A. The same crew.

Q. Did you ever come down the river with any of that pig iron from Mack's Creek?

A. Yes, sir.

Q. How was that pig iron taken to the river?

A. By wagons.

283 Q. From the furnace?

A. Yes, sir.

Q. Not by tram road?

A. No, sir; by wagons, the best I can remember.

Q. Do you recall a tram road that went down to the river from the Radford Furnace, down Mack's Creek?

A. No, sir.

Q. Do you recall a ferry which had rails on it; and tram cars would be run on to the ferry and taken across the river?

A. No, sir; I cannot remember that.

Q. Did you see a ferry there?

A. I don't remember the ferry.

Q. What was hauled on the boat that you went down to Hinton on?

A. They hauled goods, produce, or anything for people all along the river.

Q. I mean what did you see hauled?

A. I just cannot recall what they hauled, but they hauled produce and corn.

Q. From what points?

A. From different places on the river.

Q. What do you mean by different places on the river; was anything loaded at Radford?

A. I don't think there was anything loaded at Radford, but sometimes they would load things and take them down the river and unload them at the merchant's stores and places.

Q. Your father would start out from Mack's Creek with a load of pig iron and bring that to Radford and unload it?

A. Yes, sir.

Q. Then he would take the boat and go on down the river, trading as he went?

A. He would haul up and down the river.

Q. How long would it be before he came back and got another load of pig iron?

A. I just cannot recall.

284 Q. Was it a month?

A. It wouldn't take that long for them to make the trip through.

Q. How long would it take to make that trip from Radford to Hinton and back?

A. I expect it would be a week.

Q. How much of a tide did you have to have in the river to get a raft of logs over Ingle's Falls?

A. Not so much.

Q. Four feet?

A. No; you wouldn't have to have that much. I helped to raft timber through there myself.

Q. But how much would be necessary?

A. We never did pay much attention to the tides.

Q. Did you ever have a raft to break up with you?

A. Yes, sir.

Q. Did that happen often?

A. Not so often—sometimes they would "bust."

Q. Whereabouts would they bust most frequently?

A. There was an abutment just at the ferry where the old bridge used to go across, and this sluice run right down the side of that abutment, and the water kind of drawed to the other side, and if you didn't watch out it would draw you against that abutment with the raft of timber and a heap of times the pole would break and you would go into that abutment and bust up the raft.

George M. Webb testified upon Direct Examination as follows:

I live in the horseshoe five miles below Radford, at a point which is said to be six miles from the station at East Radford—six miles by public road. From the station at East Radford the distance is much longer by the river. I was born December 24, 1855, north of Pulaski on what they call the Bentley Farm. I am going on eighty-one years old I was only twelve years old when I came to this farm on which I live above the Horse Shoe on New River and have been there ever since. Our post office is at Belspring, about a mile or two from where we live. 285

Q. Have you ever seen any boats on New River?

A. These here keel-bottom boats, you mean?

Q. Yes, sir.

A. Yes, sir.

Q. When did you see those boats?

A. I never seen them until I came to the river. I don't know exactly, but it was after the Old War, I came there right after the War, and they used them boats during the War though, but I didn't see them then, they said that is what they brought them there for, and two or three years after that my father lived up in the Horse Shoe and them boats constantly went up and down the river.

Q. Were you in the War?

A. No, sir; I was born in '55 and the War commenced in '61, and I was about six years old when the War broke out.

Q. Where did you see these boats on the river?

A. Floating up and down the river by the Horse Shoe, right around the Horse Shoe, in fact.

Q. How far up the river did you ever see them go?

A. I have seen them up at the New River Bridge several times.

Q. Did they pass your place going up the river?

A. Yes, sir; going up and down.

Q. And how far down the river did they go?

A. They went to different places. They would go to Eggleston sometimes, and sometimes down to the Narrows, and I have heard them say they went to Hinton.

By Mr. Abbot. If Your Honor please, we object to the last statement.

Q. Whom did you hear say they went to Hinton?

A. Some of the hands on the boat, I don't remember who it was. In those days colored people generally or pretty much all colored people run the boats.

I didn't have any farm then. My father lived on Mr. Kent's part of the Horse Shoe and it ran to the bank of the river. He
lived not more than a hundred yards from the river—just
286 about that. From our house I could see these boats go
back and forth.

I worked on these boats long enough to haul five hundred bushels of wheat from the Horse Shoe to New River Bridge. We would carry one hundred bushels in a load and I made five trips. I have also seen lumber and passengers on these boats. They fixed up one boat to carry passengers back and forth between Radford and Eggleston Springs. There was a resort there run by Captain Eggleston who carried passengers back and forth from his place to Radford.

I don't know that I ever saw any pig iron on the shore at Radford but I used to see it piled up at New River Bridge right across from the old furnace at Radford. I think they said that a good deal of that iron was shipped down the river from Graham's Furnace or somewhere up there and was unloaded there.

When the wheat was taken by boat to New River Bridge the boat was loaded with plaster for Major Cloyd and brought back to the Horse Shoe.

I remember hearing about work being done on the channel in New River. I know this went on for several years and then in the high water of 1878 was all washed away and they never did go to work there any more.

Q. How would you know when these boats were going up and down the river?

A. I would see them; and there was an old fellow generally with them boats coming down the river on the upper side of the Horse Shoe, it made a circle where we live, and one of these boatmen had a tin horn—a bugle horn—and I would hear him blow it when he came, he would blow his bugle horn; that was Frank Bannister, one of the old steersmen they brought from James River during the war.

Q. Do you know of any other men who ran those boats?

A. That they brought from down there?

Q. No; any of the men on the boat?

A. Yes; I knew some of them. They were hands that were just hired in the country, these colored people, to manage those boats mostly, and they were just hauling stuff on them boats, and that is what they were using them for.

In my judgment the boats were at least sixty or seventy feet long.

I have seen rafting of logs on the river tried a time or
287 two and tried it once myself. I saw some logs floating
down the river when the river was up—trees and logs and
everything, including driftwood, but no cut logs. I saw them try to raft cut logs once or twice and they failed, there was no success to it. The plaster which was carried on the boats was used to spread over the meadows and pasture land, I believe, as a fertilizer.

Upon Cross Examination the witness testified as follows:

I live at Cowan's Siding at the west side of the tunnel and have been there fifty years. That is on the lower Horse Shoe. That belonged to Mrs. Kent. The upper part there was Major Cloyd's.

Q. I understood you to say that for two or three years after the Civil War, you occasionally saw a keel-bottom boat on the river?

A. That was about the first I ever saw. They commenced running and these barges hired hands and would haul wheat and lumber.

Q. And that went on for how long—two or three years?

A. That went on for 8 or 10 years.

Q. I thought you said on your direct examination it was for 2 or 3 years?

A. I think it was about that, from the time they commenced.

Q. Do you remember when Captain Eggleston started his operations of hauling guests to his springs from Radford on the boat?

A. I remember him, but I don't remember what year it was.

Q. Don't you recall that the bateaux had been laid up on New River—drawn out of the water—and he got one and put it in condition to haul people to his springs.

A. You say that I said that?

Q. No, sir. Don't you recall that fact?

A. I don't know. I know that they was said to be the same boats they had used back and forth.

Q. They had been used for some time before that, hadn't they?

A. Yes, sir.

Q. And not at the time he started his boats?

A. He just fixed up one; I think there was three of them

288 and he fixed up one with a cab on it for passengers, and the other two was for hauling freight back and forth.

Q. At that time?

A. Yes, sir.

Q. I understood that they had been hauled out of the river and that he got one and reconditioned it for that work. Who was it that used to blow the bugle horn?

A. A colored man by the name of Frank Bannister.

Q. You could hear him coming, could you?

A. We heard him up at Barnett's Falls, and that was about 4 miles before he got to our house, but he generally blew it at our house, too.

Q. How did they get the boat through Barnett's Falls?

A. They shoved it through there.

Q. Do you recall the original wing walls there?

A. I didn't see any wing walls, but there were some rocks there.

Q. Wasn't there some logs attached to the rocks there?

A. To draw the water when we went through there; yes, sir.

Q. It was something that somebody built there, wasn't it?

A. I reckon they did.

Q. I mean it was not a natural construction there, but something that was built?

A. It was a kind of a log line sort of out there to draw the water into the sluices. Whether or not it lodged there or somebody put it there, I don't know.

Q. It looked like it was actually set there in a natural position?

A. It looked like it; it was awful swift water there.

Q. You said that Captain Eggleston took passengers back and forth. Did he haul passengers up the river on the boat?

A. There was passengers taken down there and back—carried back and forth. I don't know who did it.

Q. They were people going to the Eggleston White Sulphur Springs?

A. Yes, sir.

289 Q. Let me get this straight: Just where on the river have you seen these boats?

A. Right around the horseshoe where we lived. I have saw them up New River when I would go over there. We generally went to New River to do our trading. Mr. Chumbley had a store there and General Wharton.

Q. Do you mean New River Depot?

A. Yes, sir—New River Bridge there.

Q. You saw boats there and down around the other horseshoe?

A. Yes, sir.

Q. And you rode on one boat that carried 500 bushels of wheat to Radford in five trips?

A. Yes, sir; I worked on that trip and helped to shove it.

Q. How many people were on the boat?

A. Only two on each side and one to steer it—there were five.

Q. How much does a bushel of wheat weigh?

A. 60 pounds, if it is good wheat.

Charles E. Weiss testified upon Direct Examination as follows:

I was born in West Virginia at Rock Camp in 1871. I have been sixty-five since December 20th. I don't know definitely how far from New River the place was on which I was born—possibly twenty miles. Later on I moved to what is known as Goodin's Ferry in Giles County, near Eggleston Springs. I moved to Radford in the Spring of 1887. I don't know the year definitely. You can jump back there and get it better than I can. I live on New River now. In my boyhood I lived with my father at Radford which was then called Central Depot and have lived there ever since. I am a brakeman on the Norfolk and Western Railroad at East Radford.

Q. State whether or not you and your father and brother ever operated a keel-bottom boat on the river.

A. My father told me about operating from Eggleston Springs to what was known as Central Depot. That was before my time.

(Defendant objected to this statement as being hearsay evidence and moved to strike it from the record.)

290 Q. You did not operate them yourself?

A. No, sir.

By Mr. **Abbot**. We object to what his father did and move to strike it from the record.

By the **Court**. You must state what you know (addressing the witness).

Q. Have you seen boats on the river?

A. Yes, sir.

Q. During what year or period of time have you seen boat on New River?

A. To tell you the truth, I didn't pay no mind to the year I seen them, but it is since I was railroading.

Q. How old were you when you first saw boats on New River?

A. Well, I haven't kept no true record of that to tell you, but it has been about 25 years ago—about 30 or 35 years ago.

Q. What kind of boats were they?

A. They was known as—somebody built them keel bottom, but some called them a bateau.

Q. Were the keel-bottom boats any different from the bateaux?

A. No, sir.

Q. Did you ever see more than one of these on the river?

A. Yes, sir; they used to run them. My brother operated one. I have been up the river in it.

Q. Where to and from what place?

A. He hauled staves and other things from Glen Lyn to Hinton.

Q. And you rode from Glen Lyn to Hinton, did you?

A. I rode from Hinton to Glen Lyn.

Q. Where would the boats deliver the staves?

A. At Hinton.

Q. What would you carry upstream?

A. He carried anything anybody wanted to send to that point.

Q. What would that be?

A. I don't know that I could tell you what it was altogether.

Q. He would carry produce, would he?

A. He would carry anything that anybody wanted to send up there—butter, eggs, potatoes, or anything that anybody wanted to send up and down the river during the time he operated 291 his boat, hauling staves and sand. He did not haul sand from that particular point.

Q. Where did he haul the sand from?

A. From different points along the river.

Q. From different points along the river between Hinton and Glen Lyn?

A. Yes, sir.

Q. Where would he get the staves?

A. He got the staves at Glen Lyn to haul, at the station there.

Q. Were they prepared there from lumber?

A. Yes, sir; they made them there.

Q. Was there a sawmill there?

A. Well, there was one not right at Glen Lyn, but there was one there that they used.

Q. How many staves did they carry on one boat-load?

A. I could not tell you how many; I could not tell you how many hundreds they carried.

Q. Can you make an estimate for us?

A. I don't know whether I could make a real true estimate. You gentleman could make it better than I can. I am not qualified to make it.

Q. You saw the boat there. Was it full of staves?

A. The boat ran about 50 or 60 feet or more long, and they loaded it down with staves and my brother said that they would put the staves on the edge—on edge to keep the water from getting in the boat, and that it was 4 inches above the top.

(Defendant objected to what the witness' brother told him and moved to strike it from the record.)

Q. You saw the staves in the boat, did you?

A. Yes, sir.

(Defendant objected to the question as leading and moved to strike it and the answer from the record.)

Q. Have you seen staves in the boat?

A. I never saw him load it, but I know he hauled them.

Q. Did you see them hauled in the boat?

A. I could not say I saw him load them.

Q. Have you seen the staves in the boats on the river?

A. No, sir.

Q. How do you know that they were hauled to Hinton?

292 A. I got his word for it. He did it as a business for two or three years or more. He worked at it as a business and he owned the boat—he built the boat; he built a new one or two.

Q. At the time you went from Glen Lyn to Hinton, what did the boat carry?

A. You mean from Hinton up there?

Q. Yes; from Hinton to Glen Lyn, what did the boat carry?

A. I had my family with me. He didn't have anything particular on the boat but him and my family and the workmen. They were coming for a load then.

Q. At the time you came from Hinton to Glen Lyn, you carried your family and you and the crew?

A. Yes, sir.

Q. How many did that comprise?

A. At that time it was my wife and two children—there were four of us.

Q. How long did it take to make the trip?

A. I disremember definitely, but something like 4 or 5 hours, maybe more or less; I don't know definitely; I don't remember definitely.

Q. How many men operated the boat?

A. Anywhere from 4 to 5.

Q. How did they propel the boat up the river?

A. They poled the boat. One man steered it and another man shoved it up the river with a pole.

Q. Going back to the sand that he hauled, where was the sand procured? Where did they get the sand?

(Defendant objected to this, unless he called for what the witness himself saw and knew.)

Q. Do you know?

A. Along at different points along the river. It was not as far as Glen Lyn. He hauled where it washed out, and it was used for concrete. They had to have clean sand for concrete.

I have seen a motor boat on New River belonging to a Mr. Hodge which he used to haul ties down the river. I saw the ties unloaded. They unloaded them where the railroad bridge goes across the New River at the mouth of Little River. There
293 was a road running up to the mines across the river which goes to the Appalachian Electric Company's quarry. We haul stone from there now. He hauled stuff down to New River. Mr. Hodge's boat unloaded ties at the mouth of Little River. I don't know where he got them. I have no idea; it was a long distance. It was some place up the river. The boat came from above the Appalachian Electric Power Company's dam site above Radford and passed that point coming to Little River. I saw the boat hauling ties more than once. It might have been for a year or so that they hauled for different times down there.

My brother operated the boat from Glen Lyn to Hinton for two or three or four more years. I don't know definitely.

Upon Cross Examination the witness testified as follows:

I don't remember definitely the year in which I took the trip from Hinton to Glen Lyn on the bateau. It was between thirty-five and forty years ago. That one trip was all I took on the boat up as far as Glen Lyn. I had been down there to visit my brother and was coming back home. My brother is living. He was in Hinton the last account I had of him. At the time, as well as I can remember, I was working on a dining car for the the Norfolk and Western. I commenced working for them in 1899.

Q. Where did you get off the boat at Glen Lyn?

A. It was not right at the Glen Lyn Station, but some distance below there.

Q. Was it below Shumate's Fall?

A. As well as I remember, it was above Shumate's Falls.

Q. How did you get over Shumate's Falls?

A. As well as I remember—I don't know definitely, but it seemed like they had a channel that they ran in.

Q. And they came through Shumate's Falls in a prepared channel, did they?

A. Well, I don't know definitely whether it was prepared or not. All I can give you is what I heard my father say—was that they shot out the channel and I have no right to doubt it;
that they shot out the channels for the boats to run in;
294 and a man had to know how to run in the channels; if he
didn't, he would break them up.

Q. The channels were pretty well defined—or the channel was, through the Falls?

A. How is that?

Q. I say that the channel can be seen. You can tell where it is?

A. Yes, sir; you can pretty well tell, or you could not run in it.

Q. What I am getting at: Is there a channel through Shumate's Falls?

A. I think so; but Shumate's Falls—when the river is low there would be somewhat trouble to get through there.

Q. How high was the river when you came through?

A. The river had much more water in it than it has today.

Q. Did it have four or five feet more?

A. I expect so, and maybe more. The drought has dried up the springs and the streams.

Q. I believe you said that the river was 4 or 5 feet above what it is today?

A. I would not like to say what it was, but there was more water in it than it is today.

Q. Now, the water coming over Shumate's Falls——

A. (Interrupting.) I don't remember definitely whether or not the place they ran in for the staves was above the Falls, but I know where the Falls is, and you cannot run over it with a canoe now.

Q. Do you know Wiley's Falls?

A. Yes, sir.

Q. Did you come through that on that trip?

A. We ran through these Falls to Wiley's and down in there.

Q. This was the only trip you made on that boat, was it?

A. Yes, sir.

Q. Did you come through Wiley's Falls on that trip?

A. We came up to Glen Lyn.

Q. Do you recall Wiley's Falls?

A. Yes, sir; there was a falls there, as well as I remember, named Wiley's Falls. I will not state definitely about that. I said so far as I know.

295 Q. Did you come into the channel of Wiley's Falls and go through there on the water?

A. There is no other way to go through them without coming through a channel. You had to have a channel to get through.

Q. You had to have a channel to get the boats through?

A. Yes, sir; in other words, without the water was high enough to take you without it.

Q. Where did you see your brother load the staves on this boat?

A. I never said I saw him load them.

Q. You never saw the staves loaded on it?

A. No, sir; but the staves was there on the bank, to load.

Q. Where?

A. On the bank where they run the boat in. They had a place to load them below Glen Lyn. I don't know where the place is definitely, but he hauled them.

Q. Do you remember a place where there was a station yard called the Sulphur Springs Branch—do you know Esther French?

A. No, sir.

Q. Do you know where Polly Walker's place is?

A. No, sir.

Q. Wasn't the stave place or factory in West Virginia?

A. I don't know; it was not far from Glen Lyn; you called yourself going to Glen Lyn. I don't remember how far it was. However, we came up on the boat and then we went across to the station to come home.

Q. There was a railroad to Glen Lyn at that time, was there?

A. The Norfolk and Western Railroad; yes, sir.

Q. At the time you say when your brother was doing this boating?

A. Yes, sir; that railroad has been through there for 50 years or more. It was there for a number of years before I went to railroading, and I have been railroading for 38 years.

Q. Where do you work on the railroad?

A In the East Radford Yards.

296 Q. All of your testimony about the boat going to Glen Lyn, from Glen Lyn to Hinton, prior or aside from the time that you went there to Glen Lyn, is based on what your brother and other people told you, isn't it?

A. Well, certainly. I was not operating the boat. My brother was. I had no right to doubt it. There is no doubt in my mind about it, and I could not positively say I seen him load the staves and operate the boat with the staves loaded, but the only way I have to tell you was to state what he told me, and then I came in the boat with him.

Q. And you——

A. (Interrupting and continuing.) It is very clear that he did it. He could tell you all about it, if you saw him, but I am telling you the facts what I know. I could not tell you I hauled it when I did not.

Q. Yes, sir; but facts are proved by people that know them and not by those who have just heard about them.

A. I understand that, too; yes, sir.

Q. And you say it took 4 or 5 hours to come from Hinton to Glen Lyn?

A. As well as I remember, that was about the time. They didn't travel very swiftly up the river. There was right much falls and swift water, with the exception that he told me when he could get a canvas up in the front, it would help him up the river quicker.

(Defendant moved to strike this answer as being hearsay, so far as it related to what the witness was told by someone else.)

I do not remember definitely what time the train left Glen Lyn which we got on after I took this trip. We did not go to Glen Lyn the day we came on the boat but went over the next day. We stayed that night in a tent on the river. We got some fellow to haul us over to Glen Lyn with a one-horse wagon. There were rough roads filled with rocks and we could hardly stay in the wagon. That is the reason they used the boats for hauling. I don't remember crossing a big mountain to come to Glen Lyn. I don't remember crossing any hill worth while. I was told the staves were used in Hinton. I suppose they used them for barrel staves. I don't know whether there was a barrel factory in Hinton.

The witness testified upon Redirect Examination as follows:

Q. There is just one question: This point where your brother loaded the staves on near Glen Lyn, how close was that to Glen Lyn?

(Defendant objected to the question, because the witness did not say that his brother loaded them. He said he never saw that. He simply heard that.)

By Mr. Williams. He said the staves were on the river bank. I just want to locate the spot.

I saw the staves on the river bank. I don't remember how close
that was to Glen Lyn. I suppose it must have been three
297 or four or five miles to Glen Lyn across where they were
with the wagons. I saw my brother's boat and I have been
in it. I have seen it since then. I did not see the boat before I
was in it. I had been visiting my brother and came back this

trip on the boat. My family stayed that night and the next day we came to Glen Lyn. My children were three or four years old when I brought them on the boat.

J. G. **Graham** testified upon Direct Examination as follows:

I live close to New River at Mack's Creek, close to the old Radford furnace. I was born in 1866 in Floyd County, Virginia, which is not on New River. We came over to Pulaski and then I lived on or near New River since I was twelve or fourteen years old, from some time in the early seventies. I remember when they shot out the channel, when the Government improved the channel in New River.

The Allen brothers, Jim and Al, cut a boundary of timber close to where I lived, put it on the river and boated it down to Radford, they said. I expect there were one hundred thousand feet, or something like that, in the tract of timber which they cut. They got the timber from Mr. Henry Wilson. I couldn't tell you the date, but I was somewhere about twenty years old. It was as near as I can fix it along in 1886 or perhaps 1890. This timber was sawed along the foot of the mountain in the boundary of the timber. They logged it and sawed it there and then hauled it by wagon down the river something like three-quarters of a mile or half a mile or something. I saw them loaded there on boats. I don't know that I ever saw the boats start with the lumber on them. The boat was something on the order of a flat keel bottom, not like some of the other keel bottoms. It was sort of a short boat. I suppose it was Mr. Allen's, but I don't know. I can't say for how long a period the boat carried timber for the Allen brothers from the time I first saw them come up there and work in that timber. All I know is they sawed out that one boundary of timber and were there, I guess, four or five months.

I have seen boats hauling pig iron on New River. I know where the Boom Furnace was located. It was up on the left of new River about two and a half or three miles from the 298 river on Little Reed Island. I have seen the Boom Furnace in operation. I have seen pig iron from that furnace on long keel bottom boats on New River but never rode on any of these. I came back up on the river with them a piece at different times, starting from where I lived. I wasn't grown then, I was just on a kind of a pleasure trip with a man who was running the boat—a boy riding in the boat. My father's farm was five or six miles, five I think, below the mouth of Reed Island Creek where it enters into New River. At that point and other points on New River I would get into the empty boat as it came back and ride up with the men as far as I thought

I could walk back home. These boats were the same ones that hauled pig iron down the river. I don't remember exactly but it seems that I saw boats on New River hauling pig iron three or four years probably. I don't remember how many years. It usually took three men to operate the boat.

I knew a Mr. Goldsmith who ran a veneering plant in the town of Radford and sold him a lot of poplar logs, I guess twenty-five years ago, about 1910 or 1911. I rafted the logs down to his plant after cutting them and putting them in the river. They were put in the river about half a mile below the mouth of Mack's Creek, which used to go by the name of Owen's Ferry. I would think it was eighteen or twenty miles from the mouth of Mack's Creek where it empties into New River down to New Radford.

I suppose it is between twenty-five and thirty miles by the river from the mouth of Reed Island Creek down to Radford where the pig iron boats ran. Reed Island Creek is farther up the stream so that the logs were rafted something like twenty miles down to Radford. They said the logs got there. Anyway they paid me for them. I don't remember how large a stand of poplar I sold to Mr. Goldsmith but I expect it was five or six thousand feet. I cut the poplar in the bluff over there.

The witness testified upon Cross Examination as follows:

I don't know how long it took the raft of poplar logs to get to Radford. I think they busted up once. The man that took them down told me so.

The ferry boat that got away in the summer of 1931 came from Mack's Creek. It was built at the mouth of Mack's
299 Creek for the Linkous Ferry. I couldn't tell you how
long it took to get that boat from the mouth of Mack's Creek to Linkous Ferry. I don't remember saying in November 1931 that it took all one day and part of a night and part of the next day to get the three miles to the ferry. It might have done it. I don't remember.

I never saw any of the pig iron in the bottom of the river which had been thrown out of the boats. I heard of it being thrown out. I don't think I ever saw boats loaded with pig iron hanging on the rocks. I never went down with these boats when they were loaded. I saw the boats but I don't remember seeing one hung on the rocks. It used one day going down to Radford with a boat loaded with pig iron from Reed Island and two days coming back. I don't remember how many of these boats were in operation.

I remember the hauling of iron ore from Clark's Bank to Breeden's Hill—Hiawassa. The ore was loaded on the boats up at Allisonia where there is a ferry now. The ore was hauled down the river a couple of miles, I guess. I think that is what they call it from there to Hiawassa. They would unload the ore there and haul it by wagon over the Lead Mine Road to the furnace. I drove a team for Mr. Southern and hauled it by wagon.

I don't know just when this boating of iron stopped. I couldn't say that it stopped before the railroad was put in operation but it seems to me that it did. I am not positive about it. I don't remember though for certain.

The iron from Mack's Creek Furnace, Radford Furnace, was gotten to the railroad by hauling it to Dublin on wagons. The Mack's Creek Furnace was discontinued long before the railroad was built. I don't recall the year it finally went out of blast. It went out of blast and then was operated again for a little while. The first coke furnace was stopped before they built the railroad. There was a Mr. Putney come there and rebuilt the furnace and made a coke furnace out of it and worked it for two or three months and then went busted and quit. I think the former operation had been discontinued prior to the building of the Cripple Creek Railroad.

The witness testified upon Redirect Examination as follows:

I don't know of my own knowledge whether the furnace went
out of operation at a designated time. I remember when
300 it did stop but I don't know the date.

James Breeding testified upon Direct Examination as follows:

I was born on New River between what is known as Allisonia now and Hiawassa, in 1862, I think. I am seventy-four now. I have lived there on the same farm where I was born practically all my life except a few years during Woodrow Wilson's Administration when I was in Ohio. Our house is not much over forty yards from the river if it is that far. The river got up in it a time or two.

I have seen boats on New River. When I was a young man I boated ore for myself and Mr. Tom Mills which was shipped from the ore bank down to the Spencer Breeding Hill by keel bottom boat. The ore was secured at what was known as Clark's ore bank. It is right west of where I live, about a mile and a half. The farm where I live is just about at New River Bridge. The first house above the New River bridge, the railroad bridge across New River. The bridge, that is the one my farm is near, crosses New River near Spencer Breeding Hill just this side of Mack's Creek. The ore which I took from the Clark ore bank was hauled down to the river with a wagon and we boated it from that wharf to the other one which was down at Spencer Breeding Hill, about two miles from Clark's Ferry. The boats Mr. Mills and I used were keel bottom boats. They were not flat boats. They had an oar behind to guide with. I don't really know how much ore one would carry. We would always load the boat down about four inches from the top until it would sink down about four inches from the top. Some said that the load was six or eight tons, some said more. We loaded it until we were afraid it would go down and then we quit. When the ore was unloaded at the river bank at Spencer Breeding Hill it went to Mack's Creek Furnace where it was made into pig iron, I believe. I have seen the ore made into pig iron.

Mills and I operated this boat or boats a right smart while—I couldn't state how long—a year or two—probably not two years. But we was there on the river a good while. I boated there as long as I could stay there and it would get bad weather, of course. Sometimes we would have a bad rain, you
301 understand, and get so dark we couldn't see and we would have to put ashore in the river to see how to run the boat through.

I know Boom Furnace, which was right up the river above our farm and the Mack's Creek Furnace—about three and a half miles above Mack's Creek Furnace, I guess. They boated ore from there down to the river. I have seen pig iron on boats from Boom Furnace but not ore. The pig iron was made at Boom Furnace. I have seen it made there. I have not seen it put on boats at that point but down on the river just below there. They would haul it to the river. I lived a little below the furnace and would see the boats come by loaded with pig iron.

Q. Over how long a period did you see boats carrying pig iron coming from above on the river?

A. I couldn't testify exactly how long.

Q. I understand you can't state exactly, but approximately?

A. Sometime, you know, and really I went with them myself down to Radford and I would get lonesome and I would feel bad and I would go myself. Sometimes I would feel like I wanted to go and I would go.

Q. Did you make that trip several times on the boat?

A. Yes.

Q. And the boats would be hauling pig iron to Radford?

A. I had no interest in it, no money in it or nothing.

Q. You just made the trip?

A. Yes.

Sometimes there would be four men on the boats. I don't know how far it is from Boom Furnace, where they would start with the iron ore, to Radford but I think it is about three or four miles from where I live up to Boom Furnace and I reckon six or seven miles or something like that from where I live to Radford. I don't know how long these boats operated on New River carrying pig iron down to Radford. I wouldn't testify as to how many years boats carried pig iron down the river for I don't know but they were there some time. I wouldn't say that it was more than two or three years because I don't know.

If the river was up it would take us a very few hours to take the pig iron boats down to Radford from where 302 we got on the boats. If it was down, it would take several hours. We would come back in the boat pushed by man power. Oh, yes! We had a patch on our coats that we put the pole against. I had no interest down there but they put the pole against that.

I knew some of the men who operated these boats—I knew James Owen and then there was a man by the name of Odell, a man by the name of Clabe Lawson. There were several people there—Jeff Cox, I believe if I ain't awful bad fooled. Oh, Yes! I have seen these men operating the boats on the river which I had no interest in. I paid no attention to that. I didn't try to remember their names to testify in 1936.

Q. Have you seen anything else boated on this river?

A. Oh, yes. When I was quite a young fellow, right young boy grew up I heard some kind of music out in the river and I said to my mother, "What could that be?" She said, "That is that fellow on a raft." I said, "What is the raft?" She said, "A man that brought timber down the river." I said, "What is that he is blowing?" I went out and he had a weed, on old weed that he took off of the bank of the river and it was the most comical thing you ever heard in your life and that drawed my attention to look and he had these logs pinned together some way and nailed together some way or other.

Q. Some kind of weed music?

A. He had a weed blowing in it. I thought it was peculiar. That is how come I know about it.

Q. What we he carrying in that boat?

A. That was no boat, honey. That was what you call it—logs.

Q. A fleet of logs or rafts of logs?

A. Pinned together, just side by side, what they call a raft.

Q. And these logs were floating down the river?

A. Yes, sir.

Q. Did you see more than one raft of logs?

A. I saw several, but not a world of them.

In the early days up there we didn't have much roads. We had
a road run near our house about six or eight or ten miles
303 know as the macadamized road that runs to Baltimore,
I believe, but we had bad roads and we had to hire people
by the day and make them pay the taxes.

I was right there and remember when the railroad bridge was built up there. The materials for building that bridge were hauled down the river and sometimes they hauled on a wagon. We owned a ferry there and I took our boat when I was a boy and took it down there and kept the engine in that boat to pump the water out of this cofferdam to put the dam in the river. No materials were hauled on that boat to put in it. They had a boat, a very big boat, in which they would put a heap of material and haul it down the river for the dam. This bridge was built down at Hiawassa at what is known as Spencer Breeding Hill, down below my house. The bridge crosses right on the corner of my father's place.

Q. Have you ever seen anything else carried on boats, any merchandise or any lumber?

A. Oh, no; not to amount to anything. I have saw lots of stuff go down on boats, but I mean not regular traffic of that kind.

Q. When did the boating of pig iron cease?

A. Well, I suppose when the furnace run out there they quit. They used to haul it down there pretty often.

Q. You mean down the river pretty often?

A. They went down pretty often. James Owen and these boys used to go down there from up there about Reed Island or Boom Furnace down the river.

Q. When the furnace closed up, then the boating ceased?

A. Why, sure. I have been there all my life.

Q. Mr. Breeding, I have one more question I want to ask you. Do you know about the Buck and Byllesby dams that are above you on the river?

A. I didn't understand you.

Q. Do you know about the dams that are built on the river?

A. I don't know much about them.

Q. Do you know about them being built and being there?

A. Oh, yes.

Q. You know they are there and above you?
304 A. I can tell from the water.
Q. How do you tell it?

A. It gets up and then goes down.

Q. Explain what you mean by saying that the water is up and then goes down. Tell the court?

A. Probably the morning—I don't know really about what part of the day, but sometimes we go to the mill at Allisonia and the fellow says, "We can't grind, ain't got no water," and then have to wait until the water comes on before they can grind.

Q. Have you seen this rise and fall of the water, this fluctuation around your farm?

A. It is every day.

Q. About what time in the day?

A. I believe it is in the morning. I think it is in the morning. I ain't sure.

Q. When the water is low, is it less than normal tide?

A. Well, the water is low, you know, and the sandbank comes out here where the stock drink water, and when it gets down they can't get to it.

Q. Can't get to the water?

A. No; they can't get to it. I live right at the river.

Q. Did you notice this water rise and fall in this way before the dam was built?

A. Well, it never did that. It used to freeze over very often when we would be there on the river, freeze over often, and after they put the dam in we didn't have much trouble. It goes out or in or something, but anyhow we don't have any bad ice like we had. We did have this year some bad ice, but it goes out and in.

Q. The fluctuations in the water have come since the da[illegible]ere put in, the change in the water?

A. I know one thing, that it don't freeze up like it did. It comes up and goes out, comes up and goes out.

305 The witness testified on Cross Examination as follows:

I was born on New River this side of Allisonia within forty yards of the river. I lived there all my life except when I was in Ohio. I owned a farm adjoining the place on which I lived. I lived in Pulaski after I came back from Ohio and then I moved on a farm where I was born and have been there ever since. The river makes a bend for several miles at Mack's Creek. It is a very short distance from Mack's Creek to Spencer Breeding Hill right where the ore was put across to Mack's Creek but to go around the river is a mile or two. I never hauled any of the iron from Mack's Creek Furnace. I just hauled ore down to make pig iron.

Q. When did Boom Furnace go out of blast?

A. I told you I couldn't tell that a while ago. I wouldn't be positive about Boom Furnace going out of blast but it would come in and then go out. My cousin superintended that.

Q. Did it go out of blast after or before the railroad was built up there?

A. No; it has been since the railroad was built that it went out of blast, I guess.

Q. I didn't understand?

A. I guess it has been since then. I knew how it was made there and I was there and saw the pig iron hauled from there.

Q. But you don't mean to say that you saw——

A. I wasn't positive as to those little things, but when I would testify to it, it would be the truth and would stand, too. It will stand, too.

Q. Do you remember when the railroad was built up there?

A. I certainly do.

Q. What year was it?

A. I don't know exactly what year, but I know how old I was at the time it was built there.

Q. Maybe we can compute it.

A. All right, sir; I was just sixteen years old and I am seventy-
four at this time, and we kept all the boarders, as high as
306. twenty at a time, there. I was sixteen years old in May,
and that railroad had two sections right there—Mills and
Fairfax.

Q. That would make it the year 1878, Mr. Breeding?

A. Well, whenever I tell you because we kept the boarders there. We kept the head men there.

Q. I suppose you are not positive about that but it is the truth; is that it?

A. I am positive that is about my age because I run off from home at that time and they sent after me and that makes me a little more positive about it.

Q. Do you remember when the Government built the channel up there?

A. I certain do.

Q. How old were you then?

A. I don't know. My mother cooked for those people. I can give you some of the names.

Q. Was that before or after you had these boarders there working on the railroad?

A. I reckon it was before. I don't know but my mother cooked for them and I can give you the names of the men she cooked for. I don't know exactly. As I told you gentlemen, I wouldn't testify to an hour or day or nothing of the kind, but I am just testifying to what is a fact about it. My mother cooked for some men there, one bunch of them and some of them was at Hiawassa and some of them at Dublin, a man by the name of Wagner and a man by the name of Somers. I am just speaking about I was there and waited on Mother. I really don't know, but I did help put up that bridge. I mean I done all I could, feeding the people. We kept eighteen regular boarders.

Q. Was this when the railroad or the channel was built?

A. When the railroad was built. We never kept those regular boarders when the channel was. There was just a few of them come and stayed with us.

Q. And which was first in point of time?

A. I don't know. I wouldn't swear nothing about that,
307 but we kept them there all right and when the railroad was built they had two sections at it. We kept the head men of the railroad, Bill O'Brien and Joe O'Brien and Fairfax come there once in a while and Mills would be there once in a while and considerable of them.

By the COURT:

Q. Do you remember the big flood of '78?

A. I certainly do. I was in it.

Q. Was this railroad built before or after that?

A. I suppose it was built before that, I reckon. I expect it was. I ain't sure now about that. There was a man lived with me by the name of Cowan and he was working with me that day and it was in September and we didn't know anything about this rain up the river and next morning we got up to fix the fire and heard something, I thought, splash against the boat. We kept boats there—a canoe—and I peeked out the window and it was up into the boats. I said, "Lord, get out of here. The water is up in the house," and we jumped up and by the time we got out it had got around the house. It come like the ocean and we got out of there too and it came up to the window, middle of the window—old-fashioned window. It come up to the middle of that, almost to the loft. This house was about, I suppose, eight feet, this room was. I am just guessing about that, but it was about to the ceiling. I wasn't here in the last fresh.

Q. You weren't here in Noah's fresh?

A. I didn't know nothing about that last fresh. That was when I was in Ohio.

Q. The large boat you spoke about, was that the boat rock was hauled from Howard's Ferry to the bridge piers?

A. I don't know. They come down the river. They had that boat. It was a very big flat boat and it got away from them and Mr. Fitzpatrick, the General Manager of the abutments, gave me $20 to swim to that boat and undo it and get it away from there. It got away and got down in the river and it was an enormous broad fellow. It wasn't like the boat we hauled ore on. It was a good boat like they have down here on the
308 Monongahela River—holds 100 or 200 tons.

Q. How did you get it back up?

A. We pulled it up.

Q. Did you have any trouble with it?

A. Oh, yes; we pulled it up. We had blocks and we would catch it along and take the pole and shove it out from the bank until the other fellow pulled. We got it up there.

Q. Just one other thing I want to get clear. Do I understand that that man on the raft was using that wind instrument to propel it with?

A. I told you I didn't know who he was, but he had the raft there and had that horn, and it drawed my attention to go and look at it and it was an old weed; yes.

J. E. Owen testified upon Direct Examination as follows:

I reside on a farm in Hiawassa, Pulaski County, within fifty yards of the New River. I was seventy-four years old the 24th of March past. During my life I have lived in three places, mostly on the river. I was born a couple of miles from the river and lived there until I was two years old, then moved up the river near Allisonia. Then I moved down near Hiawassa and have been there since 1878.

I have seen boats on New River. The boats I remember best were the bateaux, the keel-bottom boats. I think they were sixty to sixty-five feet long and six to eight feet or seven feet across the top. I was one of the boatmen. I went on as a timekeeper on the river. We went mostly from Allisonia to New River Depot. I never went below New River Depot with a load of iron. I have been to Hinton by boat.

I went to Boom Furnace as a clerk in the store and perhaps two or three times a day I would run down to the furnace and weigh iron for the teams to haul down to Allisonia, where they put it on boats and took it to New River Depot.

I went down the river on boats loaded with pig iron many times as far as New River bridge. There the iron was unloaded, weighed, hauled up to the railroad depot, and loaded on to the the cars of the Norfolk & Western Railroad. I shipped iron to R. C. Hoffman & Company, Baltimore, Maryland.

309 I knew Major Graham and John W. Robinson, who were owners of the Boone Furnace. They had a company, I think, called the Reed Island Iron Company, which had four boats. These were bateaux used for transporting iron down New River. I remember that one time on the return trip coming up the river we brought back some bacon. It might have been a thousand pounds. At that time I was a foreman on the boat. Bob Porter was foreman before that time.

I worked on the river near Linkous Ferry to Hiawassa or Jones Ford clearing the channel on New River for the government.

This work consisted of cutting chutes through the ledges. The ledges were cut to increase the business on the river of transporting iron and things like that. Without this having been done you could not have boated at all.

Pig iron was not carried down the river prior to the cutting through of these ledges. I don't think pig iron was carried down the river until after that.

Iron ore was not hauled down the river in boats on New River except from Clark's ore bank I would say two or three miles down the river and unloaded at Hiawassa and hauled from there to the old Radford Furnace on Mack's Creek. It was boated down and across something like two and a half to three miles.

I have noticed changes in the river, so far as its flow is concerned, since the construction of the Buck and Byllesby dams. When we forded the river at Jones Ford above my house and went to mill with a load of wheat, it seemed that the river was much lower in the morning than it was in the evening. When we came back in the evening it had risen something like a foot and a half or two feet. In the morning it would be down again.

Pig iron was hauled altogether on wagons from Boone Furnace, as far as I remember, to Allisonia and to Howard's Ferry, that is still higher, to the mouth of Reed Island. After the iron was made at the furnace it was taken to New River. Some was taken to Dublin on wagon and shipped from there to the same company. I can't say what percentage was taken to Dublin. I loaded iron on cars there and also at New River. I don't know whether more was shipped by wagon to Dublin than was shipped by boat to New River Depot. I can't exactly state, but I was more interested in the boats. I was put in there as foreman and timekeeper.

After we got through with the work of clearing the channel we took the government boats to Hinton, West Virginia.
310 They were all kinds of boats, tool boats, flat-bottom and keel-bottom boats. The bateaux and some flat boats were the longest. I could not say what width the largest flat boat was—it was wider than a bateau.

I went with those boats all the way down to Hinton. There were four bateaux. I remember their names. I don't remember how many flat boats there were. Some were tool boats to carry tools in, some were skiffs, and some were canoes. When the government cleaned out the sluices it had commissaries here and there on the river and supplies were carried for the men who did work of all kinds. These boats carried food and powder and everything down the river.

It took us six or eight days to make the trip down to Hinton. We did not have the boats at one place but we had to go along and gather them up all along. I don't remember how low down on the river they were. I remember some of the men who were on these boats which went down the river—M. P. O'Dell, a white man, Bob Whitt, J. W. Crowell, Billy O'Dell, Tommy O'Dell, and maybe French O'Dell, and a fellow named Lawson.

I don't think I can estimate how many tons of pig iron were shipped a year from the Boone Furnace to New River Depot. We aimed to make two trips a week on those boats. We would go down on one day and it would take us two days to shove the boats back. I can't tell you how many boats there were on each trip, sometimes four and sometimes three. It seems to me we had something like six ton anyway, so that if we had four boats there would be twenty-four tons a trip. We made two trips a week if we could, but sometimes we couldn't. The men would fall out, a good many of them. Some worried over it and like that and wanted to rest. We had some trouble getting the boats down the river, but not much. We generally got through in a day. All the men knew the channel.

When I shipped a carload of this pig iron to Baltimore, I would get a bill of lading from the depot for the shipment.

The witness on Cross Examination testified as follows:

I am about a second cousin of Major Tipton. I used to be a Deputy Marshal.

As I remember, Boone Furnace, or the Reed Island Iron Company, owned four bateaux. I remember some of the names of these boats—"Old Artie," "Clara," "Bell," and maybe the
311 other was "Stella." I'm not right positive of that. I think I was second foreman of boats, the second man who had charge of the iron boating to Radford. Bob Porter preceded me as foreman. I think he quit or was discharged, or something like that.

Q. Did he make a success of the iron boating?

A. I don't know; maybe not. I am not sure; anyhow he quit or was discharged. I don't remember anything about how he got through with it. I really didn't know; I had no chance to know.

Q. When was it your cousin, Major Tipton, sent you to New River Bridge to get the experienced boatmen?

A. Sir?

Q. I said when was it your cousin, Major Tipton, sent you to New River to get the experienced boatmen?

A. I don't know that; but he did, and got two or three boatmen down there, three boatmen from down there.

Q. Did they improve the situation at all?

A. What did you say?

Q. Did they make a success of the boating?

A. They never done as well as some men we had up there.

Q. What was the difficulty about that boating; what was the trouble about it?

A. They were not as well experienced and I suppose the water was rougher up there.

Q. That was pretty expensive iron, wasn't it?

A. Yes; and they had been boating where the river was not so rough.

Q. The iron was right costly to manufacture, wasn't it, that charcoal iron?

~~A. Yes; I think~~ so.

Q. Did the men ever lighten their boats as they went down the river?

A. Yes; they done that some.

Q. Didn't they do that considerably?

A. I can't tell how much, but that is one thing I got in there for.

Q. To watch them?

A. Yes, sir; to keep the boatmen from lightening their loads.

312 Q. When would they lighten their boats?

A. When would they do that?

Q. Yes.

A. Well, if the river was low you know it was more difficult to get through those shallow places, those chutes that were cut out.

Q. When they would run on to a rock they would proceed to throw the iron out until they got off, is that it?

A. Yes, sir; that is it.

Q. And you went along to keep them from doing that?

A. Yes, sir.

Q. And that throwing out of the iron was why the boating wasn't a success, and isn't that what your cousin put you there for?

A. Yes, sir; to watch them. It made it easier work on the men.

Q. It made the iron weigh less when it got to New River bridge?

A. Yes, sir.

Q. You say you could get through all right if you knew the channel, I believed?

A. Yes, sir; some boatmen were more experienced than others and knew the running, the flow of the water.

Q. But you always on every trip you took, unless you had a particularly high tide, you always ran on a rock somewhere or had some kind of trouble?

A. Sometimes, if the tide was too high it was as dangerous as any time, because they couldn't follow the chutes then.

Q. Was it worse boating when they couldn't follow the chutes?

A. It was more danger. The boatmen knew the dangerous rocks all the way, you might say, between those rivers, where they were cut through, the natural way they were liable to run on the rock, and if the river was up a little and maybe muddy it was dangerous that way.

Q. Wouldn't a boat always have some trouble on a trip to New River, wouldn't it run on to a rock somewhere?

A. We had some trouble one time.

Q. Just one time?

313 A. That is all I remember.

Q. What was that trouble?

A. Well, the boat struck a rock and cut a hole in it.

Q. That boat broke, didn't it?

A. Broke a hole in it, and we grabbed up an old quilt or something like that and poked it in it and went to the bank and nailed some plank on it, and went on to New River bridge that night.

Q. Wasn't there always minor difficulties in going down the river of getting on a rock, that was a frequent thing, wasn't it?

A. Oh, yes.

I can't tell you how long the boating of iron from Boone Furnace to Radford continued. It seems to me I worked on it part of two years, mostly in the summer season. I don't think I boated much in the winter because of ice and the river was eddy. The boating might have been discontinued after the railroad was built. I don't remember that the boating stopped before the railroad was built up Cripple Creek. I don't remember that iron was hauled away from Boone Furnace to Pulaski after the boating discontinued. I can remember of it going to Dublin. I think the iron from Mack's Creek was hauled to Dublin. I don't know anything about that. I have seen the wagons hauling it there, and even going across on the ice at the Cat Hole at Mack's Creek. I never had anything to do with the Radford Company.

I don't know whether iron was boated from Mack's Creek Furnace, the Radford Furnace, from Mack's Creek to Radford, Montgomery County, during the time I did this boating. I never saw any other boats hauling iron.

I don't think I ever hauled any ore from Hiawassa to the Radford Furnace. I know that some was hauled by wagon across Breeding's Hollow over the Lead Mine road. A flat-bottom boat must have been used for shipping ore from Clark ore bank. I don't remember what kind of boats were used. I don't think a bateau, a keel boat, could have taken a load of iron ore down the river to Max furnace before the channel was out. I think there was more water in the river at that time than there is now.

Q. I understood you to say those bateaux could not operate until the channel was cut?

314 A. If you took that iron ore down the river to the mouth of Mack's Creek it would have been some little distance to haul it from there up to the furnace, very near as far as it would have been from where it was taken, that might have been the reason why; I don't remember if that was before the channel was cut. I don't think it would have been safe to have took it down the river to Mack's Creek.

I think I took these Government boats down to Hinton as soon as they finished the work of cutting the channel. I don't remember, but I think we took the boats to Hinton before I boated the iron from Boone Furnace. On that trip to Hinton I think I started the boats from about Foster Falls. We collected boats all the way down to the big falls between Giles and Pulaski and maybe below there—I don't remember how far down. Some of these boats might have been washed down river in the flood of 1878. Some of them did get loose and wash down the river.

I don't think I was working on the Government improvement of the channel at the time of the 1878 flood. I didn't work on that channel very long. As to the time of the year I went on that trip, I can't remember, but it was a little cool. I remember that because we had to lay out many times. The water was high; there was a right smart tide. The Government boats were not working down there at that time. Some of the boats might have been washed farther down the river by a freshet. But the boats we took down we started with them and we got some at Hematite, above Foster Falls. One flat-bottom boat we turned loose and let go. It struck the bank and went under. The water was pretty deep at Foster Falls. We got the boat out that went over Foster Falls. There was nothing in the boat to start with; it was just a tool boat. I went down in a bateau. All of us went on along together and helped load and stop and like that.

I was not at Hinton when those boats you speak of were sold at auction. I came right away and went back home across Dry River and walked across Peter's Mountain—something like fifteen miles. We did not take a boat up because we were done with the boats then.

It took six or eight days to make that trip to the best of my recollection. I don't remember going through McCoy Falls. I recall a falls that some of the boatmen wouldn't go through.
315 They wouldn't go through the main chute, which was a natural chute, I think; I don't think that place was ever cleaned out. I don't know the name of that falls. I have been told it was a line between Giles and Pulaski. I can remember that when we got down there, they stopped above those big falls. There was a colored man, John Johnson, that had been boating with me all along, and a slave that belonged to my people. He asked those experienced boatmen I talked about a while ago that came from Radford, "Maybe you had better run these boats through that notch, you are acquainted with it, and been going through it." That was Jim Hale or Whit Tate. He said "Any negro that claims to be a boatman ought to run his own boat." And John Johnson said, "Get back there, Jimmy, I can run a boat where any damn negro can run a boat." And we did it and went through. Had to go through sort of bias and two rocks in there the boatmen called the "twin sisters" that were dangerous rocks. A colored man and a white man had got drowned there, they were loaded with charcoal pretty heavy, and the boat went over and went under. That negro that wouldn't run the boat through, that claimed to be an experienced boatman down there, he hung up. That was Whit Tate or Jim Hale, one or the other. I think the boats went through all right without help. Some went out in the river with small boats, maybe flatboats, and didn't follow the sluice.

I don't think I remember who was in charge of taking the government boats down to Hinton. I believe the government employed me to go down on this trip. They wanted men that had experience in it and we had been boating up there and they got all the experienced men they could; but I cannot call over all of those names.

I don't think I did this iron boating before taking the government property down to Hinton. The government property was taken down there when we got through cleaning out the sluices. I had lived on the river all my life and those experienced boatmen that were gotten to go on that trip were people who had lived on the river all of their lives—fishermen and men who understood the water. I never went into West Virginia on a boat except this time.

The witness on Redirect Examination testified as follows:

Yes; I said I was put in the job of watching these men
316 to see that they did not throw this pig iron away. They did not throw much away. We gathered it up afterwards, maybe on the next trip or something like that. We lost very

little in a load. They would lay out a pig of iron or maybe two or something like that. Nothing to amount to much.

All of these boats on this trip got down to Hinton. There were more than twenty. There had been a lot of work done all along there and there was canoes and skiffs. I could not tell you how much of the time was spent picking up boats along the way. We just went along and the men gathered in the property all the way down.

I did not see that colored man and white man drowned. That may have happened years before. I never heard of anybody else being drowned running the boats. I just heard about these men from an old colored lady.

Q. Counsel on the other side brought out the fact that during some part of the year you did not run these boats carrying pig iron. What part of the year would that be?

A. I cannot tell you about that. If the weather was suitable we just went right on with it.

Q. Did you run them in the winter as well as the summer?

A. If it was not too cold and not too much ice in the river or something like that, we went on.

Yes; the river did freeze over sometimes. Sometimes it would freeze over and stay that way until spring—I don't know how many months. I can remember when they hauled iron across Mack's Creek when it must have been frozen over perhaps a month. I think that was as long as I remember the river would be frozen over. There would come a little warm spell and a big freshet which would break up the ice and wash it down. In some years it did not freeze over.

The witness on Recross Examination testified as follows:

I hauled iron across the river on the ice from the Radford Company, Mack's Creek. It might have been more than a month and it might have been less.

I spoke about the men falling out on these trips when we were boating iron. They just gave up their jobs and would not work any more because their shoulders got sore or something like that. It was a right tough job. It took a good, experienced, active man of pretty good strength.

317 J. W. Crowell, on Direct Examination, testified as follows:

I live at Pulaski City, Virginia. I was born in Pulaski County on what is called Southern Branch on the east side of New River about a mile and a half above Mack's Creek Furnace, a little over half a mile from New River. I did not live there very long. My mother moved back over on the other side of the river when I was too little to tell where to. When I was six years old we moved down across the river about three-fourths of a mile, perhaps a mile, above Owen's Ferry at Mack's Creek, right up there above there. I lived there for two or three years. Then we moved down the river about three-quarters of a mile above Linkous Ferry.

We moved down there in a keel bottom boat when I was seven years old. That is the first time I ever saw a keel bottom boat because I was too little. I am seventy-five years old now. They took the family and family goods in the boat. We went to about three-quarters of a mile above the mouth of Mack's Creek or about three-quarters of a mile from Linkous Ferry. It was further than four or five miles, but I couldn't say how many miles without looking at the map. That was 53 years ago and I can't remember.

We stayed down there two years, and then Allen Hurst, my mother's brother, sent a mule team down to where we were next to the ferry and moved us back up. We moved down to what was called the Alex Cook place. He sold the place and went west and we went to live down there. We stayed there two years, then we came back up here, a mile or probably a mile and a half.

I have lived nearly all of my life along New River. I have never lived in Radford but always above Radford on New River. I have never lived down as far as Dunkert's Bottom. I don't know just where Dunkert's Bottom is. That place I moved to above Linkous Ferry is as far down that way as I have ever lived.

I have seen keel bottom boats on the river, and I have also run a derrick boat on the river and seen another derrick boat there. The derrick boat I ran was right wide on the bottom. It had a top like a ferry boat but was not quite as long as a ferry boat. There was a derrick on top of it which we turned around when we were working at opening those channels. When there was a rock there we would catch hold of it and throw it out of the way with the derrick. This derrick boat was used by the government but I was not working for the government then, only taking them down when they broke up at the upper end.

318 Q. (Interrupting.) One minute, what do you mean by broke up?

A. The Government quit cutting the channel.

The government quit cutting the channel pretty close to 50 or 52 years ago. They brought everything down to Hinton, West Virginia, so they said, to sell them all because they had done cutting out the channel. I remember that I ran the big boat down there at that time. I got with them just below the mouth of Mack's Creek where the Mack's Furnace is. I told them to get in a keel bottom boat. It was leaking and I put two men in there to get the water out. Then we ran that keel bottom boat down a little ways. There was so much water coming in they could not keep it out, and I said we might as well leave it here. They said "The damn thing is no account any way, let it stay there, and let us get on the big boat." I couldn't tell exactly where I got on the big boat, but didn't run the keel-bottom boat very long because I couldn't keep the water out of it. These two men couldn't keep the water out. The keel-bottom boat was an old one.

I went down to Hinton with these boats. I drove the big derrick boat. It was as big as the ferry that takes wagons over. It was wide that way (indicating), but it was not quite as long as these big ferry boats. I imagine it was two and a half times its width and that it was 20 or 30 feet long. It must have been ten or twelve feet wide. I could not tell you exactly the spot from which I took the boat. It was above Radford down this side of Mack's Creek. This was the boat that was leaking so bad.

I don't know exactly how many other boats went along, a right smart bunch of them, six or seven of them. They were all keel bottom boats except the derrick boat which I had. I guess there were about eighteen or twenty men in the party. I had two with me on the big boat.

Q. Did you ever see any keel boats on the river? I believe I asked you that question before.

A. Yes, sir.

Q. Did you ever investigate or know what they were carrying?

A. No; I never made any investigation as to what they were
carrying. I just naturally heard it any way, that a lot of
319 them came from the Boom Furnace and they were hauling
pig iron to New River. They had been passing up and down the creek and there was one old fellow named Scott ran one all the time. There was no railroad up there so that they could get in their truck and he got anything he could and he was one that lived there and worked up and down the river.

Q. What did these boats carry, if you know?

A. I am not able to tell you just exactly what they did carry, but I have seen them, I would look at them and I have seen them loaded with shingles, or it looked to be that to me, but I wasn't right at them. I just looked at them along the river.

Q. Did you ever see any of these boats down as far as Radford or the New River Bridge?

A. No, sir; I never was down that way only when I went to Hinton. I went from there to Hinton, but I don't know what there was up there.

Mr. J. E. Owen was not on the boat I was driving, but he and his brother, John I., were in the crowd.

I live now at Pulaski City. I have been near the river recently. I go to the river about every other week regularly. I have an orchard there. I have noticed a change in the rise and fall of the tide of that river. I looked at it when I was fishing. You can tell where it runs on the sand and when it comes down, or when they shut down or run all day and then shut the dam off at night. When they shut it down the water is down and soon in the morning then where we lived it is low, way down, I would say as far as up there (indicating) on the sand bank and then it runs down that far (indicating) and then in the afternoon it comes back to where it was. This is down stream with respect to the Buck and Byllesby Dam next to Mack's Creek.

I have seen rafts of logs coming down the river along in the Mack's Creek section and below that, they took up a raft. I gathered up a load of poplar in that country and got it down there and I just let it go to Radford. They had a place there where they caught the logs. I put them out in the river and they taken them out at Radford.

The witness on Cross Examination testified as follows:

I don't think I was ever on Dave Scott's boat except
320 that one trip. I was just a baby then. After that I saw
the boat going up and down the river along about Mack's Creek. I remember the name Armstrong but I never knew Ed Armstrong personally. I was too young for that.

There was a log boom at Radford where they caught the logs. That was this side of the main part of the town on the east and below the railroad bridge, I think. And I believe it was above the highway bridge. I forget the old fellow's name. He was buying poplar logs and he got lots of it, but I forget his name. I cannot remember everything that way. The logs were fastened together and there was a wire at this end (indicating) going back to the bank. I don't think the boom extended all the way across the river. You had to drive logs into it. I went down on the logs; I drove them in there, what I taken down that time. My raft tore up. I started on the raft and it come apart but I got on those two logs and couldn't handle them that way well, and then I got along behind them and drove them back where they was. I can't tell exactly what year that was. It was after 1888, when I got married. I would have to have something to go by to tell about that. I guess it was in 1893 or 1894, quite a few years after I was married. It was after 1888 when I got married. I think it was something like in 1898 or 1894. If there was something to help but I do not know how to help in a case like this.

A. S. Breeding, on Direct Examination, testified as follows:

I live at Parrott on the New River road a little below Belspring about two miles yon side of Belspring. I was born at Hiwassee. I lived there until I was about nine years old. Then I moved to Raleigh County for one year, and then I moved back here from Raleigh County, West Virginia. From there I went to Dunkert's Bottoms and lived there until I was twenty-two years old.

The Appalachian Electric Power Company is going to put a dam at the lower end of Dunkert's Bottoms. Dunkert's Bottoms is above the dam site.

I have been on New River on a boat. I was raised there. I helped to run boats on the river. At that time we was boating pig iron from Reed Island to New River bridge. John Ed Gilliam was the master of the boat. He had ten boats and 321 another fellow had eight, so there were eighteen boats on the river. Some called them keel bottoms and some called them bateaux. I couldn't tell you exactly their size. They ran from seventy to eighty feet in length and were about eight or ten feet across the top.

I ran from New River Depot to Reed Island and back, we was boating, carrying pig iron to the railroad. Part of the pig iron came from Reed Island Furnace and part from Mack Creek Furnace. I boated pig iron just one summer. We did not have much trouble getting down the river but sometimes we had very hard scrambling getting back. We moved the boats by man power.

I have seen lumber on boats going down the river and also grain.

We took the pig iron to New River Depot and unloaded it there on the wharf. We had a dock there. I did not see it carried to the railroad cars. I paid no attention to that.

Q. Why didn't you work longer than six months boating pig iron down the river?

A. They had put the road in then.

Q. What road?

A. The railroad from Pulaski to Ivanhoe. When that road went in there, that cut out all that work.

Q. They stopped shipping pig iron on the boats?

A. Yes, sir; you could ship it on the railroad as cheap as you could on the river.

I rafted lumber on the river from Have Howe's at Dunkert's Bottoms to Wallace Hodge's mill. I did not boat lumber down there; I did raft lumber there.

I operated sawmills on the river at Belspring and here and below Lurich's. Belspring is six or eight miles below Radford. We got logs out of the mountains. None of them came down the river.

In the government work of improving the channel of the river, I helped clean out the channel at Hinton and at New River, from Hinton to Warford at the Bottoms; that is where we stopped. Up here I quit work at Woolwine's Falls. That is as far as I worked up the river. The channel we cut in the river at Hinton was fifty feet wide and two feet two inches deep. The channel up here was thirty feet wide and two feet deep.

I cut ties for the railroads lots of places. We put on ten
322 thousand for New River Road when it was first built.
We put them on at Ingle's Ferry and rafted them down New River to New River Bridge. I cut other ties which we rafted down the river and cut still others, but we never rafted any more.

I also cut ties other places on the River—Back Creek and Belspring—and I sawmilled once on Dry Branch. We did not ship any of these ties on the water. We hauled them to the railroad and they were shipped there.

The witness on Cross-Examination testified as follows:

John Ed Gilliam was in charge of the boats that I worked on which was carrying pig iron down the river. There were two gangs for these boats. John Ed Gilliam looked after ten and another man, whose name I have forgotten, looked after the other eight.

Me and John Kanode ran on some of the boats but we would not run in that gang. Stuart Rollins rode with me and the only boating that me and John Kanode done was from Have Howe's to New River. And we rafted some too. Stuart Rollins and I did the shoving. Tom Turner was the steersman. There were two to steer and two to shove.

There were three men in a boat and two captains, making fifty-six men on the eighteen boats. That was all. We would go up the river and get the iron from both the Boom Furnace and Big Reed Island Creek, the mouth of Big Reed Island Creek. That is where we loaded the iron. We would come and get some more at the Radford Furnace. Whenever they stopped at a place, we would go and get a load. We could not mix up the ore. If we went for iron we didn't look for anything else, and if we couldn't find any we came back. We went to the Boom Furnace for iron whenever they had it up there ready for us. We would go to the mouth of the creek and get it, and if it was at the other place we would go and get it there. If the iron was ready for us our captain would let us know. I don't know who told him.

Ed Gilliam lived at New River. I suppose he was working for the iron companies then looking after boating the iron down. I don't remember exactly, but it was something near sixty years ago that we did the iron boating. I was about seventeen years old. Lord, yes, it was when I run on the boats that 323 year. It was done before the freshet of 1878.

I don't know what became of the eighteen boats. Some of them might have washed down the river. A lot of them didn't because in 1878 we were working on them. When I quit boating these boats of our crew were left at New River and I was at Dunkert's Bottoms, so I don't know what became of them. I have seen them on the river since then, but not boating iron.

I remember testifying on Cross-Examination at Radford this winter, answering, "No, sir. The boats left here when the big freshet in 1878 come" to your question "did you boat any after that channel was cleaned out up there." I was speaking of the government boats. Also, when I answered "They left here and never worked no more after the big freshet come in '78" I was speaking of the government boats. In answer to the question whether I testified "I know what I am talking about, if I did not I would not tell it" my answer is I testified that the government boats went back to Hinton. I was talking about the government boats, not the bateau boats, when I testified, "No, sir; the boats left here when that big freshet come in 1878—when the big freshet in '78 come. They left here and never worked any more after the big freshet came in 1878. I know what I am talking about, if I did not I would not tell it." The government boats were taken down there and did not work any more after the freshet. Part of them was brought down in the big freshet, and these keel-bottom boats was scattered helter and skelter on the river after we quit work.

They did not boat iron after the big freshet. I left there before that and went to sawmilling. I was twenty-three years old then. I was born in 1860 on the 29th of February. I went sawmilling back in Cloyd's Mountain first. I sawmilled on the river at Belspring on both sides of the river over at McCoy.

All the boating that me and John Kanode did was from Have Howe's to New River—we used to raft some there. I bought the logs from Have Howe's and rafted them and sold them to Hodges. I had a bateau boat which I think belonged to Have Howe. I couldn't tell you what year that was, but it was before I went to sawmilling. I think it was after we hauled the iron, but I will not be positive about that.

The two men besides me who were boating iron were 324 Tom Turner and Stuart Rollins. We changed along. We didn't work all the time—sometimes a man would be off. These were my regular men.

Q. Who were your regular men?

A. Those were my regular men.

Q. I will ask you if this is the way you testified on cross-examination at Radford—if these were the answers that you gave: I asked you: "You say there were two gangs on these boats?"; "A. Yes, sir. Q. Who operated them—who was the head of the other section?—A. I forget the name of the eight boat gang captain. I think it was Tom Tate from Christiantown up here. Q. Who was the captain of your particular boat?—A. John Ed Gilliam. No one was of that particular boat. He run all of the ten. Q. Who steered your boat?—A. Harry Tate; he drowned down here in the Big Falls on a load of coal. Q. Who else was on your boat?—A. At different times, when I was shoving, first one and then the other. Q. My regular men were John Kanode and Stewart Riley." Did you so testify at Radford?

A. I don't think I told John Kanode was my regular man on the boat.

Q. What is that?

A. I said I don't think I told that John Kanode was my regular man on the boat—boating iron. Me and John boated there where I told you, but when we boated there, the other men was with me.

Q. You were talking about boating iron when you said that John Kanode was your regular man, weren't you?

A. (The witness does not answer.)

Q. Do you deny the fact that you testified as this describes here—as it is written and as I read it to you?

A. You talked awhile like these folks here—that they was boating to Hinton. I told you the Government boats went to Hinton, and you can get John Kanode or anybody else that knows back there to state whether or not I am telling the straight of it here—as straight as I can.

Q. That is what we did the last time and we got something very interesting out of Kanode. Did you testify this way when your depositions were taken at Radford?

325 A. (The witness does not answer.)

Q. Did you testify as I have read to you?

A. You got what I testified there, ain't you?

Q. You don't claim that it is incorrectly written, do you?

A. No, sir; I ain't claiming that at all.

Q. That has been a right long time ago, hasn't it?

A. I would say it had been 60 years.

Q. Your mind sort of gets kind of slowed up, doesn't it?

A. It has been long enough for fellows I rode on the boats with.

Q. You forget what you said in Radford, do you?

A. John Kanode has misunderstood me, or you one, because I did not shove the bateau boat above Have Howe's with John Kanode in my life.

Q. You said he was your regular man?

A. He was down here, but not up there. Me and him ran together down here and boated and rafted, but we never did run up any of the headwaters on a boat.

Q. Do you mean to tell the Court that——

A. (Interrupting). I mean to tell you as near as I know how.

Q. Do you mean to tell the Court that John Kanode——

A. (Interrupting.) I mean to tell you what I done.

Q. Do you mean to tell the Court that John Kanode ran a bateau to Have Howe's or about Ingles' Falls, hauling lumber?

A. I never hauled no lumber down there with him. I rafted lumber in logs, but not sawed lumber.

Q. Did you boat the logs?

A. No, sir; I rafted them.

Q. Did you do any boating with John Kanode?.

A. We boated, hauling wheat and stuff like that for Have Howe and boated stuff back there for him.

Q. And that was when John Kanode boated with you?

A. Yes, sir.

Q. You say that John Kanode boated with you at Have Howe's, from Howe's to Radford and New River Bridge?

A. Yes, sir.

326 Q. And that you never boated anywhere else with him?

A. I said no; I never boated anywhere else with him. Howe owned part of the Dunkert's Bottoms, which are about five or six miles, I believe, above New River Depot, where the railroad bridge crosses above Radford. There was no boating of iron after the 1878 freshet that I knew anything about.

Q. How was the boating up there above where the channel had been cut? Was the channel cut all the way up there?

A. No, sir; it wasn't; nothing only they had cleaned it out for those boats, just a place, you know.

Q. How did you get over the ledges and falls with your boat?

A. When the water was deep enough you had to pick your water and go where the water was deep enough to run.

Q. Was there always water enough in the river to run?

A. Not always. Sometimes the river was too low to run.

Q. Did you have to have a tide in the river to run?

A. Had to have some tide.

Q. About how many feet of tide?

A. A foot of tide would be a great big thing to a bateau boat.

Q. Did you have to have a foot of tide to run up there?

A. We had to have something like a winter tide.

Q. Is that about a foot above what you call normal water?

A. In the dry time the water goes down and you can't run the boats and when you have a wet season you can run them then.

Q. Ordinarily through the summer could you run those boats up there?

A. Yes, sir; and when they would come along dry spells we couldn't run them and if we had too much tide it would make it too hard shoving.

I said on direct examination that I think the building of the railroad was what discontinued the running of the boats.

The keel-bottom boats that I worked on were not washed down the river by the 1878 flood. They were tied up at different places along the river. One or two of them, I think, got destroyed, but there were not but one or two of them that I ever had any
account of that were destroyed. They were not loaded
327 with anything at the time. They were not hauling iron
at the time of the flood of '78. They had quit before that
time. I don't know whether the Cripple Creek Railroad was being built at that time or not. I could not say, but we didn't run all the time when the Cripple Creek road was not there.

We didn't run boats regularly all the time. We didn't have any iron to boat. I can't tell you exactly what stopped the boating of iron that I was connected with. I stopped myself. I just quit and went to work on the farm. I couldn't give you the date when I stopped. I don't remember whether it was before the big freshet of '78 or not. I can't tell you exactly whether I had stopped hauling iron on boats before the Cripple Creek Railroad was put into operation. I never hauled any iron after 1878 and never saw any hauled.

The witness on Redirect Examination testified as follows:

Q. Did I understand you to say in answer to questions from counsel that after 1878 you didn't follow the boating of pig iron so that you didn't know whether it was continuing or not? Am I correct in that?

A. I didn't follow it; no, sir.

Q. So that you didn't know whether they were continuing hauling pig iron; is that right?

A. I never saw them any more after that. I don't know what they were doing.

A. W. **Snyder** on direct examination testified as follows:

I live at Belsprings, about six or seven miles below Radford, on New River. I was born in Montgomery County about a half mile from New River. I have always lived in that vicinity—

always near New River but at different places. I am 81 years old. I was born in 1855.

I remember the Civil War and saw boats on New River at about that time. They were running along down where we lived on the river about Eggleston. We lived about a half-mile from the river then. The boats ran along about where we lived between Radford and Eggleston and the Narrows. They were keel-
bottom boats. I think they was about 75 and 80 feet long
328 and about 8 or 10 feet wide at the top. They had all kinds
of stuff in them for the Confederate soldiers—all kinds of rations for the men, the Confederate soldiers who were stationed at the Narrows, which is on the river down below Eggleston just this side of Glen Lyn in Virginia. I have been to Narrows.

Q. Over how long a period did you see these boats operating, carrying provisions for the Confederate soldiers?

A. About four years.

Q. Did you see boats coming back up the river also?

A. Yes, sir; they come back.

Q. Did you know any one who operated any of these boats?

A. Yes, sir.

Q. Who were they?

A. Well, there was two men by the name of Keister. They are dead now. My daddy was on there.

Q. Your father was on there?

A. Yes, sir.

Q. He operated one of these boats, did he?

A. No; he just worked as a hand.

Q. Do you know any boats on New River going below the Narrows, further down the river at any time?

A. After the Civil War?

Q. I am speaking now after the Civil War?

A. They told me they went on to Hinton.

Mr. ABBOTT. We move to strike that out.

Q. Was it your father who operated on the boats?

A. Of course I never seen that. My father was on there. I never seen that but they went down there to bring stuff back, you know, take produce down and trade it at that time and bring it back.

Q. You would see the boats leave with your father on them?

A. Yes.

Q. What would the boats have on them?

A. Have all kinds of flour and barrels.

Q. Produce?

329 A. Yes, sir; chickens, eggs.

Q. How soon would your father come back after he had left on one of these trips?

A. It would take about a week.

Q. When he left Eggleston and that vicinity, was he going down the river on the boat?

A. Yes.

Q. And when the boat returned it would come back up the river in about a week?

A. Yes.

Q. Would anything come back on the boats?

A. They would bring some stuff back that they traded the produce for, I remember they hauled back molasses from Hinton in barrels, you know, and sugar and coffee.

Q. Over how long a period did these boats run down to Hinton that your father worked on?

A. About ten or twelve years, I think.

Q. A period of about ten or twelve years?

A. Yes.

Q. Where did the boats start from when they went in the direction of Hinton? Where did they start from, from what point?

A. From the New River bridge.

Q. Here at Radford?

A. Yes, sir.

Q. They came up above your farm then?

A. Yes.

Q. And how far was it from your farm near Eggleston to the New River bridge, a rough estimate?

A. I expect it was some twenty miles around the river.

Q. Boats that your father was on then would start at New River bridge and go to Hinton?

A. Yes.

330 Q. And come from Hinton back to New River bridge?

A. Yes.

Mr. Abbott. He continues to lead the witness and to get hearsay evidence in the record.

The Court. Mr. Abbott, as far as the hearsay feature of it is concerned, there are certain things that can only be proven by hearsay. Suppose some one would ask you about where your older brother had gone to college and he had gone to Princeton. You may not have gone to Princeton, and you may never have seen him when he was at Princeton. Certainly you would be able, if testifying, to say where he had gone.

Mr. Abbott. If that fact were material?

The Court. Certainly. Some things can only be proven that way, particularly things of this nature. I do think Mr. Williams is leading the witness more than he should.

Mr. **Williams.** I don't want to consciously do that, but with a man of this age and with facts with which I know he is familiar, where his father left on a boat, I feel that I am not transgressing the rule and I don't wish to transgress the rule at all.

Mr. **Abbott.** May it be understood that we object to all hearsay in the record and except for that reason so it will not have to be repeated?

The **Court.** All right.

Mr. **Williams.** I am seeking not to lead the witness. I don't think I am establishing any fact that is not well known in the community.

Mr. **Abbott.** Let your witness do it and not you.

Mr. **Williams.** Your ability to testify on cross-examination has been very marked and I must compliment you. You have been gifted today.

By Mr. **Williams**:

Q. One other question, Mr. Snyder: Did the boating tend to cease after a certain number of years?

A. Yes, sir.

Q. When was that?

A. I don't know the date but it was after they built the railroad from New River to Pocahontas.

The witness on Cross-Examination testified as follows:

I was born in 1855. My father was not exactly a soldier. They would work him at different things on the boats and he kept out of war that way. He dug coal part of the time for the government. He wasn't on the boats regularly. Them boats would take five men to operate them and when one was off he worked extra. The boats were operated both by white people and negroes. They would have a mixed crew. Different
331 men were in charge of them. All of these men are dead
I think. There were two of the Keisters—Kit, Dave Keister and Harvey Keister.

Q. Did the people who operated the boats wear uniforms?

A. Yes, sir.

Q. And they had a captain? What was his uniform; do you know?

A. No, sir; they never had no uniforms.

Q. They did not?

A. No, sir.

Q. When was it that your father brought this molasses up that he said he brought from Hinton?

A. That was after the Civil War.

Q. How long after the Civil War?

A. Well, about a year and maybe not so long.

Q. What did your father do after the war?

A. He farmed then, first one thing and another.

Q. Did he run on these boats regularly?

A. No, sir; he never did. He was just extra on them.

Q. Do you remember the other people on the boat that he ran on?

A. Yes.

Q. Who were they?

A. The Keister boys and Peter Price.

Q. Who else?

A. That is about all.

Q. Were the Keister boys on a farm near you?

A. No, sir.

Q. Where did they live?

A. They lived below Radford.

Q. They lived on a farm, didn't they?

A. They lived at that time on the Flanagan farm, it is now.

Q. And they were working on the farm. That was their job?

A. They were working on the boats.

Q. They were running on the boats?

A. Yes.

332 Q. And who was this other man that you mentioned?

A. Peter Price. He lived at Tom's Creek.

Q. Did he run regularly on the boat?

A. Yes, sir.

Q. How many of those boats were there?

A. Well, I don't know how many there were. I would see three and four in the gang together. I don't know how many there were in back of that.

Q. And you saw those boats at Pembroke?

A. No, sir.

Q. Where?

A. I seen them passing along where we lived.

Q. Belspring?

A. Yes, sir.

Q. Did you ever see any lower down the river than that?

A. I have seen them down at Eggleston.

Q. Did you ever see any up higher on the river than Belspring? Did you ever see any above Belspring on the river?

A. Yes, sir.

Q. Where?

A. I seen them up there at what we used to call Cloyd's Boat Landing.

Q. And where was Cloyd's Boat Landing?

A. Right down from Price's Forks.

Q. And you say boats were run all four years of the Civil War?

A. Yes, sir.

Q. Do you remember when some work was done on the river in your neighborhood?

A. Yes, sir.

Q. Where was that work done?

A. Well, there was some of it done along about Belspring and on further as far down as Davidson. I don't know about lower down.

Q. Was that work done by the State of Virginia?

333 A. It was done by the Government.

Q. What Government do you mean?

A. Well, I think the United States Government.

Q. Wasn't it done in the year 1860 or '61?

A. It might have been. I don't know what Government work was done.

Q. Did you see any soldiers working on it?

A. No, sir.

Q. Did your father work on it?

A. No, sir.

Q. You saw the work going on along there in 1860 or '61?

A. I don't know the date. I seen them working there.

Q. Can you get at the date at all, Mr. Snyder?

A. I don't think I could.

Q. When were you married?

A. It was done the year that the railroad started from New River Bridge. They were cutting the channel then.

Q. You saw somebody cutting a channel the year that the railroad started from New River bridge?

A. Yes, sir.

Q. That was the year 1880, wasn't it?

A. Maybe it was.

Q. You are sure you didn't see somebody cutting a channel up above New River bridge?

A. No, sir; I never was up there.

Q. And you saw the Government making a channel along at Bell Springs in 1880?

A. That is what they told me.

Q. What were they doing there?

A. They were cleaning out the channel, you know, blasting the rock.

Q. And you actually saw that?

A. Yes, sir.

Q. Do you remember who any of the men were?

A. Yes; one of them was Hurst. He lived up about Dublin—Bill Hurst and Ab Hurst.

334 Q. Are they living?

A. I don't know whether they are or not.

Q. Did you ever see any boats at Narrows, Virginia?

A. No, sir.

Q. When was it your father brought that molasses back—how many years after the Civil War?

By Mr. **Williams**. That has been answered once—a year after.

By Mr. **Abbott**:

Q. Did you state he brought that back the year following the Civil War?

A. He brought it back to the merchants at Price's Forks. They traded produce, went down there and traded for it and brought it back.

Q. I understand that; but I want to know the year it was. Was it the year following the Civil War?

A. The year after the Civil War.

Q. It was the year after the Civil War?

A. Yes.

Q. And he brought it from Hinton?

A. Yes.

Q. He told you that?

A. Yes.

Q. You don't happen to know that there was no such thing as Hinton until 1871, do you?

A. No, sir.

The witness on Recross-Examination testified as follows:

I am 81 past. I was born May 29, 1855. My mother told me I was born in 1855. I don't know anything about my giving any statements to Mr. Ould on November 20, 1931, saying that I was 73 years old at that time. (Paper is shown to witness.) I don't think this is my signature. I wouldn't say it ain't, but I don't believe it is. Still, I might have wrote it. (Paper marked Def. Ex. A for identification only.) If I am 81 now, I was 76

335 five years ago in 1931. I recall the facts of the Civil War.

(It was subsequently stated in the record by counsel for defendant that the signature was not that of the witness but of one A. W. Snidow.)

L. T. **Meredith** on Direct Examination testified as follows:

I lived in Buchanan in Botetourt and have been there for a year. I was born in Pulaski County, I suppose in the southeastern part, near New River at my grandfather's. He lived about 200 yards of the river. I have lived on the river all my life until I came down here last April a year ago. I am past 79 years old.

I have seen boats on New River from the time I was a small boy about 10 or 12 years old until just a few years ago. I saw them along, I would say, from Towe's Ferry on down the river. I suppose six or eight miles; I don't know.

I had a boat built after I began doing business for myself and operated it. I carried lumber principally, down the river from six or seven miles above Radford, to Radford. I took some of the lumber to New River, some of it to Radford, and some of it to Miles, which is about three miles west of Radford where Little River comes into New River. I don't think the railroad was in operation up to Miles when I commenced hauling and that made it nearer for me after it got in operation. I carried lumber down to Radford before the railroad was built to Miles on Little River. Then afterwards what lumber I wanted to ship I would take to Miles after the railroad was built. At Miles I loaded it on the train. A great deal of the lumber went to the Norfolk & Western Railroad Company. I also sold to the Harrison Tie & Lumber Company. I sold lumber at other places also. I sold several carloads of export lumber to W. O. Price, of Baltimore. Part of the lumber which was delivered to Price was put on trains at Radford and part of it at Miles.

I saw work done on the channel up the river by the Federal Government. I haven't any record of the date, but I was a young man. The work was cleaning out what they called at that time the Government channel through the falls part of the river, the ledgy part.

My boat was 65 feet long. I am not sure whether the boats before mine were longer. Old Thomas Godby was one of my principal boatmen. Sometimes one could go and sometimes the other. They were both experienced men. Sometimes I 336 ran the boat myself; not often. We got down the river all right every time I ran it but one. That time I made a *mis-pull* in going through Ingle's Falls and wrecked my boat. That was the only time. I would carry from three to four thousand feet generally.

I think I have seen other products or produce going down in these boats on the river. I think I have seen people hauling corn and various farm products. I have seen a little cargo coming up the river in boats but not as much as I have going down. I really don't know much about where these products were being carried to because I did not haul them much on my boat. I don't think I ever carried any laths or shingles. I could not say positive I saw any of these boats carrying laths or shingles.

I have seen one gasoline boat on the same water on the river. It looked like a pretty good size boat. It seemed to be larger than my boat and it was covered. I saw windows in it. That was just after I sold my boat. I don't remember whether Mr. McWane bought a boat or had one made. I think the boat I saw was his.

I have seen pig iron shipped down the river. I have hauled tanbark to Radford on my boat. I have also carried ties.

When we got hung up on the bar at Ingle's Ferry, the ferryman there saw that we was wrecked and he come to us and put us on the land. I believe Mr. Duncan was one of the men, and Mr. Graham was another who went and unloaded their cordwood and came and took our load on their boat and took it down on this other boat which was hauling cordwood on the river at the time. We just took the water out of our boat and went on in the boat.

I couldn't say how many boats I saw on the river going up and down prior to the clearing of the channel. I live back about two miles and a half from the river but often was in sight of the river. Sometimes the boats passed without stopping at my grandfather's spring and sometimes they would stop. I couldn't estimate the number of boats, but there were several of them.

I remember a veneering plant down at Radford. I sold them veneer logs and I have sawed up their cull logs which they had on the yard. I have took my mill and gone down there and sawed up a good many thousand feet of lumber for them. That was their lumber which I sawed. They made veneer out of the veneering logs. I did not ship these down the river. They were not mine. I moved my mill down to their place.

337 The witness on Cross-Examination testified as follows:

I shipped my lumber from different points, that is, from wherever I would have my mill. I had my mill at Mr. Smith's place principally. That was about two or three miles below what was known as Towe's Ferry at that time. I also had my mill down lower on Mr. Earhart's place. That is near and a little above where the rock quarry is, just a little above the mouth of Little River. I didn't have my mill up at Linkous Ferry, but I boated lumber from it, export lumber that I would buy and sell. The places which I have mentioned may have been the only ones where I had my mill.

I understood that the gasoline boat I mentioned was Mr. Robert McWane's boat. I don't remember the name of the boat, but I believe that it was the Altha.

E. C. **MEREDITH** upon Direct Examination testified as follows:

I am the son of Mr. Meredith who has just testified. I live in Pulaski County. I was born in Pulaski County in 1879, a couple of miles or something like that from New River. I reckon the nearest point was at the S. A. Smith place, close to Abe Howe's place. That is just down stream from Towe's Ferry a short distance. I have lived near the river all my life.

I recall a man by the name of S. A. Smith. My father and I bought a boundary of timber from him, containing to the best of my recollection 105 acres. It wasn't quite all in timber. We sawed the timber there on the place and boated the majority of it down the river to Radford. It was sold there at different points and a lot of it was loaded from the river on cars and shipped to different places. I think W. O. Price got a bunch of that. It seems to me that he lived in Baltimore. I am not sure about that.

I couldn't tell you exactly how much timber we cut there. I imagine 250,000 feet. Most all of it went down the river. It was oak, pine, poplar, and chestnut—all kinds.

I have shipped tanbark down the river. We sold that tanbark to A. B. Hunter at Pulaski. It was loaded on cars there at Radford; floated it down the river, and then hauled from the landing to the cars. We used keel-bottom boats. I think the boat was 55 or 60 feet long. A boat of that kind would carry 4,000 feet of dry lumber.

Q. And how much of green lumber?

A. We generally hauled anywhere from 2,000 to 3,000
338 and sometimes we would have on as much as 3,500. If the tide was up, of course, we would——

Q. Did you ever have anything to do with the shipping, loading, and unloading of the lumber?

A. On the boats?

Q. Yes.

A. Oh, yes, sir.

I did the sawing, but I always helped to load the lumber, and then my father went off with it on the boat. It would go down the river on the boat. We loaded some also at the junction of the Little River, which was shipped down the river to the Norfolk & Western. The shipping down to Radford on the boats went pretty well at that time.

I also cut and shipped lumber for a man named Zack Cecil. We cut a boundary of timber on his place on shares. It was sawed and stacked on the yard and then we rafted a lot of our timber down the river to Little River and loaded it on the cars.

Of the timber that we cut for Cecil on shares we only rafted the heavy lumber. The light lumber we hauled on wagons to Dublin and sold it at Dublin. The amount of heavy timber we took down the river I imagine was something like 30,000 feet, I think that was all.

I have seen a steamboat on the river. To the best of my recollection it belonged to the pipe shop. The McWanes that had the pipe shop got that started. I knew of it running up the river as far as Towe's Ferry. I never did ride on it myself. I recall the S. A. Smith place. Most of the lumber we shipped came from that place.

The witness on Cross Examination testified as follows:

Mr. McWane's boat was just a motorboat, I suppose—not a steamboat, that is, it was a gasoline boat. It was about three feet deep. Sometimes very little of the gunwale would be out of water—six or eight inches or something like that.

I spoke of hauling lumber to Dublin. That was lighter lumber which we hauled on wagons from the Cecil place to Dublin. The Cecil place is up the river. I imagine it is about two miles below Towe's Ferry. The S. A. Smith place was down the river I imagine three and one-half or four miles below that. The type of lumber we hauled to Dublin was weatherboarding, framing, and light lumber, such as that. At that time the reason we did the hauling to Dublin was that we had sold our keel-bottom boat and that was the nearest point to haul to. It was
339 several years after we had sawed this lumber at the S. A.
Smith place. We had sold our keel-bottom boat. I can't say positively who we sold it to. As to when we sold, I remember we did most of this hauling in 1903.

To the best of my recollection we finished up the S. A. Smith timber in the latter part of 1903 or the first part of 1904. Then we moved our mill out away from the river and a little later the boat was sold. I did the sawing on the Earhart place the year before. That was 1902.

The point from which we shipped the lumber on the S. A. Smith place was five or six miles to the best of my knowledge above Ingle's Ferry or Ingle's Falls. I think that is about four miles above Miles, the mouth of Little River, maybe not quite so far.

Referring to my statement that I boated the majority of the Smith lumber to Radford, I will say regarding the lumber which we didn't boat to Radford that there was some little amount which was sawed and delivered out away from the river that didn't go down the river, but all that was to be took to the railroad or to be sold in Radford we took down the river.

I don't remember when the railroad was built to Miles. It wasn't built then, I am confident. I think if I am not mistaken it was built just a little later. It was built there when I loaded this lumber from the Cecil place. I am not sure. I said a part of the lumber went to Dublin from the Cecil place and part of it was rafted down the river and loaded at Little River, at Miles. It was not boated but was taken down on a raft.

The witness on Redirect Examination testified as follows:

When we boated this lumber down the river it passed what is now the site of the Appalachian Electric Power Company dam.

Ely Duncan on Direct Examination testified as follows:

I was born in Floyd County, Virginia. I don't know whether New River passes through that county or not but where I live it passes in Virginia. I have lived in "Wassa" in Virginia on New River since I was 4 years old. I am 53 now. I do most any kind of work on the river, in the river, or on dry land, or anywhere most I can pick up a job.

340 I have seen boats on New River. I first seen "kettle" bottom boats, that is, keel-bottom boats, I suppose when I was small, maybe when I was 5 years old. They were boats to carry lumber or pig iron—working boats. They were called kettle-bottom boats. I wouldn't say I have seen pig iron in these boats, I guess I did. They told me that was what they were hauling. They always went down the fur side of my house when I was small and when they come back empty they a heap of times come up our side of the river. The channel was on the other side of the river. I heard it said by the older folks that was their business—they were hauling pig iron.

(Defendant objected to the statement of the witness as being hearsay evidence.)

I would try to get them to come nearer the bank when they come by empty, that was when they come up our side, and I was a small boy, not giving any attention, not thinking it would come up, or I would have to mention it at this age.

I have rafted logs or crossed ties down the river off and on through my life. I rafted some when I was, I reckon, a close guess would be 18 or 20 years old, and also some before and since then. We have started from the Howe place, say near the upper end of Dunkert's Bottom. Goldsmith and Dodd had a "neering" plant in Radford near the upper end on the Howe farm.

Q. How would you get these rafts down the river?

A. Well, with two links of a chain and staple to link them together with from one log to another, till we would get six side by side, or seven, or whatever we wanted in a span, then we would couple them like a car someway, fasten the span together until we would get as many in length as we wanted. At times we would run them as rafts and at times put them in and float them like sheep.

Q. When they ran them in rafts did you ever ride on the rafts?

A. Yes, sir.

Q. Ever have any difficulty?

A. Nothing much, sometimes a little trouble, not much, maybe have a drift in letting them go from the channel, or something like that, and have to ply them off a rock, and might have some little trouble like that.

Q. Did you ever see a boat go up the river with a cabin on it?

A. Yes, sir.

Q. What was it doing?

341 A. Buying butter, chickens, eggs, and things and hauling produce.

That was a long while ago, back when I was something like 17 or 18 years old—not much over 17, I guess.

I recall a ferryboat about 50 feet long and 12 wide at Lowman's Ferry. At that time I was working for the company with Harry Smith, who was foreman for the Appalachian Electric Power Company, and guided the boat through from Lowman's Ferry or Cecil's Ferry. I did this in the early part of this last winter. Lowman's Ferry is near Hog Branch on the Mack's Creek section. I brought the boat about 10 miles down the river to Cecil's Ferry. It is somewhere at the upper end of Egypt Bottom, right at the upper end of Dunkert's Bottom. There was an old boat the company was using for to ferry their corn, wheat, hay, and stuff they raised on this side of the river to the fur side. It was used for a company boat to ferry the stuff raised on the company land. They generally stored their corn over there; that goes to the big stores—corn, wheat, and hay.

I recall a ferryboat at Towe's Ferry in 1918. That ferryboat got away there and went down New River below Pembroke and lodged on an island not over a half mile from Walker Creek. Pembroke is down the river with respect to Radford. It is down below Eggleston. Walker Creek comes in on the left-hand side going down the river. The island the boat stopped on is a short distance above the mouth of Walker Creek. We found the boat on the island and put it back in the river, run it back to Towe's Ferry; me and Mr. Graham together was helping the boat through the falls and channels, and sometimes we would have six men and sometimes seven, and maybe more. I don't know if the size of that boat was 12 x 50 or 12 x 60; I don't know exactly.

I recall a ferryboat at Ingle's Ferry or Ingle's Falls. One left Linkous' Ferry and went to above Ingle's Ferry and Ingle's Falls and turned over on an island. I went there and helped turn it over and run it back to Linkous' Ferry. From a rough guess I would think it would be 40 or 45 miles from this place, called Pembroke, up to where we brought it.

I have had experience rafting cross ties on the river. One time I helped Mr. Graham run some ties from, say, near "Wassa."
He ran in two spans and we run 210 ties into Radford.
342 We started from 8 or 9 miles up the river. When we
rafted down we passed the site of the Appalachian Electric
Power Company dam.

The lumber boat I ran on the river I think was a seven-ton boat. I don't know exactly the thousand feet I could carry on a boat of that kind, but we generally hauled about seven tons. The wagons brought it to the river where we was loading.

I headed one boat for Mr. Merritt. I didn't own the boat. I was hauling lumber from a saw mill. It left near the Howe boat landing and went to Radford. Some boats went to Little River and some went to Radford. We had some of it at the mouth of Little River; sometimes we would bring paint and supplies back they needed. That was going upstream. I have carried tanbark.

I have been on the river in the wintertime. New River has been frozen, to my knowledge. It is frozen over at times according to how hard the winters are. Sometimes, maybe nearly a month and sometimes it is not many days. At times it will freeze and in less than a week it will thaw and break. Sometimes it might be three weeks. Sometimes it would freeze twice in a winter. Sometimes not over once.

The witness on Cross Examination testified as follows:

I am 53 years old. You can figure out what year I was born.

I don't know when it was I saw this pig iron boated down the river. At a rough guess I might have been something like 5 years old. I was anxious to see the boats. My daddy owned a place adjoining the river and I would be on the banks and watch them. I heard it said they were hauling pig iron but I seen them pass and couldn't say for sure, but wouldn't say because I wasn't large enough, from my recollection, to tell about what they were hauling, only I heard said. I could have been 6. I was old enough to remember seeing the boats.

We put some of the logs which we floated down in the river on the upper end of the Have Howe farm—what you would call the upper end of Dunkert's Bottom—2 miles if you would take it around the river—and we put in some below in different places.

I remember a place in the river along that pool along Dunkert's Bottom called Moore's Gravel. I have floated logs through that pretty well. I have put logs in above there. If you hit the channel right you would go through pretty good. Part of the 343 channel is completely filled up and part is a little bad. I imagine at this time there would be some places at which you would have to roll the logs over there unless you had a tide. I don't doubt but what we had 6 feet or more of tide when Harry Smith and I took the ferry boat down the river.

I remember when Henry Elkins, Sam Sissle, Dave Thorton, George Smith, George Hall, and I brought the ferry boat back from Pembroke. I don't mean we just got on it and went scooting up the river. I didn't say how long it took for us to run that boat back but it was something close to 10 days. We did not use a block and tackle all the way, but we had one with us which we used at times. We had a very good tide and some showers. Part of the time we had a small tide. We didn't have any extra large tide.

The witness on Redirect Examination testified as follows:

I had no experience or knowledge of the channel where I brought this boat up from Walker's Creek except for part of the way. From Radford to Towe's Ferry I was very well acquainted with the channel. I had never been down the channel below East Radford before that so that coming up this channel was new to me. I had to feel my way along and find the best way to run the boat.

T. C. **Redpath** on Direct Examination testified as follows:

I was born in 1877. I am 48 years old. Until I was about 18 years old I lived at Snowville on Little River. I would say that is about 6 miles from the mouth of New River.

The testimony which I am about to give relating to New River pertains to that section of the river between Radford and Towe's Ferry. I am familiar with the location of the dam site of the Appalachian Electric Power Company. I lived there tolerably close to it. The dam site I think is a quarter of a mile above the mouth of Little River.

Sometime after moving to New River, I think it was along about 1918, I cut a boundary of timber on the river, during a period of about 18 months. I would say that I cut around 200,000 feet of timber of all classes. After it was cut I boated it 344 to Little River and from that point I loaded it on cars. I guess it was about 4 miles from the point where it was cut to the shipping point on Little River.

I produced lumber and ties—car stock stuff, and I rafted some logs—2 rafts of it. I cut some cross ties and boated them.

I owned a boat which was 50 or 60 feet long as I remember and 8 feet across. Mr. Coffey built it for me and he said it had around 10-ton capacity. You could carry around 4,000 feet of green lumber on it and about 6,000 feet of dry lumber.

In getting the boat up and down New River I had a little trouble a few times. Occasionally, it would sort of hang up with me about 150 yards below where I loaded it. That was just below Moore's Gravel. Sometimes we would be dilatory in striking the boat sluice and would get off that and hang up. So long as I found the channel or sluice I had no trouble.

I navigated the river in all seasons of the year and all stages of the flow of the river except that if the river would get up high we would stay off. If it was too high it was dangerous.

I think I observed fluctuations in the tide of the river. I suppose it was the dams at Byllesby. There would be about 18 inches tide every 12 hours. I did some muskrat trapping. I put traps at the edge of the water and the next morning we would find the traps on the edge of the bank so we cut that out. I had no muskrats in the traps.

The witness on Cross-Examination testified as follows:

I trapped some muskrats sometimes. Occasionally I would catch one. My home on New River is about 8 or 9 miles above Radford, right across the river from the Have Howe place. I bought the last tract of Mrs. Harry Howe Ferrow.

I sawed this boundary of timber at my sawmill about 4 miles above the dam site. This was right on the left side of the river—on the south side of the river from Moore's Gravel. We loaded the boat just below Moore's Gravel. My mill site was above Moore's Gravel. I would guess the lumber to have been 200,000 feet. It was boated from below Moore's Gravel to the mouth of Little River, which is all in the same pool of water. There is only one little rough place, places where I
would get hung up and miss the sluices. The depth of
345 my boat was about 3 feet I would guess. Sometimes the
boat would be loaded mighty heavy—to 3 inches to the
top of the gunwale. We aimed to haul right around 4,000 feet and to have the boat in the water 3 or 4 inches. The gunwale had an offset in it. I don't know whether or not it was 3 or 4 inches—the top of the gunwale—we loaded to that. Mr. Coffey, an old boatmaker, who made the boat, said it would carry around 10 tons. I could not say that I ever got 10 tons on it. I don't know what lumber would weigh to the feet. I used to know but I have forgotten.

I operated the boat for 18 months. After that I sold it to Mr. Fagg. He boated 3 or 4 small sets with it. Then it rotted down. That boating which I did was on the same body of water which I mentioned.

The witness, on Redirect Examination, testified as follows:

By the COURT:

Q. Was there any timber left up New River—is there any timber up there now?

A. It is mighty scarce through our country.

It has been since 1925. I believe the Appalachian Electric Power Company had a nice boundary in what they call Egypt but I think they cut all that.

Q. Did you ever propel this keel bottom boat of yours by motor?

A. I used to have a Ford engine on it towards the last.

Q. Did it operate successfully?

A. It just done fine. We handled it all right with it. We could make about 10 miles an hour.

Q. When the boat was run by power, how many men did it take to operate the boat?

A. Just one.

Q. Otherwise, how many men would you use on the boat?

346 A. Three.

By the COURT:

What kind of motor did you say it was?

A. It was just a Ford engine. The axle was set right across the back end and had paddles on the wheel.

The witness on Recross-Examination testified as follows:

The Ford engine didn't go out. If it hit that sluice where it was cut out I could make it all right. I always had some pushers on there. We kept them to unload. If we needed them and hung up on the rocks approximately 100 yards below where we loaded, I used the men to push it off and inch it around. It would bring the loaded boat down and bring the empty boat back, without shoving, except when I would hang up.

H. L. FAGG on Direct Examination testified as follows:

I am 45 years old. I was born above Snowville on Little River and spent about the first 14 years of my life there. That would be about 1915—Yes, sir; 1905 is right. I lived there with my father.

Q. From the year 1905 up until the year 1925, state whether or not you and your father were engaged in the timber operation on New River?

A. Yes, sir; off and on we were engaged in it the time we was there.

Q. You will have to speak louder.

A. My father first operated a boat, and after he quit and moved away from there I operated it.

By Mr. Abbott. We object to that. His answer is entirely unresponsive. He was asked if he and his father had engaged in timber operations from 1905 to 1925. He has said something here about the operation of a boat. It also seems that the question is too general. The specific operations should be brought out and we move that the answer be stricken out of the record. I think it had better be brought out in response to boating questions.

By Mr. Aiken. I asked the general question to conserve the time of the Court.

By the Court. You asked about timber operations and he started to talking about boats. You better take it in proper order.

By Mr. Aiken:

Q. Was the boat that you speak of used in connection with your timber operations?

A. Yes, sir; we used a boat to haul it to the railroad.

Q. During this period from 1905 to 1925, in which you and your father engaged in lumber operations or timber operations, can you state approximately how much timber of all classes was moved down New River by you and your father by boat?

A. Not exactly; but I guess something like 1,000,000 feet.

Q. Something like 1,000,000 feet?

347 A. Yes, sir.

Q. Can you describe the timber—the various classes?

A. It was railroad stuff; we sold it to the lumber people in Radford; it was railroad lumber.

Q. Cross ties?

A. Cross ties and switch ties and bridge ties and inch boards. I did not do any rafting. The boat which I spoke of was 60 or 61 feet long and about 8 feet wide. As best I remember, the capacity of this boat—we hauled about 3,000 feet of green lumber and up to 5,000 feet of dry lumber on it. We boated principally from what is called Have Howe's place or Moore's Gravel to the mouth of Little River.

I know where the dam site of the Appalachian Electric Power Company is on New River. It is in the same vicinity in which we navigated by boat. We went right through that place. In operating this boat up and down there to the mouth of Little River we hardly ever had difficulty in making the passage at any time except when the water was low and we would be at Moore's Gravel. We had trouble there once or twice—a few times when the water was low.

Q. State whether or not you were able to transport this lumber at all seasons of the year or had to wait for the tide?

A. No; we transported any time we got ready, except that we would not do anything in the wintertime. This was principally in the summer; hardly ever any in the winter.

Q. As a matter of fact, isn't the summertime the period of the low flow of the stream?

A. Yes, sir.

By Mr. **Abbott.** I dislike very much to object, but that is very leading. He constantly leads the witness and evidently pays no attention to the objection.

By Mr. **Aiken**:

Q. Why didn't you navigate the river in the wintertime?

A. For one thing, it was too cold to be on the river.

Q. But unless the river was actually frozen, you could have navigated it, couldn't you?

A. Yes, sir; sure.

By the **Court.** Mr. Aiken, you had better let the witness testify.

By Mr. **Aiken.** I was simply trying to expedite matters.

By the **Court.** We don't want to be too expeditious or so expeditious as to cause us to make a parrot of the witness.

348 The witness on Cross-Examination testified as follows:

I cannot remember, but I imagine the draught of my boat was from two and one-half to three feet. When I had 3,000 feet of green lumber or 5,000 feet of dry lumber on it the boat was down to 2 or 3 inches from the top of the gunwale.

To the best of my knowledge, it is about three and one-half miles from Have Howe's place to the mouth of Little River.

I have been engaged in cutting timber and doing this boating off and on nearly 20 years. We might be off a year or two and then we would buy another job or two on the river and cut it. It was not regular at all. Outside of the lumber business I was farming.

J. D. **Haley** on Direct Examination testified as follows:

I am 74 years old. I will be 75 next September. I have lived on New River nearly all my life. I was raised on what is called Dunkert's Bottoms on the Hiawassa side of the river in the Hiawassa District.

I knew a Captain Welch in my boyhood. We boated a great deal on New River. I say that Captain Welch did. He had 5 boats built and he boated from Mack's Creek. I don't remember how long he did this work, but I know he had the boats built for that purpose. Yes; he boated pig iron from Mack's

Creek down to New River bridge. I am not sure but I think the boats were 60 feet long and 11 or 12 feet across the top.

Q. Can you tell us approximately how long Captain Welch was engaged in transporting pig iron from Mack's Creek furnace to Radford?

A. No, sir; I am not positive how long he ran. After he got his house burned up, he moved away, and I don't know just what his business was after that, but it strikes me like—I will not be positive that he come down the river and was doing some boating down below, but I ain't positive. I was small; that was right along about 1870 or 1872, along there; I cannot tell you exactly, because I was just small when we moved there, and we lived right close to Mr. Welch—right where Dan Howell lives now.

Q. Do you know of anybody else owning any boat on the river at that time?

349 A. Not right at that time. I have known of some since.

Q. Well, later on. What was the next boat that you were familiar with?

A. Meredith did a lot of boating.

Q. What Meredith?

A. Tillow and his son and Fagg done a lot of boating there and Redpath and Ingles had a lot of it done, and Fagg and Meredith were the last ones in that timber business there, and also old Captain Andy Moore. He built one especially for his own benefit.

Q. What business was he in?

A. He was engaged in farming and he built this boat to transport stuff that he made on the farm.

Q. What did he make on the farm?

A, Corn and wheat and hogs, principally.

Q. Do you know where he transported the corn and the wheat and the hogs?

A. I think principally down to New River.

Q. You mean New River Depot?

A. I think so, principally; yes, sir.

Q. These other parties of whom you have spoken—Meredith and Fagg and Redpath, what were they transporting in the boats?

A. They transported lumber.

Q. Can you describe the various kinds of lumber you have known to be transported on New River by these parties?

A. I think the railroad bought most of that lumber. Most of the lumber was boated from Little River and loaded on the cars—that is the best grade of lumber. Of course, weatherboarding and stuff like that was sold in Radford, principally, I think. There was a company there that handled that stuff, and I think they handled the most of it.

I saw a couple of steamboats or powerboats that they tried on the river, but they were not much in the way of steamboats.

Old man Hodges tried to make one when he owned his
350 plant on the river. He made buggy spokes and rims prin-
cipally I think. The buggy spokes and material of that
kind came to his factory which was at New River depot. I don't
know where he sold it.

The witness on Cross-Examination testified as follows:

I saw Mr. McWayne try to run one steamboat on the river there but he didn't have it succeed very long. He made a few trips. I made one trip with him to the ferry. We had to have a little water to make the trip and we had plenty that day. I don't know how much the tide was. It was up to the top of the bank. I don't know the name of his boat. They called it "McWayne's Excursion." I thought he would buy stuff up that way and haul passengers. He didn't run very long for some reason. I suppose he didn't have water enough. The McWayne boat had superstructure on it.

The Hodges steamboat was nothing with a keel-bottom boat with a little engine on it. I never was on it that I know of. You could run all right with it, but you had to have men to push it over the falls. It was run by steam and had a little stationary engine with an upright boiler, I think. I don't know whether I heard the whistle blow or not. I never was on the Hodges boat. He used to come to our landing at the Moore place and load his boat with hickory and take it to his place of business.

My home is at the Harvey place now, a little over a mile from New River. I have not lived in sight of the river for 20 years except now and then. It has been over 20 years since I moved away from the river.

Fagg and Meredith sold the weather boarding wherever they could. I think the railroad company got the principal part of it. They boated weatherboarding to Radford. They sawed anything that they ~~had that would sell.~~ I don't know what happened to the Fagg boat or who got Captain Andy Moore's boat after he died. He used it as long as he ran the place there. The heirs took charge of the place after the old lady's death and after that I moved away. Captain Moore used his boat for hauling stuff to Radford.

Thomas Monahan, on Direct Examination, testified as follows:

I am 68 years old. I was born in Wythe County, a couple
351 of miles from New River. I have lived on or near New
River 46 years and live on the river now. I have been

working at the Carbide plant until a few days ago. This belongs to the Union Carbide Company. I am familiar with the mine up there called the Sisk Mine. It was located right along the river, on the far side, east of where I live, about a quarter of a mile. The place where I live is about 2 miles from the postoffice. It is south from Ivanhoe and further up New River. I don't know exactly how far it is from Allisonia but I suppose it is about 8 miles from there. I have lived above Ivanhoe for 46 years. I saw what was going on around the Sisk Mine, mining and hauling ore and stone.

I have seen boats hauling limestone and ore on New River above and around Ivanhoe, where I live. The boats would receive the limestone and ore about a mile or a mile and a quarter south of Ivanhoe up New River, and would haul it down the river to Ivanhoe about a mile and a half or two miles, and they hauled it about a mile and a quarter, I suppose. They got this limestone off the cliff along the bank of the river. It was a natural product there. They took it to the Ivanhoe Furnace or the New River Mineral Company furnace. I saw these boats carry limestone about 40 years ago. They carried the limestone for a period of a year or 18 months, to the best of my recollection.

I have seen some logs rafted down the river past my place.

I know there was work done on the channel in New River. About 46 years ago I worked on a channel there for the Government from the first of June up until the first of November or until it got too cold for us to work. Captain Robert Smith was the superintendent of the work. We were cleaning out a channel about 3½ feet deep under the water and about 20 feet wide. They claimed they wanted it that wide. We used a boat ourselves in hauling rock and making the wall lengthy. We would blast the rock out and put it on the boat and hauled it down to make the wall longer and to hold the water in. They wanted the water to stay in the channel. We would blast rock from the channel and put it on the boat. We took up the loose rock and laid it on the boat and hauled it down the river and made a longer
wall. The boat went in the channel which we cut there.
352 The boats would carry this rock I would say a couple of
hundred yards. We would clean out one riffle and then go to another. We worked on the channel until we got to a ledge of rock or until the water got deep again and then we moved to another place. All the places I worked at covered a period of about 3 miles. We worked from where we began at the lower end until we stopped in the fall or until it got too cold for us. We worked in the water and were wet all over in the water. The size of the boats we used to haul this limestone was about 40 feet long and 10 feet wide the best I can tell. The boat was made

right there close to where they put it in the river on a little bottom there. They had one large boat. There were about 3 gangs working and each gang of men had a boat. There were 12 or 15 men in each gang.

I still reside on this farm above Ivanhoe. I know where the Buck and Billsby Dams are located. The first one is south about two miles from my farm and the second one is between four and five miles above my house. Both are upstream right south from where I live.

Q. State whether or not you have observed the channel in the New River since the Buck and Byllesby dams were put in, and what you have observed as to the water in the channel?

A. You say to state what?

Q. Read the question. [Question read.]

A. At times there is water in it, and at times it went down so there wasn't any, when it was shut off it gets mighty low, sometimes the water is very low.

Q. When it is low, or I will ask you, is it low generally or at certain times?

A. At certain times.

Q. When is that?

A. Sometimes the river is about like usual or like it was before the dams were built, and then when the water is turned off or cut off, it will be dry and you can wade out in it, and there is just a little stream in the channel, and the deepest part is along about where I live.

353 Q. Is there any particular time of the day or the week when you notice the channel low or high?

A. About five or six o'clock in the morning the water is mighty low and then it will go to coming up and about 10 or 11 o'clock it will be the usual water.

Q. You mean you cannot use it in the early morning?

A. You have to go way out in it to get a bucket of water.

Q. What do you use the water for?

A. We get water there for my stock and sometimes they use the river water for washing purposes and we have to make a hole and lay a plank there to dip the buckets in at times, and then the water will come back up and we will take the plank away and it would come up back to normal just like it always was, in an hour or two.

The witness on Cross Examination testified as follows:

The New River Mineral Company had a large boat that hauled ore and limestone from the Sisk Mine about a mile and a quarter down the river I suppose it was. I didn't measure the distance. They used it for hauling limestone and ore and sometimes they took a load of rock. On this boat they had small cars which held 3 or 4 tons or something like that and a little motor was placed on the end of the boat somewhere to push it up to the rock or up the stream. After they loaded the cars the boat ran mostly by itself down stream. Of course, they had a man sore of guiding it with a pole.

Q. Did they guide it in this channel that had been made?

A. They had to keep it in the deepest part of it.

Q. As a matter of fact, this boat was what you call a winding boat; you wound it up and down the river.

A. They had a motor on it. I wasn't on the boat, I went along on the road there and saw them, but I wasn't working on the boat.

Q. Did you see a fixed cable which the boat was in contact with and by which it would pull itself up and down the river?

354 A. I seen a cable there about the landing place, but I don't know what they were using it for. I saw the old cable after they quit. They might have had a cable on it but they had a motor that was making a terrible racket.

Q. That was the winding up and down the river?

A. I don't know about that.

Q. Was the boat fastened to a cable?

A. I don't know how it was fastened. I just seen them go up and down the river with the boat, and I seen that motor pushing it. I was hauling or driving a team along the road and they were in the river, and I just noticed it for a time.

The boat had a motor on the end of it so they told me and pushed it back up the river. I seen the water flying terrible. They told me it was the motor that did that. They had a cable which pulled the cars up and they had a hoist that pulled them on top of the furnace where there was a track laid. They unloaded the cars up there and let them drop back on the boat again. They would load the cars at the mines and run them on to this boat and then haul them down to the furnace and unload them with the cable. I don't remember seeing a cable except pulling those cars out there. I saw an old cable laying there time and again as I passed and it looked like they had been using it for something. The New River Mineral Company owned that boat. I never was on it. I just passed by on the public road. I was hauling sand and I seen them at work there every time from the public road which went right along on the banks of the river at that time. That was the only boat hauling rock and the only one working on that channel I ever saw.

We blasted the rock and took it out of the channel and put it on the boat and made a wall to hold the water in the channel on down the stream. We lengthened the walls on both sides. We

put all of those rock to lengthen the wall and when we got to a riffle we would blast that layer of rock out. Then we would move up until we struck another and maybe we would
355 go a hundred yards before the water was too deep to work
in it. Then we would strike another channel and would work through it the same way. I did a little of everything on that work. I turned the drill sometimes and worked on the channel and sometimes they put me in as foreman. The regular foreman, Dan Downes, would put me in as assistant foreman and I would have those rocks loaded and have the wall built. He got the foreman's wages and I had to do the work.

They wanted a channel twenty some feet wide, maybe thirty. 3½ feet was the depth under the water. They wanted it so it would be 3½ feet deep or average that.

Q. When you were acting foreman of that gang, your instructions were to cut that channel 3½ feet deep?

A. Yes, sir. If he had to go off anywhere to another place he would leave me there to do the work, and I tried to do it under his instructions, do what he said.

Q. What year was it that you worked on that channel?

A. That was 1829 or 1830. I had it down on a piece of paper in my home, or in the Bible and I forgot it. It had been 46 years ago the way I got it down.

Q. The only way you know about the years is by this paper that you left at home, isn't it?

A. I know what I got down on the Bible when I came there 46 years ago.

Q. You have got 1829 or 1830 on the paper, have you? How old were you when you worked on that channel?

A. I was right around 22 years old.

Q. How old are you now?

A. I will be 68 years old my coming birthday.

Q. So that it was 46 years ago on the first of June that you started that work?

A. Something like that, the best I can get at it, it was about 46 years ago.

I began working there about my house about a mile and a half or two miles right below Buck, right straight across from
356 my house. The name of the ferry at Ivanhoe is Porter's
Ferry, the old Porter's Ferry. The Porters used to own it and there is a ford there below and we went to Porter's Ford where we started working. Porter's Ford was about a mile above Porter's Ferry and about a mile and a quarter from the Sisk Mine, I think. The ford might be a little over a mile above the ferry. It is above the Sisk Mine. A channel has been constructed up to that point before I went to work there. We built

the channel above the ford, and set in to work a right smart little piece above the ford and worked up the river as far as Byllesby. I didn't work on the channel below the ford but I have heard them tell of them working some up to that point, years before I came down there. We started to work in the first ledge of rock above Porter's Ferry. That year I guess we worked about three miles from there up to Byllesby. We were right even with Byllesby on this side of Byllesby Dam. Then we stopped work but they worked up the river, I don't know just how far, about three miles. I can see Buck Dam from my house. The channel we worked went right up through where that dam is. The dam was built several years after the channel was constructed, just how many years I don't know.

The New River Mineral Company was the name of the company that owned the Ivanhoe Furnace then. It is right below Porter's Ferry, a little piece, I think a few hundred yards down. It is a sort of a hollow where the furnace was. I think the furnace is about 300 yards west of the river.

When we were cleaning out these shallow places in the river in making this channel, we worked right down in the water and we were wet all over. We would have to stoop down to pick up the rock we had blasted. We drilled the holes and then put the dynamite in and then tied the fuse to the fork and shoot it. Then we would get in the water and pick the rock up. Sometimes the water would go plumb around my neck. Sometimes it would run down my neck and we might have to go under the water to lift the rock up and lay it on the boat. We started this work in the channel about the first of June. I came down there about the 15th of June and worked until about the first of November or until it got too cold for us. The water stayed up plenty well during that period. When it rained sometimes it would get up and we couldn't work but would have 357 to wait until it got down. We couldn't work much when it was muddy and didn't put in full time.

By Mr. **Williams**:

Q. Where did you do the work?

A. In the riffles.

Q. In the shallow places?

A. Yes, sir.

By Mr. **Abbot**:

Q. In response to a question His Honor asked you a minute ago you said you would get in the water up to your neck. You mean you would do that when you stooped down in the water?

A. Yes, sir. The water would be that deep [indicating] and you would have to reach down to pick up the rock and lay them on that boat and then when we got the boat loaded we would let it slide down the river and make the wall.

Q. And sometimes the rock was in the water about the length of your arm?

A. Yes, sir; and then we would have to get down pretty low to get the rock.

By Mr. **Williams**:

Q. If you were standing in a situation like that, where would the water come to?

A. About here [indicating].

Q. Around your waist?

A. Yes, sir; somewhere along there, and then the rock was a little high but we could feel the water all right and when the water was clear we could get the rock out, but when it was muddy we couldn't work and we would have to stop until it cleared up.

By Mr. **Abbot**:

Q. You don't mean to say that the water was waist deep before you cleaned the channel out, do you?

A. No, sir.

By Mr. **Williams**:

Q. Were there any places in the river where you worked that the water was waist deep?

A. Not where we worked. After we got so deep then we
couldn't work in it. There was layers of rock and we
358 would work through that and then strike deep water and
sometimes we would go three or four hundred yards or
half a mile before we would strike another channel and then
we would work through that.

By Mr. **Abbot**:

Q. Mr. Monahan, did you work on the channel where the Byllesby dam is now constructed?

A. How is that?

Q. Do you know the dam owned and operated by the Appalachian Electric Power Company called the Byllesby dam up above the Buck Dam?

A. We worked near to the Byllesby dam, in the channel this side the Byllesby dam a little piece, right close to it, and we worked to where the Buck Dam is.

Q. Was the channel cut through the place where the Byllesby dam is located?

A. We never got up that far.

Q. The year that you worked there you did not get that far?

A. No, sir; we didn't get up to that, but we got pretty close to it, but we didn't get right up to it.

Q. Did the Government continue the cutting of that channel the year after you worked?

A. I don't know what they done with it. They just worked us and cut us off and quit.

Q. Where did you go to work then?

A. I went to work around there for myself on the farm; I didn't work out much, I hauled sand.

Q. Do you recall whether or not the Government ever did any more work up there on the channel after you stopped?

A. I never seen anybody else working on that channel after we stopped.

By Mr. WILLIAMS:

Q. Did you do any work on the channel where the Buck Dam is?

A. To the first dam, we worked to that place, and there was right smart rock cut out there.

Q. Near the Buck Dam?

A. Yes, sir; there was right smart ledges of rock there. That is the first dam and we call it Buck Dam. We call that the first dam and Byllesby the second.

359 DAN HODGE on Direct Examination testified as follows:

I live at Ivanhoe on New River in Virginia and have lived there nearly all my life. I am 59 years old. I have been running the Ivanhoe Ferry for 35 years. The New River Mineral Company was located right at Ivanhoe, but they have sold out now. They manufactured iron. They had some mines, one was the Sisk Mine which was about a mile upstream from Ivanhoe.

They brought the ore from the Sisk Mine down the river about a mile on a flat-bottomed boat which was about 40 feet long and 12 feet wide. They got the ore on the boat by cars which ran on a little track. They ran the cars off the boat under a little chute in which they dumped the ore. Then they put the cars back on the boat and came down the river with them loaded. They took the ore opposite the Ivanhoe Furnace. They pulled the ore from the river up on top of an incline. They used limestone as a flux for the ore. They got a portion of the limestone at the Sisk Mine and boated it down to the mill also on the same kind of boat.

I have seen some timber to make a ferry boat floated down the river. There is a railroad bridge up there. I recall when it was constructed. They got some stones up the river for the piers and

some down the river. They boated some from one quarry up the river and some from one down the river. The quarries were not very far up the river from the bridge. I should judge they were 300 or 400 yards from it. I could not say exactly how far down below the quarry was, possibly two or three hundred yards. They did not use the same boats for getting the stones down to the bridge that they used for the ore. They used smaller boats—not keel-bottom boats but flat-bottom boats. They built a cofferdam there where they floated logs down the river to build a ferryboat. They floated some of the timber for the cofferdam and some (the log part) they got at an island below the bridge. Part of the other logs came from up the river about half a mile I guess. When they cut them they floated them down. Fowler's Ferry, I think, is four miles from the Sisk Mine. I recall there were timbers sent from Fowler's Ferry up there, that is
360 where these boat "gunnels" and timber come from to make
the boat. They were floated about 5 miles from there to Ivanhoe and came down to Austinville about 3 miles more, altogether about 8 miles.

Q. How was this boat you speak of propelled, how was it moved?

A. They had an engine on it, upright boiler, and little engine and had two drums on it and real close together, and put a wire between these drums, and when the engine was running that made these drums run, and that pulled it up the river, and then as they slacked off they floated back downstream.

Q. Those drums acted as a coil and pulled it up?

A. They didn't wind up, it was stationary at each end, and when they run they held the rope tight, you know.

Q. Was there a wheel on the boat?

A. Yes, sir; a wheel on the outside, and a small wheel inside, with cogs on it.

Q. Was there any kind of a wheel that would throw water?

A. Yes, sir; at first it did, and it wouldn't work good, and they taken it off, they tried the cable.

Q. At first it was run by kind of a paddle wheel?

A. Yes, sir; just like a mill wheel.

I have not seen many boats on the river except those ferryboats and the boats I was telling you about. We do not have skiffs up there. We use a canoe. Last summer I saw a two-cylinder motorboat on the river, which M. M. Price, an Ivanhoe merchant and undertaker, was running. He runs that boat there in that eddy water and then to Byllesby Dam for pleasure. The length of the pool up there must be 3 or 4 miles.

The witness on Cross-Examination testified as follows:

I run Porter's Ferry. Fowler's Ferry is about 4 or 5 miles up the river from it. The lumber I said I saw brought down the river for a ferryboat was a pair of boat "gunnels" (gunwales). There were two attached together.

361 Q. I believe you also said that some of the timber for the framing around the bridge piers below Ivanhoe were floated on the river?

A. Yes, sir; floated some down, and hauled what they got down the river, hauled it up in a boat, and what they got above they floated it down.

Q. How far did they float it?

A. Not very far.

Q. A mile?

A. No; about three or four hundred yards, something like that.

Q. Now, this boat that worked on this cable or trolley, that trolley was laid along over the channel that was prepared in that eddy, wasn't it?

A. I could not say.

I know pretty much where that channel was, but I wouldn't say positively. They had to stay where the cable went and could not go all around in the river. The boat was propelled by a kind of wheel that went down in the water. They discontinued using it because it wasn't strong enough to pull the boat.

The motorboat was a little pleasure boat.

I should judge the ore boat was about 40 feet long. I think it was used a little over a year, maybe not quite that long. That is the only boat I ever saw hauling anything on the river, only what I seen them haul down at the bridge, which was being constructed in that neighborhood.

I have been at Porter's Ferry 35 years, practically all of the time. Sometimes I have been away a week or two. Porter's Ferry is right at Ivanhoe, just about even with the iron furnace. Before I ran the ferry, boylike I was running up and down the river. The iron furnace is straight up west from the ferry about 200 yards. I am tolerably familiar with Porter's Ford. It doesn't lack much of being about at the county line between Carrol and Wythe.

The witness on Redirect Examination testified as follows:

I noticed a change in the rise and fall of the stream at New River during the day. In one way early in the morning we ain't got no water hardly for anything, if it wasn't right between the falls I could not run my boat, and late of an

362 evening it was the same way, unless it is up from rain. The flow becomes greater at different times, just when they put

the load on at Buck. I mean when they start up the works. This starts the water through the gates. It comes down through the turbines. You cannot run a boat of say a foot or two feet of draw up there when the water is cut off.

JAMES MICOU on Direct Examination testified as follows:

I live 6 miles southeast of Dublin on the old rock road, about a mile from New River. I was born there and have lived there all my life. I am a farmer now. Twenty years ago I was a civil engineer. I am 56 years old. With the exception of about ten years I have lived on New River all my life—46 years I would say. From 1905 to about 1915 I was away.

During my life on New River I have seen bateaux on it. I would say the main boat I saw was about 50 feet long and about 8 feet broad and had a long rudder behind, say 20 or 25 feet, All over its length would be about 70 or 75 feet. I saw these boats between Captain Andrew Moore's place, which is known as Dunkert's Bottom, and New River bridge. Captain Moore transported all of his small grain by boat. I think it was corn and some wheat which he carried to New River bridge. I have seen these boats come through Ingle's Ferry and Ingle's Shoals and stop there. Those boats did not carry lumber.

I have seen boats carrying lumber, not at that place, but where Mr. Redpath had a mill about two miles above the mouth of Little River. He sawed out a boundary of timber there and boated it to the mouth of Little River. He had a keel-bottom boat of his own and loaded the timber there on cars.

I can remember having seen bateaux on the river since I was ten years old, I think forty-odd years ago, forty-six or forty-five years ago. I am not very familiar with the river up around what they call Fall Branch.

I saw lumber brought down the river to the junction of New River with Little River. That lumber was loaded on cars of a little branch of the Norfolk and Western which runs out there and into Radford. This boundary of timber which Mr. Redpath had was principally yellow poplar. 363

I recall when this branch of the Norfolk & Western Railroad was built up there to Little River. It was sometime prior to 1905. My father and I worked on it. I think this was between 1900 and 1905. I couldn't say positively.

I saw a little steamboat on the river once up in Dunkert's Bottom by Little River. That boat was owned by a stock company. It was small and looked like a large bateau just about cut half in two and propelled by paddle wheels behind, a square end you understand, with a stationary engine. That boat stayed a good while at Ingle's Ferry—that is Ingle's Falls. I have seen it go through Ingle's Falls.

The witness on Cross-Examination testified as follows:

Those bateaux which I mentioned as being 75 feet overall, had a big oar behind which was about 20 or 25 feet long. The boat itself would be some 50 or 55 feet. Captain Andrew Moore's place is 3 or 3½ miles above Ingle's Ferry, I would say a mile and a half or two miles above the mouth of Little River. I have never measured it myself. It is in that pool above Ingle's Falls, what I call the upper eddy.

I testified about another bateau which Redpath boated his lumber with. I don't know what became of that bateau. I believe those are the only two bateaux I can recall.

The steamboat we were talking about I believe was called the "Queen of Sheba." I have seen that boat in the upper eddy more than once. I have ridden over the falls on it. They ran excursions up there. It would go over the falls all right if there was a little tide. If not, they would have to help it a little. They would not always have pushers. The boat would go over on about a foot tide. If the river was low they would have to pole it through, that is if they didn't have as much as a foot tide. Mr. Hodge built what was called the Hodge steamboat. It had a little upright boiler as I remember. It was the boat that the Ingles were interested in in the company.

The witness on Redirect-Examination testified as follows:

I have not heard of a boat called the McWane boat. I was not
speaking of that boat. I spoke of remembering only two
364 bateaux on the river. That is all I have ever seen. The
McWane boat might have been there the ten years I was
away from that neighborhood on the railroad.

Zattoo Farmer, on Direct Examination, testified as follows:

I reside on the borders of Pulaski just across Ingle's Ferry. The old rock road passes right by my house. Going up on the river it is on the far side. I have lived there about 30 years. Before that I was around in the county, Pulaski and Montgomery, not far away—around Radford back through that part of the country in Montgomery County. I have lived all my life near or about New River. I will be 74 my next birthday. General Wharton lived right near the Little New River town or right on the edge of Radford. It was Central Depot in them days. Wharton's mill was located just across the river from Radford right under the end of the railroad bridge.

I have seen boats on New River. I know of boats having been built and owned by General Wharton. He built 12 bateaux at one time—keel-bottom boats. I couldn't say just when he built them. It was before I was married and I have been married something over 54 years. The boats that were built there were about 60-foot gunwales, about 9 feet wide. The sweep went 15 feet further—that is the oar that they guided the boat with. I don't know that I could tell you right plumb how much, but when they used to haul ore around there, they said four tons and a half was a good load.

I saw them hauling pig iron on the boats on the river running from General Wharton's mill down at the place I spoke of. I saw the pig iron on the boat where they would throw it off on the wharf. That was every year. They didn't haul that ore constantly. There was intervals they didn't haul any and there was times they run regular for awhile when the water was high enough to carry a load. They did not carry it every day or anything of that kind. Sometimes the river was too high to work on and sometimes it was too low to carry a load. I don't know as they did this work constantly. It was off and on, you know, sometimes they would haul for 4 or 5 months right along. I don't remember whether there was a period of a year 365 when they didn't carry any. General Wharton built those boats for the purpose of hauling pig iron. I couldn't tell you whether he carried anything else on those boats. I don't know whether he carried any wheat or corn. That seemed to be the purpose of the boats. Some of the boats carried some little stuff along when they went up the river.

I had a boat of my own. I bought the last one of that bunch of Wharton's boats and had it for a year or two. I hauled lumber up the river. I took it from a sawmill at Hodge's mill—that is Wharton's mill—and hauled lumber from there up to Captain Moore's place. I hauled a thousand feet up there for one man but not all on one load. I was hauling hickory for W. C. Hodge up the river, and I would take some of that up one day and some the next until I finished. I was taking the hickory to the spoke factory at Hodge's mill. This factory is at the Wharton mill. I brought the hickory down the stream. I took other lumber upstream over Ingle's Falls and went up past where the Appalachian Electric Power Company's dam site is. I never took any merchandise up the river in my boat. I carried lumber only

I worked at cleaning out the channel one season at what they called Fall Branch, right up about Howe's place, and the next year we worked from there up to Linkous' Ferry. We worked in the summertime. This work was done right along where the falls were too shallow for navigation. They had to make it deep enough.

I have run a boat on the river before the channel was cleared out and also afterward. I didn't notice anything no more than you would know pretty well where you were going with the channel cut out but lots of them channels filled up and made them bad, you know, and you had to run around some of them places. Stones that washed down the river filled them up. I can't tell you how long it took for the channel to fill up after it was cleared out. There was stone and other stuff which filled up the channel.

I recall that a boat got loose up around Dunkert's Bottom going to Pepper's Ferry. That was quite awhile ago. I can't say exactly when. This was a boat which Captain Moore made to convey stuff across the river. It was on the order of a ferry boat but not quite as wide. He carried horses, harrows, drills, and other things from one side to the other. Captain Moore was in control on each side of the river. He had a boat for the purpose of conveying stuff to and fro, you know, and a couple
366 of boys taken the boat for a boat ride that was going down as far as the river went to see how far it was down there, and they built them a house on it and got them a lot of stuff. They built a house on it and got a lot of stuff for themselves. They took the boat down to the railroad tunnel where it goes through the hill below Radford down below the horseshoe and they hung up there. They did not hang up there but decided they would go no further and sold the boat to Mr. Henry Barnard. Mr. Godby went down there looking for it. One of Mr. Godby's boys took the boat off and Mr. Barnard hired Mr. Godby and me to go and bring the boat back from down there. We went down and found it right there at the tunnel and brought it back, just us two. I think that boat was small—about 30 feet long, about 8 feet wide, and about 14 inches high. It was a flat-bottom and not a keel-bottom boat. It was used as a ferry across the river, but had not been built for that purpose. He sold lots of corn and took it over on that boat. In getting the boat back up the river we started abut one o'clock from down at the tunnel and got it back home up at Captain Moore's the next evening. We were a day and a half at Captain Moore's.

The witness on Cross Examination testified as follows:

I was working right at W. C. Hodge's spoke factory at the time they were building those boats for General Wharton which I mentioned. The builder was an old fellow named Joe Craft who lived in our country around there and Graysonton. I was about 19 to 21 or something like that at the time those boats were built. I was born in 1863.

The river was pretty rough there, every little while one of the boats would get demoralized and go out of business and break up and couldn't use them any more and they dropped off by degrees. The last boating I remember them doing was about 6 or 7 of them. I got the last one and when this fellow failed that had the contract the last man I remember of that had the contract of bringing the iron ore down he failed—a man named Charlie Casey—his boats was sold at a sale. Charlie Casey was the last man in possession of them boats at that time. They were sold then to different parties afterwards.

367 W. C. Hodge bought this boat at a sale and I bought it from him at the price he gave, for $15. The boat was a good boat. It was about half worn and about half as good as new when I bought it. I kept it like a man would a canoe. When somebody wanted a job done I would use the boat. I had no license. No license from the Federal Government was needed to navigate that stream. People was living free and all right them days. I brought about 250 or 300 feet of lumber up the river to Captain Moore's place from the Hodge mill.

When the Cripple Creek Railroad was being built some fellows came down hunting for some of the bateaux and I happened to have this one. They were men working for the bridge company there. They knew I had a boat and came down and I sold it to them for the bridge company up on the Cripple Creek road.

My boat was not the last one on the river. There was one or two more built after that but they were not as big. The boat that Redpath had was of another kind. It was the same make but not as large. I am speaking of the boats that General Wharton built which were used for boating iron. I never saw any boating of iron on that river after I sold my boat. There were no boats then at all. I can't tell you the capacity of those boats which were built for General Wharton. My understanding was that they were 10-ton boats. They could carry not far from 5 or 6 tons, about 5 tons was about their capacity and often they didn't haul that much because that couldn't be done without having a tide. Those were keel bottom boats or bateaux.

The witness on Redirect Examination testified as follows:

I bought the last of General Wharton's boats. They were not in his possession at that time and had not been for several years. They were something like 7 or 8 years old and had been half used. I never did much with the boat. I hauled a good deal up and down the river about two years or better. The boat had been run about 9 years when I sold it. I paid $15 for it to the man who was using it to carry pig iron and I sold it for $15.

Q. I believe you said there were other boats running on the river after you sold your boat?

368 A. Yes.

Q. But that there were no boats carrying pig iron?

A. No, sir.

Q. Was there any relationship between the fact that the railroad had come in there and that they had ceased to haul pig iron down the river?

Mr. ABBOT. I object to the suggestion to the witness.

The COURT. Ask him why he stopped hauling pig iron.

Mr. THOMPSON. I will withdraw that.

By Mr. THOMPSON:

Q. Why did they stop hauling pig iron on the boats?

A. I reckon they must have got the railroad closer and closer. The Cripple Creek was building then and it might have been—I don't know why they did. I think maybe the furnace stopped running for several years.

Q. So it was either the furnace or you think the Cripple Creek road coming in?

A. Yes, sir; it might have been.

The witness on Recross-Examination testified as follows:

I have no idea why they stopped the boating. Only the batch of boats we were speaking about had gone to the bad. The bottoms had been knocked out of them and they had been rubbed by the rocks and laid out on the bank by the rising of the river. I imagine that this boating of iron stopped a year before I bought my boat at Casey's execution sale. I sold it after that time to contractors building the Cripple Creek Railroad. The Cripple Creek Railroad had been built up in that neighborhood. The grading was all finished and they were building the bridges. I have nothing against this Appalachian man or any of them or against the Government.

ALBERT W. SNIDOW on Direct Examination testified as follows:

I was born on the 19th of September 1858 right where I live at Pembroke by the river, I believe 6 miles below Eggleston, by airline it wouldn't be over 3½, possibly not that far. It is in Giles County. There has been a ferry where I live ever since I can remember. It was changed a little after the Norfolk & Western was built. It used to run directly across the river north of my father's house to that large cliff called Castle Rock. There was a horesback landing up near the upper edge of that

rock. The edge projected into the water and was used for
loading cattle. There was a kind of a hem there which
369 they used but the wagon landing was possibly 60 to 100
feet below that.

When I was a boy they would take cattle across on this ferry. That was all the transportation there was—driving cattle. Everything was hauled across on the ferry. After that the Norfolk & Western Railroad was built and it hauled cross ties and tanbark and lumber of all kinds.

I have seen boats on New River as far back as I can remember during the latter years of the Civil War, bateau boats. They had been running as far back as I can remember. At the Narrows there was a portion of the Army camped there over the winter and I suppose it was about the last winter, possibly, of the war. I can remember it. Yes and no, it was. I can't say just when the Yankees went through Pearisburg there. I don't remember exactly when that was but I think it was pretty well through the War—possibly the fourth year of the War.

I remember Captain Earl Burke. He was a white man who seemed to be in charge of the fleet of these bateau boats. He came to my father's house for a room to sleep in at night. He was there frequently but they did their own cooking. I wouldn't say that all of those boats had cooking equipment on them but some of them did. Sometimes they were loaded with barrels and sometimes with bags. I think they carried meal or something of that kind. I have seen them loaded with corn and also I have seen them loaded with lumber. I think their supplies were taken from what we called Central then—the old brick station in Radford.

Q. Can you tell me of your own knowledge how far down the river they took stuff in these boats?

A. It was general rumor all over the neighborhood there that they were carrying supplies to the Chesapeake & Ohio Railroad there that was being constructed in '72 and I can't say that I saw those boats land there at all but that was the general impression, the general talk of the neighborhood.

Mr. Abbot. We want to interpose our objection to general rumor in the community.

By Mr. Gatchell:

Q. Let us stick to the Civil War for a minute, now, Mr. Snidow. Do you remember the boats being used during the Civil War?

A. Yes, sir; I have a faint recollection. Of course, I was a small boy but I remember those boats passing down there during the Civil War, the latter years of the War.

Q. Was Captain Burke operating the boats at that time?

370 A. Captain Burke was in management. He was the Superintendent and those boats had about seven colored men to the boat. That was the crew and they kept steersmen, you know, that piloted the boats. He was on the back, what they call the deck. That was boxed up and he had his bugle. I remember that distinctly out there and he had a pole that he used under this left arm this way, but it had a metal socket on it and a spear and he dragged that pole after him under his left arm and manipulated this steering oar with his right arm and he was quick too.

Q. Where did he take the stuff that he had in the boats; do you know?

A. Generally to Hinton.

Q. That was during the Civil War?

A. Yes; about the close of the Civil War, I would say. Let us see—the surrender was in '65, in April, is my recollection. It may have been the summer of '65, but there was a large amount of corn that was hauled there on wagons, shelled corn, sacked up, and they built a foundation for it and it was packed up possibly ten feet wide or maybe a little wider. That was covered with a canvas cloth just like a show tent, and my brother that was several years older—he and a neighbor boy there were employed to watch that corn and I don't remember just how long but, of course, I was a small boy, but I went there frequently and would climb up on the mound, you know. I don't remember just how long, possibly ten days or might have been two weeks, and those boats came there and loaded that corn and went down the river with it. I don't know where they would go.

I think there were generally 6 boats in the fleet. Sometimes only 4. The last recollection I have of those boats was somewhere along as late as 1886 or 1887. They were going upstream. I don't know that they were loaded at all, but the last recollection I have of those bateau boats there is that they were.

Captain Burke had a room at our house. While he was boarding he was just in charge of these crews.

I never saw him have any difficulty in getting up and downstream. I remember seeing those boats go down loaded with loose hay once when the river was high. They were right in the middle of the channel. There is a little island or rock bar
371 in the river right below Pembroke bridge about 200 yards. When the river got a rise of 4 or 5 feet those boats would go right down over the center of it. They weren't following the

channel on either side of that island at that time. They were right on the middle and they didn't use anything but steering oars. I think there were 4 boats there at that time.

The Snider Brothers were cousins of mine. They had a mill just below the Pembroke Ferry and were there three years, possibly 4. For a while they bought a great deal of timber and had teams of their own and of others to haul it in. They had a large mill and were cutting for the Norfolk and Western Railroad and shipping their lumber. They ferried it across the river. The Norfolk & Western loaded it there and it was shipped here to Roanoke. It was car beams and things like that. They constructed what you would call a boom. They went angling on the opposite side of the river and had wrought iron, half inch or a little heavier possibly, welded together with lap rings and they constructed a chain entirely across the river and morticed it into a large sycamore tree there and fastened it. These logs which they floated I think came from between Eggleston and Pembroke. I know that they bought the timber off of the Crawford farm and there was no road there. The timber was floated, but there was a boundary of timber on the opposite side of the river between Eggleston and Pembroke that I believe was known as the Snodgrass land. I don't know whether they owned it then or not. They may have owned it since, but anyway I think it was logged and rafted to Pembroke. I know Crawford's timber was. I know it is as much as 4 miles from the mouth of Sinking Creek to Pembroke. They may have possibly gone above Eggleston with the timber. These Snider Brothers carried on their mill operations at Pembroke for 3 years or a litte longer I think. They came there in '88 and I believe left in '91 or '92. I am sure they were there 3 years and possibly 3 years and 6 months.

I know a man named John McClarity, who was a soldier and lived just above Bluff City, Pearisburg Station, a great bend in the river there that the highway cuts off entirely from Bluff City to Ripplemead. He lived on the east side of the river 372 around that bend there from Pearisburg to Pearisburg Station, and was visiting there in the neighborhood late in November of '67 and he was taken violently sick with pneumonia and I believe typhoid fever. I am not sure about that. He had a very severe case of double pneumonia. Well, he lay there at the point of death, you might say, all winter and it was a very, very hard winter. The river was frozen and just a fearful winter, and in the spring of the year—I won't say how long, but after the weather broke up—opened up—one of those bateau boats came there and carried him off, carried him from the house in his bed and placed him on that bateau and took him down there to, I would say, just above the Pearisburg Station. I would say that was 10 or 12 miles by the river.

I never measured those boats Captain Burke used to operate, but my recollection is that they called the four smaller ones 85 feet and the two larger ones 100 feet, including the rudder, the sweep, and the stern. They were made with keel bottoms, I would say with "gunnels" thirty inches high or possibly higher. The front end kinda flared up a little higher. The rear part the steersman occupied it with his steering ore altogether, and six others pushed along a gangplank and the loading was in between on each side. I can't tell you how much of a load they carried. One of these large boats might carry a carload. I don't know.

The witness on Cross-Examination testified as follows:

Q. Mr. Snidow, what year were you born?

A. I was born on the 19th of September, in '58.

Q. Now this testimony you have given about what went on in the Civil War, that is pretty hazy, isn't it; it has been a long time ago?

A. A child five years old can remember things as distinct as a man twenty years old. I can remember those boats as distinctly as I can a year ago. I might have been six years old. The War closed in '64.

Q. In September 1864 you would have been six years old?

A. I can remember farther back than that.

Q. Remember September '63?

A. Of course, I was a child and my father had a hired hand
there and he and I would go to those boats at night and
373 I was a mere boy and of course those darkies were musi-
cians and had a banjo and danced, and that attracted me,
and I was at the boat often.

Q. Would they play the bugles at night with the banjos?

A. Sir?

Q. They had bugles on the boat, didn't they?

A. Yes, sir; the steerman kept it.

Q. At whose house did you say Mr. McClarity was sick?

A. He was a distant relative and there was a meeting at the church and he just came down home on a visit with some other young folks, and he was taken violently sick, and he never did get away from there until this bad weather broke up. It may have been the first of April or the last of March, but I remember they carried him from the house in his bed and placed him on that boat.

Q. Did you see those boats on the river constantly from that time to 1886 and 1887?

A. No, sir; during 1872 I know they were running, and the Chesapeake and Ohio Railroad was being constructed there, that big tunnel, I believe they call it the "Big Ben" tunnel and a whole raft of colored men around there that worked there that summer, and we had a darky around the place, I remember his leaving and going to the railroad and that summer now there was quite a lot of travel down the river with those boats.

Q. Is that the last year you saw the traffic on those boats?

A. No, sir. The Norfolk & Western Railroad shipped, it was said it was the Norfolk & Western—John Graham, I believe, we will call it him anyway, was in charge of the road and possibly a little work done on it in '79 and '80, it was working along, and I don't remember just when it went into the hands of the Norfolk & Western, but they pushed the work, but these two tunnels at Eggleston kept them from laying the track as far as Pembroke for a long while, and the Walkers Creek bridge is a pretty considerable bridge, well it was made a wooden trestle and that kept it back, I mean that held the laying of the track back to the mouth of East River you might say, and these boats were carrying heavy timber, of course I don't say they told me it was trestle work, but that was the general talk of the neighborhood, that it was trestle work for the Norfolk & Western on the East River and Bluestone trestle. 374

Q. You don't mean to be definite about that, you saw something hauled down the river, but you don't mean to say that was bridge timber, for any of those trestles on the Norfolk & Western, do you?

A. I know*ed* it was the general impression of the people there, everybody was talking it, this is the bridge lumber. They hauled the Walkers Creek bridge timber there and unloaded it there.

Q. You mean it was hauled there by boat?

A. It was hauled there by those boats, yes, sir, because I don't think the Eggleston tunnel was through.

Q. And that is the reason you think it was hauled there by boat, because the Eggleston tunnel wasn't through?

A. I know it was hauled there by boat. I have rafted lumber over that fall there myself, I remember they wanted a commissary there about a half mile below Pembroke, and my brother and myself had a sawmill on the place, and they wanted poplar board, I think they were twelve feet, and we built a frame in the water about a mile above there and put these plank down this way and across, and I suppose we had a raft possibly that high (indicating), and stacked it up and nailed it down on the corners to hold it, and put a rope on it, and I led it there, I led the raft myself through the Falls, and my brother operated the boat.

Q. You mean you led it, how was that?

A. Had a rope tied to it, and I had a skiff right in front of it, and my brother was rowing the boat, and I just had the rope you know holding it, sitting on the back seat of the boat, and the raft was gathering so much power, you understand, than the smaller boat was, that it looked like it was going to lunge over, and I jumped up and grabbed hold of it this way (indicating) and held it against my breast, and I believe if I had not done it the raft would have gone over.

Q. What falls were those?

A. At Pembroke there.

375 Q. Below or above your ferry?

A. Right at Mr. Boxley's stone crusher there.

Q. Is it above or below the ferry?

A. It is below the ferry.

Q. It is not the Falls you see up the river from the highway bridge?

A. No falls of any consequence from the Pembroke bridge until you get around to the tunnel of the Norfolk & Western, what we call the "Horse Shoe" I suppose it is about two miles, one little ledge of rock that runs across the river, and with the exception of that it is all big water, and would run any boat between that point.

Q. Is the point you are speaking of the Falls below Dry Branch?

A. No, sir; Dry Branch is away up the river above Eggleston.

Q. You said between Eggleston and the tunnel.

A. I said between Pembroke: I am not very familiar with that water up there at all.

Q. You didn't boat any of these bridge timbers for the N. & W. bridge at Walkers Creek, did you?

A. Me.

Q. Yes.

A. No, sir; I didn't.

Q. You just saw them?

A. I saw them and it was conceded by everybody and talked by everybody in the neighborhood that is what the timbers were for, the East River and Bluestone trestlework.

Q. I thought you said awhile ago it was for Walkers Creek?

A. There was a wooden structure across Walkers Creek.

Q. Do you mean to say Mr. Snidow, the bridge timbers for the Walkers Creek bridge of the N. & W. and for the bridges below there were boated down the river?

A. Yes, sir; they were.

Q. Do you know where they were framed?

A. Well I don't know where the timber was bought.

376 Q. You never went with the timbers to the bridges?

A. No, sir; but on account of the Eggleston tunnel and on account of the Walkers Creek bridge being cut and it is right in the river, a great wide place there, it was a considerable length, and those boats carried the lumber to build that bridge, and the bridges, so it was said, now of course I don't know, but I do know they hauled from the Walkers Creek bridge, it was general talk in the neighborhood and everybody conceded that was what it was.

Q. Did you continue to see those boats operating constantly on the river to 1886 or 1887, when you say this fleet went up and disappeared?

A. I never saw any boats after the N. & W. was run through except the three I speak of, that I remember passing back up the river, and the N. & W. had been in operation several years. I don't remember I had seen any of those boats for possibly two or three years.

Q. After the N. & W. came there?

A. Yes, sir.

By Mr. Abbot. I want to state on the record an objection to all of this witness' testimony as to boating he did not see, and know where it was going. That is the testimony he gave based on rumors and common talk in the neighborhood.

The witness on Redirect Examination testified as follows:

Q. I would like to make sure of one point. Did you see boats going up and down New River after the Civil War, up to the time the N. & W. railroad went through?

A. I did in open weather. I never saw any boats during this time, I don't remember of ever seeing them go down but once in high water, and the river was possibly ten or twelve feet, and those boats were loaded with hay and kept right in the center of the river, no pushing about it, they simply steered them and passed on.

By Mr. Abbot. At this point I want to make an apology, which I hope counsel for the other side will convey to Mr. A. W. Snyder, who testified here yesterday, and some insinuation was made about a statement he had made to us with reference to his age some years ago. It so happens the present witness and the other witness, although their names are not the same, both of their names are A. W. and I regret the instance.

377 By the Court. You think it was this one.

By Mr. Abbot. It was this one.

By Mr. Gatchell. This man spells his name "Snidow,"

W. P. Snodgrass on Direct Examination testified as follows:

I live in Eggleston, Virginia. I have lived in sight of New River all my life. I was born in the southern part of Giles

County, close to the Montgomery line. I remember the Government doing blasting or river work on New River in the southern half of Giles County three miles above Eggleston.

Q. And how far upstream did they go?

A. You mean with that work?

Q. Yes.

A. I could not tell you. I don't know anything only our part in Giles County.

Q. How far in Giles County did they work, altogether about three miles?

By Mr. Abbot. We object to leading the witness.

A. I know of three miles they worked.

Q. Have you ever seen any boats on New River?

A. Yes, sir.

Q. Can you tell us about what year you saw boats on New River?

A. All the time; from 1867 is about the first I memember of it.

By the Court. How old are you?

By the Witness. Seventy.

By the Court. And you remember boats in 1867?

378 By the Witness. Yes, sir.

By the Court. That is pretty good, you weren't but one year old, were you?

By the Witness. 1877, I was mistaken.

Q. Was this before or after the Government improvements?

A. That was about the time of the Government improvements.

Q. Did you see any boats after the Government improvements?

A. Yes, sir; we operated the boats after the improvements something like twelve years.

Q. For about twelve years after the improvements?

A. Yes, sir.

Q. What attracted your attention to the boats?

A. I was living right in sight [illegible] them and could see them pass by and I was a young boy a [illegible]hat would naturally attract a boy's attention.

Q. How many boats do you remember seeing?

A. I could not tell you that. They would go back up the river ten or twelve year in constant work when the river would allow it. There was times they couldn't go sometimes, it would be too high, and sometimes it would be too low.

Q. Was your place in sight of the river?

A. Yes, sir; it was in sight of the river and looked right out over the river.

Q. Could you see what was on the boats?

A. I could not tell, it was passing by loaded, going down the middle of the current, and I could not tell what was on it, it was loaded, but I could not tell.

Q. When they came back were they loaded?

A. Not so much, it was down the river they were loaded.

I have seen as many as five at one time, but not often. I
couldn't say where these boats stopped at any time.
379 Sometimes the river would be too high, and as the falls
was right above us, they would land their boats in my
father's keep there until the river would go down. The river
would be tied up sometimes for a week and sometimes for two
weeks according to the rain. Five is the largest number of boats
I ever saw tied up at one time. Sometimes there would be only
two or three tied up. They would be tied up pretty often.

Q. Could they get up the river all right?

A. They could when the river would fall.

Q. You say you remember they had boats down there for quite a period, how long a time was it they had boats on New River?

A. They were on till the Norfolk & Western built the road down New River, and there wasn't much boating after that. That was in '81.

Q. Along about 1881 there wasn't much boating?

A. Wasn't much after that.

I remember when they cut the railroad right of way through there. A man called "Contractor" Mills cut the two tunnels there within a half mile of each other. Most of the materials they got for the work on the railroad came down the river in these boats. I don't know where it came from. I don't know anything outside of our own county. They would bring down for the tunnels all kinds of dry goods, steel, coal, provisions to run a commissary and everything a contractor would use in construction work.

The first train came over that road on the 17th of May 1881 at 11:00 o'clock.

The names of some of the boatmen were John Neece, Lewis Ferrell, Tom Palmer, Hirman Palmer, a fellow by the name of Stewart and Mike Scott. That's about all I can remember. I never did measure one of these boats, but I would say they ran from sixty to ninety feet in length and were eight to twelve feet wide. The small boat was narrower than the large one and they were built in proportion.

The witness on Cross-examination testified as follows:

The Mr. Mills I spoke of was a contractor who put the tunnels
in for the Norfolk & Western Railroad. He was connected with
the firm of Mills & Roland, which had a contract for that
380 work. Part of their stuff was shipped down the river by
boats. They bought some of it in the country, but some of
it was brought down on the boats. I saw them unloading some at
Mr. Mill's place. I did not see more than two unloaded there.

Q. I believe you said you first remember the boats in 1877?

A. The boats were running before that, but that is about the first I could make a statement to.

I saw a channel being cleaned out by the Government—I think it was the Federal Government—in Giles County. A man named Newburg was in charge of cleaning out the channel about 1876 or 1877. I couldn't say whether or not he was an army officer. This work was done in the southern edge of Giles County. I saw the Government putting a channel in Big Falls in 1876, I believe. I lived within a quarter of a mile of this work. Big Falls is on the line between Giles on one side or both sides of the river and Pulaski and Montgomery on the other. I also saw them cut channels below there in sight of our home. Where it was too shallow, they would throw the rock back and make a channel to run through, and come to these falls they would blow out a channel through the ledges that made the falls. I do not remember any wing dams to divert the water through the sluice there.

Q. Don't you think possibly you have gotten what you heard mixed up with what you have seen, did you ever hear the State of Virginia and Confederate Government cut some sluices down there in 1860 and 1861?

A. No, I do not think so. I don't think I ever heard that, all I ever heard was the Government was doing the work, I don't know if it was the Federal Government, State Government or what not.

Q. You think this work you saw done might have been done by the Confederate Government?

A. I didn't give it any thought where the money was coming from.

Q. You say you saw sluices cut through the Big Falls in 1876 by the Government?

A. I guess it was the Government back of it. I don't know who else it could have been.

Q. You saw men working there?

A. Yes, sir.

381 The witness on Redirect Examination testified as follows:

I remember the high waters in the late 70's—the big flood. The dredging out of the stream was done before that. The high water washed it away. It hit our place the 14th of September, 1878.

D. C. Allison, on Direct Examination, testified as follows:

I was born in January, 1859. I was seventy-seven last January. I was born on Reed Island Creek about two miles from New River. I lived there until I was about twenty-six years old. I went to Missouri after that. I was in Missouri in the middle part of the 70's and came back in four or five or six years.

During the first twenty-six years that I lived on or near New River, I didn't see any boats on it. The boats that I saw come up from New River up Reed Island Creek. I never seen a boat—not when I was a young boy. After I was grown I come up the river on a boat. I might not have been seventeen or eighteen years old. I rode on a boat in New River about the Cat Hole to the mouth of Reed Island Creek. That was four or five or six miles. I was running sawed timber down the rive. when the boats I was on come up the river. I didn't see timber or logs going down the river, but down Reed Island Creek to the river.

I cannot recall exactly, but I think it was in the last part of the 70's, when the Government improved the channel of the river. I don't know that I ever saw any boats or logs or lumber floated on New River before the channel was improved, but I saw them floating on Reed Island Creek to the river. We could not run a big raft down the creek. When we got to the river we put several thousand feet together and got it in the channel. I would be on it when it started down the river. That was sawed timber, but the logs they was cut and put in the creek and floated down and they went to the bridge. The bridge is twenty or thirty miles from the mouth of Reed Island Creek down to New River Depot and bridge. My best recollection is that it was twenty-five or thirty miles to the bridge. I don't know whether that is correct or not. It might have been a little less or a little more.

These logs were floated down after the channel was made.

382 Q. Did you see logs go down before the channel was made?

A. I have seen many go down Reed Island Creek.

Q. To the River?

A. Yes, sir.

Q. Did you see any boats on the river or ride on one, before the channel was made?

A. No, I don't believe I did.

H. B. Allison, on Direct Examination testified as follows:

I am a brother of D. C. Allison, who just testified. I was born and live on Big Reed Island Creek. I am sixty-seven years old and have lived there all my life. That is about two and a half miles from New River. I have been seeing New River for sixty-seven years.

I have seen keel bottom boats run up and down the river, traveled on some of them, but never worked on any of them. I think I traveled on them in the first of the 80's after the channel was built. I think the channel was built in the latter part of the 70's.

I remember the big flood. It occurred about this same time, I don't remember exactly.

We traveled on keel bottom boats about thirty feet long and eight feet wide at the top. They carried metal and pig iron down the river. Some of the pig iron was loaded near the mouth of Reed Island at a little wharf. Some of it came from Boom Furnace and some came from Radford Furnace and was loaded further down the river. Radford's Furnace was called Mack's Creek Furnace. I guess a boat would carry from three to five tons of pig iron. It depended some on the water in the river. They told me the pig iron was boated to Radford. (Defendant objected to the statement of the witness as being hearsay evidence and moved to strike it from the record.)

I didn't go down the river myself, but saw the pig iron go down. I have seen boats come back from trips on the river. They were carrying groceries, sugar, coffee, salt, and small amounts of stuff like that. I knew several of the crews running the boats. I think it takes the crews about from two to two and a half days to get back on a trip. They would go down one day and it would take them longer to come back. I saw more than one boat running on the river with pig iron. I think for a while there were about two crews.

Q. Over how long a stretch of years did you see boats carrying pig iron and produce on the river?

383 A. I don't recall that, but it was several years—some five or eight or maybe ten years.

Q. During what years was it?

A. I don't just recall that, but somewhere after about the first of the 80's.

Q. The period in which you saw boats carrying pig iron somewhere down the river and coming back a day or two later with provisions, was a period of five, six, eight, or ten years?

A. Yes, sir.

They boated sawed lumber and shingles and rafted lumber in or around New River. I helped to raft lumber down the river. We rafted down Reed Island Creek to New River for three or four days until we got a large raft and took it to the railroad trestle about five miles down from the mouth of Big Island Creek. They built trestles out of it for the railroad. I expect I have helped to raft 150,000 feet of lumber down the river altogether during this period.

The witness on Cross Examination testified as follows:

Q. Mr. Allison, what year were you born?

A. I was born in 1867.

Q. What day?

A. The 20th day of January.

Q. How old are you, did you say?

A. Well, I was 68 years old the 20th of last January but they got a little mistake there in that statement and they have got it 67.

Q. And so you are testifying in conformity with a statement they gave you. Is that the idea?

A. Well, the statement where they—well, I don't know.

Q. Well, we would like to know. What statement are you talking about?

A. Well, it was a statement I gave when a man came to see me for a witness, and ——.

Q. (Interrupting.) Who was that—was it Ex-Senator Noell; who did you give that statement to?

A. I don't remember the man's name.

384 Q. And because you made a mistake in that, you are preserving it on the witness stand.

A. He made some mistake some way; I don't know how. I think I gave him my age correctly.

Q. How long did you say you saw these boats on the river?

A. Well, I just don't recall how long they was on the river, but several years, I think.

Q. Do you remember what year the channel was cut out as far as Big Reed Island Creek?

A. No, sir; I don't remember the date or the year.

Q. Can you say that you saw these boats on the river more than two or three years before, at the outside?

A. Yes; I think I have.

Q. You have to the question, but have you seen them, or have you already said that?

A. You mean seen the boats on the river?

Q. Yes; how many years did you see the boats on the river?

A. I don't recall now, but I think they was on the river five or seven years or some where—

Q. (Interrupting.) Five or how many?

A. Five or several years; I don't know how many.

Q. By "Several," do you mean less or more than five?

A. I think they must have been on there more than five.

Q. On direct examination you said from five to ten years.

A. Somewhere between five and ten.

I was not down the river to New River Bridge very often. I was up and down the river a good deal from the mouth of Reed Island down to what they called Clark's Mill, something like a mile and a half or maybe a mile below Hiawassa. That is where square lumber—rough logs sawed into square lumber—was floated down the river. I don't know how many miles it is from the mouth of Big Island to Clark's Mill. I think it was close to five miles, maybe, the way the river goes. I didn't measure it.

385 I never worked at the Radford Furnace on Mack's Creek. I have been there off and on all my life. I never hauled iron away from there. I was there with my mother when I was small when they were running the furnace and I have been there a good deal since. I never saw them making iron there, but I saw them hauling iron and passing the store where they had a commissary up at Radford Furnace, maybe a mile or three-quarters, or half a mile from the river. I never saw them hauling iron around the river. They taken it down to the wharf to load it on boats. I saw them load it there on the boats at Big Reed Island. I never saw them load it at Macks' Creek. I have seen them hauling iron down there and they claim they took it on the boats—that is all I know.

(Defendant objected to the statement of the witness as being hearsay evidence and moved to strike it from the record.)

Iron used to be hauled from Big Reed Island and Boom Furnace on Little Reed Island.

I don't know that I ever saw iron hauled from Boom Furnace to Pulaski by wagon or hauled across the river from about Allisonia on that ford by wagon. I don't remember iron being hauled across the river on the ice. I don't recall that I ever saw a wagonload of iron ferried across the river from Boom Furnace.

Q. All of your recollection about the iron from Boom Furnace is that it was being hauled—I mean loaded on boats?

A. Yes, sir; iron there at the wharf; they had a little wharf, they called it, and they would haul it from the furnace and load it on the boats. I seen them do that.

Q. But you have never been along the river when they were hauling it away in wagons?

A. No, sir; I don't remember ever seeing them hauled that way. I may have seen it, but I don't remember it.

Q. How many boats have you seen loaded with iron at Big Reed Island Creek?

A. I don't know how many different boats, but I have saw several loads; I have also been on the same boats. I think they used two boats part of the time, and I have seen them.

Q. You have seen them load a boat several times, but whether or not it was the same boat, you don't know. Is that correct?

A. Yes, sir.

386 Q. You said something about it took two or two and a half days to make a round trip from the mouth of Big Reed Island to Radford. You never took that trip, did you?

A. No, sir; but I was well acquainted with the crew that did take it, and that is the time they said it taken them to come.

Q. Are you sure they didn't tell you it took one day to go down and two to come up?

A. Well, some days probably it would, but they would come back some days earlier; it didn't take them so long some days, and they would have good water in the river and they could make it quicker, they told me.

Q. But better days going down would be harder days coming up, wouldn't they?

A. No. When there was plenty of water they said they would handle the boats better.

Q. And when there was plenty of water they would do it in from 2 to 2½ days?

A. That is what they said.

Paul L. James testified upon Direct Examination as follows:

I reside in Washington, D. C. I was born at Kane, Pennsylvania. I have spent most of my life on New River at Hinton. My father took me to Hinton to live when I was about two years old, and I spent almost all of my life at his home there until his death. After that I was there most of the time except for the period when I was in school during which I was away temporarily. I have probably been away 10, 15 or 20 years in business for myself. I am 63 years old.

My father was in the lumber and logging and building business—stave business. He had his saw mills and planing mills at Hinton and converted timber into building material. I was connected with his lumber company in later years when I became old enough. I was bookkeeper and secretary and treasurer of the organization. From the time I was old enough to do any work at all I was brought up in the saw mills, planing mills, and offices of the company. At first it was a partnership between my
387 father and his brothers. The firm name was William James & Sons. After a number of years it was incorporated under the name of the William James Sons Company.

We had a mill at Hinton. We cut lumber all along the line of the New River or Little Blue Stone and some on the Greenbrier, and anywhere we could get it. When I was a boy there was a great deal of timber, saw timber, and ties and a lot of logging done on that river. The Standard Oil Company was buying a great many staves there. The C. & O. was buying white oak ties and we were buying white pine, white oak, and spruce.

All the timber we could use was saw timber. My father bought nearly all of the timber on a stumpage basis, delivered on the banks of the river. My uncle and my father bought timber wherever they could. I heard them speak of going up as far as the Narrows and up Little Blue Stone and Big Blue Stone and anywhere along the three rivers that they could get timber.

(Defendant moved to strike out what witness had heard.)

My father was the business manager but my uncle, or his brother, T. W. James, largely took care of locating timber, and if he did not make the contracts outright he would contact the timber people with my father. He spent all of his time in the woods.

I did not go into the woods myself purchasing timber. I was the bookkeeper. When I was old enough to keep books I did so and kept records of these purchases, so that I was familiar with the purchases which were made.

Q. How were the logs which you say that your uncle purchased up at the Narrows brought to Hinton?

A. Floated down the river either in rafts or loose.

Q. How many logs would you say that your firm floated down the river a year to Hinton?

A. I know in a general way about what my father tried to handle.

Q. I will ask a further question. Were records kept as to where these shipments came from?

A. Oh, yes.

Q. Did you have knowledge of where these shipments came from, so far as keeping the records were concerned?

A. As far as keeping the book accounts were concerned.

Q. How much stumpage would you say was floated down
388 the river by your firm a year?

A. And cut at our sawmills?

Q. Yes.

A. Regardless of where it came from?

Q. That is right.

By the **Court**:

Q. He does not mean what was the total cut of you mill, but your best estimate of about how much you were accustomed to get each year which was brought to the mill by floating down the river?

A. Well, from two and one-half to three and one-half million feet would be my estimate of it. Sometimes it would run more than that and sometimes less.

By Mr. **Thompson**:

Q. How many years did that cover?

A. Well, my father went to Hinton in 1870. I would say 45 to 55 years he was in there operating.

Q. You didn't have direct knowledge as a bookkeeper of the shipments that were made in the early days?

A. Oh, no; I had to go to school and learn bookkeeping. I was only a child when he first went there.

Q. State whether or not your company ever purchased or gathered logs at what is known as Sandstone Falls on New River or near that vicinity?

A. We had gathered our own logs and the logs of the St. Lawrence Boom Manufacturing Company at Sandstone, Kanawha Falls and as far down the river as Charleston.

Q. Did you ever do that yourself?

A. Yes, I have been down the river myself.

Q. You personally went down there?

A. Yes.

Q. Who else in the firm went?

A. My father generally attended to that.

Q. And what did you do with those logs which you
389 got down there? How would you get them to shore?

A. They were generally picked up by different people along the river and rafted and we would sell them to some sawmill and ship the lumber or sell the logs.

Q. Where would you ship the lumber to?

A. After I went to keeping the books, my father went to Columbus, Ohio, and opened a retail lumber yard and we shipped practically all of the lumber we sawed that ran through our planing mills to Columbus, Ohio, but we had business all along the river and we had business in Boston and Cincinnati. We shipped lumber wherever we could sell it.

Q. And you gathered lumber, as I understand it, not only at Sandstone Falls but at other points down the river as far as Charleston?

A. Yes, Montgomery, Kanawha Falls, Sandstone, and Charleston were the four principal places that we could dispose of the stuff easy and that is where we would collect it.

Q. And some of that, as I understand you, you shipped direct to Columbus, Ohio—some of these logs?

A. Not logs—the cut lumber.

Q. How did you know that those logs which floated down were your logs?

Mr. Forbes. We object to the form of the question. There was nothing to indicate that he did have any way of knowing.

Mr. Thompson. I will withdraw that

Q. Was there any way of your knowing?

A. Yes, whenever a log was taken up an measured in the woods or on the river bank, we had a "J&S" that was stamped on both ends of the logs.

Q. What did J. & S. stand for?

A. James & Sons.

Q. Was that a custom with the other lumber companies?

A. Yes, every logging company that did any logging on the river had their own private marks.

Q. Did you ever have and business with respect to logs of other companies?

390 A. Oh, yes.

Q. That went down that river?

A. Yes, sir.

Q. Please state what business you had.

A. We would take their logs and ours and treat them as one and keep count of the board measure by the marks on the end of the logs. We would measure by the marks on the end of the logs. We would measure the log and see how many thousand feet it had in it and if it had our mark on it we would take credit for it and if it had somebody else's marks on it, we knew all the marks on it, we knew all the marks on the river.

The lumber which we dealt in was saw timber. We sawed most of our ties at the mill. Occasionally, we would buy a few ties. We had a few stave mills but we didn't handle staves at the Hinton mill. Our stave mills were portable and we would take them to a good stand and saw up the staves. These stands were on parts of the Greenbrier.

Everything that came off the Bluestone and New River and Little Bluestone generally came in the form of logs and went through the usual course of our booms to the saw mill and was sawed there but sometimes it was handier to cut the staves and haul them out on the boats or wagons or in any way we could get them out.

The Standard Oil Company was buying staves there largely for oil barrels. I saw a great many staves in boats on the river for years.

Our lumber was handled largely as logs but what lumber was handled there was either handled in a raft or on a bateau.

A bateau was a round bottomed boat, partly flat, with running boards on the inside. It was about 10 feet across and 55 or 60 feet long and was pushed up and down the river by hand power. These boats were sharp at both ends, with an oar paddle on each end to steer them. I have forgotten the capacity of one of these boats. My best estimate is 10,000 feet board measure, depending on whether oak or pine was carried.

The photograph marked Government Ex. No. 2 which you hand me seems to be a picture of a picnic. There is a bateau in the picture such as often was used for such parties. I recognize one

man in the picture as Mr. Hobbs. He is the man with whiskers and a straw hat. That is his wife sitting next to him. The
391 type of boat known as a bateau was commonly used for transportation to all points. The bateau in the picture, I think, is an ordinary one, 55 or 60 feet long, with 8 or 10 feet beam, drawing probably 18 or 20 inches of water and 3 to 3½ feet deep (photograph offered marked Government Ex. No. 2). The photograph marked for identification Government Ex. No. 3 which you hand me shows another bateau with 22 or 23 people in it.

Mr. FORBES. Did he identify any of the people in that bateau or identify that bateau as a bateau on New River?

Mr. THOMPSON. No; he is only identifying it as a type of bateau. He has identified parties in the boat.

The photograph which you hand me marked for identification Government Ex. No. 4 is another bateau, with 30 or 32 people in it. (Photographs offered in evidence by plaintiff—marked Government Ex. No. 3 and No. 4.)

I have seen steamboats on New River over most of my lifetime. I saw the first one when I was a child. I lived within 100 feet of the river bank on New River and there was very little as a child that was going on which I did not see.

There were a great many types of boats, but three or four boats were made into steamboats over the period of my lifetime there. The first one I can remember my father showing me I remember had paddles on the side of it. That is about all I remember about that boat. I can remember it was boarded up at the side and had side wheels. I don't remember that it had any decks. My estimate is that I saw that first boat 50 years ago. It must have been about 1877 or 1878.

Q. When did you see any other steamboat?

A. Well, from that time on there was always somebody working with a boat, running it up and down, trying to convert power on these bateaux. The bateaux were always the method of transportation of freight back and forth on the river and somebody was trying to introduce a power that would save this manpower in going up and down the river and that was being done by different people. I remember my father, I think, was one of the originators of that first boat company and then when I was older, just about the time I was going to school, I remember there was another boat.

392 Q. When was that, about?

A. That was about '88 or '89.

Q. What was the type of that boat, if you recall?

A. That was a flat boat, also with these side wheels on it, steam or electric power. I don't remember which it was.

Q. And do you recall how long that boat ran up and down the river?

A. No, sir; I don't remember. I just remember seeing it. I never took a trip on the boat.

I remember that after I went to school and came back Mr. Hobbs had a foundry down there. They were building a boat and working on the engine. That was about the last one I remember anything about. I saw that boat running on the river.

I don't remember a Captain Davis. I can remember the Davis boat but I don't remember the boat. I was away at school at that time and only home on vacations and didn't see so much about it. I saw such a boat but don't remember it. I don't think the boat I saw in 1888 was the same boat. I think the Davis boat was a later one. I remember seeing a boat partly capsized and I think that was the Davis boat.

Q. I hand you a series of photographs marked for identification Government Exhibit Nos. 5, 6, 7, 8, 9, 10, and 11, and ask you to look them over and say if you know what those photographs represent as pictures?

A. Well, there was an attempt made, and I think by the Hobbs boys—as I said awhile ago, they ran a machine shop right on the river bank and they were all the time working on different boats. I think they made an attempt to and did——

Mr. **Forbes.** We object to what he thinks.

A. All right. I know that they put one of these aeroplane power plants on a bateau.

Q. Power plants, you said?

A. I said they put one of these power mechanisms on a bateau and used it as power for that bateau instead of the pole, going along as manpower. These are just photographs of the same thing.

Q. State whether or not you ever saw a boat of the type as represented in those pictures on the river?

393 A. Yes, I have.

Q. Was it running or not?

A. Not running when I saw it. It was at the Hobbs foundry, right at the boat landing. That was one of the later types of boats.

(Plaintiff offers in evidence photographs marked for identification Nos. 5 to 11, inclusive.) The photograph or kodak picture which you hand me marked Ex. 12 for the Government shows one of the last boats I think I ever saw on the river which was built by these same Hobbs boys. I have seen that boat on the river. I would say that its length was 30 feet. Of the two boats in the picture the one I am referring to is the one with a black bottom and upper white rim. That was a motor-driven boat.

The photograph marked for identification Government Ex. 13 which you have handed me shows one of the first boats. I think this is a boat belonging to the stock company which my father and some of the earlier settlers there organized. What attracted my attention to the boat was the propeller on the side.

By Mr. THOMPSON. Someone put a newspaper clipping on this picture on the back, and we ask that it be disregarded. We had nothing to do with that, and didn't know it was on there.

By the COURT. When were those photographs Nos. 5 to 11, inclusive, supposed to have been taken?

By Mr. THOMPSON. I don't know. All I know is where we got them, but I don't know when they were taken, but the witness has testified he knows people in the pictures.

By the COURT. I mean the small pictures.

By Mr. THOMPSON. The best recollection I have of them is about 1912. Counsel object to what is on the back of this picture, and I think rightfully so. We offer this in evidence with
394 the suggestion that any thought about what is on the back of this picture be excluded. We will try to blot it out or remove it.

Q. I think you testified that your company moved about from two and a half to three and a half million feet of lumber a year, is that right?

A. Yes, sir.

Q. Are you able to estimate what other companies moved on the river during the years you were there?

A. It would only be comparative to what they were doing and what we were doing. I would give an estimate of the staves and what other lumber and ties was.

Q. With that qualification, please state your best judgment about it.

A. I would certainly think we handled a third of the business on the river. That would make somewhere between seven and ten million feet handled on the river.

Q. How many years would you figure there was such an amount of timber on the river?

A. We were in the business there about forty-five or fifty years. I would say about forty years.

Q. When you cut lumber and shipped it, would you ship it on order to some destination or take some chance on it?

A. Took all the chance. We bought the logs as I said delivered on the river side up maybe thirty or thirty-five miles from us, floated them down the river, cut them into different size timber and converted them into mouldings, window jams, etc., and shipped them where we could, and when I got big enough to run the mill we shipped everything mostly to Columbus, where our retail yard was.

Q. Prior to that had you ever shipped to any other cities?

A. Yes, sir; we shipped a great deal of oak for the manufacture of furniture, we went into the northeast, Boston was a big buyer, they used to take it up and measure it at our place.

Q. Did those buyers come to Hinton?

395 A. Some did and some of our regular customers we would ship a carload of lumber.

Q. Would that be on order from them, or how?

A. Yes, sir; on order from them. We cut a great deal of bridge and trestle timber.

The witness testified on Cross-Examination as follows:

I was not born in Hinton but went there when I was two years old. That was my father's and my mother's home. My mother died about 7 years ago and my father about 12 years ago. I went there during the summer; then all through the period I was in business down on Cabin Creek, 8 or 10 years, and have been in the coal business, but I went back to Hinton off and on all my life. I lived there continuously from the time when I was two years old to the time when I went away at school. I was about 16 or 17 years old when I first went away to school. I was away from Hinton in school three or four years but returned there each summer.

I was the bookkeeper and office manager. We did a lot of building in Hinton and summers I worked at the carpenter's trade and sawmill. I was brought up in the mill. After I had been away at school three or four years, I returned and was continuously identified with my father's business until I was 33 or 35 years old and then I was in the coal business in the county adjoining us. My father was in this coal business with me and I took charge of it, but Hinton was our headquarters at the same time. I would say my life was spent at Hinton for the first 38 years almost solid and intermittently between that time and the time when I was in the coal business downstream from Hinton, and that was ten years more. The coal business had no connection with the lumber business.

When I was a child the first boat I ever saw was a steamboat about 1877 or 1878. I saw it at the landing which they call Hinton's Ferry, a ferry operated right in front of our house. That is the deepest water from there down to about a half a mile in where the lumber and ties and boats and bateaux tied up. I never rode on that boat. I never saw the boat upstream above Hinton.

I have been in bateaux and taken them and chartered
396 them and run them up the river, but not a steamboat. The
farthest I ever went up the river on a bateau was the mouth of Bluestone, six or seven miles from Hinton. We floated our logs on the river and did not handle them in bateaux.

I don't remember the name "Cecelia Miller" in connection with this boat I mentioned having seen in 1877 or 1878. That is the boat there (indicating on picture marked "Ex. 13"). I remember seeing 3 or 4 boats built along during my life. I never rode on them. I mention another boat which I identify with the year 1889. I don't know whether this was a steamboat or gasoline motor boat. In characterizing it as steam or electric I mixed up electricity and gasoline. They were gasoline or steam boats I saw on the river. The boat I mentioned having seen about 1889 was a flat bottomed boat with paddles on it. I don't remember whether it had a particular name. I said I thought it had been built by the Hobbs at the Foundry. I don't know whether or not it was a pleasure boat used for picnics.

When I said I went to the mouth of Bluestone, we would hire boats for pleasure and go up and back in a day. We would take our girls along. That was a very favorite way of spending a day from Hinton, taking a bateau up the river.

I know where some of the logs floated on the river were put in the water—some in the Bluestone, some in the Greenbrier, and some originated at those points. I had one uncle whose particular business was to go around and buy these logs and we bought them on board measure and they went down to the mill and sawed. Sometimes the logs were brought a certain distance together in what we call rafts, 50 or 100 log rafts.

I saw some staves brought down the river on bateaux. Bateaux were continuously unloading those staves right there where I lived. We had one stave mill of our own, really more than one, that was up at Greenbrier. As I remember my father cut staves but from the time when I really remember we were cutting staves and bringing them down the river on bateaux and hauling them by wagons.

Q. I suppose you selected the method that represented the shortest route to where you wanted to go?

A. Probably the cheapest.

Q. As shortness bears on cheapness?

397 A. Yes, sir; and up the river, and Bluestone, they always used bateaux because that was the cheapest way to get down.

I think I have seen the Davis boat. I heard about it when I returned home from school. I saw three or four boats but I could not tell you just the name of the boats. I never connected the name Davis with any boat.

I was interested in the lumber company whether I was there all the time or not. I had been in the lumber business 45 or 50 years. My father and his brothers were in it before me. I had not been in it myself for that length of time.

I have no records which show the amount of logs and timber that our company brought down the river. After my father's death those books were kept a few years but I really don't know what became of them. My memory is very clear as to how my uncle used to bring in those log books. He would go to the woods, take his log rules and measure them and stamp them and when they came into the mill it became a board proposition and we sawed them up into boards. We stamped the initials "J. S." on the logs. We were cutting logs continuously over that period where we could get the timber.

When a log got to the sawmill I couldn't tell whether it had come down the New River, the Bluestone River, or the Greenbrier River. Our logs which were hauled by wagon were also initialed "J. S.".

My estimate of the amount handled through the books came from my general experience closing the books over that period of years. Ninety-nine percent of our timber came by water at that time.

Q. Were you concerned at that time by allocating the method, how it was sent?

A. I arrived at the feet we cut over a period of years and the average cost and sales price.

399 **John H. Peters** testified upon Direct Examination as follows:

I reside at Washington, D. C. I was born in Monroe County, West Virginia, and will be 70 years old the 15th of next September. I lived in Monroe County about six years until we moved from there over into Mercer County, West Virginia. I have been on New River practically all of my life.

When I was a young man my father and I ran boats up and down the river for a good many years. My father had charge of the boats and I went along with him to see after them. I never owned any of the boats on New River myself.

My father had six boats at one time, I think. They were called bateaux, and were 66 feet long. We built some of them ourselves. In the center they were about 8 feet wide. Referring to Exhibit No. 2 which you hand me and which contains a picture of a boat, this is the type of boat I was speaking about and is called a bateau. The capacity of these bateaux in carrying lumber was about 10 or 12 thousand feet of lumber as it came from the saw mill.

The town of Glen Lyn is located in Virginia at the mouth of East River. I have been to Glen Lyn on my father's boat looking after his interests. My father sold his boats after so long a time. While he had them we hauled trade up and down the river from Hinton to Glen Lyn and we made one trip clear to Radford. From Hinton to Glen Lyn we carried mostly stuff for the Norfolk and Western when they were building the railroad there.

We carried groceries of all kinds up to the Salt Works, which is up the river from Hinton about 22 miles on the right-hand side going upstream. There were stores up and down the river which had country trade. We hauled stuff up and down the river for them. When they shipped stuff out we took it.

On the trip down from Glen Lyn we hauled mostly tobacco and some fertilizer. I couldn't state just exactly the date when we hauled fertilizer. It has been so long ago I cannot remember the date. It was when I was a young man. We brought fertilizer down from Glen Lyn for about two or three years. It was distributed along at different places down the river as we came down. The fertilizer came from Dublin, across there to the mouth of East River. I do not think any of it came in on the Norfolk & Western.

400 Some of the materials which we carried for the Norfolk & Western was boxed up. I don't know what was in the boxes, but we hauled powder and dynamite, picks and shovels, and stuff they used on the railroad. That was when the Norfolk & Western was being built.

I took trips myself on the boats. I had several darkies working for me on these boats. I don't know whether I could recall the names of all of them or not. We had some of the Medleys and some Smiths, and there was one by the name of Tom Agee. These men moved those boats with poles. We had three men on each boat.

Q. I believe you stated you made one trip up to Radford?

A. Yes, sir.

Q. Please state or describe that trip to the Court?

A. Of course, I wasn't along with the trip, but we moved——

By Mr. Abbot. We object to anything that he testifies about the trip. He says he was not along.

By Mr. Thompson. He said he was not along with the trip, so I will withdraw that question.

Q. Did you ever move a man or contract to move a man to Radford?

A. Yes, sir.

Q. From where?

A. From Crump's Bottom.

Q. Who was that man?

A. John G. Crockett.

Q. And what were you doing for him?

A. We were moving his household furniture to Radford.

Q. Do you know as a matter of your own knowledge that you did move him?

A. Yes, sir.

Q. And whom did you move on that boat?

A. John G. Crockett.

Q. Was his family with him?

A. No, sir; they weren't along, but we moved his household goods.

Q. Did your men go on this trip?

A. Yes, sir.

Q. State whether or not you were paid for moving Mr. Crockett?

A. Yes, sir; we were.

Q. Who were the men that moved him if you remember, I mean of your men?

A. There was two Merchants.

Q. You mean the Merchant brothers?

A. Not brothers, one was the old gentleman and the other was the son.

Q. Were they colored men?

A. Yes, sir.

401 Q. Who else?

A. I think this man Agee that I have been telling you about was along and a man by the name of Roach.

Q. Do you know whether a man by the name of Smith was along?

A. I think there were two Smiths.

Q. How long were you on the river with the boats?

A. I was on there, I guess—I couldn't say, just exactly, but about 16 or 18 years.

Q. During that time were you going up and down the river?

A. Yes, sir; we made trips up and down the river pretty nearly every week.

Q. How often would you go to Glen Lyn?

A. While they were building the Norfolk & Western we made a trip up there nearly every week.

Q. And how often would you go when you were getting the fertilizer?

A. We would only go about one trip up there in the spring.

Q. And why did you go in the spring to get fertilizer?

A. Because the people raised tobacco in that country and they used fertilizer for raising the tobacco.

Q. Do you recall whether you made trips at any other time to Glen Lyn other than for fertilizer and for carrying materials for the Norfolk & Western?

A. Yes, sir.

Q. You did?

A. Yes, sir.

Q. When did you do that?

A. That was just about before the Norfolk & Western was built. We moved from there——

Q. From where?

A. From up there at Glen Lyn.

Q. Did you ever live at Glen Lyn?

A. Right close to Glen Lyn.

Q. How close to it?

A. About two miles.

Q. Which way?

402 A. Back northwest from the mouth of East River.

Q. You were back from New River?

A. Yes, sir.

Q. You moved from the junction of East River and New River to where?

A. To Mercer's Salt Works.

Q. That was across the State Line?

A. Yes, sir.

Q. You have no recollection of boats moving up and down the river prior to the Government doing work on the river; or have you?

A. Yes, sir; boats ran up and down there all the time.

Q. As far back as your memory goes?

A. Yes, sir; as far back as I can remember.

I worked opposite the Salt Works in one of the channels when that Government work was done. The work consisted of opening a chute through the falls. I can't say that it facilitated the movement of boats up and down the river. It helped in a way in getting up the river but it did not help in getting down the river.

Boats did go up the river before there was a clearing of the channel and they continued to do so after the clearing of the channel. The Government work made it easier going up but did not necessarily improve the river for coming down.

I think I have seen a steamboat moving on the river, called Cecelia, two or three times. I don't know whether I can describe it exactly or not. I could not give you its dimensions but I think it was about 50 or 55 feet long. I think it had two side wheels and one back wheel. I think there was only one pipe or smoke stack on it. It had a whistle which I have heard.

This steamboat hauled freight and passengers up and down the river. Tobacco was about the only industry that the farmers worked at. Everybody raised tobacco. They got the tobacco ready for market and brought it to Salt Works and different places along the river and we boated it to Hinton. I can't give an estimate in pounds of the amount of tobacco I boated down the river, but it was up in the millions of pounds.

The witness testified on Cross Examination as follows:

My father owned five or six bateaux. They were built way back yonder. I don't recall just when but I would say it 403 was after 1878. I think they were built about 1885 at Mercer's Salt Works. I helped build them. He was running the store there. I did not build them all myself, because we had other carpenters.

My father ran these bateaux for twenty years or more. He has been dead about 12 years. He ran them until somewhere along in 1905. When he got through with them he sold them to different persons along the river down there. I think one went to a man by the name of Lily and I think one went to a man by the name of Frazier. I think he had more than two to sell at the time he sold these boats. He didn't sell all the others at that time. He still ran them up and down the river. But there came a time when they were all out of his possession. The others were sold later on, I couldn't say just when.

When we moved to Mercer's Salt Works I was about 15 years of age, I believe. I will be 70 years of age my next birthday.

Q. You stated that you yourself did not move Mr. Crockett to Radford?

A. I did not go with the boat myself.

Q. Did Mr. Crockett pay you before he left, or I mean, did he pay you the money for the trip before the bateaux left up there?

A. No, sir; he was to pay us and did pay us after the work was done. He still stayed there a good while after his stuff was all moved.

Q. Do you remember the year in which he was moved by some of your father's boats. You said you did not own any of the boats yourself?

A. No, sir; I did not own any boats myself.

Q. What year was he moved by your father's boats?

A. I couldn't say.

Q. What is your best recollection about the date or rather the year?

A. It was in the nineties, I think, 1890 something, I cannot tell you for certain, because I don't recollect those dates, but I know the boats went up there, though.

Q. Your father was alive at that time?

A. Yes, sir.

Q. And he owned the boat?

A. Yes, sir.

Q. Did Mr. Crockett pay your father?

A. Yes, sir.

404 Q. That is, he paid your father or paid you?

A. He paid my father, which was the same thing, because I was looking after them for him and whenever there was a bill coming in I would know it.

Q. And you handed it over to your father when it was paid?

A. Yes, sir.

Q. Do you know whether he paid it by check or cash?

A. No, sir.

Q. I suppose if the money or a check was handed to your father, you wouldn't know which it was?

A. I wouldn't know which it was now; no, sir.

Q. And the fact that your father was paid, is based upon what your father told you, I assume, that he was paid for the trip?

A. No, not exactly that, because I was generally there when those transactions took place, because I was interested in them.

Q. You say "those transactions." There is only one transaction involved here, isn't there, the payment to your father?

A. Yes, sir.

Q. And you were present when your father was paid? I understood you to say a moment ago that you were not present and that you did not see whether a check or money was handed to your father?

A. I don't know whether it was paid in check or paid in money. It has been so long ago I have forgotten all about that, but I know it was paid.

Q. You have an impression, however, that it was paid?

A. Yes, sir.

Q. I suppose Mr. Crockett was a man of good repute, and a man that ordinarily paid his bills?

A. Yes, sir; he stood mighty high, Mr. Crockett did.

Q. Now you say you saw boating on the river before the Government did this work on the river?

A. Yes, sir.

I can't recall the year the Government commenced working up there. I don't know how old I was when the Government started the work on the river. I was large enough to be able to do 405 a man's work. I was living at Mercer's Salt Works at that time. My father did not do any work on the channel. He was running the store. My father also had a farm up on East River. Farming was not my principal occupation but I worked on the farm there and worked on the boats, when there was boating to be done.

Q. You mentioned a little while ago that you made these trips by boat to Glen Lyn. As a matter of fact, the majority of times you did not get to Glen Lyn by boat, did you?

A. No, sir; not the majority of times.

Q. The majority of the time you had to stop your boat below the falls, didn't you?

A. Yes, sir.

Q. And you unloaded your boat there. Isn't that a fact?

A. Yes, sir.

By Mr. **Thompson**. What falls are your speaking of, Mr. Forbes?

By Mr. **Forbes**. Shumate's Falls.

A. When we could get up we went on up to Glen Lyn, went up in East River and unloaded up there in the East River.

Q. The Government did not cut any channel through Shumate's Falls, or did it?

A. No, sir; it never went that high.

Q. Where did you unload in East River on the occasions when you did get up there by Bateau?

A. I don't know whether you would understand it now or not. Do you know where the Ford used to be in East River?

Q. What ford?

A. There is a kind of a bridge I reckon across there now. I ain't been there for years, but it was right down off from the depot, right opposite that old bluff as you go in the East River.

Q. Was there a landing there or a wharf?

A. No, sir; that water was deep in there and we would run up in there and unload right on the bank.

Q. Was it further up the creek than Mr. Shumate's house at Glen Lyn? Do you know where Mr. Shumate's house was?

A. You mean the man that run the store there?

Q. The one that had a brick house; yes, he was the man that run the store?

A. He didn't have any brick house there.

406 Q. You are sure of that?

A. Yes, sir.

Q. Did you ever see any brick house in Glen Lyn at that time?

A. I think there was one over there. There was a widow lady there by the name of Mrs. Hale.

Q. Do you know where Mr. Shumate lived, who ran the store?

A. He lived in one end of the store.

Q. Where was this brick house in which Mrs. Hale lived with reference to the store, which direction was it from the store, and how far?

A. It was south of the store.

Q. How far?

A. About a quarter of a mile, I reckon. Shumate's store was right on what they called Adair's Run.

Q. Was there any other store there at that time besides Shumate's store?

A. No, sir.

The point at which I worked in the channel was right across from the Salt Works. I worked there for two or three months, from some time in July until the water go so cold that we had to quit.

I don't remember how much Mr. Crockett paid for the movement of his household goods.

I guess I have seen the boat called "Cecelia Miller" three or four times up there. It came up to the mouth of Lick Creek. I don't think it was on the river very long. I think just a few months. I never seen it stalled on the river because I never went along with it. I would judge this boat was about 55 feet long. It might have been 60 feet. There was some kind of a little house built on it. It had a kind of a deck but I couldn't tell you what it was because I just looked from the bank when it was going up or down the river. I couldn't tell you whether there were one or two decks. I know there was something built there for passengers to sit under and on, but I couldn't say what it was. I did not see the "Cecelia" carry merchandise up and down the river myself. All I know is just what people told me.

Q. Now these trips that you mentioned a while ago on which you went to Glen Lyn, as a matter of fact, you did not go on many of those trips yourself, did you?

407 A. No, sir; I didn't go on all of them; no, sir.

Q. How much of the time was there that you had to unload your goods below the falls?

A. About two-thirds of the time.

Q. You said you tried to run once a week. I suppose, as a matter of fact, there would be two or three weeks or several weeks at a time in which you did not run, and sometimes as much as five or six weeks?

A. Sometimes in the winter time when the river froze up we could not run up the river.

Q. But aside from the time when it was frozen over, ther' were other times when there would be several weeks that you did not run. You don't mean to say that you went every week up to Glen Lyn, did you?

A. No, sir; I do not. I couldn't recall that we went every week but we went lots of times.

Q. And then sometimes you would skip a few weeks?

A. Yes, sir. Whenever we got a load of stuff for the boat to go up there then we commenced to haul.

Q. But quite often there was nothing there to haul?

A. Pretty nearly all the time there was something to haul up there.

Q. But it was a question of whether or not it was an advisable time to get up there?

A. It depended on how much they had down there, if we had enough for a boat load we would go, but if we did not, sometimes we would have to wait until we did get a load.

Q. Who paid to have this material hauled, such as was hauled?

A. You mean the stuff that was hauled up for the railroad?

Q. No, sir, the merchandise to Glen Lyn. You mentioned that you hauled merchandise and fertilizer, and tobacco from Glen Lyn, that you received it at Glen Lyn, or did you also receive that below the falls?

A. No, sir; the tobacco we received up there, it was right at the mouth of East River.

Q. You mean the tobacco was grown there?

A. No, sir; it was grown out in the country and brought there and loaded on the boat there and we took it to Hinton, and the railroad company paid us our freight back. 408

Q. The railroad company paid you for taking it down to Hinton?

A. Yes, sir.

Q. On how many of those trips from Glen Lyn, that is, up the river, or rather up there on the East River, to Hinton, for the railroad, did you actually make yourself, I mean, yourself?

A. I couldn't tell you that, because I don't know, but I made several trips, I couldn't say how many.

Q. Do you think as many as ten?

A. I guess maybe more.

Q. Can you recall who, on behalf of the railroad company, employed you to do that work? Can you name the man?

A. The man that had that contract was named Rhinehart.

Q. He worked for the railroad company, that is, he was employed by the railroad company?

A. No, sir; he had that contract to build the railroad, or that part of the Norfolk & Western in there.

Q. You mean that Mr. Rhinehart paid you for hauling tobacco?

A. No, sir; he didn't pay us for hauling tobacco or anything like that.

Q. Who paid you for hauling the tobacco down to Hinton?

A. The railroad company, the C. & O. paid us for hauling that tobacco.

The man who actually paid us for the hauling of tobacco to Hinton was the agent there at Hinton. I think it was Mr. Calloway, and I think Mr. Gunther—Mr. Flannagan and Mr. Gunther. We hauled tobacco there for several years.

I was sixteen or seventeen or eighteen years old or along there when we hauled that stuff for the railroad. After that we boated lots of stuff all along down below there, staves and lumber. We took a load of fertilizer down the river in the spring. I couldn't say where it had been hauled from or how it got to Glen Lyn from Dublin, but it was loaded on the boats there. I understood that it came from Dublin. It didn't come down the river—it was conveyed. I don't know whether the Norfolk & Western was running at that time or not. I couldn't say. If it was not running, it
was hauled in there by wagon. We never hauled any fer-
409 tilizer but one year. We hauled a load one spring. I can't
recall how old I was when we hauled that fertilizer down
there. I must have been sixteen or seventeen years old—maybe eighteen. I won't say for certain.

Q. Now the supplies as I understood you boated for the purpose of building the Norfolk & Western railroad to Glen Lyn, on some of which occasions you had to unload the boat at the foot of Shumate's Falls, that also was the time when you were about the same age, wasn't it, sixteen or seventeen or eighteen?

A. Right along there sometime.

Q. That is, while the railroad was in the course of construction at Glen Lyn?

A. Yes, sir.

Q. That is the trip that you made in which you brought the fertilizer down there in the spring. Was that load of fertilizer brought down the river from Glen Lyn before or after you moved to the Salt Works?

A. That was before we moved to the Salt Works.

Boating on the river wasn't no easy job. If I was supposed to be out there today, I think I would let somebody else take my place. I don't know that it is as difficult work as I ever did—I have done some pretty heavy work; for example, making excavations for buildings is more difficult. Whenever you get an excavation for a building and go down in the ground, you don't get a breath of air. You do get some air on the river. There was always a breeze.

There was a ford across the river in my section of the river. I have forded the river many times and waded it too. I have forded the river just above Shanklin's Ferry and also at what they call Walker's Island. Those were the only two places that I forded the river. I waded the river also just above Shanklin's

Ferry on that ford. There is three or four fords down the river. There is one called Warford's Ford, but I never had occasion to cross that one. I went to Hinton many times on horseback.

Q. Did people in the country go by wagon or buggy?

A. Not then, or not often. You wouldn't see a wagon or buggy go by there I would say once or twice a year.

Q. Did the best road to Hinton run past where you lived?

A. No, sir; I don't reckon it was. There was a road that
410 ran down the river, but it wasn't no feather bed, I can tell you that.

Q. Why did you quit this boating?

A. I think the last trip I made down the river was in 1905 or 1906.

Q. The question I asked you was, why did you quit it?

A. I married and got away from the river.

Q. Do you know when the boating down in that country stopped?

A. No, sir; I don't know, I couldn't say. After I got away from the river, I never tried to keep up with it.

Q. Nor do you know why it stopped?

A. After they got to building good roads in there, then they could get their stuff cheaper than they could bring it up on the boats.

Q. The railroads were not the cause of it being stopped?

A. No, sir.

Q. Do you remember what your father's bateaux would draw, that is, what depth or the draft of the bateaux was?

A. It just depends on how it was loaded.

Q. When it was loaded, there was a draft of what?

A. From 12 to 14 inches.

Q. And it would carry how much of a load?

A. We would always aim to bring about 5,000 pounds up the river.

The contractor who had the contract for building the Norfolk & Western road was named Rhinehart—something like that. I don't know his given name—we always called him Captain Rhinehart. I think he lived in Roanoke at that time, but I am not certain.

The place in Virginia at which we lived was close to Glen Lyn—it was about two miles northwest of Glen Lyn on a farm. A man named Louis Caperton lived on the adjoining farm. This was south of my father's farm, between us and East River. There also was a man named Thompson who had a piece in there between us and East River where Shumate had his store. Charles S. Thompson owned the farm on the other side of us.

We lived next to him. Our farm was about seven or eight miles from Round Bottom. I have ridden horseback from my father's place to Round Bottom around the mountain.

Q. When you hauled tobacco for the railroad, isn't it a fact
that on a good many occasions the tobacco was hauled by
411 wagon to the foot of Shumate's Falls, and there was
loaded on your bateau?

A. It was not; no, sir.

Q. That never was the case?

A. No, sir.

Q. Wasn't that load of fertilizer that you mentioned hauled by wagons to the foot of Shumate's Falls and there loaded on your bateau?

A. No, sir.

Q. When you went up the river from Mercer's Salt Works, what is the first falls that you come to?

A. After leaving Mercer's Salt Works?

Q. Going up the river; yes, sir.

A. There were some falls right in there.

Q. Did you put your boat in the river before or below those falls?

A. Below it; we were in there just below the falls. Mercer's Salt Works were near these small falls there.

Q. There were small falls there?

A. Yes, sir.

Q. What were the next falls that you struck?

A. The next place up there was Shanklin's Gravel.

Q. Shanklin Gravel was the next?

A. Yes, sir.

Q. What did you next strike?

A. There were two or three little chutes there; I don't know; they didn't have no name until they got to Wiley's Falls.

Q. I wish you would tell us if you had and difficu*tl*y in going over these falls?

A. No, sir; not a bit in the world.

Q. When you got to Wiley's Falls, did you have any difficulty there?

A. No, sir.

Q. You had no difficulty there?

A. No, sir; there was no trouble going up the river to Glen Lyn nowhere.

Q. How did you get through Wiley's Falls?

A. How did we get through Wiley's Falls?

Q. Yes?

412 A. We just shoved the boat through there.

Q. Do you remember what part of the falls you shoved the boat through?

A. Well, it was on the east side of the falls.

Q. On the east side of the falls?

A. Yes, sir.

Q. What is there on the east side of the falls; is there a chute there to go through?

A. There is a chute there now, but when I first went through there, there was no chute. Them falls tapered off there.

Q. You went through on the east side, did you?

A. Yes, sir.

Q. Before the work was done there and after it was done by the Government, there was a straight chute through the east side of the falls?

A. Of course, there was a chute there, but before that there was not, but the falls tapered off to that side where there was not so much falls to it.

Q. Did you go through there before the Government did this work?

A. Yes, sir.

Q. Where did you go through then?

A. Glen Lyn.

Q. On the east side of the falls?

A. Yes, sir.

Q. What was the next falls above Wiley's Falls—the next obstruction above Wiley's Falls?

A. There was another little falls up there; I don't know what they called them.

Q. How far above Wiley's Falls?

A. About, I will say, about 2 or 2½ miles.

Q. Did you have any difficulty there?

A. No, sir.

Q. What was the next beyond that?

A. Then comes Shumate's Falls.

Q. Did you have any difficulty at Shumate's Falls?

A. Sometimes we would and sometimes we did not.

413 Q. When you went through Shumate's Falls, where did you go through?

A. We would go through on the left-hand side as you went up the river.

That would be on the right-hand side if you were in the river, but on the left-hand side if you were on the bank. If you were in the river, the boat would be on the right side, but in walking up the bank, it would be on the left-hand side of the river going up. I could not tell you whether that would be the east or the west bank of the river because the river makes so many turns.

Q. Was there a channel through that part of the river just above Shumate's Falls or through Shumate's Falls?

A. No, there was no channel cut through there; no, sir; Wiley's Falls was as far as they did that.

Q. How much tide did you have to have in the river to get through Shumate's Falls?

A. You did not have to have much of a tide; just so the water was good and swift, you could go through there.

Q. How much tide did you have to have to go through Wiley's Falls?

A. You didn't have to have any; just ordinary water.

Q. Before the channel was built, did you have to have any tide to go through Wiley's Falls?

A. No, sir.

Going up the river, we could run a little better when the water was low than when we had a tide.

I don't know how high Wiley's Falls was, but my best judgment is that it was higher on the west than on the east side. I could not tell you its height in inches on the east side. Regarding the elevation of the river, it is stationary. I could not tell you the elevation in inches in low water. I would say that it was as much as a foot and more. I know there were more than five or six inches there. I could not tell you whether it was less than eighteen inches. I think there was a difference of six or eight feet in elevation between the higher parts of Shumate's Falls at low water and the lowest part after the water had passed over the falls. Them falls was pretty long in there.

414 The witness, on Redirect Examination, testified as follows:

I testified that we aimed to have cargoes or loads of 5,000 pounds. When we went to Glen Lyn we would have loads of approximately 5,000 pounds. I said about two-thirds of the time we had to unload at Shumate's Falls. We did not take the unloaded cargo around the falls. They came with wagons and teams and hauled it. Shumate's Falls was in the State of Virginia. We did not have to unload at Shumate's Falls when we came down the river from East River. We did not have to unload at Shumate's Falls. I never unloaded a load anywhere on the river while I was on the boat.

I guess I was a couple of hundred yards away out on the bank when I saw the boat Cecelia. I don't know for certain what it carried. I know it carried passengers. I seen them on there, but as to merchandise or freight, I could not say because I did not see it. It was a matter of general discussion about the boat going up and down the river and what it was hauling. They made several trips coming up below us there at Crump's Bottom. I don't know what he had, but it was passing us.

Q. You were asked about trips up the river to Glen Lyn. State whether or not you could make those in the summer, the springtime, and the fall?

A. Yes, sir.

Q. Could you make them in the wintertime?

A. Well, if there was no ice on the river, we could.

Q. And at a time when there was no ice on the river——

Q. How many years did you boat to Glen Lyn and back again?

A. About 3 years, to the best of my knowledge.

Q. And you made those trips whenever you had a cargo?

A. Yes, sir.

Q. And when you made them, you said you went regardless of the weather and conditions?

A. Yes, sir.

Q. And you were never stopped on any one of those trips?

A. No, sir.

415 We never stopped on any of those trips. I said the work of pushing one of those boats was not as difficult as excavating for a building; I'll take my work on the boat all the time. The boat work was easier.

By "fording" the river, I mean going across on horseback. You could not go across on horseback in high water or when the river was fairly high. It had to be low water. In low water the water would come up so high on the horse that you would have to draw up your legs. It would come above the stirrups a right smart piece on the horse's side. You could wade the river when the river was low, but not in high water or medium water. In low water the water would come up almost under my arms sometimes in wading the river.

I would say that Wiley's Falls was fifty yards long downstream. I guess Shumate's Falls is about 200 yards long—maybe longer than that.

I carried fertilizer down there from Glen Lyn for only one season. I do not know whether or not my men carried it more than one season.

Our farm was located right close to New River. That was what we called the second bottom from the river. Our farm was about half in Virginia and half in West Virginia. The line split right through it. We had 640 acres. We raised tobacco and shipped it down the river on bateaux. We put it on the boats right below the mouth of East River at a place called Baptizing Hole. That is in the State of Virginia. Wiley's Falls is located away down the river, six or eight miles from there, partly in Virginia and partly in West Virginia. The State line crosses at that falls.

The witness on Recross Examination testified as follows:

Q. This tobacco that you raised—why did you send it down the river?

A. If we could not send it down the river, we would have to haul it to Dublin.

Q. Why did you want it to go to Dublin?

A. To get it to the railroad.

Q. Was that the same object you had in mind in sending it to Hinton? To get to the Railroad?

A. Yes, sir; to get to the railroad.

I was only ten or twelve years old when we were shipping tobacco at Glen Lyn. The fertilizer which I hauled for one season consisted of only one load—one trip up there. 416

Q. Now, Mr. Peters, to clear up one further thing—how old did you say you were when you worked on the channel—the Government channel?

A. I could not tell you.

Q. You might state it approximately; you said you did a man's work. Approximately how old were you?

A. I could not give you the dates.

Q. I don't want the date; I want your best recollection of how old you were then?

A. I was 17 or 18 years old.

Q. Was it after that that you hauled these supplies for the building of the Norfolk and Western Railroad to Glen Lyn?

A. No.

Q. Was it after the channel was built?

A No, sir; we hauled a whole lot before the channel was ever built.

Q. What did you say?

A. We hauled a whole lot before the channel was ever built; then we hauled while the channel was abuilding.

Q. You hauled some before the channel was built?

A. I don't recall whether or not it was for the Norfolk and Western Railroad.

Q. That is what I was asking you about.

A. We hauled some for John T. Shumate, that run a store there.

Q. Let's get back to the supplies that you mentioned that were hauled during the course of the construction of the Norfolk and Western Railway Company. Now were those supplies hauled after the channel was built?

A. I cannot recall that; I don't know that.

Q. You don't know whether they were hauled before or after the channel was built?

A. No, sir.

Q. That is your best judgment, is it?

A. As well as I remember.

Q. Do you remember if you went through Wiley's Falls or not?

A. Yes, sir; we went through Wiley's Falls.

417 Q. And you went through Shumate's Falls sometimes without unloading?

A. Yes, sir; we went through Shumate's Falls without unloading; we went clear on up into East River.

Q. Was the channel cut through Wiley's Falls when you did the boating of the supplies for the construction of the Norfolk and Western Railroad?

A. I cannot recall whether or not it was. I cannot say.

James H. Howard, on Direct Examination testified as follows: I will be sixty-seven the 12th of next January. I was born January 12, 1870. I live in Pulaski County, Hiawassa District, about a mile from New River. I have lived there thirty-eight years. Before that I lived a mile above Allisonia right on the river. I have lived on or near New River my entire life. I am familiar with the New River in the vicinity of Allisonia down as far as Radford.

During my lifetime I have seen keel-bottom boats on New River. They were about 65 or 70 feet long, about 8 feet wide and they used two by sixes and sloped them two by sixes to make it rounded then under the bottom, and that was planked up the long way and on the inside they put two by eights across and laid a sub-floor in order to put everything they wanted to hold on, and then up about six inches above the sub-floor there was a running board eight inches wide from one end to the other for them fellows to walk on that run the boat. Those boats loaded were supposed to carry five tons.

I saw those boats loaded. My father used to haul pig iron from Boone Furnace to Allisonia and he brought that on boats and taken it to New River Depot which is below Radford. I don't know exactly how far it is below Radford. The distance from Boone Furnace to New River Depot, I suppose, is twenty-eight or twenty-nine miles.

The first time I observed these boats on the river was when I was eleven years old. They was cutting a channel in the river—a boat sluice. My father owned a ferry and they put a camp in his bottom, right at the ferry. That was a mile above Allisonia. When they opened the channel up that far those boats come up that far. The ferry my father owned was called Howard's Ferry. Those boats were running there when the railroad was built.

418 They was using them boats there. There was a rock quarry on my father's place. The stones were gotten out from it

for the bridge for the railroad at Hiawassa and also Reed Island and those rocks were hauled to the river and loaded on the boats and taken four miles to Hiawassa for those piers. They claimed that the capacity of those boats which hauled the stone was ten tons. I couldn't tell you. There were four of them hauling pig iron and two hauling stone I think.

I am not positive how long these boats were used in this way, but I think the furnace—those boats we used them up to the time they quit to haul pig iron—as long as the furnace run. My judgment is that it has been thirty-five or forty years since Boone Furnace run. I suppose it was twelve or fifteen years between the time the furnace stopped and I first saw these boats. They stopped hauling iron at the time the furnace stopped. I don't think the furnace had been stopped more than 18 months or two years when the railroad was built. This traffic I am speaking about occurred before the railroad was built.

Speaking about roads, there was a travel-way from there but it was pretty rough. My father hauled pig iron by road to Pulaski, which was then called Martinstank. It was three miles from Boone Furnace to my father's place and about twelve miles from there to Pulaski or Martinstank. This hauling by wagon was done usually along about the last of November. It would get cold and there would be too much mushy ice in the water so that you couldn't use those boats. The winters were different then from what they are now and you couldn't use the boats then.

My father would haul with wagons then until along in March when they would begin using the boats. The only time I hauled on wagons was when the river was full of mushy ice.

They gave my father $4.00 a ton to haul that iron to Martinstown or Martinstank, and four of the fellows who worked on the boat used to work for my father. I was a kid then and used to ride on the boats some with them. They told me that they were getting $1.50 a day and it took them a day and a half to make the trip and they would take five tons. That was $9.00. When my father hauled it on the wagons, that was $20.00. There was a difference there of $9.00 and $20.00. It was more profitable to haul on the river than it was to haul by wagon..

My father ran Howard's Ferry. I recall the time when that ferry boat broke loose. It was fifty-two feet long and
419 twelve feet wide—a flat boat. The last few years it was operated, it was rented to Virginia Iron Coal & Coke Company. They paid my father and mother $1.00 a day for it. They put a man there to mind the ferry and he let the boat get away on a tide and it washed down to where I am living now, about twelve miles. A man by the name of Whit caught the

boat and I said to my brother, "Let us take that boat back up there." So we hired a man to help us and Whit wouldn't let us have the boat unless we paid him $10.00 for capturing it. We paid him $10.00 and taken the boat back. It taken us three right at two days. We took the boat back twelve miles to Howard's Ferry, the original place.

The witness on Cross Examination testified as follows:

The other man on the ferry boat with me was my brother, R. L. Howard. I don't remember the third one at this time. They just picked up some of the hands they had at the mines and put them there. There was no special plan. One man would be put on one day and maybe another one the next. Three of us taken the boat back when it washed away—my brother and I and a boy named Dallas Elkins. It was Bob Whit that caught the boat. We brought the boat up just in the daytime. Nobody else was helping with it, I am sure. We taken the boat the first day and fastened it to the bank and went home that night and went back the next morning. We used poles to get it up.

There was two falls that we had to go next to the bank on account of we used a cable over two falls. We couldn't stay in this boat and use the cable because we had to snub it to a tree above. We did not use a block and tackle to get up the river with the boat. We used a windlass which we made and a wire cable to go over those two falls. Outside of that, we didn't use anything but the pole. One of those falls was, I suppose, a mile above Whit's Ferry. The other falls was up at what they call Runyon's Island, which is right where the bridge is built now across New River below Hiawassa. I do not mean the railroad bridge. We have a bridge across for cars and everything at Lowman's Ferry. That is below Hiawassa. There is a railroad bridge at Hiawassa.

Mr. R. L. Howard who testified in this case the other day is my brother. I do not know that my father hauled any iron to Pulaski while iron was being boated on the river, but I wouldn't say he didn't, but not that I know of or have any recollection
420 of. He did haul iron in the winter time. I know that. I don't mean to say that he didn't haul it in the summer time.

Regarding your question whether my father had a contract with Boone Furnace people that whenever he was hauling a load of iron to Pulaski and came across the boats loading at the wharf he would get a dollar for going ahead and unloading on to the boats. I don't know about that. I was just a kid. The men got a dollar and a half a day working on these boats. That is what they told me. There were four of those men that worked on the boats that used to work for my father. There were three on each boat, but there were four of these who used to work for my father.

The witness on Redirect Examination testified as follows:

I spoke about having a windlass to help get this ferry boat back upstream. I will explain why it was necessary to have the windlass. There were twelve feet of water there that we were trying to push the boat against and it made so much force on the boat in those swift falls that we couldn't push it over is why we used the windlass. Three men couldn't push it over there because there were twelve feet of flat space in the breast of that water. That is why we couldn't push it over there.

The contract which my father had was for hauling iron from the furnace down to the landing. It was not a contract to haul down the river.

The witness on Recross Examination testified as follows:

My father had a contract with Graham and Robertson to haul the iron that was put on those boats on the river. I don't know anything about a contract to haul to Martinstank. I don't know whether he had such a contract. He would haul to Martinstank and got $4.00 a ton for it. I don't know anything about him having a contract to haul to Martinstank. He had a contract to haul to what is called Allisonia now on the boats. We had a whole lot of teams there and could cultivate our crops and spare a team off nearly all the time. It was no trouble to take a team that distance. We would haul five or six tons a day.

He made this contract with Graham and Robertson's superintendent, who was Major Rives Tipton. My opinion is Mr. Wesley Lyons was superintendent there at that time. I wouldn't be positive about that. I didn't say that he had a contract to haul it to the river, but didn't have a contract to haul to Martinstank
421 because he had had a contract that what they didn't boat to Martinstank he would have to hire teams instead of using what teams we got because he could not have kept it away from the furnace. That was fifteen miles that he had to haul it. Certainly he would be utilizing the team all the time, but we had our teams to farm with. We had six hundred acres of land. We didn't have the teams especially to haul. We had a good many teams. I do not mean to say that all of these teams were busy all of the time.

Q. You could just as well be hauling to Martin's Tank as to the river, could you not?

A. I suppose so. I don't know what difference it would mean.

Q. And you know your father got $4?

A. I can tell you the difference very easy. That is very easy to explain. We got a dollar a ton for delivering it three miles from the furnace to Allisonia. We only got $4 a ton for delivering it from the furnace to Martin's Tank. That was fifteen miles. He would send the teams to Boone's Furnace, put on a ton of iron, bring it three miles to home in the evening and the next morning make the trip to Pulaski, to Martin's Tank and back, twelve miles. He got $4 for that. He put men there time and again, and they would haul six tons this three miles. That was $6. There was a difference there of $2 a day for a team, and that was a great big difference. They didn't do that every day, but they never did haul less than five loads.

Q. Isn't one of the main items of hauling iron loading and unloading?

A. Well, of course, that was a great big job, but we just paid those men 75 cents a day that we had on the place there and it was a hardship on them, of course, but it really wasn't nothing more out of our pocket.

I did not say that my father did not haul iron to Pulaski while they were boating iron on the river. I said that we would haul iron there when the mush ice was in the river and they couldn't use the boats. Along in November, the nights would get cold and get mush ice in the river and they had to cut the boat out. He did haul then, I know. He might have hauled some little to Pulaski when there wasn't mush ice in the river. When our crops was laid by, the teams was idle then, and of course it didn't take them all to keep the iron, what they boated at Allisonia, that short distance. They might have hauled some.
422 I wouldn't say that he did or didn't. He had no contract
to haul to Pulaski, but he had a contract with their superintendent to put iron at the boat at Allisonia, a distance of three miles. That was the only contract he had. Mr. R. L. Howard, who testified in this case, is my brother, six years older than I am.

Henry S. Skeen on Direct Examination testified as follows:

I was born in 1848 at Walker's Creek, Giles County. I lived there until 1862 and moved then to New River down near a place called Lurich. The railroad pushers used to stay there. That place is below the Narrows about four miles, between Narrows and Glen Lyn.

I served in the army in the Civil War in the 36th Virginia Regiment. While I was in the army, I have camped on New River down at the Narrows and at that time saw boats operating on New River. They run from the Narrows up this way about Radford, I suppose. The army had a commissary down there at the Narrows right about where the station is now and those boats would bring provisions down there to the commissary, stuff like that you know for the soldiers. Some of the boats would go downstream from the Narrows where I was camping—right on down below Glen Lyn—I don't know how far down they went.

After the War was over, I stayed in the neighborhood. After the war, I did not see very many boats on the river. I saw one that hauled bales of straw and hay or something of that kind from up above here down to Lurich. It come from up this way somewhere and went downstream to Lurich.

The boats they used during the Civil War were called bateaux, keel bottom boats, and were about eight feet broad and about three feet or something like that, and maybe forty, fifty, or sixty feet long. I don't know.

I did not travel on any of the boats on New River very much. I came up from Glen Lyn one time on an almost empty boat coming up to the Narrows. I never went up above the Narrows. We had no trouble making that trip.

I have heard of a man named Mr. Pedigrew. He was a railroad contractor, grade contractor—I don't know whether he was a subcontractor or not. He had a contract for part of the Norfolk and Western Railroad. The camp was down at Lurich. I know only where he got part of his supplies. Part came out from about the C. & O., about Lowell. He brought some 423 stuff from up the river here. I don't know where he got it—about Radford, I suppose. He brought that down to Lurich on the river. I don't know how many boats he had carrying stuff down for him. I didn't see more than one boat at a time. I am not sure that that boat made more than one trip. I never seen him make but two trips. I didn't see any other trips made then. Way back further than that, I saw a good many—about the time the Civil War was going on. There was right smart hauling on the river then, moving the stuff first one place and then another. There wasn't very many after they got this railroad built down this river. That about cut the boat business out.

I don't know exactly how many men they carried on these boats as crew—seven or eight, possibly. They would pull the boats up with poles. They had three men on each side and the man in the hind end of the boat had a steering oar to guide it when they were going up the river. When they was coming down, they had one man on the side with an oar and one in the hind end to steer the boat.

Q. What would they do with their poles?

A. When they was poling the boat?

Q. Yes.

A. They would put it down in the bottom of the river, a great long pole with an iron tap on the end of it and they would put the other end against their shoulder up here and had a pad tied on here and come out about like this and put that pole against that and they would put the pole down and they would walk up to the front of the boat and they would start and while they was going down this side the other men was going up that side, you see, and kept the thing going all the time.

Q. When you saw the boats on the river, did you ever see any of them have any difficulty getting up and down?

A. No, sir; never where I was.

I also saw timber moved on the river—poplar logs and walnut logs, a lot of sawed timber and cross ties and framing for a bridge and trestles and something like that for the railroad company. They were putting in a bridge down below Lurich between Lurich and Glen Lyn. They put the timber in a raft which was pretty good size. I know where that timber came from—from
up there just below the Narrows, and I believe what is
424 called Cold Spring Branch. They took it out down below
Lurich.

When they were carrying ties during the Civil War, they brought them down this way. They didn't get none down that way to take that way. They couldn't get nothing down there to take nobody or haul nowhere. There were hardly any roads at all around our neighborhood. They would haul a two-horse load on the road and put about four on it.

They didn't take much farm produce out. Sometimes they shipped tobacco and stuff down the river. I guess it went to about Hinton. There was a tobacco factory down there somewhere.

The witness testified on Cross Examination as follows:

At one time there was a tobacco factory at the Narrows. I believe it belonged to Whitlow and Merrill, men from Lynchburg. I heard of a man named Mike Clark. He was one of them. There was another man whose name I have forgotten. Clark died at Wolf Creek.

Q. Mr. Skeen, I don't understand you as saying that tobacco was shipped from the Narrows to Hinton, do I?

A. No, sir; I say it went down towards Hinton. There was a man down there below there somewhere between Hinton and Glen Lyn that bought tobacco and overhauled it and then shipped it on somewhere else.

Q. What was the name of that man?

A. A man by the name of Shumate that had a warehouse down there.

I was in the 36th Virginia Infantry in the Confederate Army. I joined the army about '64 sometime. I went the time when they took them at sixteen years old—16 to 60.

John Pedigrew was contractor to build the grade of the Norfolk and Western Railroad between Narrows and some point somewhere about Glen Lyn. I don't know how far out toward

West Virginia he went. I actually hauled some of the stuff from Lowell for him—machinery and stuff he brough' there that way. Lowell is in West Virginia on the Greenbrier. The C. & O. Railroad comes there. I believe some of the other farmers in the neighborhood engaged in that hauling.

In answer to question whether I know the Spanglers and Dunns hauled a great deal, I didn't live over at Peterstown. I saw them on the road while hauling or working for Mr. Pedigrew. I hauled over that road for Mr. Pedigrew. While I was engaged in that hauling, the Dunns and Spanglers from Monroe County were engaged in hauling something.
425 The Dunns and Spanglers had a big livery business at Peterstown. They ran a stage line and hauled people from Lurich to Red Sulphur Springs and Lowell. I don't remember just how long. I don't know when the stage line started, but they used to run other stage lines before that It had been established a long time.

The hauling I did for Mr. Pedigrew and the business of the Spanglers and Dunns which I just mentioned was hauling with wagons and teams on the road. The stage route I am telling about crossed the river at the ferry below the Narrows—Hobb's Ferry. Anthony Adair had a ferry down at Lurich, but it didn't amount to much. There was a ford at Lurich they used at times.

The railroad bridge I was talking about was the Norfolk and Western Railroad bridge across the big hollow above Glen Lyn. We rafted or floated crossties and stringers down the river for that bridge. They built the bridge of wood. We floated sawed lumber, stringer. We didn't build any cofferdams for that place. It was a big hollow and a branch ran down through it.

I have seen logs come down from Ripplemead. I never said this particular work, I said I had helped to bring down some logs.

These Johnsons had that other I think brought down from up there for that bridge at Wolf Creek at Narrows. Johnsons come up the river and got some pine and lumber and floated it down the river and took it out and sawed it at the Narrows.

The witness on redirect-examination testified as follows:

I don't know whether the Dunns and Spanglers operated the stage in bad weather. Sometimes they had to go through pretty bad weather and sometimes they would have about six horses for a four horse load to get it over when the roads were wet. They didn't have much roads then.

William Price (Colored) on direct examination testified as follows:

I was born in Shellsville, Montgomery County, close to New River. I have lived in Montgomery County all my life close to Tom's Creek with a man named Peter M. Price.

I remember seeing boats on New River passing along close to where I lived, which was within a mile and a half of New River.

426 I would go along the cliff and look at it, the boats passing up and down the river. I was seven or eight years old or so when I first saw boats there. I will be seventy-six the 18th of April.

Q. Did you ever see any of these boats close up to them?

A. Yes, sir; I have been along the river bank while the boats passed up and down the river.

Q. Ever ride on any of them?

A. Rode on them sometimes.

Q. When you rode on them where would you start from?

A. Start from New River bridge, Central Depot.

Q. And where would you go to?

A. I would ride down the river to Cowan's Mill at the mouth of Tom's Creek.

Q. Do you know how many times you did that?

A. I don't know exactly, some six or seven times and maybe more.

Q. Did the boatmen have any trouble going up and down the river when you were on the boats?

A. No, sir.

Q. Ever get stuck on any of the Falls?

A. Got stuck lower down the river, McCoy Falls, a great big falls; they would get stuck there sometimes and hang a whole day, but I didn't go that far down.

Q. Ever go up the river?

A. Went up from Cowan's Mill, to Central Depot—from Central Depot down to Cowan's Mill at the mouth of Tom's Creek.

Q. Did they have a load on when the boat went up?

A. Didn't never have much of a load up there.

Q. Did they have a load on when they went down?

A. Yes, sir; have a load when they went down, but not much when they went up.

Q. Do you know what they hauled on these boats?

A. They hauled coal and corn, wheat and crated chickens, and hogs and produce of all sorts, and took that down the river.

Q. And you never went on the boats that went down the river?

A. No further than Cowan's Mill.

427 Q. Did Mr. Price give you permission to go up the river?

A. Yes, he let me go along with him up the river, and then come down and sent me on home from Cowan's Mill, on back home. I stayed with him.

Q. Would he ever let you go down the river?

A. No further than Cowan's Mill.

Q. Why wouldn't he let you go any farther?

A. Thought I would get too far from home, and have to walk.

Q. Do you know where the boats went to down the river?

A. I know where they said they went, said they went to Hinton. I never went that far down but a man working on them said that was where they went with things, down to Hinton, but I never went that far down.

By Mr. Abbot. We move to strike that out as hearsay.

Q. Did they ever mine any coal at Price's Mountain and Brush Mountain, that you know of?

A. That is where the coal that went down, where they hauled it, from Price's Mountain and Brush Mountain, and loaded it down there on the boats that went down the river.

Q. Do you know how much those boats would carry, how many wagon loads?

A. I don't know exactly, but they would haul the coal with a four-horse team with wagons and fifty bushel to a load, and sometimes four loads on a boat and sometimes put five.

They built railroad tunnels around the section I worked on on the Pulaski side at Belspring. I never saw them bring any supplies on the river down to those tunnels when they were building them. I worked on two or three other tunnels on the Pulaski side.

The witness on Cross-Examination testified as follows:

Q. Uncle William, who told you they put four or five four-horse wagon loads of coal on those boats?

A. They put about four loads on a boat with those big wagons.

Q. Who told you that?

A. I don't know the man who owned the land. I guess they dug it and hauled it to the boat.

Q. I said who told you that they put four or five four-horse wagon loads of coal on the boat. Who told you that first?

A. I seen that.

428 Q. You have seen that?

A. Yes, sir; I have seen them haul coal, four-horse loads and two-horse loads and put them at a place on the river bank and they would load it on the boat.

Q. They would put the coal on the river bank and then load it on the boat?

A. Yes, sir.

Q. Who hauled that coal to the river bank?

A. Different ones, I don't know who it was.

Q. Just where on the bank was the coal unloaded?

A. Some was unloaded at Cowan's Mill and some down at McCoys, some was unloaded there where they could get it to the boat and put it on the boat.

Q. Do you mean to say the coal was gotten out of that hill above Cowan's Mill, up above Tom's Creek? They didn't get any coal up there, did they?

A. From Cowan's Mill, the whole mountain back there was full of coal. That is all they had to live on, the coal they got out of Brushy Mountain; they hauled it down to the river below; that is where they got the coal.

Q. They hauled it down the river below Tom's Run?

A. Yes, sir; and they put it on the boat at Cowan's Mill.

Q. At Cowan's Siding?

A. At Cowan's Mill, it wasn't at the siding, the siding was at Belspring.

Q. You were talking about Cowan's Mill and not Cowan's Run?

A. Yes, sir.

I saw them haul coal to the river bank there. I know the men got the coal, but I don't know who they were. I don't know their names. I was too far off to find out their names. I would see them working but didn't find out who they were. I was right young and didn't think it was none of my business to ask them who they were. Price's Mountain is back of Price's Fork between there and Christiansburg. I saw boatloads of coal loaded at Cowan's Mill, but none of it that I ever saw came from above Cowan's Mill.

Q. Did you ever see any corn being hauled down past Cowan's Mill on those boats?

429 A. Yes, sir; corn, wheat, and all kinds of produce. The men who had stores at Prices Fork would take the produce down the river.

Q. Did you ever go to French's Mill?

A. You mean Price's Mill?

Q. No; French's Mill. Did you ever hear of it?

A. No, sir.

Q. You never went down there?

A. No, sir.

Q. Did any of that corn or wheat ever come to Cowan's Mill?

A. At Cowan's Mill they used to grind some there, some meal and corn there, and put it on the boat and take it on down the river.

Q. Then this was meal and flour going down the river, rather than corn and wheat?

A. Yes, sir; they shipped corn and they shipped wheat and then had the flour ground and the meal ground and shipped it down the river at Cowan's Mill. It wasn't Cowan's then, it was old man Jim Kent's Mill.

Q. Do you remember Major Kent?

A. I ought to, he cracked me over the head with a stick many a time.

Q. He didn't hit you hard enough, did he?

A. Sir?

He had a ferry boat across the river.

Q. Who were the people that operated the boat that you rode on?

A. Mr. Price, he was one, he was the Captain on one boat and there was five men on the boat, and only one Captain on the boat.

Q. They called him the head man?

A. Yes, sir; I knowed him, and I knowed three colored men from down east that were on there.

Q. Who were they?

A. One was Frank Bannister, and old Man Jim East and Lewis Farrier.

Q. And they were the ones that were on Mr. Price's boat?

A. Yes, sir; and then there was a lot of others on the other boat and some of them I didn't know.

Q. Do you remember a place in the river on about Cowan's Mill called Barnett's Falls?

A. Yes, sir; that is way up the river.

430 Q. You have been through there?

A. I never rode through that but once. I went through that coming down from up at Radford once.

Q. You say you came through there once?

A. Yes, sir; through Barnett's Falls. That is what you are talking about, ain't it?

Q. Yes.

A. Yes; I came through there once. I got on the boat at Barnett's Falls several times and came on down to Cowan's Mill, to the mouth of Tom's Creek.

Q. Do you mean that you would get off the boat above the falls?

A. Below the falls and would come on down to Cowan's Mill. I didn't get on the boat above the falls, but I got on below.

Q. You always got on the boat below Barnett's Falls?

A. Yes, sir.

Q. You never came down from Radford or Central?

A. Only once down to Barnett's Falls. I was afeared to come, I was afeared of the water.

I remember the Wing Dams up there that formed a sluice through Barnett's Falls. I remember the timber and the cribbing that were put in to keep the water in the sluice. I don't know who built it, but it was built there before 1874 or before I was seven or eight years old. There was the channel for the boats to go through. I would sit up on a high cliff and look at the men working in the river when I was about seven or eight years old. I remember when the men were mustered out and when the man with whom I lived went to the war. I taken him near to Christiansburg on a horse and he turned me back as he was afraid I wouldn't know the way home and I went back home. It was before that time I saw these people working in the river.

Q. Who told you that you were born in 1866?

A. That is the way I have my name down.

Q. Who told you that you were 76 years old?

A. That is the way my age was put down.

Q. Put down on what?

A. On a paper.

431 Q. What paper?

A. It was put down by Squire Perfeder.

Q. When was it that he put your name down?

A. When I was quite small. When I was bound out to this man, I told you about, they took my age then when I was bound out, until I was twenty-one. Old man Perfeder took my age, but whether he put it down right, I can't say.

Q. You remember the Civil War and the men working in the river at that time?

A. I remember when they were mustered out. I had two Uncles that worked in there and I know that they were drowned.

Q. Were they the Myers?

A. Yes, sir.

Q. Was anybody else drowned when they were?

A. I had two Uncles and there was a white man by the name of Dotson that got drowned.

Q. Where were they drowned?

A. At the Big Falls.

Q. Where is that falls?

A. That is way down the river.

Q. Near the line between Giles and Pulaski County?

A It is down to the line betwixt Montgomery and Giles.

Q. I mean Montgomery and Giles?

A. Yes, sir.

The witness on Redirect Examination testified as follows:

Q. Uncle William, I want to ask you a couple of questions. Do you remember seeing any soldiers during the Civil War?

A. Yes, sir.

Q. Did you ever see any soldiers marching?

A. Yes, sir; I have seen them marching.

Q. What makes you think you remember seeing soldiers marching?

By Mr. Abbot. We object to this evidence. What makes him think he has seen them, he is their witness.

By the Court. Do you say that you object?

By Mr. Abbot. I think he is undertaking to discredit or impeach his own witness.

By Mr. Gatchell. No; I am not trying to do that.

By the Court. I want to know if you object.

By Mr. Abbot. Yes; I object.

By the Court. The objection is overruled.

By Mr. Gatchell:

Q. What makes you recall soldiers marching, or what do you recall about seeing the soldiers marching.

A. I seen them stirring about, I seen them lots of times pass through where I lived.

Q. Was it before that time when you saw the soldiers pass or after that time when you saw the men working in the river?

432 A. It was before I seen the soldiers that I seen the men working in the river.

Q. Before you saw the soldiers you saw the men working there?

A. I saw the soldiers when the war was breaking up.

J. R. Smith on Direct Examination testified as follows:

I am sixty-five years old. I have lived in Hinton close to forty years. Before I liver there I lived four miles from Hinton and after I liver at Hinton we moved to Cash's Hill or what is called Mercer's Salt Works. In all my life I haven't been over three miles away from the river.

I have worked on New River on a bateau, I have rafted logs, ties and lumber and have boated hay, staves and export lumber. I commenced working on the boats on the river when I was about thirteen years old, I was making a man's hand when I was that old and worked on there until I was about twenty-eight or twenty-nine years old or more.

I was about thirty years old when I quit running regular. After that I ran on a few trips. I never had any boats of my own. I worked for Squire Jim Peters, a merchant who ran a store at Mercer's Salt Works. He had a son we called Bud Peters, but some called him Henry Peters. The son was older than I am, but I don't know his age.

We ran these boats from Hinton to Mercer's Salt Works and we had other trips up to Round Bottom and then we had some extra trips up to Round Bottom and then trips above Round Bottom.

The highest I have ever been up the river on my trips was above Glen Lyn close to about the Narrows. We moved a man when we went to the Narrows and we went to Glen Lyn to get fertilizer and stuff. The man we moved to the Narrows was Mr. John Crockett, who was going from Crump's Bottom to Radford. We loaded his stuff on the boat and taken the boat up the river. We had two boats. They were bateaux about five feet or so in the bottom and about eight feet at the top and seventy feet long. Squire Peters had two boats for a while. The old boat was laid out and then he had one built called the Blue Bird.

I did not go all the way to Radford with this boat. I went up there close to the Narrows. Then they loaded the stuff off one boat onto the other and three of us taken this other boat back to Glen Lyn and got a load there to carry back to the Salt Works.

433 G. In other words, you had two boats going up the river on that occasion?

A. Yes, sir; we divided the loads up on the two boats and then when we got up there we doubled over from one boat to another.

Q. You mean that you took the cargo of one boat and put it over on the other?

A. Yes, sir.

Q. Then you loaded up the empty boat and returned back downstream to Hinton?

A. Yes, sir.

Q. What became of the boat that was loaded?

A. It went on.

Q. It went on where?

A. I reckon it did. We went back after we unloaded, we cut out.

Q. Did you see the boat start out?

A. No, sir; because after we unloaded we cut out.

Q. You mean by "cutting out," that you returned?

A. Yes, sir; we started back on our other trip. What we call "cutting out," is when we leave the bank, we cut out.

Q. How many trips would you make up and down the river?

A. It is hard to tell how many we did make. Every spring we got fertilizer from the Virginia Line, on account we could take three times the load from up at the Narrows that we could bring from Hinton up that way.

Q. In other words, you could carry a bigger load coming from the Narrows down than you could going from Hinton upstream?

A. Yes, sir.

We went to Glen Lyn for the fertilizer. We boated goods up there for Mr. John Shumate from Hinton up to East River or what they call Glen Lyn. These trips were not regular, but we took a trip sometimes in two or three months. I don't know where they ordered the fertilizer from, but it came to the depot of the Norfolk & Western at Glen Lyn and we went there and got it. We would run up in the East River where it branches

out and runs in to New River, would shove the boat up into East River and load it there and then back out. We would have
434 to back out because we couldn't turn around. We would come down the East River to the New River and then turn around.

Q. When you came down the river from Glen Lyn, did you have any trouble getting through?

A. No, sir.

Q. In going upstream what were the conditions?

A. It was hard.

Q. But would you get up?

A. Yes, sir; we got up there.

Q. Did you ever have to turn back?

A. No, sir; we never had to turn back. When we started we stayed on the river until we got what we went after.

Q. During what seasons of the year would you go up and down that river?

A. We would always go in the spring of the year. In the summertime the water was low and we couldn't do much good running in the summertime.

Q. How about your going up to Round Bottom. How often would you make trips there from Hinton?

A. Twice a week.

Q. All through the year?

A. No; not all the time through the year, because they would only get the staves that had been cut a certain amount, and the we would run until we got them all out. Sometimes we would run for three or four weeks and then we would have to lay off a week or two before we would get any more runs.

We carried the staves for Mr. Harder, the Standard Oil man. He was the tobacco man, and was handling the staves. We also carried tobacco and some lumber. I have seen lumber boated down the river, but couldn't say how much. If it was dry lumber, we would run about 7,000 feet on the boats and if it was green lumber, we would run about 5,000 feet.

I saw others boating lumber down the river—Charlie Cox, Albert Meadows, Luster Lane, and some of the Lilly boys, Ed Lilly and Bud Lilly. I have seen rafts going down the river pretty often from all up and down the river, from Round Bottom on down. They would have some at Round Bottom and some at Island Creek, some at Lick Creek, some at Harveys Ledge and down at the Bull Falls and at Blue Stone. The boats run after I quit running boats and I run some after I quit running regular.

435 The loads that I would bring from Hinton up the river were from five to seven thousand pounds. When we went

up as far as Glen Lyn, we would only take about four or five thousand pounds and we had to have four men in the head to do that. We had five men on the boat when we made a trip like that, four men on the head and the captain that steered the boat. It taken five of us in all.

I have been over the channel of that river. I have seen the Government do work on the river, blasting and drilling. This work started right above Hinton and came up to Greenbriar Shoals and up to Thompson's Mill Dam, sometimes called Wiley's Mill Falls just on the edge of West Virginia and Virginia. It crossed the line about twenty feet of the break of the falls.

They boated tobacco on the river. I boated some of it. I would carry about 14,000 pounds of tobacco on a boat. We would lay a double layer in the bottom and then put another extra layer on top. Some of us would sit on top of a high load and direct the men in the rear from the man in the head. We sat up and told them which way to move by our hands. We taken the tobacco to Hinton. I never taken any tobacco from Glen Lyn, but I have taken some from Round Bottom.

I remember Mr. Peter's son. In response to the question—"His name was J. Peters too," We called him Bud, for a nickname. He was with me on one trip. I don't know whether he was with anybody else or not. I remember because the trip was so hard on me.

We had passengers on the boat from the Salt Works to Hinton. I did not carry any passengers from Glen Lyn to the Salt Works. We would carry some extra passengers at times. They would get on the boat almost every trip and we would have six or eight or ten from the Salt Works to Hinton. I ran staves and lumber for Mr. Boone Burks.

Q. Did you ever see a steamboat on the river?

A. Yes, sir.

Q. When did you see that?

A. I don't know exactly what time it was, but I seen one on there when we were living about four miles from Hinton.

Q. What kind of a steamboat was it?

A. It had a water wheel on behind called a peddle water wheel and a steam engine on it.

Q. Any stacks?

A. Yes; a smoke stack.

436 Q. Just describe it as well as you can. How long was it would you say?

A. It was, I suppose, over a hundred feet long.

Q. And how wide was it?

A. About eleven or twelve or more feet wide, I couldn't tell you exactly how wide it was, because I never measured it, and I was quite a young fellow then and didn't pay much attention to what the size of it was.

It had a deck. It was not a rebuilt bateau. It was a great big broad boat with irons up the side and a cab on it.

I have seen another boat on the river which I think was a gasoline boat. That was afterward. I can't tell you just when. It was the Davis boat—not as large as the steamboat. I am not sure, but I think it was a gasoline boat because it came higher up the river than the other one, as far as Mercer's Salt Works, which is twenty-five miles from Hinton.

We would not have a tide to run the bateaux on coming down the river, nor any tide going up the river and the reason we didn't have to have any tide was when the Government cut them channels they cut them and laid them in such a way that the water would press against them walls and make the water higher there and it was better for the boats to run through. The boats when loaded drew about two and a half feet. There had to be about two and a half feet of water or you would be likely to hit a rock or something. That was during low water. In high water we could go on just the same. It didn't bother us at all.

I seen the steamboat first when it came by Pack's Ferry. We lived right on a hill and could look right down on the river. We saw it going up the river. We could hear it—it would blow. Everybody would be running when it blowed. It was a big curiosity to the people to see anything like that.

The fertilizer was in 200-pound sacks and we would put about forty sacks on the boat. There was nothing but a store at Mercer's Salt Works, not a tobacco plant. It was carried there for the people. It was distributed to all the people throughout the country, but that was the headquarters to which tobacco was brought to be shipped. They had it in hogsheads when it come there. They had a man to go to the people's barns and they had the hogsheads and they would pack it in hogsheads and would bring it to the warehouse there. They had a regular warehouse there where they kept it until the boats got ready to go.

437 The warehouse was at the Salt Works. We rolled the hogsheads out on the boat.

Q. For how many years did you bring fertilizer down the river?

A. I don't know; we done it for several years.

Q. For as many as two years?

A. I don't know how many.

Q. Well, two or three years?

A. More than that.

Q. How many do you think?

A. Six, seven, or eight years.

The stress up and down the river were one at the Salt Works, and one at Round Bottom, and then there was another one which a Mr. Floyd Goodson had between Island Creek and Round Bottom. It was just a small one. He lived there. Then there was an old store house down at Fraziers or Crump's Bottom. An old man, Buck Smith, had a store across the river from Crump's Bottom, and there was another store at Bull Falls. People would bring their stuff to these stores and flag us to come and get it, and take it down the river for them. What we did was to carry the goods to the boats and to the stores and carry the people's produce back.

The witness on Cross Examination testified as follows:

I was a small boy when I saw that first steamboat, when my father was working on the Government improvement in the river after they opened up the channel. That was near the same time I saw it at Pack's Ferry, which is on New River about four miles above Hinton.

Q. About how long after you had seen your father working in the Greenbrier Shoals was it that you saw the steamboat?

A. I didn't keep any account of it because a boy don't keep any account of days, weeks, and months, and years, but it was after them channels was opened up and they quit working in the river, and after a while then the steamboat come up the river.

Q. It was shortly after the channel was built, was it?

A. I don't know when the channel was built, but after they quit working in the river, the steamboat come up the river.

438 Q. Can you give us any idea about the length of time after the channel was built that it was you saw the steamboat?

A. No, sir; I cannot.

Q. How big a boy were you when you saw it?

A. I don't know about that, because I didn't pay much attention to it. It was just a curiosity to everybody to see it.

Q. The whistle blew and you children ran to see it, did you?

A. Yes; and grown people was running to see it, too, because it was a miracle for them to see a thing like that coming up the rive

Q. That was the only time you saw it—the steamboat—was it?

A. It never did go no further that I know of.

Q. Were you working on the river then?

A. No, sir.

I used to work for Jim Peters at the Mercer's Salt Works. I shoved the boat and worked on the boat for him, and also worked on a farm for him when I was not boating. He had a whole lot of men at work. Some stayed on the farm and some were on the boats. There were old man Alex Kidd, Press Roach, Alf Merchant, John Williams, Charlie Parks, Andy Medley, Jasper Smith, Timm Fitts, Mac Clark, Henry Clark, Jim Crump, and Henry Crump. Jasper Smith was a big man that shoved on the boats sometimes. He isn't living now. Different men would make different trips. I done anything that Jim Peters wanted me to do in connection with his business. I was paid a different wage and more money for boating than for working on the farm. He paid me fifty cents a day for my work on the farm and one dollar a day and board on the river. Sometimes I would work on the farm several days and then go on the boat. He boarded us on the farm also, but we didn't get but fifty cents a day. I hung to him in farming because we could get work on the boat more than those who lived farther away. He had two boats, one was worn out, and then he had a new one built called the "Bluebird:" I don't know the name of the old boat. It didn't make many trips after he had the "Bluebird" built. The "Gray Eagle" was a boat which belonged to Alf, John, and Jim Merchant.

Q. What became of that?

A. The river took it away.

Q. What river?

A. New River.

439 Q. What time was that and where?

A. I don't know, but the boat was laying there; there was a woman killed on the boat, and after the woman was killed, the boat never did run right, and they tried to stop all the leaks and keep them stopped, but finally that boat would sink all at once with a load on it, so they tied it up to the bank and let it sit there, and the river got up and broke the rope and took it away.

Q. Who killed the woman on that boat?

A. Fellow in the pen now.

Q. The man that killed the woman is in the penitentiary now?

A. Yes, sir.

Q. What was his name?

A. Brick Medley.

Q. Was he any kin to Andy?

A. He is some.

Q. You say he is his son?

A. No, sir; I said some—very little.

Q. Jim, you say that this channel that the Government cleaned out in the river was 2½ feet deep?

A. I said the boat would not run unless it had two and half feet of water or more, because the boat generally carried the rim to run about two feet or two and a half feet before it would clear without hitting any rocks.

Q. You had to have 2½ feet of water to run the boat loaded?

A. You have got to have that much water before you could with it loaded.

Q. How deep was the channel that the Government cut through these ledges and falls?

A. I don't know. I never did measure it.

Q. Can you give us an estimate of it—and also the shoals.

A. I didn't measure it, but they cut it deep enough so that the water—the rocks would not interfere with the boats when they ran.

Q. It was over 2½ feet, or 2½ feet, was it?

A. They cut it so that it would not interfere with the boats.

Q. How did they divert the water into the channel?

A. They took and cut in there kind of a little slaunch-
440 wise across the river—like this is the river (indicating),
and they went a little this way (indicating), and the water will press against them when it is moving and will raise the water up, and that wall will throw the water higher until it makes it deeper to run in. It was not built straight down the river.

Q. They were not built straight down the river?

A. No, sir; they was built kind of angling.

Q. Is it easier to run in the channel or out of it, or was it easier when you ran the bateaux. Assuming that you had enough water in the river, would you follow the channel or not?

A. I did not boat in there before there was channels.

Q. I know that, but after there was a channel, say you had a four-foot tide in the river, would you follow the channel or go outside the channel?

A. If you had a four-foot rise, you could float anywhere. You always kept for safety out of the roughest water.

Q. Wasn't the water the fastest where the sluices were in coming over the falls?

A. Not if you had a four-foot rise. It is just the same all across the river.

Q. So, it is just as well to boat in or out of the channels, regardless of the stage of the river?

A. I will take the channels for mine.

Q. Coming up or going down?

A. Yes, sir; I will take the channels. Do you want me to explain it?

Q. Yes, sir.

A. Well, in the channels, when you are right at the head of the channel, there is a little kind of ease of water below the channel, and it would go around like this (indicating) and it shoots up against the wall, and when it hits it pushes it back in here (indicating) until it runs into the knuckle, and we would have a man at the head, and as soon as it takes her head in there, the man will catch ahold of it and shoot it over there (indicating). You would not have as hard water as a man that would not understand it. But if you tried to put it against the wall, you would have to break it all the way, and you would have to ground it to get away from the wall, but if you lay over from the wall, in the other water, it is easier to shove.

441 Q. And it is in the channel——

A. (Interrupting.) It is like in the outer edge of the channel—in the main channel you would not shove into the main channel coming up, but run in coming down.

By Mr. THOMPSON. Is that downstream or upstream?

Q. You said coming up—that when coming, rather when going down you did not run in the channel.

A. We run in the channel coming down, going up we ran in the easy water.

Q. Is there easy water inside or outside of the channel?

A. In the edge of the channel, but when the water hits the wall it makes a curve and don't make the water as swift as it does against the wall.

Q. So you were always in the channel coming up and going down?

A. We were on the outer edge of the channel; right in the channel; we were right in the main channel heading out of the channel, and when we head into the eddy, we are in the main channel, then going and coming.

I don't know how many years I worked for Squire Peters, but I was with him a long time. There was old man Jim Johnson; I ran with him after I worked for Mr. Peters. I never counted how old I was when I left him. I paid attention to my work when I was working and didn't pay any attention to the time. After Squire Peters sold his store Joe Meadows took it and I worked for him. After I was thirteen years old I was right around at Mercer's Salt Works while all the time Squire Peters ran the store there, and run on the water. I was a pretty regular boatman for him.

I am familiar with Wiley's Falls. There is a channel through it, but it was never finished like the channels in the other falls. It ended at the Virginia and West Virginia line. It went through Wiley Falls on this side of the river (indicating). It was on the left bank of the river going up and on the right-hand side coming down on this side from Thompson's Mill. Thompson's Mill Dam is on the Round Bottom side, that is, the left side coming down the river. The last work where they ran the channel was at Wiley's Falls. My father worked there.

Round Bottom is below Wiley's Falls a mile or two, I think.

442 Doc Dickerson ran the store there. I don't know what kin he was to Jim Dickerson, but he was Squire Peters' son-in-law and Bill Shorter ran the same store, too. The store was not so far from the river.

I did not pay attention to where Round Bottom branch run. We boated through there and what made me pay attention was that we had a fishing hole right at Round Bottom which we used in the winter time. It must have been at least thirty feet deep. I don't know how long it was. We didn't fish over fifty yards up and down the bank between Wiley's Falls and Shumate's Falls. I know where Anderson Shumate's Falls is. It is higher on the river below Glen Lyn.

Q. Is there any obstruction in the river between Wiley's Falls and Shumate's Falls?

A. Any obstruction—what is that?

Q. I mean ledges or falls or shoals, sir.

A. Yes, sir; there is some ledges in there; yes, sir.

Q. Pretty much all across the river?

A. The way we run now, all them ledges is across the river. If we will take the man that run this upper ledge here (indicating) and a man would run this ledge on this side, and the water would carry the bateaux here (indicating) and it would run to the other side, but he would not go through the ledge here (indicating) because he would run into the other ledge.

Q. But that was the character of the ledges that you had between Wiley's Falls and Shumate's Falls?

A. Well, there was some ledges between them.

Q. Now, how much of a falls is there at Wiley's Falls?

A. It is a pretty big one.

Q. From the upper part where the water begins to fall to where it flattens out below the falls, what is the vertical distance, in your estimation?

A. I would think it is about five or six feet or more.

Q. And that is in a distance of about 35 or 40 feet, isn't it?

A. I would not know how to say that, because I could not say that to be positive about it.

Q. There isn't any sluice through there—there isn't any channel through Wiley's Falls, except the one that the Government cut, is there?

A. No, sir.

443 Q. Now, Jim, Anderson Shumate's Falls is a pretty tough one, wasn't it?

A. That is a pretty tough falls.

Q. Instead of having pretty even ledges going across the river, you have got a lot of ledges and rocks poking up there, haven't you?

A. There is some rock and ledges in it; there is two rock there, when I was running, that you would come into when you come into the head of them shoals.

Q. Did you say going up or down.

A. Going down, when you come into the head you are going down, and when you go into the tail, you are going up. When you get into the head, they come down here at Anderson Shumate's Falls and there is a sudden turnout here [indicating].

Q. Are you coming down the left bank of the river or the right side.

A. In coming down, I told you it was on the left—on the other side, coming down—that would be the left side.

Q. Coming down that would be the left side.

A. Yes, sir.

Q. And you hit the head of the falls?

A. You are not hitting the head of the falls because you come into the river when you leave the East River shoals, you can run pretty much all over the river in there, without running over them two first notches after leaving the East River shoals.

Q. Do you know what we call the Sand Bar up there where East River comes in?

A. There may be one there now, but there wasn't any there when I was running.

Q. You never heard of a place called the Sand Bar.

A. There has been places that are.

Q. There are some pretty bad places there, or were some pretty bad places there—not falls but shoals—I mean shallow water.

A. There is shoals there, because now, when I was running through there the last time I was through there with Peters—with Bud Peters.

444 Q. I thought you said you never went in there.

A. The last time I was through there.

Q. He was with you?

A. I was with him, and I had to reach my steering oar over my head to hold it. When I went to drop down, there was my oar, and when we dropped down, there was his oar in the bottom of the boat.

Q. Do you mean to say that there is an oar both in the front of the boat and the back of the boat?

A. There is an oar in the front and the back and the side.

Q. How many oars.

A. Three.

Q. On which side is the oar?

A. He generally works one side and then another, and one in the head and one in the stem.

Q. You had two men that stayed at it and a man——

A. (Interrupting.) That made three men employed—three men employed regularly all the time—one pulls a side oar, and one pulls—pilot—and pilots in the head and the other steers.

Q. That is coming down?

A. Yes, sir.

Q. Going up what do you do?

A. Going up he has got that pole right against his shoulder and walk back and shoving with that pole stuck in his shoulder.

Q. How many men would do it?

A. Two men in the head with just a common load but if we had seven thousand we got four men in the head.

Q. I interrupted you when you were telling me about Shumate's Falls a minute ago. Start that again and tell it your way about how you get though going downstream?

A. When we head into the falls we head in right up here and come down here and then there is two rocks down in there that you have got to get between them two rocks and if you don't get between them you have got trouble.

Q. If you don't get between them you have got what?

445 A. Trouble. You have got trouble when you get messing up with those rocks if you ain't a man that knows his stuff.

Q. Are those the only two dangerous things in there?

A. Those are the only two dangerous things in there because there are two rocks sitting up there and there ain't much room on each side of the boat when you hit them, and you have got to hit them exactly right or you don't go through.

Q. Is that where the main current goes through the falls?

A. You go down here and turn out this elbow and shoot out into the deep water right out here. There is what you call a little island that runs out here, and then water is behind that and this point will run you out into the river and you have to come out here.

Q. You have been indicating on your arm and bringing your finger down the outer edge of it and saying when you get to the elbow you have got to turn this way, which means to the left out into the stream?

A. You have got to turn out to the right.

Q. You have got to turn out to the right?

A. Yes.

Q. Turn out to the right to get between these two rocks? Where is the elbow in the falls?

A. I told you here is the elbow just up in the falls.

Q. In the upper end of the falls?

A. No, sir; it is not.

Q. The lower end?

A. Well, it is not right in the lower end either. It is up in the falls.

Q. About midway?

A. I wouldn't say midway. I say it is up in the falls. I never looked to see whether it was halfway.

Q. But that is the only thing you had to bother about in going through those falls was to make that curve between the two rocks?

A. You have got to miss them rocks.

Q. You have got to go between them, you say?

A. You have got to go between them. You have got to have an
awful tide of water if you don't go between them and you
443 never do run on that tide of water because when it is that
rough we couldn't carry no heavy loads in there.

Q. How much of a tide does it take to make it too rough up there?

A. We have never tried that but when we would have a whole lot of water the boss said, "Well, we won't go until the water falls a little." That is the way it is. I didn't pay no attention to that, just when he say go, then we would go.

Q. Coming up the river going through Shumate's Falls, did you have to go through the same route you would take when you came down?

A. You have to go up the same way.

Q. Follow the same course?

A. You don't have to follow the same course because you are not loaded so heavy, and, another thing, you can dodge things when you are going up the river that you can't dodge going down because you can go up the river so slow and then when you are coming down you are coming down in a rush and you have got to get in the clear then.

Q. But you said that you weren't hauling as much stuff. You mean that your boat wasn't as far down in the water?

A. Well, you know when a boat ain't loaded as heavy it ain't as deep in the water as it is when it is loaded heavy.

Q. The load that you would carry downstream on your boat from Glen Lyn would take your boat how far down in the water?

A. Well, when we are going down?

Q. Yes.

A. We got about three or four inches sticking out of the water and we always carry a stripe on the gunwale of the boat about four inches and when we load her to that stripe we stop loading.

Q. How deep was your boat, Jim?

A. Well, it generally taken about two feet and two feet and a half of water.

Q. I mean was it two and one half from the strip to the bottom of the boat?

A. Well, I didn't measure that. I told you it took about two and one half feet of water or over to run the bateaux.

447 Q. And you would load the boat that way coming down?

A. Well, sometimes we wouldn't have as much load but when we loaded her down for fair, that is the final load we put on her.

Q. Jim, you always had to have what you call a tide to get through Shumate's Falls?

A. No, sir; not always no tide.

I testified about moving Colonel Crockett from Crump's Bottom. I couldn't tell you what year that was. I will tell you how the thing come. Pay attention to how I tell you and you need not think I'm going to change because I ain't. When old man Anderson Shumate had the store we was working for him. Then Squire Peters had the store and we worked for him. When Mr. Joe Meadows had the store we were working for him. Then Mr. Anderson Shumate died and Mr. Bal Shumate took charge of the store and put one of his boys over there and then after his boy died he put another clerk in there. When Joe Meadows got married and went away, Mr. Anderson Shumate put one of his sons in there.

Q. Jim, I asked you what year it was?

A. I wouldn't tell you that because I don't know what year it was because I didn't pay that much attention to it.

Q. Will you tell me within ten years of it?

A. I am telling you the way we worked it and I wasn't paying no attention to the years.

Q. And you don't remember whether you were working for Squire Peters or——

A. I told you I run with Squire Peters and I run with Mr. Bal Shumate and Mr. Joe Meadows.

Q. I want to find out for whom you were working at the time you were on the boat to move Col. Crockett from Crump's Bottom?

A. Squire Peters was the man that had the boat.

Q. Jim, do you remember the Spanish American War?

A. I know it was going on but you needn't ask me about what year but I ain't going to tell you because I never paid no attention to it.

Q. I am not going to ask you what year it was.

A. I wasn't in it.

448 Q. Was that the time you moved Col. Crockett?

A. I don't know. I couldn't tell you that. I never paid any attention whether it was before or whether it was after. If you will pay attention to me, I am a man that don't lie and I try to tell the truth and when I tell anything once I mean just what I said. I aim to tell the truth. I live that way around my home. I have got plenty of witnesses and things around my home. I try to tell the truth.

I was thirteen years old when I first commenced boating and I reckon I was older than that when we moved Colonel Crockett. I was married I don't know w*äht* year. I don't know how old I was. I know that it has been about forty years ago. I moved Colonel Crockett before I was married. I guess it was before 1896 that I moved him. There was two boats of us. Andy Medley was on one of them. I was on the other. We went to the falls of the Narrows and there we doubled over. We unloaded what was on my boat onto the boat that Andy Medley was on. I never paid no attention to the falls of the Narrows because you see I wasn't above there on no boat. I couldn't tell you that. We unloaded the stuff from my bateau to Andy's bateau somewhere close to the Narrows. I don't know whether above or below. Then we goes back and picks up another load because they was waiting on some stuff at the saw mill. We let the other boat go on. And we went back and taken the other stuff and goes on back to the sawmill. When we cut out the other boat was there.

Q. It was dark, wasn't it?

A. When we cut out we left them there.

Q. What were they doing, Jim, when you left there?

A. I wasn't paying no attention to that.

Mr. **Thompson**. I don't understand he gave any testimony as to what they were doing. He said he turned his back and they went on down the river.

Mr. **Abbot**. I think he testified in Hinton they were cooking supper.

Mr. **Thompson**. That was Hinton, not here.

By Mr. **Abbot**:

Q. Were they cooking their supper when you left, Jim?

A. I told you I didn't know whether they were or not, because I didn't say anything about supper. When we transferred the load we turned around and cut out and goes on back.

Q. Well, had you gone through a rather precipitous falls or a pretty steep falls in the Narrows before you unloaded your furniture?

A. I don't know that because when the Captain says "this is as far as we will go, we will double the load on the other boat and we will go back and pick up."

Q. Had you gone above the mouth of East River then?

A. Yes, sir.

449 Q. Were you as far as Lurich?

A. Yes; Lurich is not but two miles above East River.

Q. And you had gone above Lurich?

A. Around up in there.

Q. And you had gotten up to a point where you transferred this load but you don't know whether you had gone over a big falls?

A. I didn't pay any attention to that.

Q. Jim, you would have remembered it if you had, wouldn't you?

A. We never paid attention to the falls because we never pay no attention to falls much when we are running without we are looking for danger and then if we are running at night, why then we got certain men that we will trust.

Q. You weren't running at night this time, were you?

A. It wasn't right then.

Q. And you don't remember whether you went over about a six foot falls before you transferred your cargo of your boat to that of Andy Medley?

A. Didn't have no falls that I know of.

Q. You didn't go over one before you made the transfer?

A. We didn't have any such falls that I know of.

Q. You say you know you didn't go over any falls of that character?

A. I wouldn't say that. I didn't pay any attention how high the falls were or nothing. I don't know that.

Q. How did you know where you were, Jim?

A. Didn't the man say, "This is as far as we will go. We are up close to the Narrows now and this is as far as we will go. You all can make it from here provided I give you so many hands," and asked the other Captain, "Can you all make it?" And he told him—he says, "Well, I guess I could." Well, we give him the other men and he took us two and went on back.

There were four men in the head of each boat—five men to a boat over rough water. There were five in Andy Medley's boat and five in my boat and then we gave them two off our boat. We gave him the load we had and two of our men to help him on. I don't know whether at that time I had gone over a falls of about six feet. I haven't been over the falls in the Narrows—the Falls of the Narrows, I believe it is called. I don't know anything about it. I don't know the man named Chap Lilly. 450 I knew Bud Lilly and Ed Lilly. I don't know Chap Lilly. He may have been working on the boats, but I don't know. None of the Lillys were on the two boats that I was on that I know of. Nobody came down to either of these boats and hauled the furniture away in a wagon on that trip when I was along.

Q. Are you sure there was more than one boat on this trip?

A. Well now, if two boats was along there would have to be more than one boat. If two boats was along it is more than one, ain't it?

Q. And you were sure there were two boats on this trip?

A. Yes; there was two boats because we doubled over and let the other man go on and the other one run back.

Q. Have you ever made any other trip with Col. Crockett's furniture than this one that you have mentioned?

A. No; never moved him but once.

Q. And you did not on this occasion hang up on Shumate's Falls and then unload your bateau, the furniture from your bateau onto wagons when it was hauled away to Glen Lyn to be put on the railroad train?

A. No, sir; now I will tell you. You can't get to the river at Anderson's Falls.

Q. You cannot get to it?

A. No, sir, you cannot.

Q. You can get to it below there, can't you?

A. No, sir; you can't get into the river below there.

Q. Where is the nearest point that you can get into the river?

A. Below there? I am telling you the peak that runs out into the river—sand settles in there and you can't get to the river at all and then above there the rocks is so big and rough you can't get to no river with the wagon.

Q. And you are perfectly definite that you can't get into the vicinity of Shumate's Falls with a wagon?

A. No, sir; you couldn't get in there. You couldn't get into them falls with a wagon.

Q. But that isn't the reason you say that none of this furniture was taken off of your boat and put—

A. Didn't take none off of ours, the one we was running.

Q. The only time the furniture was taken off that one you were running was when it was transferred from one boat to the other at the falls?

451 Q. Certainly on this occasion no wagon came and got the furniture off of your boat?

A. No, sir; they couldn't get in there.

Q. And you had gotten above Lurich?

A. Yes; they couldn't get in there.

Q. Jim, the store you were talking about at Round Bottom, that is on the left-hand side of the river as you go down?

A. Round Bottom is on the left-hand side as you go down.

Q. And the store is in Round Bottom?

A. Yes, sir.

The witness on Redirect Examination testified as follows:

Q. Mr. Smith, did you ever have any trouble getting through Wiley's Falls, either going up or coming down?

A. No, sir.

B. T. **Johnson**, on Direct Examination testified as follows: I believe I will be 75 years old the 10th of March. I have lived at Narrows since 1875. When we first moved to Narrows we didn't have much roads. My father was an old teamster, was in the horse business, followed wagonning all his life, and did a great deal of hauling. Regarding the number of horses required because difficulties with roads, I have known him to hitch six horses to pull a two-horse load.

I have seen boats run up and down New River. Some were a good deal longer than this room, some a little longer, and some a little shorter than this room, according to my recollection.

Q. What did they call those boats, if you remember?

A. Keel bottom boats.

Q. Do you know how far down the river they went?

A. Just from hearsay, they went to Hinton, maybe below Hinton a little bit.

Q. Did you ship anything on those boats to Hinton?

A. Yes, sir.

Q. State to the Court what you shipped.

A. I shipped mostly meal, and I shipped tobacco.

452 Q. Did you raise tobacco in those days?

A. Yes, sir; I raised tobacco, me and my father and brother.

Q. How would you prepare your tobacco to ship it to market?

A. We would put it in big hogsheads, we called them.

Q. And from what point on New River was this tobacco placed on the boats?

A. Well, what I shipped I shipped from Narrows, mostly.

Q. State to the Court whether or not other inhabitants of that section raised tobacco.

A. Yes, sir; pretty much, only way we had to get a little money.

Q. Where did they ship their tobacco from?

A. Along different points, Glen Lyn and on up this way, I suppose.

Q. What would these boats bring up the river from Hinton?

A. They would bring a little of everything.

Q. Can you state some of the articles to the Court?

A. They would bring salt, coffee, sugar, rice, and many other things. I just can't remember, but they was pretty well loaded.

Q. How far upstream would they go, if you know?

A. They would go above Narrows somewhere, I don't know just where.

Q. That was—first, how would you know when those boats were coming?

A. Well they had bugles, great long bugles, longer than that [indicating with hands], and if they wanted to make a big fuss they blowed a big bugle and if they wanted to just make a little fuss they had a little bugle they blowed; they had a pile of them, and when they blowed they let you know they was pretty close, and you could tell pretty much from the sound of the bugle how far they was off.

Q. Did you engage in cutting any timber on New River?

A. That has been my business all my life—timber business.

Q. What disposition did you make of your timber; how did you get it to market?

A. Them days all we could do with our timber was to make staves out of it.

Q. Where did you ship the staves?

A. I would load them on the boats and they would go to Cincinnati and around. I don't know where all they did go. I
453 sold them to other people. I shipped them.

Q. Where did you place them on the boat?

A. All I shipped I shipped from Narrows is my recollection.

Q. Were other residents of that community cutting staves?

A. Everybody that had any timber would.

Q. Where were the staves cut around Narrows shipped from?

A. They come up by Wolfs Creek mostly.

Q. Where were they placed on the boats?

A. Right along the brink of the river.

Q. You spoke of Wolfs Creek, the mouth of Wolfs Creek is just below Narrows; is that right?

A. Right below Narrows.

Q. Do you recall when James and Sons were cutting on the river?

A. Cutting logs?

Q. Yes.

A. Yes, siree.

Q. State if you ever had any business transactions with James and Sons.

A. Oh, yes; I think I sold them some logs. Now they manufactured their own lumber, and I sold them some big poplar logs.

Q. Did you sell anything else?

A. I don't remember I did.

Q. Do you remember a gentleman by the name of Mr. Arter?

A. Theodore Arter is the man I sold the meal to that went down to James' Mill.

Q. Was he employed by James and Son?

A. I think so; he always come and got it and paid me for it.

Q. Where was this meal shipped from?

A. Narrows.

Q. Do you know where this meal was delivered?

A. I do not. I didn't follow it down; he would always come there and buy it and settle for it.

Q. Do you know where the plant, the lumber plant, of James and Sons was located; I mean the mill?

A. Right close to Hinton.

454 Q. Do you recall when the bridge was constructed across Wolf Creek, when the Pocohontas line was put in by the N. & W.?

A. Yes, sir.

Q. State whether or not you furnished any timber in connection with the construction of that bridge.

A. Me and my brothers and father did; I don't think I did by myself.

Q. What was the character of those timbers?

A. Oh, big stuff; that big square [indicating with hands]; a heap of it.

Q. Where was it cut?

A. Cut right around in the neighborhood.

Q. How was it transported down to Wolf Creek, or the side of the bridge?

A. It just needed hauling in there; it didn't need transporting down the river, because there had not been no construction done down there then.

Q. Did you ever raft any logs or timbers on the river?

A. Yes; I have rafted logs.

Q. From where?

A. Up above Narrows a piece.

Q. Where did those logs go?

A. To a little mill I had down at Narrows, and I think I would make rafts, my recollection is, out of oak and poplar and pine and make them stay up, in order you know, and I think I sold a good many of them logs to a fellow by the name of Zinc; they come from down here at Christiansburg, and they cut them into timber for the railroad, but I don't know how they handled them.

The witness on Cross Examination testified as follows:

I will be 75 the 10th of March. I was born in Campbell County, Virginia. I lived in Oakvale in Mercer County which was called Princeville when I lived there. I did not live there all of the first twenty years of my life. I was scattered around, you might say, from pillar to post in that neighborhood. Sometimes we would be there and sometimes a few miles away.

I have never operated as low down New River as around Mercer's Salt Works, cutting timber and staves. I went to
455 Narrows about the time the War closed. I was not so very
big then. There is no other B. T. Johnson at the Narrows now. There was until a few years ago. The other man who is dead now was an uncle of mine. He did a little of everything, as far as his business is concerned. I have been in the real-estate business a little bit.

Q. Did you have any difficulty rafting logs from Ripplemead to the Narrows?

A. Not a bit, what I put in.

Q. Never lost any logs?

A. Not that I remember.

I wouldn't put in enough to lose any. I rafted them together and tied them pretty good. I remember when Zinc Brothers tried to raft logs from above Pearisburg to Narrows. It is my recollection that they turned their logs loose, rolled them in, and followed them down to the Narrows and had teams there to pull them out right away. They didn't lose any that I know of.

I remember a man by the name of William Alcott and when he tried to raft some logs to Hinton in 1885. He was a man who would always have his own way in spite of the dickens. People told him to put light logs in with walnut logs and he would be able to save them, but he never would do this and was bound to take a chance or he could have saved a heap of logs which he lost. He lost a good many walnut logs which he tried to take down the river. Seems to me the raft would break down about what they call Bull Falls. I don't think the raft broke at the Falls of the Narrows. He got over the Narrows pretty well. After that Mr. Alcott went into the export business at Narrows or Pearisburg. He would get his lumber to market on the railroad after that. I used to sell him lots of export lumber 5 x 12.

We used to haul some tobacco from Narrows to Lowell and to Dublin. I have an idea I have hauled a two-horse load with two horses. I am not positive. We used to use six horses. We had to, to do any good going on the roads in the condition they were in.

I remember a man by the name of Mike Clark. He came to Narrows to manufacture tobacco and built a factory there. I don't think he built two factories. I remember him building one where the Narrows Motor Company is now. It was a big one. He figured on building a factory also at the Narrows to roll tobacco from the warehouse into the boats, but he never done it I
don't think. I don't know why he didn't do it. He already
456 had the factory up on the hill built.

I used to ship staves down the river just about a year before the railroad went into operation. I loaded them on the boat and shipped them down to Hinton. I couldn't tell you what company owned the boat.

I don't remember talking to you about this river on the 10th day of November 1931, at Narrows, but you and me did talk something about it. I am pretty familiar with my signature. I believe that is my signature on the paper which you have handed to me. It looks pretty much like it, I feel that it is mine. I don't know; I could be real definite, but it looks a whole lot like it.

I have not talked about these things with anybody that I remember since I talked with you in 1931. I have not talked with anybody in the last month except Mr. Noel. I talked with him just about once. He may have come to my house twice. I believe that he did. It wasn't more than twice.

Q. I will try to refresh your memory a little. You remember stating on the 10th of November 1931 you had never seen any use by boats on New River?

A. Well, just read that over.

Q. (Reading.) "Never seen any use by boats. I tried to raft some logs myself but too rough. Lost a lot of logs and gave it up. This was from Ripplemead down to Narrows."

A. Oh, yes.

Q. Did you make that statement?

A. I believe I did make a statement like that to you.

Q. (Reading.) "This was from Ripplemead down to Narrows."

A. No; that was to Curves, it wasn't Ripplemead.

Q. (Reading.) "Zinc Brothers tried to raft logs from above Pearisburg to Narrows. Rafts broke and they had to give it up same time as above. William Alcott tried to raft walnut logs from Narrows to Hinton about 1885 and this raft broke up at the Falls in the Narrows and he lost logs and he was financially crippled." "Q. State what, if there was ever any navigation on New River by steam, rafts, or otherwise, and if so, the points between which and the times and result." And did you not state, "None except above?" What you had already told me.

"Q. To your knowledge, has any trade or traffic, that is, the hauling of products, person, or the floating of logs, etc., 457 ever emanated at a point above the Radford Dam site, and gone into the State of West Virginia, on New River, or vice versa?"

"A. Never heard of it."

A. Never heard of it; no sir.

"Q. Aside from your actual knowledge, if you ever heard of any of the above being done, please state what you heard as to time, places, and persons, and the source of your information."

"A. Some batcaux from Salt Works in Mercer County to Hinton." Did you make that answer?

A. That is where the boats come from, down above Hinton and the Salt Works.

"Q. Have you ever heard that traders or trappers made use of the New River from the point above the site of the Radford Dam into what is now the State of West Virginia?" "A. No."

"Q. Please state from your own observation, what the character of New River is, that is, with reference to depth, width, falls, rapids, shoals, ledges, and floods?"

"A. Series of pools, shallows, falls, and ledges with little water flowing over them in normal times."

"Q. Please state what you know about the improvement of New River by the Federal Government, whether this improvement facilitated trade and travel on the river and enabled trade or travel emanating above Radfored to get to West Virginia, or vice-versa, and what the present condition of the improvements is?"

"A. Heard something about it but I think they gave it up."

Then there are some other questions to which there were no answers. Did you make those statements to me?

A. I expect I did.

Q. Did you make the following answer to this question asked you:

"Q. Is the New River in its ordinary or improved condition susceptible of being used as a highway for commerce over which trade are or may be conducted from a point at or above the dam site at Radford into West Virginia? (In making this answer, consider the transportation of product, persons, logs, etc.)"

458 "A. I wouldn't consider it anything at all on account of too many shallows and ledges and in high water very rough."

Did you make that answer?

A. I don't remember I did. Of course you can make New River anything you want to by spending money enough.

Q. Then this question was asked you:

"What have you heard old men now deceased say as to the river in Virginia being susceptible of being used as a highway over which trade and travel might be conducted?"

"A. Heard old folks say that it was no use to try to make the river navigable."

Is that the answer?

A. I never thought so myself.

Q. Ever hear the old folks say so?

A. I never did think it was a money-making proposition.

Q. Did you make that answer to me?

A. I might have done that.

Q. Then this question was asked you:

"Please give any other information which you may have bearing on the subject?"

"A. About 1875–80 people in tobacco business here made a contract with someone down about Crump's Bottom to bring up bateaux and haul tobacco from here to Hinton. Couldn't get bateaux over falls in the Narrows and it was given up. The thought that the river could be navigated brought Mike Clark here from Lynchburg. He put up factory but he said river too dangerous and he would not try it. Hauled tobacco by teams from here to Dublin and Lowell and he had to quit without making use of river. In fact, he died here. Wouldn't have come but for the idea of using river. First factory at where depot now is, but when couldn't use river built another factory up town."

A. No; he built the other one first down in town; he didn't build no factory there, but just put up a little shanty to protect the tobacco he would ship on the boat is all he done there.

Q. But you say that is your signature?

A. It looks mighty like it.

459 Q. ~~I will ask~~ you to file that as a part of your testimony.

By Mr. Aiken. We are putting on our evidence now. If the gentleman wishes to offer it later he may do so.

By Mr. Abbot. I offer to file it.

By the Court. I expect Mrs. Lewis has it anyway.

The witness on Redirect Examination testified as follows:

Q. You say you think this is your signature?

A. Yes; it looks mighty like it.

Q. Was any other part of this statement read to you in your handwriting?

A. I don't think so.

Q. Do you recall the circumstances under which this statement was given to Mr. Abbot?

A. No; I just can't say.

Q. Do you know where you were?

A. He said it was there at the Narrows.

Q. Does this statement represent what you told Mr. Abbot or what Mr. Abbot told you?

A. It looks a little more like what he told me.

Q. How long did Mr. Abbot spend with you?

A. Well, I can't state that. He was there a right smart while.

Q. And he would ask you questions and make statements to you, is that right?

A. Yes, sir.

Q. And you said nothing here is in your handwriting except your signature, I believe?

A. My signature is all, it looks like.

Q. Do you recall whether the statement was read to you after he interviewed you?

A. I don't think it was.

Q. Did you read it over afterward?

A. I don't think I did. I don't remember reading it.

Q. Do you remember if any witness was present when this statement was given?

A. None I remember.

Q. Do you recall any of the circumstances whatever attending this interview which you had with Mr. Abbot?

A. I was generally pretty busy and I expect me and him got through mighty quick. I was generally kept pretty busy 460 and hardly ever liked to take much time.

Q. I will ask you if the evidence which you have given from the witness stand here today, under oath, respecting traffic on the river is the truth as you recall it?

A. As I recall it.

By the COURT. You have stated here on the stand you made the answers to Mr. Abbot contained in that statement. Do you mean to say now they were not true when you told Mr. Abbot that?

By the WITNESS. I don't say that. I might have made them statements, and I might not.

The witness on Recross Examination testified as follows:

I have been sick about a year lately. I am right smartly improved now. There is a doctor here with me today. My wife insisted that I let the doctor come along. I didn't consider it necessary, specially.

461 J. A. MEDLEY on Direct Examination testified as follows:

I have been living at True, West Virginia, four miles above Hinton on New River, for twenty-five years. I was born at Cash's Hill on New River and have lived on New River all my life.

I have worked on New River at boating and running ties. I have been a boatman there since I was thirteen or fourteen years old, off and on, all my life. I will be 73 years old the second of January. I knew and worked for a man called Squire Peters. I worked on the farm and built and run boats for him, I would say, for five or six years. He lived at Mercer's Salt Works, which is on New River.

The boats I worked on were bateaux about eight feet wide and 65 or 70 feet long. They ran up and down the river from Hinton to Mercer's Salt Works and from there to Radford City. We made a trip up there.

When these boats came up stream we put four people in the head of them and shove, carrying a load of 8,000 or 10,000 pounds, as far as we know. We carried merchandise to Mercer's Salt Works and up to Roundbottom about once a week in the summer time. Sometimes in the winter we made trips after lumber got coming in, shoving a pole against your shoulder, but after that we got motorboats and put them on the river and made a trip every day.

I made trips to Glen Lyn. As far as I can remember that was about 35 or 40 years ago, hauling merchandise and fertilizer for Jim Peters, who was known as Squire Peters.

Some of the men who boated down there for years with Peters were Jim Smith, Ed Smith, and old man Kidd off the Gauley and Mud River—they used to boat down there and come there and give them a job and stayed there for years with old man Peters. Others besides myself were Bres Rhoades, old man Aleck Kidd, Ed Medley, my boys, and myself.

We went up to Glen Lyn to get merchandise. We brought fertilizer from Glen Lyn in Virginia to Mercer's Salt Works in Sommers County and Mercer County. The post office is Mercer's Salt Works, Sommers County, West Virginia. That was a long time ago, I can't remember everything. That was about 30 years ago. We went off and on. Every spring we would go up there and get stuff. We would get fertilizer and bring it down 462 from Glen Lyn when they made the N. & W. This fertilizer was put up in sacks which I think would weigh about 100 pounds, somewhere along there—125 or 150 pounds.

I was well acquainted with a man named John Crockett. We taken him up here to Radford. I was on the boat all the way to Radford and returned with it. We moved house furniture for him. That was about 35 or 40 years ago.

I owned a bateau myself and ran it on the river carrying lumber, staves, tobacco, fertilizer, and merchandise all up and down the river. I know a firm by the name of N. H. Nabb & Company, and worked for them boating staves which I got up and down the river here, Bull Falls and Wiley's Island.

Q. Where is Wiley's Island?

A. Right across below the old State. West Virginia is different.

Q. You mean it was in Virginia?

A. Yes, sir.

Q. Was it in Virginia or West Virginia?

A. Right across the line. There are four counties and two states on the corner there.

I know a place on the river called Quinnimont. I run a boat there from Quinnimont down to Quinnimont Gorge about two miles. Quinnimont is down the river below Hinton, below Sandstone Falls. It is about 35 miles from Hinton, a little above a place called Stretcher Neck. I was boating for B. L. Rhoades down there, down to the yard of Quinnimont about two miles.

We built a boat down below Quinnimont for old man Lee and Stonewall Mining Company, and run it down around the mountain from Piney Branch down to Stretcher Neck.

I recall the construction of the Chesapeake and Ohio Railroad Company at what they call the Gorge and saw materials used in that road hauled on the river up to Hinton by boat. They were brought upstream from West Sewell and East Sewell. I know a place called Sandstone Falls. They had a crew above it and another one below it and hauled goods around there with teams and put the goods back on the boats and brought them to Hinton.

The draft of the boats when loaded depended upon the kind of load. We would take about 12 to 18 inches. They 463 was 22 and 23 inches deep and draw about 21 and 22 inches of water loaded down. The river was used for the carrying and hauling of this material through to the country where it was needed. There were no roads at all, only bridle paths.

Q. Did you ever see any moborboats on the river or steamboats?

A. Well, yes, sir; we have run them.

Q. You have run them?

A. Yes, sir; got one down there at home now laying in the cellar, a nine-horsepower engine, that we run on there on a 25-horsepower motorboat—hook it to a bateau and go up the river with it.

Q. When did you do that?

A. Well, it has been about twelve or thirteen or fourteen years ago.

Q. How many years did you run motorboats on the river?

A. Well, ever since we got sense enough to get a motorboat, you know, we quit shoving with poles. You take a pole and put it on your shoulder and shove them and then they built motorboats.

I have rafted all along the river from Bluff Post Office to Hinton, which is up on the river. St. Lawrence Bluff is what they call Roundbottom. I have seen two or three steamboats on the river years ago.

Q. When did you see them?

A. Oh, it has been years ago. It was a boat come from Radford and I forget that man's name. He had a little motorboat, nice built boat, and brought there and they loaded it and they taken it off and I don't know where it went to.

Q. How do you know it came from Radford?

A. They said it did. They told me it did.

By the COURT:

Q. Where was it you saw it?

A. It was Hinton and then I went in it a few trips up and down the river to Bull Falls., The Martin boys were heading for the fellows after they got down there.

464 I have shipped ties on the river to the Lilly Lumber Company. The Chesapeake and Ohio Railroad, or the Pennsylvania, bought a few ties there and shipped them in cars on the C. & O. Railroad. I don't know where they took them. There were thousands and thousands of ties that were shipped down the river. I have rafted or loaded ties. We had a contract to load them and raft them. You couldn't run them unless we would put them up and raft them.

We stopped hauling lumber on the river because they built roads and that cut us out. They began hauling by wagon and automobile trucks.

I can't remember how many sacks of fertilizer I would carry on one of my boats, but we could bring a whole lot of them. We never did count them though.

Q. You haven't any estimate?

A. Well, a pretty good lot of them. We didn't take time. We worked for a man that had to move them and load them and carry them on our backs to the river and go on down, for old man Jim Peters.

Q. Do you recall a ferryboat having gotten loose up above Hinton and floating down the river?

A. Up above Hinton?

Q. Yes.

A. Well, Mister, I could tell you a whole lot but the other people will——

Q. I just want you to answer my question.

A. About them getting loose?

Q. Yes.

A. Yes, sir.

Q. Tell that, what happened about that boat, if you know?

A. About them getting loose?

Q. No; about the ferryboat getting loose.

A. Well, I reckon the flood must have got it.

Q. Did you ever have anything to do with moving that boat that went down below Hinton?

A. We moved a boat from below Hinton back up to Hinton.

Q. You said you moved it from Hinton up to Hinton?

465 A. No; we moved from down where old man Richardson lives up to Hinton for Dr. Quisenberry.

About 4 or 5 of us were on the boat when we moved it upstream. It was about 40 or 45 feet long and about 9 or 10 feet wide. We didn't measure it, but I built enough boats to know its size.

I knew a man downstream below Hinton on the river called Old Man Bob Flannagan, and worked for him on boats. He didn't own any boats. I took my own boat. Hauled stuff, lumber, staves, to Hinton. We didn't boat from Hinton down the river and bring it up there. As far as the shoot goes is Hinton. We boated from Crump's Bottom and all them places. We boated materials from down below Hinton downstream only down at Quinnimont for B. L. Rhoades.

The witness on Cross-Examination testified as follows:

I didn't do any hauling from Hinton to Quinnimont on the river. I said I done the hauling from what they called the head of Quinnimont Shoals down to where they loaded it on the yard—switching. I boated down there on a pool just about two miles long.

The boating I mentioned from the mouth of Piney to Stretcher Neck tunnel was for a different man. That was for Lee and Stonewall, ran to Stretcher Neck and go down the left-hand side. After you left Prince you crossed. There used to be an old bridge there way back yonder, you know, and take it to I don't know where. We crossed there and they got me to go down there and build them a bateau and run some lumber down there for them. We run the lumber from Piney Branch down to around the Narrows of Stretcher Neck. We didn't run the bateaux down there, we built the boats down there. We didn't run our boat from Hinton down there because they could get lumber down there cheaper to build it than we could afford to take it from Hinton.

I first saw boats on the river as far as I can remember when I was a little kid about 10 or 12 or 13 years old. I know where Narrows of New River, a town in Virginia, is.

I don't know of any Bluff City except Bluff Post Office below the Narrows of New River. It is about six miles back down the river from Narrows.

I worked off and on for Squire Peters for five or six years.
466 I couldn't tell how many years. Beside boating for him, I run the old salt mills, me and the old lady and kid. We also planted corn and beans.

Q. These trips that you mentioned that you went to Glen Lyn, what time of the year were they made, Uncle Andy?

A. Well, we didn't keep no figure of that at all. We was working for old man Jim Peters and we couldn't tell what time.

Q. What did you get up there to bring down?

A. Fertilizer and merchandise.

Q. Was that usually in the spring of the year?

A. Why, yes.

Q. It was in the spring of the year?

A. Well, you use fertilizer in the spring; you don't use it in the winter, do you?

Q. I don't know. I was wondering about it. So it was in the spring that you made the trips to Glen Lyn?

A. If they called us we would go there in winter or any time. We would often get trips in the spring of the year to bring fertilizer down to Summers County from Glen Lyn.

Q. You would make an annual trip up there in the spring to get fertilizer; is that right?

A. We would go up there and get merchandise?

Q. Did you ever go up there just to get merchandise?

A. We have moved a few people from up in there.

Q. Yes; but I wondered whether you had ever gone to Glen Lyn to get merchandise other than fertilizer?

A. Well, you people, surveyors of New River, you ought to see what they have done over there. The company has got about six miles of railroad made in there and they couldn't get nothing through there if there hadn't been boats.

Q. The railroad you talk about is down there below Round Bottom, isn't it?

A. Well, from Bluff Post Office on down towards Walker Island. How could we get stuff in there and no roads if we did not have boats?

467 Q. That is where you did your boating, Uncle Andy, to those people working on that roadbed?

A. Well, there wasn't nobody to bring it in. How could we get stuff there unless we had boats to bring it? You couldn't haul it along the roads because there wasn't no roads. We even then would go up at Mercer Salt Works from Kanawha on horseback and get salt.

Q. That was in 1880 or 1881 that that roadbed was being repaired?

A. What?

Q. What year was that, that that was being done?

A. I don't know anything about it. I was born in 1864. I don't know what they done before that because I wasn't here.

Q. I said 1880 or '81. That is a good while after you were born. You remember when they were doing that grading down there below——

A. I didn't keep no figures of it at all.

Q. And you say they were the people that you supplied with bateaux on the river?

A. People?

Q. Yes.

A. Yes, sir.

Q. And you boated up the river to take care of those hands working on that stretch of roadbed down there, didn't you?

A. On the roadbed?

Q. Yes.

A. No; there wasn't no roads then. We was working on the river.

Mr. THOMPSON. I don't believe he understands you when you say "roadbed."

A. Do you think it was a hard road? There wasn't built no hard roads. It was a bridle path. Maybe you take a two-horse wagon to go down to Hinton and get a saw and bring it back in about a week.

Q. Do you remember when the railroad company graded the roadbed down below Round Bottom, from Bluff Post Office down the river?

A. Yes, sir.

Q. Did you do any work in connection with that?

468 A. Well, I stayed with old man Tom Dickson, and carried dinner down there to the bosses.

Q. Wasn't there considerable boating done for the people working there?

A. They was running boats then when I was a little kid and bring stuff in there to the people working on the road up to Bluff Post Office.

Q. Do you remember Mr. Pine that had the store at Round Bottom?

A. Lewis Pine?

Q. Yes.

A. Yes.

Q. That is where they would bring it?

A. Yes; they would bring it there.

Q. I don't believe they ever laid any tracks down there or ran any trains along there, did they?

A. No, sir.

Q. They just prepared this roadbed?

A. Well, sort of like they done today. They start on something and quit it and leave it.

Q. And that is down the river from Bluff Post Office to Round Bottom?

A. Well, it is Round Bottom.

Q. And you said that was about six miles long, Uncle Andy?

A. Sir?

Q. That was about six miles long?

A. Which—the railroad?

Q. The grade?

A. No, sir; it wasn't six miles long. I didn't say that. I expect it was about two miles long.

Q. Andy, were you engaged in this hauling of goods up to Hinton during the construction of the C. & O. Railroad that you testified about?

A. No.

Q. Did you see that done?

A. I seen it. I told you I was about twelve or thirteen years old when they would bring the stuff in there.

469 Q. And you saw stuff brought in where?

A. Brought in to Hinton from down the river.

Q. You didn't see it come up that river, did you?

A. They would shove it. It is bound to come up there.

Q. How far down the river from Hinton did you see those boats?

A. Well, we walked way down below Hinton. That was before there was mighty few houses in Hinton when that was done.

Q. How many were there—two?

A. I never counted them. There might have been five or six. I didn't count them. I didn't have time, you know.

Q. And you say you were twelve years old?

A. I said I was twelve or thirteen years old.

Q. Why were you so pressed for time then?

A. Pressed for time?

Q. Yes; you said you didn't have time to notice how many houses there were in Hinton.

A. A little kid couldn't run around—there might have been fifty, I don't know—running around there he couldn't count the houses and didn't think about it. We wasn't counting them at all. There was no time, you know.

Q. This boat that you talk about that came down the river from Radford—do you remember the gentleman who owned that boat?

A. No; I don't remember him. I told you before that I didn't remember the man. I remember there was a Martin helped him run after he come down there and they loaded it and I don't know where it went.

Q. You don't remember whether it was a man named Mr. Robert McWane, do you?

A. He didn't tell me his name and I never asked him his name.

Q. It was a motor boat with a little cabin on it, wasn't it?

A. Well, it was a pretty good boat, nice, you know, like they have on these great big places. On the Kanawha, down there they have all kinds of boats.

470 I seen that boat come down the river from along in the shoals there. I don't know whether it was the boat's first trip or not. I don't remember what year I saw that boat. I didn't

keep no dates of it at all because we see things come into that country and we didn't have time to keep dates and survey the river. I didn't keep any account of how long that boat operated around Hinton. I think they shipped it away from there. I don't know what became of it.

I remember a man named Davis who had a boat there about 1906. I worked for old man Captain Davis and Harry Starbuck. I didn't measure that boat, but it was about 60 or 70 feet long. You go down in the river and take a boat up and measure it and you get it in the water and it looks like it won't be over 25 feet long and it will be 50. That boat could carry a pretty good load. It would not carry any load as heavy as a bateau which was poled on the river. It wouldn't carry no load like that at all. We put a bateau in front of it and couple them together and load the bateau down and put staves and lumber in it. I operated the bateau in conjunction with the Davis boat. We would help him out in these hard places. The steamboat would help in the easy places and the bateau would help the steamboat in the hard places. I think the Davis boat just laid there in Hinton and they shipped the engine away. I don't know what they done with it. I don't remember where they taken the engine to. I think Old Man Pack bought the hull from Captain Davis and run it a little bit up and down river as a bateau. He did not shove it. He had two motor boats, skiffs, and one right in front of the other and pulled that boat up. Old Man Pack built him a motor boat and put two motors on skiffs—on motor boats not on the Davis boat.

Q. How much of a tide did you have when you went to Radford?

A. Well, we didn't measure it.

Q. A pretty good one, wasn't it?

A. Well, it was a tide all right and we were working and going down there. I couldn't tell. We didn't measure that.

Q. You had enough tide to get over the big falls, didn't you? You had enough tide to get over the big falls that you had to go over?

471 A. We can go over there tomorrow if we were down there and take a boat. You can't because you ain't man enough to do it.

Q. How many times have you ever been over the falls of the Narrows?

A. Sir?

Q. How many times have you ever been through the falls of the Narrows in a bateau?

A. I didn't count them—several times, though.

Q. Where is the channel through that falls?

A. Channel through which falls?

Q. The falls of the Narrows?

A. Narrows Falls?

Q. Yes.

A. I don't know where the channel is. We weren't looking for the channel. There wasn't any up there. We would just go on up to Radford over here.

Q. You would go right over the falls? You didn't have to look for a channel?

A. How would we look and shoving for life? All we had to look for was something to eat, bread and meat, and work.

Q. Are you familiar with the channel in Shumate's Falls?

A. Which Shumate?

Q. Anderson Shumate?

A. Yes, sir.

Q. How far is that above Wiley's Falls?

A. That is below Wiley's falls.

Q. I am not talking about Anderson's Falls now.

A. You said Anderson's Falls, didn't he? He asked me how far it was.

The COURT. He said Anderson Shumate's Falls.

A. Anderson Shumate? You know where the Doc Shumate place is? That used to be the old Anderson Shumate farm.

By Mr. ABBOT:

Q. We want to get it down here so other people will know. We know a whole lot the rest of them don't know.

472 A. Well, there wasn't no chutes in there.

Q. You had to go through a channel to get through that?

A. Wasn't no channel there. We would go to Glen Lyn and load a boat and come down there and get a team and haul around the Shumate's Falls and load it on and come on through.

Q. Would you always do that, Uncle Andy, at Shumate falls?

A. Yes, sir; every trip I made we would do that.

Q. You have never poled a boat through Shumate's falls?

A. Poled it through there?

Q. Yes, pushed it through?

A. We pushed it through there, but coming back we would go to Glen Lyn and unload and haul stuff around there below Shumate's falls and put it on back there.

Q. Do you remember what happened at that falls when you were boating Mr. Crockett up the River?

A. Well, sir; let me tell you I can't remember anything like that at all—what happened. If you had been along you wouldn't have knowed. You wouldn't know at all.

Q. Maybe not.

A. You would have been like me—work. We didn't know what happened.

Q. Was Jim Smith on one of these boats?

A. Yes, sir.

Q. He was on the second boat?

A. I don't know whether it was the first or second. I told you I couldn't remember what boat he was on, but he was on one of the crews that went up there.

Q. That went up where, Uncle Andy?

A. Up to Radford. There was one boat that went on through to Radford and the other turned around, the one you said went to Glen Lyn that you all tried to get me to tell a lie there.

Q. Were you on the boat that went to Radford?

A. I went to Radford; yes.

Q. Did Jim Smith go to Radford?

473 A. No, he didn't go there.

Q. Did two boats go to Radford?

A. No.

Q. Two boats started out, didn't they?

A. And we doubled, I told you, after we got over at Glyn Lyn.

Q. Where at Glen Lyn did you double?

A. Mister, I didn't measure it or keep count of it. Do you know where the Tony ferry is?

Q. That is right at Glen Lyn, isn't it?

A. That is right.

Q. Is that where you doubled?

A. Tony's Ferry, yes. It comes over—do you know where that bridge is at the N. & W.? Well, that wasn't no bridge there. The N. & W. was just put there.

Q. You don't mean to say the Norfolk & Western has got a bridge across the river at Glen Lyn, do you?

A. No, sir; I said the Virginian got one in there. There are two divisions, the N. & W. and Norfolk & Western, right at Glen Lyn—the Virginian road and the N. & W. comes right in there at Glen Lyn, one on one side of the river and crosses the river right there at the tunnel, comes around the mountain from over at Bluefield, and comes through there and comes across the river at Glen Lyn where the Power Company has got a plant.

Q. That is the Virginian that comes across there?

A. Virginian comes across there and the N. & W. keeps up the right-hand side.

Q. And you say it was there that you doubled over?

A. Right along there at Tony's Ferry.

Q. And from that point one boat went to Radford, and you were on that boat?

A. On that boat; yes, sir.

Q. Don't you recall, Uncle Andy, that the boat hung up down there at Shumate's falls and the furniture was hauled from
474 there by wagon to Glen Lyn and shipped away on cars?

A. No, sir.

Q. Did you take the furniture out of either of those boats at Shumate's Falls?

A. No, sir; we doubled over there and hauled them up over Shumate's Falls and taken them on to Glen Lyn and transferred from there and went on to Radford up here. There is no bridge there. There ain't on that map there. There is one up at Radford.

Q. How long did it take you to get to Radford, Uncle Andy?

A. I told you we didn't keep count of it, mister.

Q. Was it a week?

A. I couldn't tell you. I said we didn't keep count of it.

Q. Can't you tell things you don't keep any account of?

A. I could tell you a lot of things I kept account of, but I ain't going to do it.

I kept count of the boats I used on the river around Hinton, and from Hinton up to the Mercer's Salt Works, but I didn't keep count of any one else's boats. I testified in Hinton when I gave my deposition there that there used to be as many as eight and nine boats down there at a time, but I didn't keep count of them at all. I was looking after my own boats. Between eight and nine bateaux were the most that ever operated on the river at the time. I had boats of my own. I couldn't tell you how long it took us to get up to Radford. When we got there, Radford was a pretty rough-looking place, rough people, and rough-looking country, too; mountains, rocks, and cliffs. This was before the Appalachian was building the dam.

Q. Did you see any railroad bridges when you went up there?

A. Wasn't any in there at all on the N. & W.

Q. You didn't see any railroad bridge across the river on that trip?

A. How could we see a railroad bridge in there, when we got to Radford there was three or four come in there.

Q. You didn't see any until you got to Radford?

A. They come up and down there, coal yards up and down the river, before the N. & W. used to haul it back about Union, wagons hauled it.

475 Q. What was that they hauled?

A. Coal.

Q. From where?

A. From up at tnem mines.

Q. You mean the Parrot mines and McCoy mines on the river?

A. Mines; I don't know whose they were.

Q. When you went on this trip from Crump's Bottom to Radford, did you go under any railroad bridge or trestle?

A. No, sir; it has been so long I don't know. We might have went under bridges and everything. We couldn't take time to see what it was.

Q. Have you any recollection as to how many; might you have gone under as many as four of them?

A. We didn't count them, in the name of the Lord how could you count them when you get in a place like that riffle, could we take time to count bridges and railroads up there, we had to be looking out for something else, if we had we would have done better to have laid on the bank and walked.

Q. You don't mean to say you encountered any riffles?

A. Did you ever see any eddies up there?

Q. I thought it was a pretty placid stream to take two loads of furniture on a boat to Radford?

A. Which?

Q. I say I thought this was a smooth stream.

A. Pretty rough I tell you.

Q. Where were these eddies, do you remember any of them?

A. No; after we left Glen Lyn we didn't keep count of nothing, didn't have time to keep count of nothing.

Q. You didn't see any railroad bridges?

A. How in the name of the Lord could we keep an account of that and go down there and shove like dogs, how could we count the bridges and things? Mister, we couldn't have done it.

Q. I thought you might have peeped up on some occasion and caught a glance of some of them, but you didn't have time to do that?

476 A. No, sir.

Q. Did you see anything going up that river you remember?

A. Geese and ducks and birds and things like that and skiffs.

Q. Did you see Walker's Creek?

A. I never paid no attention to Walker's Creek or John's Creek, either.

Q. Did you go by any cities or towns on the way up there?

A. No, sir; we had supplies on the boat and went on.

Q. I suppose when you got to Radford they put a blindfold on you?

A. That wouldn't amount to a penny on a boat. You think they could come down there blindfolded running New River?

Q. How long did it take to run it?

A. I didn't count the minutes or hours.

Q. You said you didn't move the furniture on either of those boats until you doubled over at Glen Lyn, I believe?

A. I said we taken it to Glen Lyn where Tony's Ferry is, on two boats.

Q. No furniture had been moved on any boat.

A. Might have been before I was born, I don't know. I couldn't keep count of it.

Q. I am talking about that trip?

A. We didn't take time, mister.

By the COURT. He wants to know when you all started up the river with the two boats of furniture, did you change or switch the furniture until you got to Glen Lyn?

A. We put it on one boat and sent the other one back.

By the COURT. Did you do that before you got to Glen Lyn?

A. We taken one load around Shumate Falls.

Q. Why did you just haul one load around Shumate Falls?

A. Enough of us in there to shove it.

Q. Did you take off each boat or first off one boat?

A. I didn't count them I told you.

477 Q. It is a fact that wagons came up to Shumate Falls?

A. They can now.

Q. Couldn't they when you boated fertilizer down the river?

A. A man lived there, old man Anderson Shumate; we would go to him and get him to help us around there.

Q. He would help you around there with a team, wouldn't he?

A. Yes, sir.

Q. Uncle Andy, did you ever boat up into East River?

A. No; we went as far as Shumate at Glen Lyn, never were up in East River in a boat.

Q. Never up there?

A. Have you ever been up there?

Q. Not on a boat, but I have been up there.

A. Well you ought to know without asking me.

Q. I want you to tell about it. Can you get up East River with a bateau, get up into the river or on up?

A. I never did try it.

Q. You have gone up there to get stuff, haven't you, at Glen Lyn, at the station?

A. Yes, sir; Ould's store used to be there at the mouth of East River.

Q. What do you mean by the mouth of East River?

A. Where it empties into New River, like the Kanawha empties into the Ohio, that has a mouth, ain't it?

Q. What I asked was if you were ever up in East River—don't you recall Ould's store in there?

A. We went up to the mouth of East River to where Ould's store is, you know where that is, right there by the side of the station, now the N. & W., since I have been up there was put through there and I ain't been back in a boat since.

Q. You took your boat and loaded it in front of Mr. Ould's store when you would get stuff from Glen Lyn?

A. We went right below the store, a ford right below Ould's store.

478 Q. You mean the old ford going down the river?

A. The ford going over to Ould's store at Glen Lyn station used to be there.

Q. How far up into East River would you take your bateaux?

A. Along about Ould's store at the mouth of East River.

Q. Up where the old road coming down East River was?

A. Now they may have changed since I was there, could I tell which way it come, we went in there I told you.

Q. Do you remember the road coming down East River, Uncle Andy?

A. Which road?

Q. The wagon road, the road that crossed the East River right there by Mr. Shumate's house, and one road went to the left, you went on around the mountain?

A. The house was away down this side of Glen Lyn and the road come up New River past that place.

Q. You did not go up into East River with your bateaux?

A. We went to the mouth of it at Ould's store. You know where that is without asking me.

Q. Is that near a brick house?

A. I didn't look to see if it was a brick house or what, Ould's store, you know whether it was made of lumber or brick.

Q. I asked if it was near a brick house on the left bank of the East River?

A. I can't remember that, it might have been a plank house or weatherboarded, I don't know.

Q. When was the last time you were at Glen Lyn?

A. Been about twenty or thirty years. Last time I was at Glen Lyn was when I went over in Franklin County.

Q. When was it you moved Col. Crockett on a boat?

A. I can't tell you the day and hour at all. It has been away back yonder, a right smart back, thirty-five or forty years. We didn't keep the date.

479 By the COURT:

How old were you?

A. I was a young man, going on seventy-three now, and take it thirty-five or forty years ago, I would have been a pretty good man, wouldn't I?

Q. Uncle Andy, how old were you when you were married?

A. Twenty-four years old.

Q. Was this before or after you were married?

A. This was before—no, after; I married after that, because I went on there to get cattle from over here at Christiansburg.

Q. And was it anywhere near the time you were married, within a year, or two years, after you were married?

A. After I was married?

Q. Yes.

A. It was after I was married. I can't remember the years.

Q. How many years would you say?

A. I can't keep account of that.

Q. So you have no idea except you were a young man?

A. That is what I was, a young man and very good one, too.

Q. By a young man, what do you mean?

By Mr. **Thompson**:

It seems to me this is going beyond the bounds of cross-examination. He says the best of his memory he did it as a young man, and I appeal to the Court.

A. Can I remember everything? No, sir; I cannot.

Q. I just want to get your idea as to what a young man is.

A. How old are you?

Q. I am pretty young—I am forty.

A. Then you ought to know without asking me.

Q. Were you forty at that time?

A. I don't know what age I was. I didn't keep the date of it at all.

Q. You might have been anywhere from twenty to fifty when this happened?

A. No; I wouldn't say that long.

480 Q. Can you tell us just about how old you were then?

By the **Court**:

He said it was thirty-five or forty years ago.

A. Yes, thirty-five or forty years ago.

The witness on Redirect Examination testified as follows:

Q. Mr. Medley, could you give an estimate from your best judgment as to the number of trips you took up to Glen Lyn and back?

A. No; we didn't keep account of them, Mr. Thompson. How could we keep account of them and working hard? We were working for a man and getting $3.00 a trip, and how could we keep account?

Q. I believe you stated it covered a period of from six to eight years?

A. Yes, sir.

Q. Have you any idea how many times a year you would go up there?

A. We didn't keep count of it.

Q. Did you go in times other than springtime?

A. No; only in the spring to Glen Lyn to get fertilizer.

Q. Did you go at any other time to Glen Lyn?

A. No; we didn't.

Q. I understood you to say to counsel you would go when an order came?

A. We would, but it wouldn't be no winter, you know, would take a boat up there loaded down enough to supply them in cold weather.

Q. In answer to a question from counsel I understood him to ask you how many times you went through Great Falls, and I would like to know what you meant by that.

By Mr. **Abbot**:

I said Big Falls at Narrows.

A. You mean the Shumate Falls?

Q. Is that what you understood by the Big Falls?

A. That is what he said.

Q. Did you understand him to mean Shumate Falls when he said Big Falls?

481 A. That is what I understood him to say.

Q. Did you go through Shumate Falls on a boat?

A. We didn't walk over it.

Q. Did you go through on a boat?

A. Yes, sir.

Q. Going upstream?

A. Yes, sir.

Q. Coming downstream did you go through Shumate Falls?

A. We didn't carry the boat around there.

Q. Just answer my question.

A. We certainly did.

Q. Were you always able to come down Shumate Falls in a boat?

A. We never missed it coming down through there, we would have a load on there and have to unload it, put it in a boat down under them falls, go up and get a load, and get old man Anderson Shumate to deliver it, take his team and go and haul the stuff from there and come on in.

Q. You loaded the boat below the Falls?

A. Put it back on the boat below the Falls.

Q. I don't understand; did you run the boat empty below Shumate Falls and then load?

A. We come to the Falls and unloaded and hauled it around and put it back on the bateau.

By the **Court**:

When you got to the Falls you ran into the bank and unloaded?

A. Yes, sir.

By the **Court**:

And then ran the empty boat through the Falls and reloaded?

A. Yes, sir.

Q. How many boats did you say you built?

A. Bateaux?

Q. Yes.

A. About twelve or fourteen.

Q. Did you run them on the river?

482 A. I helped run them and build them. I had five of my own.

H. A. **Starbuck** on direct examination testified as follows:

I reside at Hinton, West Virginia. I am 52 years old and was born at Lansing, West Virginia. I have lived in Hinton about 48 years. I am and have been a locomotive engineer for little over 30 years on the C. & O. Railroad and have been on that road all the time.

I have seen all kinds of boats on New River—bateaux, skiffs, motorboats, and steamboats. I have seen boats operated by steam engine or gasoline motor.

I have heard of a boat owned by a man of the name of Davis. It was built in what we call a flatboat style with a cabin, two side wheels, and a steering wheel. I judge it was 50 or 60 feet long, and about 11 feet wide or something like that. I don't know when I first saw the boat. I helped my father put machinery on it but I can't say what year. My father run a machine shop and foundry. I don't remember the horsepower of the engine exactly, but it was close to 30, possibly a little less or a little more. I went on the boat with Mr. Davis in 1907, but I had been on it some time before that. How long before I don't remember. I run the engine and machinery part of the boat for Mr. Davis for a season or two, I don't remember. After I ran the boat for Mr. Davis I taken charge of it.

I got the boat from Mr. Dunlap and was to pay a dollar a day for the use of the boat on the days that I run it. I ran it in 1907 and I believe the year before that. That boat was run at least three and maybe four years on the river. I am not positive about it.

They taken the machinery off the boat and shipped it, I don't know where to. The hull was laid up there a good while and I don't know what became of it. They took the machinery off because there was nothing up there to boat after the roads opened up and they quit cutting staves.

The principal things hauled by this boat were staves and lumber. I hauled staves for the Nabb Stave Company, but our contract was made with a man on the wharf named Alf Atkins. We got those staves at Sulphur Spring Branch, Bull Falls, and 483 Indian Creek. I suppose it was 25 miles up to Sulphur Springs up to Mr. French's place that the boat was run. Going upstream we would have a passenger or two maybe and someone might have some groceries or something for the store we would take up on the trip. Some of the groceries were carried to a store at Bertha and some for True and some for Crump's Bottom. Coming down we carried staves, principally, and also other lumber. Staves and lumber is about all we boated.

We used a bateau, shoved it ahead of us and we generally brought five or six thousand or more on a bateau and on the gasoline boat. It depended on how long the staves had been cut and seasoned. We would go two days on the trip to Sulphur Spring Branch. We would go up and load and come back the next day. We would not stop coming down unless we had a passenger or a little freight. The reason we stopped running this boat was that they got to hauling in wagons and the roads were better and there was not enough hauling to pay to boat the freight. There are no staves cut on that river now at all that I know of. The stave business is practically gone.

Referring to the photograph marked Government Exhibit No. 13 which you have handed me, that is the Davis boat in the picture, the boat which I ran, and in the picture the man in the window down below where the people are standing under deck is Bill Flippen, the man who run the machinery ahead of me a while.

I knew of quite a few smaller boats on the river. There were lots of motor boats and lots of skiffs and bateaux. I have had two or three motor boats myself. They ran from 20 to 25 feet in length, and I had one 30 feet long which my father and I built. I didn't build the hulls altogether. I built the machinery and installed the motors. I would say that I have installed the machinery in 7 or 8, 5 or 6 motor boats on that river, or something like that. We used this boat for excursions generally to Bull Falls on Sundays and holidays. The engine on that boat was of a horizontal type. Fairbanks and Morris gasoline engine, as I remember.

I made money running that boat so long as stuff lasted. I made a living but didn't get rich at it.

The witness on cross-examination testified as follows:

I installed machinery in 7 or 8 boats on that river. Some 484 of them were used for pleasure and some for shoving bateaux up the river with loads. They would range from 20 to 25 feet in length. The boats they later used to push the bateaux up the river were of the same kind. They shipped the machinery off of the Davis boat, I don't know where, and I don't know what become of the hull. We stopped using boats because we run out of something to boat.

I said I went up to the stave yard on Mr. Estil French's place at Sulphur Spring Branch. We had no trouble getting through Bull Falls on that boat. We wound through it. We would snub a big rope to a tree above the Falls and then had a windlass that pulled the boat, helped with its own power.

We generally had one to three bateaux. We would use the power on the motor boat and winding with the rope. They would get on the top of the Falls and tilt up and throw your power out of the water and you would have to catch it 'till the wheel would take hold.

Q. Uncle Andy Medley ran on the bateaux in connection with the boat, didn't he?

A. He worked on the boat for me a time, and also Mr. Davis.

Q. On the bateaux in front you mean?

A. He was one of the crew, the whole thing.

Q. I understood when you got to the shoals the bateaux men would shove and help the whole thing along and when you were in good water the motor would take it on very comfortably?

A. No; that was only in certain places where the bateaux being so long would throw your wheel out and maybe if you were in a hurry you would catch it with a pull. It wasn't absolutely necessary only on Bull Falls.

By the Court:

I believe you said when you ceased working for this boat called the Davis boat that later after that you had several smaller boats yourself, you and your father did, you used those for pleasure boats.

A. No; I used them for awhile shoving a bateau but the majority of mine was used for pleasure or hauling passengers, if someone wanted to go up the river I would take them. I didn't have any schedule.

485 J. H. Dickinson on direct examination testified as follows:

I was 73 years old last February. I was born in Giles County, Virginia, four miles below Glen Lyn on New River, and lived there about 25 years, or until I was about 25 years old. I remember something about the crops that were raised on the farms in that section at that time. We raised tobacco, wheat, corn, and a little of all kinds of crops.

Prior to the time when the C. & O. came through Hinton we would haul our tobacco to Dublin. I was a very small boy and went on a trip there. We hauled the tobacco to Dublin with horses and wagons. A trip to Dublin and back from Glen Lyn would take a little less than a week.

After the C. & O. Railroad came to Hinton we taken our tobacco to Hinton, usually on boats called bateaux. They were 60 to 70 feet long and seven or eight feet wide, and were of different sizes.

Q. How much tobacco did you haul on one of these boats from Glen Lyn to Hinton?

A. I never done no boating myself, but I guess they would take 8 or 10 thousand pounds on them boats.

Q. Do you recall what the boatmen charged you to transport your tobacco down there?

A. I think from Round Bottom it was 25 cents a hundred.

Q. Do you recall when the Government made channel improvements in New River?

A. I was at home when they were working there cleaning out the river.

Q. State whether or not you saw boat traffic on the river between Hinton and Glen Lyn prior to the time the channel improvements were made?

A. Yes, sir.

Q. How far up the river from Hinton did the Federal Government improve this particular section of the river?

A. It seems to me like they stopped pretty close when they got in Virginia.

Q. Do you know where Wiley's Falls is?

486 A. They cut through Wiley's Falls, a channel was cut through Wiley's Falls, and they done some little work on above there. At that time they were camping on our place, that was their headquarters:

Q. Where was your place, in West Virginia or Virginia?

A. That was in Virginia.

Q. Do you recall anything about the stores along the river between Hinton and Glen Lyn in those days?

A. There were stores at Round Bottom and one at Salt Well; there were sores in different places.

Q. Did Mr. Shumate have a store?

A. Yes, sir; that Salt Well store was the Shumate store at one time.

Q. State whether or not there was a store around Glen Lyn or in that immediate vicinity?

A. Yes, sir.

Q. Do you recall who ran that store when you were a boy?

A. Yes; I remember, it was John Shumate.

Q. State to the Court how these storekeepers got their merchandise?

A. They got it hauled to them in boats mostly.

Q. From where?

A. From Hinton.

Q. Do you recall what the bateaux hauled down from the Glen Lyn territory to Hinton, other than the tobacco which you have described?

A. They hauled wheat, lumber, and various things. Them bateaux would carry wheat, and corn, and they have taken corn to the mill from Crump's Bottom in the boat.

Q. When you moved from the vicinity of Glen Lyn down the river, where did you move to?

A. Crump's Bottom.

Q. That is between Glen Lyn and Hinton?

A. Yes, sir.

Q. Do you recall when the Norfolk & Western constructed its line in the vicinity of Glen Lyn?

A. Yes, sir.

487 Q. What have you to say about any supplies or material being hauled on New River in connection with the construction of that railroad?

A. They had a lot of boats and they boated their supplies from Hinton up there to the Shumate Falls near Glen Lyn, and they would haul them from there a mile or such a matter on wagons.

Q. Can you tell us how many boats were engaged in that particular traffic?

A. I think five or six or four or five.

Q. What about the weight of the load that was brought up there of that material?

A. They had them loaded pretty heavy coming up. I wouldn't tell just how many pounds they would fetch up there. Of course, that would depend on the water, the more water they had the bigger load they would carry.

Q. State to the Court whether or not you have any knowledge of boats going through Shumate's Falls?

A. Yes; there has been boats went through Shumate's Falls.

Q. What have you to say about how far up the river the boats have gone?

A. There was a fellow at Radford that made a little boat and he ran that down to Crump's Bottom and stayed there two or three days and then went on into Hinton.

Q. Was that a power boat or a keel bottom boat?

A. It was run by power. He stayed at Crump's Bottom, and I don't know what became of the boat, but he went on to Hinton.

After the Government completed the channel improvements the boating equipment that they had went to Hinton and I suppose was disposed of. I was on one boat that went down there. I got on the boat at my father's place in Virgina. A lot of boats came down there and stopped and then all the boats went down the river. I reckon there was a dozen or more boats in that fleet that went down the river. I was on something similiar to a bateau. The boats wasn't all alike.

488 It required something like a week to take a load of tobacco from the vicinity of Glen Lyn to Dublin and return. It wouldn't take all day to take a boat load of tobacco from the vicinity of Glen Lyn to Hinton. I think it took them boats nearly a week to get to Hinton and get loaded and come back. They brought back supplies for the Norfolk and Western up the river. They were loaded down pretty heavy. They would bring to the stores just what the merchants wanted, including shoes, sugar, coffee, and things like that.

They used to boat the good timber down the river in boats. They rafted the rough timber. I don't think they wanted the best timber to get in the water and they carried it on the bateaux. Cross ties were rafted two or three hundred in a raft.

Q. After the Government put a channel through up as far as Wiley's Falls, state to the Court whether or not you observed any effect that it had on the river traffic?

A. Yes, those boats could make it better after they cut those channels and they could take bigger loads.

Q. Could they run at low stage of water?

A. Yes, sir.

The witness on cross-examination testified as follows:

I was a very small boy when I hauled tobacco to Dublin. I had done some hauling over to the C. & O. or over to Lowell or Talcott. I got some fertilizer over there a time or two.

Q. When you were working on the Ace place, do you remember when you were a young man that you worked on a farm of your father's, a little small farm, and said you made 17 acres of tobacco up above Round Bottom?

A. That is the place they called the Ace place. I made a crop of tobacco there.

Q. Is that where you used the fertilizer that you got from Lowell and Talcott?

A. I don't know that I did then. I hauled fertilizer at different times. I hauled fertilizer from Hinton and I hauled fertilizer from Glen Lyn.

Q. By wagon?

489 A. Yes, sir.

Q. The tobacco you raised and sent down the river you put on the bateau at Round Bottom?

A. That is just where we put our tobacco on, about Round Bottom.

Q. You say the toll was 25 cents a hundred from there down to Hinton on the tobacco?

A. That is my recollection, that that is what they charged, about 25¢ a hundred.

Q. When you were testifying about the traffic on the river from the vicinity of Glen Lyn, you were referring to the shipping of tobacco from Round Bottom, were you not?

A. Well, yes, sir; there in Virginia, we would haul our tobacco down to the Round Bottom, or two or three miles below that.

Q. You would put it on a wagon and haul it down there and ship it by water?

A. Yes, sir.

Q. You said that the stores along New River were supplied by bateaux. You do not mean to create the impression that John Shumate's Store at Glen Lyn was supplied that way, do you?

A. I didn't say John Shumate's store, but I will say the Shumate Store at Salt Well.

Q. Before that channel was cut through Wiley's Falls, you had to have a right sharp tide to get over it, didn't you?

A. I never was no boatman myself, I don't know as much about the river in regard to boating as some of these old boaters do, but then they would go over the falls.

Q. But there had to be right much water in the river?

A. Well, it would take some water.

Q. Uncle Jim, when was it the Government boats went down the river, when you went on one of them?

A. How is that?

Q. When was it the Government boats went down the river, when you went on one of them?

490 A. That has been a good many years ago. That was when they quit working on New River, and when the boats went down I was a boylike.

Q. Was it the year of the Big Flood?

A. I don't know, I ain't positive about that.

By the Court:

Q. Do you remember the year of the Big Flood?

A. Yes, sir; I remember the flood.

The witness on redirect examination testified as follows:

Q. You spoke of transporting fertilizer down the river from Glen Lyn?

A. We always hauled fertilizer on a wagon, I always did.

Q. When you lived at Round Bottom?

A. Yes, sir; I used to haul it on a wagon.

Q. After you moved to Crump's Bottom, how much farther down the river is that?

A. I suppose it would be about 12 miles.

Q. When did you move down there, do you recall the year, or how old you were?

A. I was twenty-four or twenty-five years old.

Q. State whether or not you got supplies at Crump's Bottom from up and down the river?

A. Yes, sir.

Q. On the boats?

A. Yes, sir. The boats run regular. If you wanted anything from Hinton they would bring it for you, and if you had anything to ship, they would take it down for you.

D. L. **Lane** on direct examination testified as follows:

I am 48 years of age and have lived at Hinton or in the county close by all my life. I am familiar with New River in that vicinity.

I have seen boats on New River ever since I can remember. I would say since I was eight years old. As to when I saw the last boats on New River, they have got boats there now, ferryboats, skiffs, and boats like that.

491 Q. When was the last time you saw any boats hauling merchandise or similar products up and down the river?

A. I don't know that I have seen any in the last ten years.

Q. Continuously during the period then of about 40 years, you have seen traffic on New River, have you?

A. I will say thirty years.

I believe the bateaux which I have seen on the river were 62 feet long and 9 or 9½ feet across the top. I owned and operated a pair of boats myself from 1906 to about 1914, and done hauling for other people altogether. We hauled lumber, staves, tanbark, pulpwood, shingles, sand, and merchandise, and corn and wheat. We hauled the merchandise upstream to those stores. The biggest haul we made was downstream. I don't know the capacity of those boats in pounds. We would haul as high as 11,000 feet of dry poplar or pine. We would haul about 9,000 staves to a load.

Q. How many boats have you seen on that river at any one time?

A. I would say 15.

Q. Did you operate those boats all the year round?

A. Yes, sir; except when the river was frozen up and there was ice on it.

Q. Did you operate them regardless of high or low water?

A. Yes, sir.

Q. Were there any wagon roads in there at this time?

A. Very poor. There were wagon roads but they were very poor.

Q. Why was not more hauling done by wagon?

A. Because the roads were very poor.

Q. Would you stay that practically all the commerce in that part of the country was carried on the river?

A. Yes, sir.

Q. How did it happen that these bateaux stopped running?

A. Well, the timber played out and they were not hauling any timber much. There has been a little hauling since then with trucks, in late years.

I operated these bateaux from Hinton to Round Bottom and different points, including Pack's Ferry. I operated upstream as far as Round Bottom. There was a creek that came in at Round Bottom and I loaded below and above it where there was two little loading places. The creek is called Round Bottom Creek. I loaded on the right hand side going upstream. We always loaded the boat headed up the river because in getting to the river bank we had to cross the river. The channel was on the opposite side of the river or near the other side. That is, when we loaded we pushed the boat out and went upstream and crossed to the far side of the river because the channel was on the far side of the river. Then as we went out we turned the boat around and came down. 492

Q. Have you ever seen any motor boats on the river?

A. Yes, sir; they used to have a big motor boat up there that they pushed those bateaux back with.

Q. Where did that operate?

A. Between Hinton and Sulphur Springs Branch.

Q. How many boats would they push with that motor boat?

A. Three.

It had a gasoline motor. It would push one down and three up. I have seen some logs rafted. There was some loose logging. There used to be a pocket there and they rafted the logs down there.

Q. How many trips did you make with these bateaux a week?

A. From the upper place, we made two trips a week and sometimes three.

Q. How long did it take you to make a round trip?

A. Sometimes it would take up two days and sometimes it would take us three days, according to weather conditions.

The witness on cross-examination testified as follows:

I did this boating from 1906 to 1914. I was hauling for other people. I had two boats of my own part of the time but most all of the time I had one.

About 1910 I saw 15 bateaux on the river. They were owned by different people. I can't name all of the owners, but the Weeks boys owned two. I had two at that time, my father owned one, Surber owned one, John Bradbury owned one, Ed and Bud Lilly owned one, and some of the Merchant boys
493 owned one. I can't remember their names, but I believe their names were Cliff and Dick. Bob Craddock owned one, and A. Nabb and Company who ran the big stave company owned one, and they owned this other big boat which pushed them up there. There were some more boats but I can't remember the names of the owners. I did not count the boats or bateaux that were pushed up there by the big boat of Nabb and Company.

Q. Don't you know as a matter of fact, that that boat stopped running in 1907 or 1908?

A. No, sir; I don't know just what time it stopped.

Emmett M. Smith on direct examination testified as follows:

I am a brother of J. R. Smith, who testified here yesterday. I live at True, West Virginia, which is about five miles above Hinton up New River, right at the entrance of Bluestone River into New River. I will be 48 years old the twenty-first of this November.

I done some boating on New River with Captain Davis' boat that run with gasoline and I also rafted ties and lumber. I worked on boats on the river near about nine years. We taken some of the boats to above Hinton. I made three trips, but the longest trip to my knowledge was here to Glen Lyn. I was working for Elbert Merchant who is no longer living. He owned two boats to the best of my knowledge.

We took some groceries and merchandise and things like that up to Glen Lyn which we got at Hinton. It had been unloaded there from the train and placed on the river bank at the boat wharf, and we loaded and unloaded there. We took the merchandise to Glen Lyn and put it on the river bank where wagons could get it. I don't remember who we carried the stuff to. I remember there was a store at Glen Lyn then when we made that trip. To the best of my knowledge it was run by a man named Williams. When we returned we did not take anything from Glen Lyn, but we dropped around to Round Bottom and loaded with staves.

We also carried lumber and staves, tanbark and tobacco down stream. We made two trips with tobacco down there. On our trip to Glen Lyn sometimes there would be just little tides in

there but not so we couldn't travel it. We made those trips in the early part of the year near the spring. We
494 generally hauled about 5,000 staves on a boat. It depended upon the length of the staves. It would be 5,000 staves if they were 32 inches long, and if we got 10-inch or 12-inch or 14-inch staves we carried about 6,000 or 7,000 staves on a load.

I remember the T. H. Lilly Lumber Company and helped to load ties and lumber for them on the river bank there at Hinton near where the Standard Oil Company's place is now. That was the wharf for boats to come in.

I saw power boats on the river. There was a big boat there run by Captain Davis. It run by gasoline and had something like 20 horsepower or more. I worked on that boat and made several trips on it. If I am not mistaken that boat ran near about four years on the river.

The Lilly boys had a motor boat. Elbert Merchant had a motor boat and he fastened it on to the side of the bateau, the Lilly boys did.

I also worked for Captain John Lane who had a bateau. He hired Elmer Medley and used his motor boat to push his boat in the latter part of the year of that boating. When they used a motor they also used a pole at times when they got in a heavy chute like Bull Falls and Anderson Falls. Up where they got in those heavy chutes they would use poles.

When we went up to Glen Lyn we went through all the falls all right and we went through when we came down.

We boated staves for A. Nabb and Company which were shipped into New York. I remember that Captain Davis carried anywhere from two to three thousand staves on his boat and then he pushed a bateau that carried about five or six thousand staves.

Q. When you made these trips to Glen Lyn, were those trips made when your brother was along?

A. I don't recall my brother going on any trips at that time. I think he was off the river then.

Q. He wasn't with you on the river then?

A. No, sir.

Q. And you were boating for somebody else?

A. Yes, sir.

The witness on cross-examination testified as follows:

I was quite a young man when I did this boating to
495 Glen Lyn. I will be 48 in November. I was round about 20, I might not have been quite that old.

We did not follow the channel going up there all the way because there would be a little rise in the river and that could float the boat and keep you off the rocks. Part of the time we used the channel and part of the time we did not in going up when they carried cargoes and then we used the channel.

I did not see the Government cleaning out the channel on New River but my father worked on that. I don't know how far up the river that channel went. It went up the river as far as I had ever been with the bateau.

Q. This stuff that you say was going to Glen Lyn and that you say was loaded on the river bank, you say that was hauled away by a wagon?

A. If the wagon could get to it they hauled it with a wagon from the river bank.

Q. And that is where you put it, on the river bank?

A. It was our instructions to unload it there.

E. N. Farley on direct examination testified as follows:

I live in Hinton, West Virginia. I have lived there since 1906, except for a few years in the West. I am a Special Agent for the Chesapeake and Ohio Railroad Company.

When I was a little boy boats were working on New River. I know boats ran on it for 35 or 40 years. I have run boats there myself.

I am 55 years old and have lived in Hinton since 1906. I was 25 years old when I went to Hinton. Before that I lived at the east end—at True, West Virginia.

I began working on the boats in the year 1906. During the time that I worked on the river I owned two boats. We hauled lumber, staves, merchandise, and switch ties on them. The farthest up New River I ever went on the boats was just east of Island Creek. Island Creek is up the river from Bull Falls. It is near Round Bottom but downstream from it.

I have been in the lumber business and have bought and sold some lumber. I bought quite a lot of timber and lumber from R. J. Houchins and quite a little from Joe Lilly and his brother, whose first name I have forgotten. I bought and sold for myself. I sold to the Lilly Lumber Company. Lumber was carried by me on the boats on the river. 496

There was a great deal of timber floated on the river on rafts, cross-ties, and things like that. I sold all the cross-ties that I bought to the Pennsylvania Railroad Company. They were shipped to various places on the Pennsylvania Railroad. First an inspector would come and pick them up and he would bill them out to the Pennsylvania Railroad Company. They were billed outside the state and a great many were shipped to the State of Pennsylvania, at least, so they said.

No cross-examination.

Charles Edward Kenley on direct examination testified as follows:

I am 59 years old. I live across the river from Hinton, at Madam's Creek, and have lived there 28 years. Before that I lived at True, West Virginia, where I was born. That is about six miles this side of Hinton. I am familiar with New River in the vicinity of Hinton.

I seen bateaux on the river and a small boat which they called the Government boat. I seen a boat that Davis made. I don't know what kind of a name they gave it. It was a pretty large boat. They called the others bateaux. These were from 68 to 85 feet in length and about 9 feet wide.

I worked on these boats. I hauled staves, lumber, pulpwood, hay, wheat, corn, and tanbark downstream. We hauled groceries and things for the stores upstream and sometimes we would have parts for the saw mills and different things like that going upstream.

The first bateau I seen was when the Government quit work and they turned them back in. The last time I saw bateaux operating was about 15 years ago. They quit working on the river because they claimed there was nothing to haul. I made my living boating on the river for about 20 years, off and on.

I went upstream from Hinton on the bateau as far as the place they called Round Bottom. There was a loading station there at that time just a little above the mouth of the creek, not right at it. When we were going down we had a side oar that pulled the oar on one side and pulled it around and down there.
497 We slipped into the stream and took the boat out to the chutes. They were angling back and forth across the river—sometimes on one side of the river and sometimes on the other side, and sometimes in the middle. Generally it was on the other side where we first got into the channel across the river before we got on the first shoals. When I first loaded the boat I crossed to the other side of the river and started down. At that point I made only two trips a week off the bateau. It took us about three days to a trip.

Q. Did you operate the bateaux all the year around?

A. Well, ice sometimes would prevent us from operating in the wintertime; sometimes we would operate in the wintertime and sometimes ice prevented us from operating them in the winter season.

Q. Did you operate during the rest of the year, regardless of whether or not there was high or low water?

A. Yes, sir.

Q. Was there any other commerce around there, such as commerce on the roads—did they carry things on the roads?

A. No, sir; not to amount to anything. The roads was in such bad shape that wagons could not get over them empty at that time.

Q. Did you see any rafting?

A. Yes, sir; plenty of that.

Q. Where was that?

A. I have seen rafting—I have seen rafts run from Round Bottom clean into Hinton, rafting ties. I have seen logs rafted from the mouth of Indian Creek and lumber and I have seen it rafted from Crump's Bottom into Hinton.

Q. Have you seen a lot of that, or just occasionally?

A. I have seen a lot of it.

The motorboat I saw there was what they call a skiff. It had a motor in it which they would hitch to the bateau to operate the bateau with the motorboat. This skiff was a flat-bottom boat with a sharp end in front. They would push just one bateau with this skiff going up and down stream.

I worked some for other people and operated the boats myself.
The first work I did was to operate for George Pack from
498 Round Bottom. The first work I did was for Mr. Rutledge,
but the first work operating for George Pack was from
Round Bottom. After I worked for him I worked for Wesley Serber and Mr. Ernest Farley, Lester Lane, the Bradberry boys, and Mr. Taz Rutledge, and it would be too numerous to recall them all. I owned all of one boat and part of another. I saw six boats operating on the river during the same summer.

The witness on cross-examination testified as follows:

I saw rafts of ties from Round Bottom. The ties would be laid together and poled—nailed on top to hold them together. There would be two layers of ties side by side, one tie thick. I suppose the ties were of white oak, but they made them from different kinds of wood, I don't know what kinds. I had to remain in the channel in rafting ties. The rafts had oars on each end to guide them.

Q. Could you run a raft upstream?

A. No, sir; not very handy.

When a raft was taken down from Round Bottom we had to use oars to keep it in the channel. One man at each end would operate an oar. If they wanted to get this side off [indicating] they would both pull the same way, and if it was the other side they would both pull that way and keep it in the channel and off the shoals.

The first chute is when you cross the river at Round Bottom. I don't know nothing about a ford, but I know the first chute that entered—that we entered in was just across, after loading the boat, we went across the river and entered in the chute and stayed in all the way down. We did not have to go upstream to get into the chute. It was just straight across. We couldn't go down on this side of the river because there wasn't any channel cut. Some places were deep and others were almost dry. I don't know whether there was a fishing hole in there or not. I never fished much. I think there is a deep place near Round Bottom, but don't know much about it. The channel does not end at Round Bottom. They have it all the way as far as Hinton.

Coming upstream they have walls built up along the side that go up close to the bank. Some places they would go in the 499 channel when the water was low, but they generally went along the bank with an empty boat.

There was a little store at Round Bottom on the creek, I couldn't tell you exactly where. The first store I remember there was Mr. Wick's. I think it was on the left-hand side of Round Bottom Creek as you faced the river. I think they had a landing below the mouth of Round Bottom Creek, but we landed above. That is where the staves was at that time. I suppose staves were brought right down by the store on a road going to the landing below the mouth of Round Bottom Branch.

Q. Why did they take them over the branch and pile them on that side of it?

A. I could not tell you, only those boats could get to the bank.

Q. You say that the boats could not get to the water at the landing below that landing?

A. Them boats could not get in there over the shoals—the water was not deep enough.

Q. Then why did they have a landing place there?

A. That is the reason I say they landed above, because they could not get below on account of the shoals.

Q. Wasn't there a landing place below the mouth of Round Bottom creek?

A. Some of them said, I think, that they boated there, but I never did. They said they had a landing there, but I am telling you what I did.

Q. When did you find out about the upper landing?

A. When I was boating.

Q. Why didn't you tell us about it when you testified at Hinton?

A. About the upper landing?

Q. Yes.

A. I don't remember the question being asked about what side the landing was on; I don't remember that.

Q. I don't think it was, but you did not say anything about any upper landing down there, did you? What recalled the upper landing to your mind recently?

500 A. Why, I was just thinking what place that landing was to get this stuff, and it just come to me that we—where we landed, which is right at the mouth of the creek; right at the mouth of the creek; right in the mouth of the creek is where we landed.

Q. You loaded right in the mouth of the creek?

A. We loaded almost in the mouth of the creek—just above it.

Q. Why were you taxing your mind with it? Why were you thinking about it?

A. I was aiming to give you the truth; I was just trying to get things lined up. It has been a long time, and I was trying to get it lined up.

I boated at Round Bottom off and on for a couple of years. I don't remember how many times I have been up there. I did go up there several times when I wasn't on the boat. I couldn't tell you how many times. Sometimes I would be walking and sometimes riding horseback.

I have boated staves from French's stave yard. The channel, it was not cut—the real channel up the arm there, up to the stave yard—and when we come out we went across the river to the channel; about half way above the river to the channel, when we come out. At the mouth of the arm of the river the channel is somewhere near the middle of the river. We boated there a long time. I kept no count of how long. I boated with Lester Lane. Besides myself on the boat were Lester Lane and first one brother of his and then another, I could not begin to tell you. Sometimes I would make a trip with one crew and then with another.

I quit boating along about 15 years ago, or something like that; I didn't take note of it; maybe longer than that. Most of my boating, I reckon, was done from the Mercer's Salt Works. I also boated at Bluestone. We done more boating above there than at Bluestone. I did not load at the Mercer's Salt Works. I did most of my boating from there on below. The boating business is pretty hard.

R. E. Lucas on direct examination testified as follows:

I was born in Sommers County, West Virginia, at True, 501 and have lived there all my life. I have seen boats and boated on New River, and I have also rafted ties and logs on it. I have rafted and boated there about 15 years. It has been around 20 or 25 years since I quit. I am now 54 years old.

I commenced working on the river when I was about 16 years years old. I owned one or two boats on which I carried lumber and staves which I sometimes got from the ferry and sometimes at the lower falls, and sometimes at Crump's Bottom—also at Mercer's Salt Works and the Sulphur Springs Branch.

When I worked as a boat hand the boat would go to most of those places. I don't think I ever went farther than Island Creek, I mean Round Bottom. I don't recollect whether or not Island Creek came in above or below Round Bottom. The place I went to upstream they called Sulphur Springs Branch.

I don't know that it had any other name. I made several trips that far. I don't know that I ever boated in any heavy timber and I never rafted any heavy timber. I rafted ties and logs from the mouth of Bluestone and down. I don't recall any above the mouth of the Bluestone.

The names of some of the men I hauled stuff for were D. M. Meadows, A. Nabb and Company, Zinie Burks, and Billy Burks.

Sometimes it was pretty hard to get over some of the places in going up and down. We took loads up the river to Mercer's Salt Works. I don't know that I taken any heavy loads farther up the river than that.

The boats I worked on were 50 feet long and 7 feet wide, and 70 feet long and 9 feet across the top.

The largest number of boats I saw working on the river at one time was 12. There were that many there for not more than one or two years. At other times there would be an average of five or six nearly every day going out.

The witness on Cross-Examination testified as follows:

I said there were 12 boats at one time on the river for what might have been a couple of years. I don't remember what years those were. Alf Merchant owned some boats and Alfred Meadows owned some. I think Alf Merchant owned two, him and another fellow, John Williams, who was a kind of partner of his. I ain't sure that I did not own any at that time. I might
have owned one of the 12 boats. I owned one boat along
502 towards the last of the boating.

It was along about the middle of the 15 years that I worked when the boats were running that there were 12 boats on the river. Wes Serber and Alfred Meadows also owned boats. I can't remember who else owned boats. I owned a boat once which another fellow and I built. It was the same size as the others—50 feet in the gunwale and 60 feet on the ends. These boats cost about $150 or $200 to build one.

J. W. Reed on Direct Examination testified as follows:

I am 74 years old. I live at Hinton, West Virginia, and have been there well on to 60 years.

I was a hand on the steamboat which would at one time operate on New River in the vicinity of Hinton. It ran from Hinton to

Bull Falls. It was supposed to have something of a schedule. The daily trip was supposed to be from Hinton to Bull Falls and back.

Most anything was carried on this boat—anything that they wanted to take up and down the river, such as freight, tobacco, groceries, dry goods, staves, and hay. It carried some passengers. They had two cabins on it up above for passengers. It was 110 feet long and 35 feet wide, to the best of my recollection. It had only two decks. It run between 18 months and two years.

Q. What personal experience have you had navigating bateaux?

A. Well, I have had my shoulder skinned right sharply shoving a pole. We loaded the freight on a bateau—some of them call them keel-bottoms—and put freight on there and shoved it up the river and put on staves, lumber, hay, or tobacco, or anything else, to come down the river and come back down and bring it to Hinton to the railroad.

Q. How far up New River from Hinton did you go when you were working on the keel-bottom boats?

A. Up as far as Shumate's Falls.

Q. At that time what operation was going on in the vicinity of Glen Lyn?

A. Well, when I went up to the Falls I was working for
503 a fellow by the name of Pine, L. A. Pine. He was running
four or five boats, you know. I had a contract to haul groceries and stuff up to the mouth of the river for the Norfolk & Western Railroad or for the contractors that were making the road.

Q. You say the mouth of the river?

A. Well, I believe the road turned up at the mouth of East River; didn't it?

Q. Where did you deposit the merchandise?

A. At Shumate's Falls.

Q. How many boats were being used on that contract by Mr. Pine?

A. Well, I can't recall all of them, but there were four or five, maybe six.

Q. How often would you make a round trip?

A. Well, a round trip would take from three to four days.

Q. At that time, Mr. Reed, had the Government completed the channel improvement on that section of the river?

A. No, sir; not up at the upper end there, up where Shumate Falls is. They hadn't gotten through Wiley's Falls or Thompson's Mill dam, we always call it.

Q. How far up stream from Hinton had they gone with the improvement?

A. As well as I can recollect, I think they got up near Shanklin Ferry—up there.

Q. Before the Government cleaned the channel through Wiley's Falls or Thompson's Mill Shoals, state whether or not you navigated that particular shoal.

A. Yes, we shoved that before it was cleaned, before the channel.

Q. And that was the time you were going through to Shumate's Falls?

A. Yes, sir.

Q. Were you able to navigate the river at all seasons?

A. Well, yes; sometimes it was pretty bad when the water would get low.

Q. What would you do when the water would get low?

504 A. Just take what we could go with. If we had anything to go they would take what they could go with and lighten the load. Of course, they wouldn't aim to take a full load on a low stage of water.

Q. When you were transporting the supplies up to the Norfolk & Western construction operation, what would you carry on the return trip, if anything?

A. Coming back to Hinton?

Q. Yes.

A. Just anything that was to come—lumber, tobacco or staves, hay—anything that was to come down the river.

The witness on cross-examination testified as follows:

We had no trouble about the operation of that boat except that the channel was pretty swift. When we had to go in the channel we would take a rope and run up to the head of the wall. They had a wall or buoy down at the head of the wall and a big ring, and tie a rope on that and take the capstans on the boat and wind yourself up in three or four places.

All the chutes are tolerably swift, some swifter than others. I don't know that I can tell you exactly how many there were between Bull Falls and Hinton. There was one through Beach Run Shoal, right at the foot of that island, starting out from the landing. And one up through Greenbrier Shoals, one through Bluestone Shoals, just above where they started to put the dam, and one or two what they called Landcraft Shoals, and we had no more channel until we got up to above Landcraft Eddy. The next one as I recollect was what they called Barker's Notch, just about a mile and a half below Bull Falls.

I don't know much about the ones above Bull Falls. I never navigated up that way with the "Cecelia." We never got any farther than Bull Falls, with the exception of one time. One time we went to the mouth of Indian Creek. That is the highest that that boat ever got, to my knowledge. Bull Falls is between 10 and 12 miles from Hinton. I expect Indian Creek is two miles and a half above Bull Falls.

The way we would run this rope out to the buoy that you would tie to was for some three or four men to get hold of it and walk
up the wall and pull it up there. Sometimes the water was
505 running over the wall. We would run up there to the foot
of the wall and have the rope ready and go right on up the
wall with it. It took three or four men to take the rope up and moor it. Sometimes we could reach out there and get hold of the buoy. They had it right on the end of the shoals and they had a buoy to show you where it was at all the time and reach down and get the ring and they had to get in the water sometimes. Sometimes these walls were along the sides of the channel out of the water. They were out of the water most of the time unless there was a rise in the river. I couldn't recall how deep that channel was constructed, but it seems to me it was supposed to be 18 or 20 inches. Whenever the water got above that depth it got over the walls. The walls were just the blasted rock piled up on each side. That looked like what you call dry walls. They were just loose rock piled up in a line.

I don't remember where Mr. Pine had his store. I was never up there. He never had it at Shumate's Falls. They would come down and get the merchandise with a wagon.

Q. Where was his store? You say you never were there?

A. I never was in his store; no.

Q. Did you ever see his store?

A. No; I never did see it because we would go up there and unload this stuff and a wagon would come on and get it. The store must have been up further, the commissary, or whatever it was.

Q. In other words, you would haul this stuff to the river and then it would be hauled away to Mr. Pine's store?

A. Yes, sir.

Q. Do you remember where that construction was that the Norfolk & Western was doing, Mr. Reed?

A. Where was it?

Q. The construction the Norfolk & Western was doing that Mr. Pine was furnishing the supplies to?

A. They was building that road up there, grading the railroad up through Bluefield and up that way.

I didn't see where they were grading that railroad because we
never got up to the railroad. I never got out when we
506 landed these supplies and looked around. We would unload
and come right back. We never fooled around much. I
don't recall whether there was a little branch coming down or not where we unloaded.

I suppose they intended to run that boat through the channel through Wiley's Falls or they wouldn't have channeled it.

Q. I said where in Wiley's Falls is the channel, in Thompson's Mill Dam?

A. I couldn't tell you. I never did go up there after the channel was put there.

Q. You never went up?

A. I quit the river and went to railroading before they put the channel through there.

Q. And so you don't know where the channel through Wiley's Falls is?

A. No, sir.

Q. Did you ever go through Wiley's Falls on a boat?

A. On a bateau?

Q. Yes.

A. Yes, sir.

Q. Whereabouts? What part of the falls did you go over?

A. Near the left side.

Q. As you go down?

A. As you go up.

Q. And there was no channel there?

A. No; there was a little notch in the place where more water run over there than any place else. You could shove the boat up through there.

Q. But you never went up there after the Federal Government cut the channel?

A. No, sir.

The witness on Redirect Examination testified as follows:

I stated on Direct Examination that I passed through Wiley's Fall on my trips up to the place where I deposited the
507 merchandise at Shumate's Falls. Wiley's Falls is below Shumate's Falls. I went up right below Shumate's Falls.

Lewis M. Smith on Direct Examination testified as follows:

I will be 75 my next birthday. I was born in Virginia and moved to Bull Falls on New River when I was 10 or 11, or maybe 12, years old. I lived in sight of the river on a farm for about 20 years, until I was about 32 or a little past 30. They called Bull Falls 12 miles from Hinton. After I lived there we moved to Hinton, where I have resided since. I am Constable. When I first moved to Hinton I got a job on the Chesapeake and Ohio Railroad.

I saw boats on New River during the period in which I lived at Bull Falls. They were bateaux about 45 or 50 feet long in that kind of shape (indicating with hands) and about 10 or 11 feet wide at the widest place. The bow of the boat was pointed and the boat had a flat bottom.

I saw bateaux on New River in this period of 20 years almost every day nearly. I would say three times a week. I have been on a bateau and owned one which a fellow built for me. It was 45 or 50 feet long, about the size of these other boats. The bottom of it was kind of flat but it flared out at the gunwales and had no keel. When the boat was empty it would not draw more than a foot of water. When it was loaded down heavy I guess it would draw two and a half or three feet.

I operated this boat from Lick Creek to Hinton. Lick Creek is up the river from Hinton on the right hand side, about 32 or 33 miles. You had to pass Bull Falls and then Crump's Bottom. I operated my bateau about 15 years, I guess. That was my business during that time.

I worked on other boats before I bought this one; I don't believe I can say when I first worked on a boat. I boated about five or six years before I bought one. Before that I ran boats from Lick Creek to Hinton along this same 30 or 32 miles.

During this period the boats carried wheat, corn, lumber, and staves. I don't know that they carried anything else. They would get this produce which I described from Lick Creek. Some of it would come in from Crump's Bottom and some from Bull Falls. The boats would come along and gather
508 it up and take it to Hinton.

The Mercer's Salt Works is on Lick Creek about two miles from the mouth of it where it flows into New River. During the Spanish War time they made salt there. There was farming country around Mercer's Salt Works.

There is a store at Lick Creek and one at Crump's Bottom. There was one at the mouth of Pipestem—True, I believe they called it. That is a little closer to Hinton. Joe Meadows ran a store at Lick Creek and John G. Crockett ran one at Crump's Bottom. Mr. Lawrence Meadows ran the one at True.

When my boat reached Hinton during the days before I owned one, we mostly came back empty and brought some stuff. We would bring back dry goods, tinware, and stuff for a general store to Crump's Bottom and to Lick Creek. That is about all the stores there was there.

During this period in which I worked on the boats there were boats on this portion of New River before the channel was improved. After the channel was improved there were more boats. I commenced work on the river after the channel was improved. For the next four or five years after that, I would say there were 10 or 12 bateaux operating up and down river from Hinton to Lick Creek.

One of the men who worked on the crews of these boats was Mr. J. W. Reed, who just testified. Most of the others are dead.

Some of them were Captain Thorbison, Captain Johnson, and J. A. Medley. I saw Mr. Medley here today. And also two men, colored—Smith and Charles Kenley, who was on the stand today. I also remember a man named Frazier who is living and who worked on these boats.

The capacity of these boats that I ran I reckon was 2,500 pounds or more. I ran them down to Hinton from Lick Creek. I have hauled 7,000 sawed staves on boats of this kind. Some of the staves came from Lick Creek and some from Bull Falls. Most of the staves were out of Pipestem. I have carried 7,000 staves on one boat on one trip. I had two men besides myself on one of these boats. Some of the men who operated my boat were Joe Pack and Anthony Pack, and a fellow named Frazier. I can't recall any others now.

I carried tobacco, staves, wheat and corn mostly down the river. I carried just a little stuff for the stores up the river—bacon, sugar, flour, hardware.

509 It would take me eight to ten hours to come from Lick Creek down the river to Hinton, depending upon the height of the water and the wind. It would generally take about a day and a half to go back to Lick Creek from Hinton.

Most of the boating on the river was done along in the fall, but there was some lumber and staves coming continuously. I hauled grain in the fall. The tobacco was cut and hauled in the spring. There was some operating of boats in winter when the river was not frozen. I would say the river was frozen for about three months. During that period the water would be frozen nearly solid. The winters were colder than they are now. The river froze last winter, but generally it doesn't.

I would carry 2,500 pounds or more of tobacco. I got most of it at Lick Creek and some at Bull Falls, and would bring it to Hinton at the landing above those shoals. There is a wharf there where everything was unloaded. The tobacco was put in hogsheads and barrels. There were some large hogsheads and some smaller ones. The tobacco was shipped to Danville and Richmond in Virginia. I know that because I saw the tags which were tacked on the hogsheads in the depot. The tobacco was put in the hogsheads before we moved it down the river.

I don't know of any bateaux going from Hinton to Radford, Virginia, except what I heard. I never was that far up.

Thorbison and Johnson had a boat but did not go above Lick Creek with it. I did not see any boat above Lick Creek.

I ran a bateau on this river for 15 years. During the same period other bateaux operated on the river, I would say 10 or 12 of them. The most were bringing supplies up to the N. & W. They took those supplies up there to Lick Creek for the railroad after getting them at Hinton. They would carry picks, shovels, tools, and foodstuff.

I don't remember when I stopped running my boat, but it was after we moved to Hinton, which was in 1887. I built my boat then. I saw boating on the river about 10 years after I discontinued boating.

I saw a steamboat on the river name the "Cecelia." I could not give you the date. We were at Bull Falls yet at that time. I came to Hinton in 1887 so it was before that that I saw this steamboat. It was a tolerable large boat and operated by steam and carried store products, bacon and stuff like that. I saw
510 people on it. It carried passengers. It ran from Bull
Falls to Hinton, which is 16 miles. I have seen it above Bull Falls, up above the mouth of Indian Creek. It operated on New River from two to four years, I would say.

Captain Davis also put a steamboat on New River after the "Cecelia" was there. I saw that boat which was kind of narrow and slim. I saw some passengers on it but don't know how long it operated. I don't know much about that boat. The Lick Creek I have spoken of is the one Mercer's Salt Works is on.

No cross-examination.

EVERETT W. LILLY on Direct Examination testified as follows:

I am 58 years old. My home is at Hinton. I have lived there for 36 years. I have been in the lumber business there for that time, and in that period have seen steamboats, gasoline boats, bateaux, and rafts on New River. The rafts were of ties and logs. I have seen some loose logging also there.

I have ridden on bateaux and gasoline boats on the river, the farthest upstream from Hinton I have been is above the mouth of Island Creek up at Round Bottom. I went there in a gasoline motorboat. It was a kind of fishing outfit, gasoline outfit, attached to the boat. Also in the last few years they used a gasoline motor, about running the bateaux. The motorboat which I was on was 20 to 24 feet long.

During my time in business there I had seen loading and unloading of boats on the river which carried export and domestic lumber. I have also seen boats carry produce down to Hinton and go back upstream with groceries.

I can't state just when I seen a bateau operating on the river for the first time, but it was before I went into the lumber business. They were operating when I went into the lumber business 26 years ago. I don't think I have seen any bateaux operating for 10 or 12 years. These bateaux may not have brought lumber down to me downstream to Hinton since 1920. They begin to get some produce up and down the river and come in by truck.

I would say that lumber came to me in bateaux between 1900 and 1915, a period of 15 years. It came in with pretty good rapid speed during that time. I had docks of my own there where the bateaux unloaded.

511 All the ties that came in rafts were loaded direct from the river on railroad cars and the lumber was sometimes loaded into them and sometimes it was piled up. The ties were handled from the river by an electric hoist, chain, and electric motor. I had one of these.

I was not the only person engaged in the lumber business at Hinton during this period. I don't know how many other concerns there were. There were three or four there that handled lumber in a small way. Ecomstock Lumber Company of New York handled quite a bit.

The amount of lumber that would be unloaded at my dock from these bateaux would depend on the kind. Export lumber did not have as many feet in it, possibly six to eight thousand feet, and dry lumber for domestic use would maybe be 10 to 14 thousand feet, in that neighborhood. By export lumber I mean lumber for foreign shipments. I don't remember that we exported any staves that came down the river. We handled principally railroad plank, they called it wagon plank in English.

I couldn't say how many feet of lumber a year was hauled down New River and unloaded by my dock at Hinton. Sometimes a bateau of the larger type would bring in a minimum weight of a carload, 30,000 pounds. I couldn't tell exactly how many cars a year were filled with lumber that came down the New River, but we handled millions of feet, between the period of 1900 and 1915, came down the river by raft and by bateau. Sometimes we would load from 10 to 12 cars a week.

I ~~couldn't say what~~ the largest number of carloads I shipped out in a year was. Possibly we ~~would ship~~ as much as a million feet, some years, that came down the river—I would say in the neighborhood of a million feet, possibly a hundred cars in a year. The million feet includes only the export lumber and domestic lumber that came down New River on bateaux or was floated down stream. The million feet was all lumber that came down New River.

I have seen a steamboat on New River. I don't know what boat that was or who owned it. The last time I knew the Hobbs boys had it in charge. It was the Hodge boat.

The other lumber concerns in Hinton I spoke of had a dock, it had an electric hoist and it received ties coming down New River.

512 The witness on Cross Examination testified as follows:

I understand that this boat I have been talking about was driven by steam at first. I wouldn't say for sure. Later on it was run by gasoline. That was the Hodge boat. I don't know how it got that name unless Hodge was the man who built it. I couldn't tell you whether there was a man in Hinton named Hodge. I can remember seeing the boat there before 1900 when I was a boy. It was just a small outfit. It might have been 60 feet long and might have been longer, or it could have been shorter. I couldn't tell you what its width was. It had wheels on both sides. I couldn't tell you if it had a wheel at the stern. I just seen it out on the river and didn't pay much attention to it. The old hull is laying over there buried up the river yet, right on the edge of the river. It is at the loading docks owned by the Hinton Builders Supply Company at what they call Avis. I haven't been there for a couple of years perhaps. It hasn't been so long since I have been down the river at that point. I couldn't tell you whether or not a guage station has recently been put in the river there. I have seen that boat hull rotting there I would say for 30 years, 1900 to 1930. I couldn't describe the boat. I used to go in it for shelter during the early part of 1900 and 1901. The Hobbs brothers used to run it some. Bill Flippen and a man named Starbuck may have operated it some. I heard that Mr. Starbuck and Harry Hobbs and John Hobbs operated it. I have seen them with it.

I don't remember that I ever heard of a boat called the Davis boat. I have seen several motors on bateaux but I don't recall just who owned them. I have seen several boats and bateaux on the river which has been under my observation pretty constantly since 1900. I have not seen nothing but this one big boat that was driven by internal power and the bateaux, small outfits, gasoline boats.

I got lumber from other places up river than New River. I have had lumber hauled into my plant by wagons. Some was hauled in there from up the Greenbrier. I have had some lumber hauled in there from up New River by wagon and have had some brought up from lower down New River by wagon. The lumber
industry there came from the people deforesting the
513 country there of all the merchantable timber they could get.

I have no records with me showing the carloads I shipped away. I wouldn't say for sure whether those records have been been destroyed or not.

I have handled staves. When staves are brought down the river they are sometimes seasoned at the yard and sometimes they are shipped green. I have handled them both ways. A green stave will weigh about 4½ pounds to the foot. The staves were all different lengths. Those shipped away from Hinton were 28, 30, and 32 inches in length and over lengths, depending on the size barrel or keg they wanted to make. The staves that were 28 inches long were of different sizes, some 3 to 6 and 7 inches wide, and I have seen them 8 inches wide. The staves would be anywhere from 3 to 8 inches in width. If you have a 3-inch dry stave 28 inches long, ¾ of an inch thick, and multiplied by 4, that will give you approximately the weight of air-dried staves. That weight might be 252/100 pounds as you have computed it. If you had a 30-inch stave, 3 inches wide and ¾ of an inch thick, that would work out the same way. A stave ordinarily would weigh about four pounds to a square foot surface measure if the stave is air-dried. Possibly some oak wouldn't weigh that and some might cross it a little.

I did not say that 8,000 pounds was a minimum car; 30,000 pounds was a minimum when we first commenced shipping over the C. & O. I said a bateau would bring down a minimum car—30,000 pounds, 15 tons. What is a maximum car depends on the capacity. The maximum capacity of some ordinary car to ship lumber in is 60,000 pounds, and it is greater for some. How much greater I don't know. The C. & O. had them up to 100,000 capacity.

If a 28-inch stave were dry and an inch thick it would weigh four pounds. If it were ¾ of an inch it would weigh a quarter less. Staves cut for flour barrels are thinner. The only staves we handled was oil barrel staves and whiskey barrel staves. Staves cut for apple barrels and flour barrels are not as thick as a barrel that will hold liquid.

The amount I paid on an average for the lumber floated down the river depended on the kind of lumber. The cheapest we ever got a boat for was $15 a trip. The cost of the lumber depended on the kind of lumber. I think we used to pay about 65¢ a
514 piece for cross ties up at Bull Falls and round in that section and it would depend on the demand during that period of years what price we could afford to pay. We shipped more ross ties away than any other kind of lumber. I included these n the million feet I mentioned.

I couldn't tell you what was the most I ever paid for lumber which I had brought down the river.

Some of the cross ties I brought down the river were 7 by 8. Eight was the standard and some were 7 by 9. I think there ere about 44 feet in the 7 by 9. I guess the ones I paid 65 ents for were the standard ties. 7 by 8 was standard.

I used to pay different prices for sawed lumber. I guess I aid as high as $25 a thousand for export lumber up the river. That was not the highest price I paid for lumber within this illion feet I mentioned. I have an idea that I have paid as igh as $90 a thousand for No. 1 and No. 2 poplar. I got quite a lot of that during the period from 1900 to 1915. The poplar was a small percentage of the lumber I brought down the river compared with the amount of feet in ties that were shipped out. I couldn't estimate that percentage, it would be guess work with me.

I don't remember exactly the lowest price I ever paid for sawed lumber, I brought down the river and shipped away. It might have been in the neighborhood of $10, No. 3 common. $15 would not be a fair average for lumber and ties together which I brought down the river. We have gotten as high as $2.25 for a 7 by 9.

We handled more ties than we did boards and export lumber, but I wouldn't attempt to say just what amount of each. I can't give you the average cost of that.

The witness on Redirect Examination testified as follows:

The lumber hauled in by wagon came from different places all around the section of the country near Hinton. We had a shipping yard there. None came in by wagon from as far up as Island Creek. All of the lumber up there came in by boat. It was only the lumber right near Hinton that came in by wagon.

J. H. Hoover on Direct Examination testified as follows:

I will be 72 the 20th day of next December. I have
515 lived in Hinton since 1872. Before that I lived in Lewisburg, Greenbrier County.

There has been two steamboats on New River that I saw and I have seen bateaux running up and down it. The bateaux would not go further down the river than Hinton. They carried merchandise of different kinds. I don't know how far up the river they went.

I worked for J. P. Mills at that time. He owned a sawmill and a gristmill, and I run the gristmill, which was located in Hinton right below the real mouth of the river. Greenbrier came down one side and New River the other. It was on New River.

I remember work being done on the railroad around Hinton only by hearsay. I heard where they worked only by hearsay, also.

I shipped a thousand bushels for Mr. Mills up the river from his mill, I suppose. They said it was to go to the contractors at the mouth of East River. I don't know whether that contractor was working on the railroad or where he was working. Their camp or headquarters was at the mouth of East River. As far as I could see the grain I spoke of went up the river. It was put in bateaux and loaded by the men who worked on the bateaux under my supervision. The grain was put on these bateaux and they went up to East River as far as I know.

I saw a couple of steamboats on the river. I cannot remember how many years each one of them operated. The first one that was built there was a very large boat, something over 100 feet long and 30 or 35 feet in width, or beam, they called it, but it wasn't a success by any means. I was on that large boat as far as the mouth of Bluestone. I did not go up stream any further.

The witness on Cross-Examination testified as follows:

I don't know who the contractors were that I shipped this stuff to. The contract was made by Mr. Mills with the contractors. I suppose the contractors made the contract with the boatmen because I know we did not pay any freight. All I know is that the boats came up to the mill and got the grain and took it up the river to the place where the construction of the railroad was going on.

I don't know anything about whether or not the grain was being taken to the people who were working on the railroad bed which was graded down below Round Bottom. All I know
516 is that Mr. Mills told me that it was going to the mouth of East River, to ship it to the mouth of East River. He said he was shipping it from Hinton to the mouth of East River. Mr. Mills made the contract and I was working for him. He instructed me where to send it. I don't know who sent the boatmen down there to get it. We did not pay any freight on it.

I don't recall hearing of a man by the name of Pine. I don't say that the stuff wasn't shipped to a man by that name.

(Defendant moved to strike out of witness' testimony that part dealing with what was told him about the shipments.)

East River is at Glen Lyn. I never was up that far on the river. I couldn't tell you how far up New River East River is. I never was up that far. I never was up above Bull Falls or Bertha. I don't know anything in the world about East River.

Besides Mr. Mills I have heard those boatmen say they shipped lumber and staves in bateaux.

Marshal Richmond on direct examination testified as follows:

I am 75 years old. I was born November 22, 1860. I have lived practically all of my life with the exception of eight years about two and a half miles west of Hinton on the north side of the river. I have been there for 34 years and about 8 years I was working away.

I think it was 1871 when the first train came into Hinton on the C. & O. It came from the east. The railroad was constructed both from the east and west. My father and me was down there to move the foreman who was working on the bluffs west of Hinton. His wife lived at Kanawha Falls and I went with my father there to move her up there and the track was laid there then on this way, but I don't know how far. The two sections coming from the west and the east on the C. & O. met somewhere about Hawk's Nest, but I am not positive. It was about 1870 I suppose when they finished the construction work.

At the time when I saw the first train there in 1871 there was only three houses in Hinton as I remember, one above the roundhouse and two in what they called Middle Hinton. My home was about 40 or 50 yards from the river, or something like that about.

I remember having seen boats on New River frequently. I saw bateaux or keel-bottom boats while they were constructing the C. & O. They came down stream and went as far as Sandstone Falls, which used to be Richmond Fall. That is about 7 or 8 miles below Hinton, I believe. 517

Q. Then what would the boats do when they got as far as Richmond Falls or Sandstone Falls?

A. They transferred their cargo, what they were loaded with, and we loaded it below the falls, possibly a mile and a half, possibly a little farther, on another bateau, but I don't know how far they taken it down the river.

Q. Do you know who had the contract for making the portage there at Sandstone Falls?

A. My uncle, Tuck Richmond, done the hauling around there.

Q. What did these bateaux carry?

A. All kinds of provisions, hay, grain, and everything, and supplies for the men.

I don't see how the supplies could be taken down into that section otherwise than by the river. There were no roads at all after you got by Sandstone Falls where we went across the river. There was no road down the river and there isn't very much of the road down the river yet.

These boats I expect were 50 or 60 feet long.

We cut timber in that section off my father's land, and Lewis Atkins and the Braggs cut a lot below us. We rafted some of the timber to the sawmill. Some we just put it in the river and drifted it down and caught it at the mills below Sandstone Falls. I expect my father and I cut 200,000 feet or more altogether.

The witness on Cross Examination testified as follows:

I reckon when they first commenced the road was in 1867. I am not positive about that, but I was seven years old then. That is when I saw these boats in front of our house on the river. I went down on one of them but I did not go down the river on boats all the time. I had no occasion to because I was not connected with the boat. On occasions when I went down the river on the boats I was just riding out.

We cut these logs that we floated down to Sandstone Falls off
my father's land and Lewis Atkins' and George Meadows',
518 a mile and a half below where we lived. We lived two
and a half miles below Hinton on the river. It would
be four miles below Hinton where we cut a part of the logs. We cut the other part all down along the river on both sides, some down as far as Long Bottom, which is about a mile or a mile and a half below Sandstone Falls down the river. We just took those logs and pulled them out a little, then they floated themselves. We had boats below the falls to catch them, and after we caught them we would raft them to the mill. We would let them go over the falls and catch them in the pool below the falls. We didn't tie them together and send them down in a raft because them falls was too rough to raft them. I wouldn't like to go over Sandstone Falls in a boat. We wouldn't raft them down there and get off and let them go over. We always unloosened them in the big eddy in Long Bottom and pulled them to the railroad side on the north side, which was very shallow on our side and they did not go through in a common tide. There is a break in the river on the railroad side and they would go through there. I recall the place called Long Bottom. We would catch the logs and pull them across there so as to get them on the opposite side of the river so they would go through the falls. They would not go down on the opposite side because the river was too low, there was a current in the river and the river or the current runs to the north side there. That is, the left-hand side of the river as you go down. It turns to the left side. We just put the logs in the river single and caught them when they got below the falls.

In response to the question "Where were those houses at Hinton you were talking about?" there was one house in Hinton out next to the railroad where the road used to cross until they built that overhead bridge. There was a log store out there and one down next to the river. Both of those houses were in what was until a comparatively recent time known as Avis. There were no houses at all in what was known as Hinton, that is, in the former city limits of Hinton, until they took in Avis and then those two houses would have been in Hinton. Hinton and Avis used to be separate.

519 J. W. Graham on Direct Examination testified as follows:

I have lived in Hinton, West Virginia, 35 years and in the county all of my life. I was interested in a mill on New River with my brother at Sandstone. We got the logs for that mill up the river above Sandstone on New River. Up the river two to six miles above Sandstone, I would think. We would float them down to the mill.

I have seen boats on New River around Hinton. The first boat I saw was built somewhat on the order of a river steamer, and later on there was another boat built more on the order of a flat boat. I saw the first one well on to 50 years ago, probably 45 to 50. And the next one I saw 28 or 30 years ago. The last one was made on the order of a ferry boat and propelled by a gasoline engine. I couldn't give you a size; but probably it was 10 or 12 feet wide and 40 or 50 feet long. That boat operated on the river two or three years, maybe longer, I couldn't say. I rode on that one boat on just one trip.

I was only directly connected with the mill at Sandstone two or three years, but I was around with my brother a good deal in the meantime seven or eight years or more than that, and during that entire period I got logs from up the river which were floated down the river.

No Cross Examination.

524 W. L. **Burks** on Direct Examination testified as follows:

I reside at Hinton, West Virginia, and have lived in and around Hinton all my life. At present I am helping my brother in the Sheriff's Office—Deputy in the Sheriff's Office. I am 58 years old was born five miles from Hinton. I am familiar with New River and have seen it often during my lifetime.

I was in the lumber business in and around Hinton for 25 years. At first I was associated with my brother, Z. V. Burks. He is here today, although he is not in the court room. I first went into the lumber business with my brother on New River possibly in 1910 or 11, somewhere along there. I was with him part of the time and part of the time I was in the business alone. I stayed in the business for 20 years.

Part of that time when we had operations up the river we transported the lumber down by river. We manufactured lumber. We had sawmills all through the counties adjoining Summers County but the one my brother and I operated was near Warford, which is 12 miles above Hinton on New River. Warford is the post office for Bull Falls. We did not have the sawmill
525 At any other point on New River except at Warford. I think we operated that sawmill for three years, or something like that. When we did not have the sawmill we handled lumber from other points, other than the river. During that period we bought and sold lumber occasionally but not much.

We had the sawmill three or four years up the river, I believe, from 1910 or 11. In connection with the sawmill we boated and rafted lumber down the river from Warford to Hinton. We would get our timber in the mountains at Warford before it was sawed. We sawed the timber back in the mountains but we would put it on the boat at Warford with wagons.

We hauled the lumber on boats because the haul was too long and too expensive to use wagons. The boats we used were called bateaux and were about 8 feet wide, straight and narrow and about 50 to 60 feet long. The bottoms of the boats were round. The boats were sort of half round. It usually took about 4 men to operate them. We hired the boats and did not own them ourselves. I have ridden on these boats occasionally but did not make a practice of doing so.

We shipped by boat to the Lilly Lumber Company, which was located in Hinton, and to the Richard B. Baer Company, located at Baltimore, and to Holger A. Coppell. I am not sure where Mr. Coppell was located but I think it was in Philadelphia. When the lumber was brought to Hinton it was placed on board railroad cars. The unloading place at Hinton was at what we called the hold-up track where the Hinton Builders' Supply is. It is on the river bank there in what was known as Avis at that time but it is Hinton now. I saw some of the lumber loaded on railroad cars which I shipped down. I would say that practically all of the lumber I shipped down was loaded on railroad cars—at least 90 percent.

I would say that during this period I shipped 3 or 4 million feet of lumber down New River to Hinton. The lumber consisted of pine, oak, and some hemlock.

I saw other boats on the river during this period. Some of these carried lumber and some carried tobacco—big hogsheads of tobacco—down to Hinton. That is about all I think of now that come down the river. I have seen groceries and merchandise shipped up the river in bateaux. It went to some of the stores along the river. One store was at Warford and one at 526 True. There was another store between True and Warford but I don't know whether the owner boated his merchandise or not.

The boating of lumber was done mostly in the summer. There was some boating of lumber done in the fall or winter. When the river was frozen up we were unable to do any boating. I think I remember a couple of weeks or a similar period in the winter in which the river was frozen. I have known the river to be froze longer than that but not during the time I was working. I have operated boats in the winter on New River.

I know some of the men who sold lumber, bought and cut timber or operated boats on the river or furnished our firm with timber during that period. I knew J. A. Medley, Alf Merchant, a boatman, Will O. Farley, who manufactured some lumber or had it manufactured, L. G. Neely, who was in the lumber business, J. O. Petry, a boatman, W. H. Barton I don't remember; B. B. Trail, who, I think, shipped some lumber down the river, Will Peters, who also shipped some down the river, T. H. Lilly. C. C. Lilly I don't remember. T. H. and E. W. Lilly were wholesalers. They were the men in the Lilly Lumber Company I have spoken of.

I knew Fred Gore, J. J. Anderson, and T. B. Ballard. Fred Gore manufactured lumber which was boated down the river and so did J. G. Anderson and T. B. Ballard.

During the 20-year period in which I was in the lumber business in some way or other all of these men were in the lumber business and did boating. I don't know that all of them were in that business at the same time that I was. With the exceptions mentioned, I knew them all personally and saw them operate boats.

There have been lots of sawmills up there. Farley had one. The products of the mills were brought down New River to Hinton either on boats or in rafts. I have seen lots of rafts on the river.

The witness on cross-examination testified as follows:

I didn't own or operate any of these boats personally. My shipping point was at Warford, mostly above Bull Falls and partly below. True is about 5 miles above Avis, right at the mouth of the Bluestone. Warford is 12 miles above Avis and just above Bull Falls. That is where the store was at Warford. There is no store there now.

Q. Mr. Burks, counsel for the other side read you a list of names and asked you if they were lumber operators. You 527 don't mean to say they were solely engaged in lumbering operations, those men whose names were read to you by Mr. Williams a moment ago?

A. No; I don't say they were all solely engaged in that, but they did do the work, manufactured or had manufactured it and boated it and rafted it down the river.

Q. Weren't a lot of those people farmers up the river?

A. Why, yes.

Q. And those who had a boundary of timber would get a sawmill to come in there and saw it up and dispose of it?

A. No, some of them owned their own mills.

Q. Some of them?

A. Yes, sir.

Q. But not all of them by any means?

A. Well, I don't remember about that, and I don't know that I would know for sure about all of them.

Q. All you meant to say was that these people whose names were read to you had shipped some lumber down the river; is that correct?

A. All that I named had shipped lumber down the river; yes, sir.

Q. And one of two of them that were mentioned to you were boatmen—for instance, Medley?

A. Oh, yes, they wasn't lumber.

Q. And some of them were rafters, people who brought you rafts?

A. The people who worked on the boats usually ran rafts down the river.

Z. V. **Burks** on Direct Examination testified as follows:

I reside at Hinton, West Virginia. It has been my home practically since I was about 18 years old. Before that I resided on New River at the Mouth of Bluestone. I am 66 years old. I came from Hinton here this morning by automobile. I think we took the shortest route; we tried to. Our speedometer showed the distance as 109 miles.

528 I first went in the lumber business when I was about 20 years old. At that time I owned the mill and sawed for my father. W. L. Burks, who just testified, is my brother. I think I am 8 or 9 years older than he is.

I think he and I were first partners in the lumber business about 1906. My part was to manage the mill and the woods, that is, to ee to the cutting of the timber and getting it into the mill. My orother did the selling and getting of the timber to market. The irst milling I did with my brother was right at Hinton and then I went to Tom's Run, a creek that runs into New River near Bull alls, 10 miles from Hinton.

When I was in business for myself I have gone above Bull alls for lumber. The highest point up the river that I loaded umber was the mouth of Round Bottom Branch near the Virginia line. There was a tree about 200 yards from my loading lace and it was said to be a corner of Virginia and West Virginia. he tree was upstream from my loading place.

When I was working with my father he hired the boats and I nly manufactured the lumber. I floated the timber down as logs r lumber. The mills I had with my father were on New River. he first one was on Tom's Run. The second was on Lick Creek, hich is farther up than Tom's Run and about 16 miles from Iinton.

The boats we used in boating this lumber were bateaux of ifferent sizes. Most of them were about 60 feet long. The gun- els were from 50 to 60 feet, making the total length about 70 feet. There were a few small ones on the river too. I don't know that there were any larger ones.

The capacity of my father's mill, that is, the one I operated, was from 7,000 to 10,000 feet a day. I operated this mill mostly through the spring and summer seasons. When I was operating the mill we ran it at about its capacity every day that we sawed timber. During the time I was with my father I estimate that we sawed from 300,000 to 500,000 feet per year. I wasn't with my father all the time from the time I went into business until my brother came in. When I first went into business with my father I owned a mill and contracted sawing timber for him. He owned the timber. This continued for about two years. Then I went into business alone and probably continued about 10 years more until my brother came in, making 12 years that I was in the lumber business, in all, before my brother came in with me.

529 When I was operating the mill for myself the annual production was about the same as when I was with my father, that is, about 300,000 to 500,000 feet a year. Probably two million feet of this lumber of my own went down the river on boats when I was in the business by myself. That covered the whole period of 10 years but I wasn't on the river all that time.

This lumber was shipped to Hinton where I sold most of the lumber and staves to D. M. Meador, but a good many of the staves I sold to A. Nabb & Company. I was cutting some staves along while I was working lumber. We would saw poplar, pine, basswood, and wood of that kind into lumber and the white oak and best chestnut oak into staves. We would saw one at a time. The mill wasn't of a capacity to operate both the staves and lumber mill at the same time. I don't remember that I cut any staves while I was associated with my brother. I did cut some while I was operating the mill alone. I sold those staves to A. Nabb & Company and to D. M. Meador, who contracted with the Standard Oil Company.

These boats carried loads upstream. They used to carry merchandise for the merchants along the river and I don't know what it was but Captain Arbison boated some steel to Glen Lyn, it was said. (Defendant moved to strike out what witness had heard.) He lived with us. I seen the steel on the boat but he said he delivered it to Glen Lyn. I don't know as he said what the steel was for.

The boats coming down the river carried grain, hay, tobacco, and farm products, besides lumber and staves.

I was five years old when we moved to the mouth of Bluestone, and this old Captain Orbison owned the boats then and had them there when I saw them and I saw them from that time on on the river until he went away. Then other people had boats there until the last boating was done, which I think was in 1914. Captain Orbison had two or three boats on the river at a time. Alf Merchant and Jim Merchant also had keel bottom boats on the river. I don't know how many Alf Merchant owned but he operated boats for a number of years. I think there were as many as 10 boats at least operated at one time on the river above Hinton.

I saw a steamboat on the river at Hinton on New River and at the mouth of Bluestone and Bluestone. The name of the boat was "The Cecelia." I don't know just what year it was that I saw this boat. I was rather small boy then. I think it was over 100 feet long. It came to Bluestone and stopped at the
530 mouth of the Pipestem. I don't remember if they unloaded any freight or stopped to let off a few passengers. Then it went back out into New River and started up the river.

Q. Have you ever seen any boat other than that on New River, that is driven by gasoline or steam?

A. Yes, sir.

Q. When or about when?

A. About 1887 or 1888. My father and some others, I don't know who the other stockholders were, but it was a stock company there, that built a rather flat boat, the front part of it, as I remember, was about ten feet wide and forty-three feet long; then it dropped off to about five or six feet wide, and a wheel on each side behind these shoulders off the wide part of it.

Q. Where did that boat run, if you remember?

A. Just around close to Hinton there.

Q. What did it do, what was the purpose of the boat?

A. I really don't know what their intention was when they built it.

Q. Did it carry passengers or freight?

A. Yes; they carried some passengers, but I don't know they ever carried any freight, I don't remember that.

Q. Do you remember a Captain Davis?

A. Yes, sir.

Q. Do you recall any boat that was known as the Davis boat?

A. Yes, sir.

Q. When was that, about when?

A. That was later, it was after this, I don't know what year.

Q. Did you ever see that boat on the river?

A. Yes, sir.

Q. Going up and down?

A. I have seen it just around in the water there near Hinton. I don't know that I ever seen them attempt to go up the river above Hinton.

Q. Have you ever seen motor boats on the river?

A. Yes, sir.

531 Q. When and where?

A. Well for several years before they quit operating bateaux they used them to push bateaux up the river and down.

Q. Do you recall how far up the river you have seen one of these motorboats pushing bateaux?

A. I seen motorboats pushing bateaux as high as Lick Creek.

Q. Has the lumber business quieted down on New River?

A. Yes, sir.

Q. What has been the cause of that?

A. The main reason is there is no timber. The timber is cut out. Might be a few small patches, that could not be bought at the time the mills were operating up that way.

The witness on Cross Examination testified as follows:

I couldn't say but I think I was along about 13 or 14 years old when I saw that boat loaded with steel at the mouth of Bluestone. It was long steel something like on the order of eye beams for a derrick or shovel. There were some three or four pieces of it and they seemed to be very heavy. Two lengths of these pieces were about the full length of the boat I seen it on. I don't know how long that boat was but the boats that Captain Orbison owned were from 60 to 70 feet long. An eye beam is a broad piece of steel crossed with a "T" on each edge. I don't think it was a rail that was laid for a track.

Q. You said you thought it was for a derrick, didn't you?

A. At the time I seen this and heard them talking about taking it to Glen Lyn, or they was taking it to Glen Lyn, I didn't think much about that, I didn't know much about derricks then, but since I am older I have thought about it, and thought it could have been something of that kind.

By Mr. Abbot. We move to strike out his answer as to hearing them talking about taking it to Glen Lyn, as hearsay.

Q. Did he have anything else on that boat, beside the three pieces of steel you mentioned?

A. I don't remember of seeing any other freight at that time.

I lived at the mouth of Bluestone until I was about 15 or 16 years old. I don't remember my exact age at the time we
532 left there. I don't think of any way to fix the date definitely. I think I was older than 8 and I don't think I was 15 years old at that time. I might possibly have been about 9.

I couldn't state how many pounds of merchandise I saw in any one bateau going up the river.

Q. Did you ever see any empty bateau going up the river?

A. Yes, sir.

Q. That is the way they customarily went up, wasn't it?

A. I don't know I understand your question.

Q. I said they customarily went up the river empty, did they not?

A. When they were boating one way down the river they went up empty, if they had nothing to haul upstream, they went up empty.

Q. If any of the three stores up there wanted a little stuff it would be loaded on the bateau and brought up?

A. Yes, sir.

Q. It is not a fact by any means the bateaux were hauling loads up there every time they went up the river?

A. No, sir.

Q. It was just a matter of supplying two or three stores?

A. Yes, sir.

Q. And those stores were small country stores, were they not?

A. Yes, sir; and they would also bring up anything a farmer had along the river.

I don't know what happened to that steamboat my father was interested in. The machinery was finally taken off of it and it was just let lay there. It operated just a short time. They didn't have sufficient power to operate it. It would go downstream better than up.

The witness on Redirect Examination testified as follows:

I don't remember that I ever saw coal hauled on New River in boats. We used wood as fuel to make steam for our sawmills. I never knew of coal being hauled on New River except a sack or two to take to a blacksmith or something like that.

533 The witness on Recross Examination testified as follows:

When we came from Hinton here this morning we left Hinton on Route No. 3 and got on to Route No. 311. I don't remember to just what point we came from Hinton on Route No. 3. We came through Alderson, Union, and Salt Sulphur. We probably left No. 3 at Salt Sulphur. After Salt Sulphur the next point we came to was Peterstown, or Rich Creek, or Catawba. We did not come by the Narrows. We came through New Castle and then went by Sweet Springs. We went down the valley from Union to Sweet Springs and then over by Catawba to Sweet Springs. I believe I said Salt Sulphur but Sweet Springs is what I meant.

By Mr. **Williams**. If Your Honor please, in accordance with the order of presentation of the oral witnesses, we now want to read the Radford depositions first. Your Honor, will take judicial notice of the fact that Radford is in your District and within 100 miles of this Court.

By Mr. **Abbot**. As a matter of conserving all the time we can, it is agreed, if Your Honor please, between counsel on both sides that the defendant objects to all leading questions asked in the depositions and all answers thereto, and the record may state that this is by agreement of counsel for both sides, so that we will not be interrupting the reading of the depositions.

By Mr. **Williams** We consent that they may enter objections to all questions they consider leading questions.

By Mr. **Abbot**. Also hearsay testimony and that sort of thing, all objections of that kind.

534 Gordon A. Farmer

Plaintiff introduced in evidence the deposition of Gordon A. Farmer and offered in evidence certificate of Clerk of Corporation Court for the City of Radford, Virginia, certifying to the death of Gordon A. Farmer of Radford, Virginia, and introduced this certificate as marked for identification "Plaintiff's Exhibit No. 16."

As recorded in the above-mentioned deposition, the witness testified upon Direct Examination as follows:

I was born in Montgomery County somewhere between here and Snowville. I don't know just where. I will be 89 years old the fifth day of next month. I was born in about three or four miles of New River, I suppose. I have known New River since I was about five years old—ever since I could recollect anything. I live here in the town of Radford right in the west end and have been living here for about 32 years. I have lived in this town longer than that.

Q. Do you recall ever seeing anyone do any work on the New River channel?

By Mr. **Abbot**. We object. Counsel is continuously leading his witnesses.

A. Yes, sir; I know when the Government cleaned the channel out up this river here.

When I saw them they were at work up above the upper end of Dunkert's Bottom, at the upper end of Have Howe's place, at the falls up there. It is just a little piece above there, just past the first islands up there. I suppose it would be three miles above Radford on the river.

Q. What do you understand by my question?

A. Well, I just understand that you wanted to know something about the people cleaning out this channel, the Government cleaning out this channel.

535 Q. No, I want to know how far up the river Dunkert's Bottom is from here?

A. Well, there's Cloyd's farm—maybe you know something about that. Well, I suppose it is something like three miles, at least three miles or more.

I don't know exactly where Reed Creek empties into New River, but I know where Peek Creek comes in. That is the creek that comes down through Pulaski. I don't know how far up the river it is. I never run up and down the river much, and don't know exactly how far it is. It is up there a right smart piece. I don't remember exactly. It's right close to Newbern. It goes down through that road that goes up to that ferry and you cross Peek Creek. It, the creek, comes in above Towe's Ferry and below the Linkous Ferry—between the two ferries.

Q. What was the Government doing on the river?

A. They seemed to be just drilling out rocks and busting out a channel. They was all working in the water. I didn't stay there but a few minutes while they were working—a half hour or something like that. I just went down there to see what they were doing, see the work. I never had saw it. They passed up the river here, and people told me they was working here. I lived up in Pulaski then—two mile this side of the river.

By Mr. Abbot. We move to strike out so much of the answer as states what people told him.

I am referring to the County of Pulaski. I never lived in the town.

There was some keel-bottom boats on this river. I would just see them passing up and down the river. I don't know what they was made of. I saw them above Ingle's Ferry. I lived up and in sight of the river. They was good long boats. They pushed them up there with poles and had oars on them and pulled them back down the river with the oars, and pushed them up with the poles. Had three men to a boat.

I have seen a good many keel boats on the river. I don't know how many. I know of some—I know of a good many but I don't know who they belonged to. Dick Jones is the very man I am talking about that had them boats. He had three or five, I don't remember just exactly the number he did have. I have only seen
coal brought down in the boats. I never was in them. I
536 don't know what was in them.

Q. Couldn't you look at them and tell without getting in the boats?

A. I just saw them passing up and down the river. I was way off from them. I lived three or four hundred yards of the river and they was still doing that for a while, but they ceased doing that in my knowledge. They ceased. That was before they built the line of railroad from Pulaski up the river.

Q. Was that the Cripple Creek Railroad?

A. Yes, sir.

Q. That ceased after that?

A. That ceased before that commenced.

Q. Have you ever seen any logs floated down the river?

A. Plenty of them; yes, sir.

I could not give you an estimate of the amount of feet of lumber there would be in the rafts. I saw a great many rafts and rafted ties down there myself from the Earhart place at Dunkert's Bottom. I had ties rafted. I cut the ties out up there. I bought the timber and hewed the ties out and brought them down to the river and hired people to bring them down New River for me. I have forgotten whom I hired to bring them down. They were all niggers and they are all dead. That has been over 50 years ago.

I didn't see no lumber in the keel boats that came down the river. They were too far away from where I was. I suppose there was lumber boated down here after this town commenced building down here but I couldn't know nothing about it. I knew people brought lumber here in rafts and keel boats too but I don't know who they was or nothing about it. I know there was lumber unloaded down here and hauled out in this town but I don't know who brought it down, or how it was brought down. I wasn't in sight of the river after I moved here.

I have never seen any pleasure boats on the river at all except there was one built here by Mr. Jim McWayne and Walter Dudley. They built that boat and put a gasoline engine on it and I think that is what it was built for—they said it was. They tried it over these falls and it couldn't go up. They kept it here a while and I think they got it on a tide or four or five feet and took it
537 down to Hinton and sold it. That is the only thing I saw or heard of in that way.

(Defendant objected to the statement of the witness as being hearsay evidence.)

I don't have no idea in the world how far up the river logs were rafted from down to Radford. They used to buy them over at New River Bridge. General Wharton had a small sawmill over there and he bought the logs and cut them up and sold them. I don't have no idea of how many or nothing about them. Whole lots of them came from above Dunkert's Bottom, way above there.

The witness on Cross Examination testified as follows:

I didn't go down the river on the pleasure boat I mentioned a minute ago. I didn't know nothing about going down river on it. All I know about it is what people told me. I didn't see them built it. I have seen the boat but they say Jim McWayne and Walter Dudley built it. That is all I know about it.

I did have something to do with guarding New River Bridge during the Civil War. I stayed on that old bridge and like to froze to death many a night. I guarded the bridge during the war just a year before the war ended. It was the last year of the war that I guarded the bridge. I did not see any use made of the river that year by boats.

Dunkert's Bottom is on the right hand bank of the river as you go up. It is on the other side of the river from here—on the left bank as you come down. It is not two miles up to Dunkert's Bottom from the mouth of Little River. It is about two miles from the upper end of it. Dunkert's Bottom is about a mile long or a mile and a half, something like that. I saw these people working at the upper end of that. That is the only place I ever saw them.

I have forded New River with a horse or a horse and wagon hundreds of times at five or six different places. I forded at Ingle's Ferry many and many a time with two and four horse wagons and on horseback. I have forded it at Moore's Island, at Dunkert's Bottom and at Smith's Ford below Towe's Ferry, way up the river above Howard's Ferry, at the mouth of Reed Island.

Dick Jones had some boats before the channel was cut in the river. I saw those boats when I was first married and was living right in sight of the river a mile above Radford at the Zull place. That is a little this side of Little River, a half a mile. I was married in 1868. It was about 1869 and 1870, when I seen these boats. I lived there two years right in sight of the river. I had by business to tend to and would just see the boats going up and down the river. That is all I know. 538

I never saw any boats after that time. I never seen no boating at all after the channel was cleaned out. I was not living at the Zull place when the channel was cleaned out. I moved away from there and have been away from there 67 years.

The witness on Redirect Examination testified as follows:

Concerning the guarding of the bridge in 1865, the Yanks came in and burned that bridge, about the last of March in 1865, I think. It was at the time they made that raid across the mountain and we got across the bridge and come over here and looked back and saw one side of the bridge burning. I commenced watching the bridge in about 1864. I was in the army. I didn't join the army until the second year of the war.

Q. So boats could have been going up and down the river during the war?

A. Oh, yes; they could have been, but they wasn't, I don't think.

Q. You say you don't think?

A. I don't think they was.

Q. Why?

A. I didn't see no boats.

Q. All of the men were out of this part of the country then, weren't they?

A. Yes, sir; everybody was gone.

I don't know who burned the bridge, whether it was the Confederates or not. I didn't see them.

I didn't ford New River in high-water time. We just guarded that bridge night and day on account of somebody might set it afire. I forded the river on horseback and in wagons at all times of the year, winter and summer, and all kinds of times but not when the water was high. It couldn't be done then. We forded it only in low tides. When I forded the water was sometimes up to my saddle skirts in some places but in low tide in the summer time there were some places you could ford where the water wouldn't be above the horse's knees. The winter tides generally would be higher and deeper.

539 Q. You spoke, in answer to questions from counsel, of seeing boats here close to New River. State whether or not you ever saw any of these keel boats when you were at Dunkert's Bottom?

A. No, sir; never saw none after I first told you about when I was first married. I left that river there. I lived there two years and moved away and never seen them any more.

Q. That was sixty-seven years ago and you didn't see them because you moved away?

A. That was it. I moved out of sight of the river.

The witness on Recross Examination testified as follows:

I was born up here somewhere between here and Snowville in Montgomery County. I didn't know how long I lived at that place. I don't recollect living there very long. When I first remember I was about five years old and lived up where Little River comes into New River, just this side. The railroad bed goes right through the place where the house was. I lived at that place just a little bit. I was a five-year-old boy. I wasn't more than three or four or five when I moved away. I went off a mile or so from there away from the river until I was about 13 or 14 years old—two or three miles from the river and we moved back to the river when I was about 13 or 14 years old.

I have been knowing the river pretty well since that time. I have been pretty close to it. I have lived within a mile and a half of the river. I never lived more than eight miles from it, for about four years. During that time the river was frequently under my observation, I imagine.

Mrs. Hettie D. Helvey

Plaintiff introduced in evidence the deposition of Mrs. Hettie D. Helvey, and offers in evidence certificate of physician marked for identification "Plaintiff's Exhibit No. 17," concerning her incapacity to appear in person to testify.

As recorded in the above-mentioned deposition, the witness testified upon Direct Examination as follows:

540 I do not live in East Radford, Virginia. I live across the river. I came over here because I was sick and am staying with my daughter, Mrs. Nina Salmons. My home is over in Pulaski County across the river. I will be 69 years old the first of September. I was born about five miles this side of Blacksburg in Montgomery County, right on what is now known as the Cloyd farm. At that time it was called the Pepper farm. My father's name was Charles Franklin Dudley. I lived with him in the early days. He bought the ferry here between Radford and the Pulaski side of the river, here at Radford. It was known as Hurt's Ferry. We were supposed to have a quarter of an acre on this side of the river. That is the Dudley Ferry now. When we moved there, there was already boats there and we bought the boats with the ferry and my father had to build a boat a couple of years afterward—a flat bottomed boat—to carry wagons and horses in. It was 50 feet long and I don't think it was over 14 feet wide. I think he always bought his timber, his plank, 15 feet long and made it 14 feet. He built more than one. I don't know how many. He used one for his ferry. We only had one boat at a time. That was just to go from one landing to another, and to ferry across.

I knew General G. C. Wharton and recall a trip with him on this river. On September 13, 1878, we had a terrible freshet, the largest I ever saw on New River, and we went up on a boat on a picnic which General Wharton and his wife gave to the Sunday School at New River. The New River Sunday School was a mile above Radford up on a hill above the New River Depot. We went on a bateau, which some called a keel bottom boat—a round bottom boat, just to haul things on. It was 65 or 70 feet long. Colored men worked on it when they were working on opening a channel in New River. I think General Wharton had something to do with it, superintendent or something. General Wharton had these men come with this boat and take us up New River on this picnic. I guess there were 40 or 50 on this boat. I couldn't tell you how many. It is four miles from New River, they tell me, to Ingle's Ferry and I don't remember how far it is but it is not more than a mile to the mouth of Little River. We went

541 to Ingle's Ferry and up Little River a piece—so far that we could not turn around and had to back down the river. We had dinner there. It rained all day or all afternoon and we didn't have games. I couldn't tell you exactly how ~~long it~~ took us to go from where we started near Radford up to the scene of

the picnic. I don't remember just what time we got on the boat. It was sometime after breakfast and I had gone a mile from the ferry. I guess the time we were to start was nine o'clock but we were a little late. We got up to the Ingle's farm and come up a real hard shower and General Wharton decided we would all have to go over to some tobacco barns. He took us there and we got very wet. Then we had to wait to get dried before we could eat dinner. Then we came back to New River that afternoon. The only motive power we had to drive the boat was men pushing it and then we drifted down the river with the current but they poled the boat so we could get on faster. That was on Saturday.

That bateau was used by men in connection with the channel on New River. I lived here then in a house near the ferry. I do not recall the men making that channel. I never saw them working at it. This boat which I took up to the picnic that Saturday started from New River. General Wharton owned the mills and everything there. When I say New River, I mean the bank of New River, not any river depot. The depot is a quarter of a mile or more above the river there. The boat started on the picnic about a quarter of a mile below the New River Depot. The landing was just above the end of the New River Bridge.

Q. You rode on one of those keel-bottom boats on another occasion, did you not?

By Mr. Abbott. I object to counsel leading the witness.

A. Yes, sir; my father and myself went up to the mouth of Little River with some men by the name of Flannigan, hauling some lumber down the river in one of those keel-bottom boats, and we went up that way, you know, and we didn't come back on the boat, we went up to the mouth of Little River, and we got out on the Pulaski side, the mouth of New River was on the Montgomery side. We walked up to my Uncle's; he lived in what they called the Dunkert Bottom.

There was no one in this bateau that time but the man who
poled it up. I don't remember exactly what time in the
542 morning we started from our ferry. We got up there by
noon, and got noon dinner there that day. We came back
on the train. We went on to Dublin, and visited there. This
was the trip I made to Dunkert Bottom. I think the Appalachian
people have bought all that land now. I have heard that.

Q. Do you recall this bateau hauling lumber?

By Mr. Forbes. This question is objected to as leading.

A. Yes, sir.

I don't know whether they had to go up Little River to get the lumber or if they got it just along the river. I don't know where the sawmill was that was sawing this lumber. They hauled two loads of lumber that I know of.

I have not seen boats hauling material on this stream between these points I mentioned in the last 20 years. Before that they used to haul their corn from the Horse Shoe, which is over on the Pulaski side opposite the farm where I was born, the Pepper farm. It was exactly the shape of a horse shoe. They called one the lower shoe and one the upper shoe.

They hauled their corn to General Wharton's mill, which was up at the bridge where it is now. I have seen them hauling it. My mother went down on one trip. She went down to what they call Lover's Leap. It is the place that Mary Draper Ingles came to when she came home from the Indians. It was about half way to Blacksburg. My mother got on with the children at our ferry. The boat was a bateau.

I don't know how many bateaux were operating on the river then. They just disappeared out until there wasn't any at all. Finally the use of them was abandoned. I don't know exactly what dates those boats carried these articles. I don't know whether I have seen a bateau on the river since I was married.

Q. When were you married?

A. 1889, and I don't think I have seen a bateau since then, but they operated up till then, a few now and then.

Q. From your marriage, going back, do you recall them from your girlhood or what time?

A. Back toward my girlhood. I was only eight years old when we moved to the ferry.

Q. How old were you when you were married?

A. Twenty-two years old.

543 Q. So during that period of fourteen years you recall the bateaux operating?

A. Yes, sir; and I never saw but one with an engine, a man by the name of Hodge.

Q. Do you know his first name?

A. No, I don't.

Q. What kind of engine was that?

A. I don't know, a little engine that puffed and made a noise, and he used to drive it down by our house, he never went down the turn of the river because there was falls down there.

By the turn of the river I mean below Radford. I don't know what falls those were. They always called it Castle's Island, down below where the power house is. I saw this boat with a few passengers going for a trip. I didn't see it haul anything.

I never knew of this bateau hauling anything except that they used to haul coal from down about where the Parrot Mines are. They are below Belspring. We call it six or eight miles from Radford across our country roads. I don't know where they hauled that coal to.

Two of the men that ran the boat when we went on that picnic was drowned when they was hauling coal down there. The boat went over the Big Falls and four men were in it, a white man by the name of Dotson and Mr. Sifford and two of the colored men that run the boat we was on that day was drowned when the boat went over the falls.

Q. State if any grain was hauled on these boats?

By Mr. ABBOT. This question is objected to because leading.

A. Except what was hauled from the Horse Shoe up to General Wharton's Mill.

Q. Do you recall where the lumber was secured for building your house?

A. We bought the house already built.

Q. Do you recall a house being built there near you, of lumber being hauled down the river to Dunkert's Bottom?

By Mr. ABBOT. Objected to as leading.

A. Not that I know of. I went on the boat up Little River and walked up to Dunkert's Bottom. They were hauling that to Mr. Flannagan's. I don't know how far down the river it was.

544 I think they built a barn for Mr. Flannagan.

Q. Where was his place?

A. Down near the Horse Shoe. He owned the Horse Shoe.

The witness on cross-examination testified as follows:

The names of those colored men who were drowned were Chap Meyers and Andy Meyers. They lived close to my father. They had a brother Bill. I don't know that he was drowned on that trip. Dotson was drowned but Sifford swam out.

Q. Mrs. Helvey, you said you know of two loads of lumber brought down the river on bateaux to your father's ferry?

A. No; that was people that moved down the ferry, the loads of lumber was going to Flannagan's. I had come up on one of the boats and I think that was the last load they had hauled. I think they were building a barn for Mr. Flannagan down below the tower down here on New River.

Q. In your examination in chief you said they hauled coal down about the Parrot Mines?

A. They hauled it from there; that was where it was mined.

Q. Did you ever see them haul any coal from there?

A. No; I didn't see them haul any. I just knew of these people drowning, and one of the men that swam out was a school friend of mine.

Q. That was a boat loaded with coal?

A. Yes, sir.

When I lived at the Pepper farm my father raised grain, wheat, and sheep. He farmed in general. He shipped his grain by wagon over to Christiansburg, that was our nearest station. We just had the flat boats. The wagons went backward and forward over the river down there.

The witness on Redirect Examination testified as follows:

My father operated a ferry right down here at East Radford. The ferry hauled all kinds of machinery, cattle and sheep, merchandise, and everything they drove on the road. There was lots of wheat hauled but that was on the flat-bottomed boat, the ferry boat we owned. We never owned a bateau. I don't know they did much shipping on the trains of these things which were hauled
across my father's ferry. The New River Depot was closer
545 than it was to haul to Radford for the people in the county
that raised food stuff, and over in Montgomery County we had a central depot. It is Radford now.

Lucy Calfee Smith

Plaintiff introduced in evidence the deposition of Lucy Calfee Smith and offered in evidence certificate of physician marked for identification "Plaintiff's Exhibit No. 18," concerning her incapacity to appear in person to testify.

(Note.—This deposition was taken at the home of the witness, on account of the witness being ill.)

As recorded in the above-mentioned deposition, the witness testified in Direct Examination as follows:

I was chistened Lucy Smith. I am 79 years of age, I reckon. I was born on this farm just a very short distance. There was no town at that location. The farm was near Allisonia and owned by the Calfees. I have always lived in Allisonia, which is on the river bank. I live just up the road right near the river.

Q. Did you ever see any boats on the river at Allisonia?

A. Yes, sir.

Q. What way were they going?

A. Up and down, too.

Q. What kind of boats were they?

A. Keel bottom boats everybody called them.

Q. Have you any recollection as to how long those boats were?

A. No, sir; I couldn't have judged them.

Q. Did you ever see anything on the boats?

A. Yes, sir.

Q. State what you saw?

A. I have saw produce.

Q. What do you mean by produce?

A. I have saw corn and wheat and stuff shipped up and down the river.

Q. Did you ever see any eggs or things of that kind from off farms?

A. They brought eggs up the river, there was a store
546 where they took things and a good many men come down
about there.

I recall that the store was just above Allisonia about a mile right where the creek runs into the river. That is the place called Little Reed Island. I have been in that store. I have seen boats go up there and saw them put the goods in there but I don't know that I was ever right there and saw them put the goods in there, but I saw the goods go up there. It was a country store. I understood the goods came from Central down here, because what makes me think so, there was people who come from Central up there who worked in the lumber, and they would buy things, get things off of these boats and always looking forward to the boats coming up, Overstreet was the name of the people. Lee Calfee was the name of the man who ran the store.

I have seen lumber go downstream on the boats. I have seen some farm produce go down on the boats, at least from where I was that is what I thought it was, and sometimes they would stop at the ferry and sometimes probably buy something, some of the country people come and bring them something they wanted to sell or ship.

I could not just say how often I would see these boats. They come up nearly every week for several weeks at a time and they would miss maybe a day or two and come again. I was very small and can't say. I don't know how old I was when I first saw boats up there. That was as far back as I can remember.

I remember a place called Clark's ore bank, about half a mile from where we lived from the river. The bank contained iron ore. I have seen iron ore carried on these boats. I don't just know where they were going. They shipped so many things up and down the river, I don't know. The boat crossed the river and come to the opposite side and I thought went to Mack's Creek Furnace and some of it I think come down the river to where the creek ran into the river.

I went to school at Mack's Creek, and was at the furnace there. They was working at the furnace and it seems to me once I know I seen them making pig iron, or else at Boone Furnace above where I lived. I just can't recall. I can't remember if I saw them put the pig iron on the boats.

547 The witness on Cross-examination testified as follows:

I am 79 years old. I have lived with Mr. Calfee right in Allisonia until recently when his health gave out. That is the place at which I was residing during the time about which I have testified.

I testified that there were keel-bottom boats that went up to the store which was at the mouth of Big Reed Island. They went up the river that far but I reckon that the store was a half-mile or more up the creek. The store was run by Mr. G. L. Calfee and his brother. He owned a large farm above Rich Hill.

I don't know why they would haul corn and wheat from Central Depot 30 or 40 miles down the river to this Calfee's store. I just saw that they had such on it.

Q. Isn't the occasion you refer to when they were working on the channel in the river a short time?

A. I don't remember much about that; I remember hearing talk about it, but I don't remember.

Q. Can you approximate to all the years you saw this grain taken out at the Calfee store?

A. No, sir, I can't do it, but there are citizens around there that can.

Getting up by Allisonia they had to go up the river right where the mill is. Some places there were deep and some not so deep. I have crossed there many times. It is a place we used to ford on horses and in wagons that came out right at the mill. It was a very good ford, I reckon. It was tolerable deep in some places. I have no idea when this grain which I referred to was taken up there.

Q. It is only your supposition it came from Central Depot?

A. I heard it did, that they brought it from down here, but one thing that kept the boats down here a heap, everything when they come down was going to Central, you know.

There was a little mill near Calfee's store, not worth anything. It was a little gristmill that ground a few bushels a day.

I don't know whether there was occasion for hauling
548 wheat up to Calfee's store or not. There was a mill there
and they took some wheat for fee and rye, too, I know.
The mill was right at Calfee's store where Little Reed Island runs into Big Reed Island. The lumber hauling was mostly down the river. They made rafts. I can't remember how long that continued. You know I was a child and not much interested in that. I can't tell you just how much, but several different years, I think.

Q. You have a vague recollection about them rafting logs?

A. Yes, sir, they rafted logs down there.

They rafted logs down Big Reed Island and also Little Reed Island. Rafting logs was sometimes a very common practice in there when there was wet weather.

I don't know why they hauled wheat up there from the mill down here at Radford. I would see people go up there with wheat. I don't know if they went to the store. I don't know why they would haul corn from Radford to Allisonia where corn was raised, but they brought produce up there for their boaters. I suppose they ate the wheat and corn and sold it at the store.

I have testified about them hauling ore from Clark's ore bank that is situated up the branch about a mile from the river in the direction of Draper's Mountain. They would haul the iron over the river at J. W. Clark's ferry. That is a different ferry than Calfee's ferry. I think there was a ferry where they would boat over but I don't think it was a freight ferry. It was a private one.

Q. The Radford Iron Company would haul that ore across the river and take it in wagons to where Hiwassee is now?

A. I think they took some that way and took some in boats.

Q. But when they would take it in boats they would unload it on the opposite side of the river and haul it across to the ferry, would they not?

A. No; I think they had their own boats. Now they did bring it over, I don't know why they didn't at first, but they got to bringing it over and loading it on wagons and sometimes on the boats.

Q. When they would load it in the boats they would transfer it to the wagons and haul it down the Lead Mine Road
549 to Mack's Creek Furnace, didn't they?

A. I think they did, some.

Q. You intimated awhile ago they would haul it down to the mouth of Mack's Creek, that is supposition on your part, isn't it?

A. No, sir.

Q. Isn't it about as far from Mack's Creek up to the Mack's Creek Furnace as along the road to Mack's Creek?

A. No, sir.

The road was not steep at all. They did not have to ford the creek four or five times. They forded it one time. Wait now; I forget; I don't remember. We used to go down the road and cross the creek and go to church.

Q. You didn't go down the river?

A. No, sir.

Q. You never have been down the river?

A. Yes, sir.

Q. Down Max Creek to the river?

A. Yes, sir; I have been down there, but I can't recall that; I don't remember anything about it, but I have been down there.

Q. And your whole recollection about this ore is very vague, isn't it, and indefinite.

A, I am right forgetful. I can't remember everything.

We lived on the Old Lead Mine Road which I think went by Snowville.

Off and on the people would use the boats sometimes. They used canoes sometimes, but as long as they worked in that ore up there I think they used the boats some. I don't know how long they used that ore from Clark's mill at the Mack's Creek Furnace. I don't remember how long taking the ore across the river and unloading it on wagons lasted.

Q. Now all this boating you referred to stopped long before the railroad was built, didn't it?

A. Yes; as well as I remember, it did.

Q. Several years before the railroad was built up there?

A. I think it stopped before, but I can't remember those things.

550 I can't tell whether in hauling this ore from the Clark's ore bank, the principal part was hauled across the river on wagons. It was not very far from my home. I was not often about it, passing the road sometimes, go up in the fields, and watch them. We owned two farms down there. In going down to Mack's Creek, they would have to cross over Jones' Ford from this side of the river.

Regarding your question, whether there are very rough falls all down between Sand Islands and by Dr. Clark's, and on down in the direction of Jones' Ford by the old Carnahan place, I don't remember about that. I don't know whether there was considerable tide in the river or not. I was too little and young to pay attention to things like that.

Q. All of your testimony is just a vague recollection of years ago, that you cannot be definite about?

A. Yes; I can; I can about that.

Q. You have told about the store; that is definite?

A. I see the stuff boated by.

Q. But you can't remember within ten years of the date, can you?

A. Yes, sir.

Q. What date was it?

A. I know that it has been a good while ago, it has been over ten years ago.

Q. You can't remember within ten years of the date it occurred?

A. No, sir.

Q. You can't remember definitely what was in the boats, or how many boats there were?

A. Yes, sir.

Q. How many boats did you see with lumber?

A. I could not tell you that.

Q. Did you state you saw lumber in the boats, or just logs rafted down?

A. I saw lumber in the boats. I saw shingles.

Q. How many times?

A. I could not tell you that.

Q. When?

A. It was several years ago.

Q. And you can't remember how many boats you saw with pig iron on them?

551 A. No, sir; but I have seen them with pig iron; I think I seen them bringing the pig iron over the river; I wouldn't be sure, or up the river; I know I seen some pig iron there.

Q. But you can't remember what year it was?

A. No, sir; I can't remember that.

Q. Can you remember if the other boating was about the time you saw that pig iron or not?

A. No, sir; I can't tell, my recollection is bad, and I am so old and nervous I can't recollect.

Q. Was this boating after 1900 or not?

A. I don't remember that. It was when I was a small child, they boated there. The boated ore and lumber.

Q. When they would haul this ore from the Clark ore bank you saw it unloaded from the boats and put on wagons, didn't you?

A. Yes, sir; they used to. I could see it from where I was, but I wasn't close enough to see it, but I know they boated some of it down the river, too.

Q. Did you ever see a boat load of ore below Hiawassee?

A. No, sir; I don't remember seeing any at Cox's ferry.

Q. Ever see a boat opposite what is now Delton?

A. I forget.

The witness on Redirect Examination testified as follows:

Q. You did see boats going up and down that river as a little girl?

A. Yes, sir.

By Mr. Abbot. We object to counsel leading the witness.

By Mr. Thompson. When you say a little girl, do you mean ten years of age or five years of age?

By Mr. Abbot. We further object to the leading of the witness.

By Mr. Thompson.

Q. What did you mean by little girl, about how old?

A. I was large enough to take an interest in seeing the boats pass and look at them, they attracted my attention, like most children.

Solomon C. Furrow

Plaintiff offered in evidence deposition of Solomon C. Furrow, and the following certificate of a physician, marked for identification Plaintiff's Exhibit No. 19, concerning his incapacity to appear as a witness.

As recorded in the above-mentioned deposition, the witness testified on Direct Examination as follows:

552 I am 49 years old. I live at East End in Radford. I have been here since 1901. I was born right across the river on the Pulaski side. I have been off sick for nearly three years. Before that time I was employed on the Norfolk and Western Railroad. I have been employed by the Norfolk and Western upstream on New River where it is joined by the Little River. I was working on the track, track service.

During that time I saw boats coming down New River. I saw a big keel-bottom boat which I judged to be about 40 feet long and about 12 feet wide. It come right around about 12 o'clock noon. It was coming down with ties. It came down and turned and come under the trestle and up to a flat place and the ties were unloaded. It had about 50 ties on it. Some days the boat would bring ties and maybe the next day it would bring rough lumber. I saw that boat about every other day. I think there were about five or six men on the boat. When the ties or lumber were unloaded they were taken to a flat place and loaded into cars. There is a railroad spur there. Lumber was taken from where they unloaded it about the distance from here to in front of that man's store there across the street, and was loaded on the N. & W. cars. I don't know where it was shipped to.

I saw that right around between 1920 and 1923. I could see up the river about a mile or maybe a mile and a half from where I was working. I know where the Appalachian Electric Power Company dam site is. I could see plainly up to that dam and beyond it.

Q. Could you see boats coming past it?

A. Yes, sir.

Q. Did you see boats passing it?

A. Yes, sir; them boats loaded with ties.

By Mr. Abbot. We object to the leading form of the questions. He testified he saw one boat come down the river.

Q. You never saw but one boat at a time come down the river?

A. Yes, sir.

Q. When you were working there, name some of the other men working with you?

A. Johnny James, Earl Hardsock, and Sherman Slusher.

553 The witness on Cross Examination testified as follows:

The boat I described they called a keel bottom boat. They only had four or six men. Some days it would come there with four on it, and some days with six on it. Four men could push the boat all right. I don't know who the men were that were on this boat. I don't know the names of any them.

I saw them about every other day. Sometimes we would be up there for a week at a time. Then I would come down and work somewhere else and maybe we would have to go back up there and load ties.

I don't think I worked up there a whole year. I worked there in 1920 and the boats were coming down there then. I mean I saw this boat come down every other day for a week, if I was up there for a week. Sometimes we would be up there about a week at a time and again maybe it would take us about three weeks to get the work done. In all I think I was up there just about a month during the year.

This boat could carry right around 50 ties. It did not have a motor on it, I am sure.

The witness on Redirect Examination testified as follows:

I noticed the boat was poled with four men, two men on a side. I did not see any boats coming down there at any other time than the period which I have mentioned. I seen a raft of logs come down. A fellow had a raft of logs when the peg factory was running.

Q. And you saw them come down the river past where the Appalachian Electric Power Company dam site is?

By Mr. ABBOT. We object to that question as leading and the use of the word "them" he referred to a raft.

Q. Did you ever see more than one raft?

A. Two or three fellows come down with a raft apiece, landing right down here above these falls, below the wagon bridge or highway bridge. We always called it the wagon bridge.

Q. And you saw them as you were standing up at that place where they were loading the ties?

A. Seen them come by there, and then I was working right down here on the main line and seen them come by there.

Q. Where, on New River?

554 A. Yes, sir.

Q. How far down the river would they go?

A. They would land down just above the falls.

Q. That was in the year 1920, now did you see any in the year 1921?

A. Well, I have seen them between twenty and twenty-three.

Q. Would you see them each year of those years between twenty and twenty-three?

A. Yes, sir.

Q. And about a month each year?

By Mr. ABBOT. We object to the continual leading of the witness.

A. Yes, sir.

The witness on Recross Examination testified as follows: I said I worked up there during the year 1920 about a month out of the year. These ties were racked up there on the ground. I worked there a month out of 1920 and a month each other year. I worked there in the year 1921 and also in the year 1922 about a month out of each year. In the year 1920, I worked there along in July, and in 1921 and 1922 I worked there in the same month, July. In 1923 it was in August I think and not July that I worked there.

A fellow by the name of Mike Fizor who is now dead was my foreman or immediate superior. Mr. Johnny James worked with me. He was my partner putting in ties. E. P. Hartsock and Sherman Slusher also worked with me all during this period. I am sure Mr. Fizor was the name of my immediate superior. James was the last foreman I worked with up there. He was over me after Fizor passed off. Mr. James' superior was Mr. Grubb. Fizor also worked under Grubb. Grubb was foreman and Fizor was assistant foreman.

I mean to say that in each of these months, namely, July 1920, July 1921, July 1922, and August 1923, I saw this boat come down the river with cross ties or lumber and leave the cargo at the mouth of Little River there where I was working. I was not up there in 1924. In 1925 I was in the yard. 1920 was the earliest year I worked up there. The track was laid up there to get that stuff loaded on cars in 1903.

555 The witness on Redirect Examination testified as follows: I said I was there in 1903. I was not quite far enough up to see boats coming down in 1903.

D. R. Peterson

Plaintiff introduced in evidence a deposition of D. R. Peterson and offered a certificate of a physician marked and identified "Plaintiff's Exhibit No. 20," concerning his inability to appear in person to testify.

Mr. Abbot. For the purposes of the record, we object to all leading questions and the answers and all hearsay. Do I understand those answers are taken under advisement?

The Court. I will note them when I read it over.

Mr. Abbot. We do not have to preserve any exception at this time?

The Court. No, sir.

As recorded in the above-mentioned deposition, the witness testified on Direct Examination as follows:

My name is Radford Peterson—D. R.—I was named after the man the town was named after—old Dr. Radford. I was born in Montgomery County near Riner July 10, 1855, a little village out from Christiansburg. I couldn't tell you exactly how long I have lived here in Radford—about 25 years I suppose. I couldn't tell you when I saw New River for the first time. My father had a place up there before he was married. After he was married he and my mother went on the place out at Riner. I have known of New River and Little River ever since I knew anything.

In 1877 we moved from Riner up on the river to a farm right in between New River and Little River.

Q. Do you recall whether the Government did any work on the channel of New River?

A. Of Little River?

Q. Of New River.

A. Yes, they worked there. I remember that very well.

Q. Do you remember before the Government did that work on New River?

A. Yes. I think they might have brought some boats there—I won't be certain about that, though.

I think some rafting was done. I don't know whether they had boats on there or not. I wouldn't like to make a statement that I don't just know is true.

In the work on the channel they opened these falls—Ingle's Falls—so they thought they could get the boats through. Ingle's Falls is up above here a little ways. I suppose they thought they could make it a navigable stream.

556 I have seen keel bottom boats on the river for quite a while but haven't seen none lately. The old Radford iron furnace up at Mack's Creek used to haul pig iron down the river there when they first commenced there, along about that time. They hauled it from Mack's Creek in boats and unloaded it at New River. I suppose it was loaded on cars at New River, but I don't know.

Q. State whether or not these boats, these keel bottom boats, carried anything other than pig iron?

Mr. Abbott. Objected to as leading.

A. Why, yes; they hauled some other stuff—lumber and some cross ties, I think probably.

Q. Do you know whether they hauled any farm products like grain?

Mr. Abbot. Objected to as being leading.

A. I don't hardly think they carried very much farm products at the time I knew it anyway—mostly I knew of was lumber and ties and pig iron. That is about all I ever knew.

My father did some business with persons working on the river. It was '77 or '78 just before the big freshet in the river and the

Government had these men work a good ways up above the mouth of Little River. I think it was 8 or 10 miles above Little River probably where they were working.

We sold these men bacon out of 90 head of hogs and the Government came there in two keel bottom boats and took the bacon up. I don't know how much bacon was carried but these 90 head of hogs averaged 150 or 200 pounds at least in meat. You know that the meat dries out a great deal after being made into bacon. I think they come there and made two loads out of that in the boats. I think that they took the meat from about 45 hogs on a boat. I won't be sure about that.

Some lumber was hauled on these keel bottom boats. I never saw much rafts of lumber but did see rafts of logs on the river, I think. Most of the logs were unloaded about at New River. It was at New River, on the other side of the stream.

The witness on cross-examination testified as follows:

I think the Government had 2 boats, I am not real sure. Anyhow, they made two loads to get the meat. I don't know whether they had another boat to come and get it or not. It seems
557 to me they brought the men down the river in these boats at the time of the big freshet. We had just sold this meat to them a short time before the freshet and that was all lost to them, I reckon. A lot of the men came very near being drowned but they got on the boats and came down here.

Q. Did more than one boat haul the meat?

A. Just one load at the time. They came there twice and got the meat.

Q. Are you sure, Mr. Peterson, that they didn't carry that in more than two boatloads?

A. About two boatloads, I think it was.

Q. Would you be certain that there weren't three or four boatloads?

A. No. It might have been. Of course that much time makes a whole lot of difference.

Q. I know it does, but I want to get it as accurate as I can.

A. I know we hauled it and delivered it at the river there, and they loaded in on boats—I would say two or three, might have been three boatloads. I wouldn't tell you the boatloads, but they got the meat, and hauled it up there on the boats. That is all I can tell you.

Q. This boating of iron from the Radford Furnace that you mentioned, when did that take place?

A. Well, that was along after I got to the river, they was hauling some down there.

Q. How long did they continue to haul it on the river?

A. I couldn't make that statement. I don't know how long. I know they hauled some, but I don't think any very great quantity.

Q. Was it as much as a year?

A. Well, they might have been bringing some down. They had to wait until they would get a tide to come down through there. They didn't haul regularly, couldn't get through.

Q. How did the Mack's Creek Furnace, or the Radford Furnace, regularly haul its iron away.

A. Why they would be hauling it with wagons most of the time.

558 Q. Where to?

A. I reckon they hauled it to Dublin when they hauled it, to Dublin. They finally quit the boat business and hauled it with wagons again all the time.

Q. Do you know why they quit the boat business?

A. No, I really don't. I reckon they couldn't make a good success of it. I reckon that is the reason.

They hauled iron on the river after we were there about a year. I think that is when they started hauling iron. I wouldn't be real sure about that. They might have brought iron down occasionally for as long as a year. I wouldn't say that they didn't haul iron on the river for more than 2 years. I just don't know.

I have come down several times through the channel the Government built in the river. I reckon when they first taken it out it did some good, but it filled up some again there. There is a ford at Ingle's Ferry. I have forded there many times. I used to ford there all the time when I lived on the farm near there.

The witness on Redirect Examination testified as follows:

I said that I came down through these channels several times. When I worked for George Miles he had a school over here and was a promoter of this railroad and was putting in a dam at Little River for city lights. We had been doing all our hauling on wagons and he decided we would haul in a boat and we decided to have one made, and I had one made by a man named Crafton up at Grayson town. That boat is the one I came through there on hauling lumber. Mr. Miles had a big lot of lumber up there. He had me to have the boat built. We hauled on it a little while but it didn't give very good satisfaction and we quit and went to hauling with teams. Mr. Miles had a big boundary of timber bought from Mr. Harvey about 4 or 5 miles up the river from here.

The witness on Re-redirect Examination testified as follows:

In getting the lumber down which we put on the boats
559 we would sometimes get hung up and it would be quite
a while before we could finally get it out. If you had tides you could go on through; if not, you couldn't.

Robert Hill Moore

Plaintiff introduced in evidence the deposition of Robert Hill Moore and offered in evidence as Government Exhibit No. 21, a physician's certificate concerning the witness' incapacity to appear in person to testify.

As recorded in the above-mentioned deposition, the witness testified on Direct Examination as follows:

I guess I lived at Radford or in its vicinity around 12 or 14 years. Before that I lived for about 2 years on a farm of mine in Montgomery County. Before that I lived 13 or 14 years in Pulaski about Linkous Ferry about a half mile. I lived there until I was married when I was 25 years old. After that I went to Pulaski City and lived there about 3 or 3½ years. My mother taken very sick and I went back to our farm and stayed there until she died, probably 8 or 10 years. After my mother died, I stayed on the farm for about 3 years until I sold the farm. I was born in 1867. I will be 69 the first of July. After my mother died I came over here above Linkous Ferry. I lived about 2 or 2½ miles east of Allisonia. I have lived on or near New River nearly all my life.

I first saw boats on New River when I was 10 or 12 years old, I guess. I did not see the boats there for many years after that. I remember when the Government made a channel in the river. I couldn't tell you whether I saw boats there before the Government made the channel or not. The boats I saw were as long as from here to across the street. They were called keel bottom boats and were 40 or 50 feet long, I believe. They bulged out at the top and were 8 or 10 feet wide. They had a keel. They had 2 men on a side and a man in the rear to guide the boat.

I saw these boats near Allisonia. I saw them going both up and down the river. I couldn't say just how many I saw but
there were 4 or 5 or 6. I would say that probably there
560 were about 3 on the water at a time. They carried pig iron
and iron ore. They would bring shovels and picks, kerosene oil maybe, sugar and coffee sometimes when they would come back from Central Depot. That is where they said it was from. I don't know where it was from.

I never saw any lumber in the boats. I can't recall that I saw farm produce in them. I don't know whether they got the sugar and coffee at Central Depot except that it came up the river. I can't say whether there were any grocery stores between Radford and Allisonia where they could have gotten these things. I was small, and I don't know.

I suppose it is 25 or 30 miles from Allisonia down the course of the river to Radford but I don't know. Central Depot was at Radford. I came down to Central Depot in a wagon with my father.

The iron ore was carried down the river on the boats. Iron ore is dug out of the bowels of the earth, and put in a washer and washed good. Pig iron is in bars up to 3 feet long.

Q. Do you know whether there was an iron furnace above Allisonia or not?

Q. Do you know whether there was one near or above there?

A. Yes, sir; Boone Furnace was above Allisonia.

Q. Was there any furnace near Allisonia?

A. That is the only one.

Q. How far above Allisonia was it?

A. I guess it is two and a half or three miles.

That is the only one near Allisonia. The boats were loaded with ore just this side of Allisonia at Clark's Ferry, my brother-in-law's ferry. There was a big wharf there. They hauled down there in wagons and unloaded it on the wharf and loaded it on boats. I never saw any pig iron there but I would see some further up the river. When I saw pig iron it would be on boats coming down from Allisonia.

They loaded the ore at Clark's old ferry and taken it down the river one or two miles to what was called Breeding Hill, loaded it back on the wharf there and hauled it to Mack's Creek furnace which was right off of New River ¾ of a mile there between Radford and Allisonia.

561 I have been at Mack's Creek Furnace hundreds of times while I was a boy. After I grew up it went out of business. It was run by charcoal and the timber that produced the charcoal got scarce.

I never saw any pig iron loaded at Mack's Creek Furnace. It was hauled by wagon over to Dublin from that furnace. The pig iron which I saw on the boats which came down the river by Allisonia was from Boone's Furnace.

I saw Mack's Creek Furnace in operation turning out pig iron. They spread what looked like sand inside of the furnace six or ten inches deep and then would take a shovel and make little troughs in it about four inches wide up to the mouth of the furnace, where the metal would run off on each side. They had a steel gauge which they would set down on each side and fill it up. Then after the heating or melting process the pig-iron bars would come out of the furnace.

I saw logs floated down the river when the tide was up. I couldn't say at what time of the year the tide would be best. I paid no particular attention to that. I don't know that I ever saw any rafts, but I saw logs put in the river and saw heavy logs come down.

William M. Martin

Plaintiff introduced in evidence a physician's certificate, marked Government Exhibit 22, concerning the inability of William M. Martin to appear in person to testify and also introduced in evidence the deposition of William M. Martin.

As recorded in the above-mentioned deposition, the witness testified on Direct Examination as follows:

I have lived in or about East Radford between 45 and 50 years. I am 76 years old. I was born in Newport in Giles County. Radford is in Montgomery County. Giles County is down New River from here. Its county seat is Pearisburg. Giles County is close to Glen Lyn. I lived near Eggleston in Giles County about 10 years. As nearly as I can recall, that was after I had lived at Newport. I lived at Eggleston when I was about 18 or 20, maybe 21 years old. That would be between 1880 and 1885.

562 Q. While you lived at Eggleston do you know whether or not you or your father constructed a boat at that time?

A. Yes, sir.

Mr. Abbot. We object to the leading questions.

Q. While you lived at Eggleston did you work on a boat there?

A. Yes, sir.

It was a round bottom boat which we called a keel-bottom boat. It was 30 or 35 feet long and about 8 or 10 feet wide and about 2 feet deep. I don't know what it drew. I know one they hauled coal in they had it clear to the top.

We brought this boat up the river and my father sold it to Mr. Richard Gillam. We brought it from a point two miles this side of Eggleston. Eggleston is about 12 miles down the river from Radford. We brought the boat over to New River bridge on New River to a place called New River Depot. This was 11 or 12 miles. The trip was made by my father and three other men who had been working on the river all their lives, Jim Scott, Sam Scott, and Joe Scott, and myself. It took us a day and a half to make the trip up. On the trip we stayed out all night on the river bank. We set up a "sprawl" on the ground. We pushed the boat up with poles.

I don't know that I ever saw a boat called a bateau. I never saw my father's keel-bottom boat after Richard Gillam bought it from him. I don't know where he used it. It took 5 or 6 days to construct this boat.

Q. Along about the time when you were sixteen to eighteen years old, do you recall seeing a steamboat on New River?

A. I was coming up the river one day this side of Hinton, and a boat coming up the river, and I asked someone what kind of boat that was, and they told me a steamboat.

It was 5 or 6 miles above Hinton. It got up there a piece and stalled and I didn't stop to see what became of him, I kept coming on.

Richard Gillam to whom the boat was sold was a prospector for ore. He did most of his prospecting up New River from Radford. I don't know where he went up in there after the ore, I never seen him haul any.

Q. To refresh your memory, he used the boat for prospecting ore?

A. Yes, sir.

Mr. Abbot. We object to the continuous leading of the witness by counsel for the Government. We object and will continue to urge our objections when they undertake to read the testimony.

Mr. Williams. Let the record show that no witness in this hearing has been led to suggest any answer that he himself does not know about or any answer he would not otherwise make, but that any mention of names, dates, or places to any witness is made by counsel for the Government to refresh the witness' memory upon matters which the witness has already talked about with many persons.

563 I saw Mr. Gillam the day my father delivered the boat to him. I don't think I heard him discuss what he was going to do with it.

The witness on Cross Examination testified as follows:

I was born at Newport, in Giles County. We lived there until I was about 18 or 20 years old. Newport is about 6 miles from New River. During the time I lived at Newport I did not observe the river any. I never went to the river to fish, or swim, or boat, or do anything like that. When I was 18 or 20 years old I left Newport, and we came down to what we called Spruce Run, which is on New River, two miles this side of Eggleston Springs. I lived at Spruce Run for 10 years, about a mile from the river. I could not see the river from where we lived. I left Spruce Run when I was about 30 years old, and went to Belspring. I lived at Belspring about a year, I think, and then came to Radford.

In bringing the boat which I mentioned up the river there was

3 men poling the boat. My father was along and did only a little of the poling. I was not big enough to do any of it. There were 5 of us on the boat. We carried no cargo of any kind. We didn't get along as fast on the trip as we thought we would. We thought we could make it in a day, and it took us a day and a half.

I remember a point in the river called Big Falls, which is about 3 miles this side of Eggleston. We had a right smart trouble getting the boat over Big Falls. A sluice of water runs down between the rocks. It is pretty steep, and it was awfully hard to push the boat up. I do not remember how long it took to get he boat over Big Falls.

I know the place in the river called Dry Branch. The river is pretty rough there. It is not very deep there. There are ledges of rock running across there that come up above the water. Sometimes you can walk over on those rocks. You can get a boat hrough that point by picking around between the rocks, but you could not get up there with a load. You have to pick your way hrough there. I believe the river is counted a mile wide there. I hink those shoals run for at least a quarter of a mile or maybe more.

I don't believe I remember any other rough places between Eggleston and here besides those shoals and Big Falls. I
564 don't believe I remember McCoy Falls. I remember a falls at Parrot Mine. Them was the falls I was speaking of. That was below Big Falls, the other falls, and ledge of rock I spoke of.

It took us a day and a half to bring that empty boat from Spruce Run to New River Depot.

The witness on Redirect Examination testified as follows:

There were 3 men by the name of Scott in this boat which I was speaking of besides my father and myself. At this place where I said you could walk across on the rocks it was possible o do so in low water in the fall of the year and mostly in the winter.

Q. Was it high or low water?

A. Low water.

You can cross there in a boat at high water but you can't cross on those rocks by foot in high water.

They hauled coal across there opposite the Parrot Mines in a boat. These mines are down below Belspring about 2 miles. There is another mine across the river at which they haul coal across there near the place where I said you can walk across someimes in the year.

Along about September and October you could cross there in a boat, and along in the spring and at any time in high water.

They brought the boat up the river to Richard Gillam in the fall of the year. The water was pretty high, not very. You know you can go in between those ledges of rock and pick away where there is a sluice of water large enough to run it through, it will go through all right. I waded the river right above Big Falls one time in the fall of the year. We have both low and high water in the fall.

Q. You could not wade it many months in the year, could you?

A. Not so many, no, sir.

Mr. ABBOT. We object to the leading questions.

The high water period in the river is usually mostly in the spring.

WILLIAM M. DALTON

Plaintiff introduced in evidence a physician's certificate marked Government Exhibit 23, concerning the inability of W. M. 565 Dalton to appear to testify in person and introduced the deposition of W. M. Dalton in evidence.

As recorded in the above mentioned deposition, the witness testified on Direct Examination as follows:

I live in Radford and have been here off and on for 50 years. I was born up here close to Carroll and Wythe County, close to the old copper mines. I don't know exactly how far up the river that is from here. The house I was born in was near New River, about a half a mile from it, I think. I have seen New River from the house off and on all the time. I am 88 years old, turning into 89. I lived at Have Howe's place on a farm a great deal and at Dunkert's Bottom, they all join. I was married on that place. I lived in Radford about 50 years.

I have saw work done on the New River channel by the Federal Government several times, I don't remember when they said they was going to clean it out for boats. I saw them here and up at Ingle's Ferry and along there and also further up the river close to Cherry Branch. Cherry Branch empties into New River up above Have Howe's place. It runs into New River on the right hand side coming down stream. I know a place called Cole's Ferry which is up where the Government workers camped when the freshet came, and they went away and never worked any more. It is located at the islands above the ferry, that is, Towe's Ferry.

Q. State whether or not you have ever seen any keel bottom boats on New River?

By Mr. ABBOT. We object to the question as leading.

A. Yes; I have saw them lots of times.

I have seen them up as far as Cole's Ferry but no farther. The keel bottom boats I saw were about 50 or 60 feet long and had a round egg shaped bottom. Men stood on each side with poles and shoved them up the river. They come down the river the same way only they had a steering behind where they could turn the boat. These boats carried grain of all kinds nearly and sometimes lumber and they also rafted logs down the river. They carried only lumber and grain, wheat, corn and oats.

I know they carried pig iron in wagons across the river on a ferry boat and hauled it to Dublin in wagons. The ferry was up here across from where the old furnace used to be. The
566 furnace was above Cole's Ferry not far from Linkous Ferry.
The corn, oats and wheat which I saw carried in these boats went to New River Mill across the river from Radford where the railroad bridge is. I know a Mr. Hodge who resided across the river from the old mill. He had his work done over on that flat where those houses are on the other side of the river from Radford. He did not own a boat but he built a little steam boat and had it running here a while, here on New River.

Q. Have you ever seen any logs, rafts of logs floating down the river?

By Mr. Abbot. We object to that as leading.

~~A. Yes.~~

The rafts run there a long time at different times. I couldn't tell you the number but there were lots of them. They went down beyond Dunkert's Bottom down this way. Most of them were unloaded down here at the Hodge place, at the bridge just across the river from Radford.

Q. Have you ever seen any pleasure boats on the river?

A. Never seen none but that little steamboat I was telling you about.

Q. That was a pleasure boat?

A. Yes, they run it from the mill here up here to the ferry up here and backwards is as far as it ever run.

Q. Then they sold it and took it off the river?

A. Yes, I think it went to Hinton, I think that's where they said. I don't know where it went to.

By Mr. Abbot. We object to the answer as hearsay and move it be stricken.

I remember Linkous' Ferry, Carter's Ferry, Jackson's Ferry, and Lyon's Ferry. Lyon's Ferry is down here. It is not the same as Ingle's Ferry. It is right here in Radford. I remember that the river became muddy many times. This was caused by the washing of ore above here up in Wythe County on New River.

The witness on Cross Examination testified as follows:

I saw several bateaux with grain in them. I couldn't tell you just now how many and then men would have them and run them. I think there were only three different ones.

567 For quite some time they rafted logs down at different times. Just now and then you would see them, you know. Most of them were rafted in warm weather. The rafting was best when there was a little tide.

I can't remember the year that the steamboat was built by Mr. Hodge.. It was not more than 10 or 15 feet long. It was used for pleasure boating from here up to the ferry and back down to New River. It was not used for a very long time.

The witness testified on Redirect Examination as follows:

The steamboat would carry several people. I don't know how many.

I saw keel bottom boats going up and down the river now and then. I was not watching the river all the time. I would see them now and then. I was working on the farm.

Q. So you would be back on the farm and just from time to time you would take notice of the river, is that right?

A. Yes, see them going down the river.

Q. And you would see them go up the river too?

A. Yes, see them go back.

The witness on Recross Examination testified as follows:

Quite a portion of the time I was working in the bottoms along the river so that I was close to the river and saw the boats pass. Most everything on the bottom land of the farm would be in sight of the river. Part of the river was in sight of the upland part of the farm but not all of it.

The witness on Redirect Examination testified as follows:

When I was ploughing I was not looking at the river. When I was working along on the river I would see the boats coming and watch them pass.

The witness on Recross Examination testified as follows:

It was a good deal like looking at a train or automobile when it passes.

568 HARVEY C. JOHNSON, by deposition, on Direct Examination testified as follows:

I was born in Adams County, Ohio, and came to the State of West Virginia in 1903. I came to Hinton. I am in the lumber business at Hinton with a firm. The firm is being organized. I don't know what the name or style of the firm is going to be. The name we are using right now is John Raine Lumber Company.

I have been engaged in the lumber business in the vicinity of Hinton since 1902 with the exception of possibly from January, 1, 1933, to October 1, 1935, when I was practically out of the business. Most of the time I have been engaged with companies in the lumber business. From 1902 to 1914 I was with the Evans and Retting Lumber Company, Grand Rapids, Michigan. From 1915 to 1926 I was with the Arrow Lumber Company, Parkersburg, West Virginia. From 1926 to 1933 I was in business for myself.

I have never been associated with Burks Brothers as a firm. I bought their products ever since they have been in West Virginia. Their office is located at Hinton but they have operations in various sections of the county. Their business is the manufacturing of lumber. They take it from the stump and manufacture it and deliver it to the railroad.

My first business transaction with them was with Z. V. and W. L. Burks about 1911. That was the style of the firm at that time. I bought quite a quantity of stuff. I couldn't recall just the amount. It come from Warford on New River and was delivered to Hinton. Warford is about 12 miles up New River from Hinton. Most of the lumber I bought was railroad stock, switches, ties, and car stock. It was brought down the river partly by bateaux and partly by raft. I was delivered at Hinton at what we call River Landing which is just under the hill at what used to be Avis. It is about the central part of the town now.

569 My duties with Burks Brothers were buying their stock and selling it. When I was in the market for stuff they had, I issued a purchase order at so much per 1,000 feet. That would be delivered on board cars at Hinton, West Virginia, their loading point. The lumber came from what is called the Tom's Run section. Tom's Run is a stream that empties in New River at Warford or near Warford. Burks Brothers had sawmills in that section of Tom's Run. They would have lumber sawed there. They owned their own mills and teams and logging facilities. The lumber which arrived at Hinton was shipped to various destinations. I bought the lumber f. o. b. the cars Hinton. After it was placed on board the cars their responsibility ceased and it became our property.

We shipped this lumber to various points. The large portion of the stock I bought from Z. V. and W. L. Burks went to the Pere Marquette Railroad Company at Saginaw, Michigan. Some went to other parts of the Pere Marquette Railroad Company at Traverse, Michigan, St. Thomas, Ontario, Canada, and Grand Rapids, Michigan. I would say that I shipped in the neighborhood of one-half million feet for this one concern to points outside of the state.

I bought lumber from various other persons also. One was W. L. Neeley, whose address at that time was Pipestem, West

Virginia. Pipestem is not right on the river. It is possibly 6 or 8 miles from the river on top of the mountain between here and Princeton. His lumber came to the river and went down. Both Burks Brothers and Neeley loaded from the same point, Warford.

Another company from which I bought lumber was Butler & Williams. They got their mail at Lick Creek at that time. That is a post office in the vicinity of Warford. Others were W. O. Young, A. T. Farley, and Shumate & Farley, all of whom got their mail at Warford at that time, and J. W. Wyrick, who got his mail at Lorona at that time. There also was J. G. Anderson. I believe his post office was Tophet.

All this lumber was boated and rafted down to Hinton. I would estimate that the total amount of lumber I shipped outside of the state was from two to three million feet, as a low estimate.

I do not have any of the original books of entry. I destroyed
570 all my records after they became obsolete. I did not think there would be any further use for them. I done that I would say three years ago. I have testified concerning these shipments from my own knowledge.

Q. Do you know who boated any of this lumber down the river?

A. The larger part of what I bought was handled by Ed Lilly.

Q. That is the Lilly Lumber Company?

A. No; he owned a boat on the river. He boated a large part of it. There was a man by the name of Lane that boated a good bit of lumber, John Lane, I believe; I am almost certain it was John Lane who boated part of it, but Ed Lilly boated the principal part of it.

I paid various prices for this lumber because there were various grades of it. The prices possibly ran from ten dollars a thousand to fifty and seventy-five dollars a thousand, but it would be rather hard to say definitely. I handled all kinds of lumber, principally oak, poplar, chestnut, white pine, hemlock, and basswood. I live at Hinton now.

W. C. Anderson, by deposition, on Direct Examination testified as follows:

My post-office address is Hinton. I have it mailed J. B. Route—rural route. I will be 65 in June. I was born in Giles County, Virginia. I moved to True, West Virginia, in 1870.

I moved to True, West Virginia, on a bateau. We moved my father's household furnishings on this bateau and the whole family, all what there was, came along on the boat. We came from what was called Eggleston Springs in Virginia. I think it is called New River now. I ain't certain—I ain't been there since. I could not say how long it took for us to move. We left Eggleston Springs sometime in the night and got to True sometime in the next evening. That was in the spring of 1879. The boatmen were a couple of colored fellows. I don't remember their names. My older brother and my younger brother were both on the boat and also my mother and father and one sister.

Q. In coming from Eggleston Springs, down to True, did you have any difficulty; that is, did you have to move any of
571 the furnishings or did any of the people have to get off of the boat to lighten it in order to get through places in the river that had shoals or rough water?

A. Not that I recall.

After my father moved to True he followed farming, but he worked the river that following summer. That would be in 1879. His work on the river was in cleaning out a channel for boats. We moved before he worked on the channel. As far as I know there was no artificial channel at that time. I know they cleaned the channel out. I saw men working there.

I saw a steamboat on the river in 1879 or 1880 when I was 8 years old, that June. When I saw this boat for the first time I was at the mouth of the Bluestone at what they call True now. I was in school and the teacher let a bunch of us little fellows go out and see the steamboat. We had not seen one before and it was a right smart curiosity to us. We heard the whistle before we left the school room.

After we moved to West Virginia I saw plenty of bateaux on the river. They hauled freight of different kinds. I saw the bateaux many times. They were carrying things to Hinton. There was a regular dock up here at Hinton where they unloaded at. I rode on a bateau when I came from Virginia and I have been on them many times. I don't remember riding on them when they were loaded with lumber, but I have seen them loading and unloading. I saw them loading a boat at True and saw them unloading boats at the dock at Avis. I could not say how many times I have ridden on those boats, not a big amount of times. I never worked on a boat.

I guess that it has been from 15 to 25 years since I've seen a bateau, I saw bateaux on the river up to from 15 to 25 years ago. I have lived here all the time, not on the river—away from the river, but I would go to and from the river every little bit.

I would not have any idea of the size of the bateau which was used to carry our household furnishings and our family from Eggleston Springs to True, West Virginia. My father was just renting the farm at True, West Virginia. I would say he raised corn, oats, potatoes and vegetables of different kinds. I don't remember that he marketed his products. Wasn't much
572 market here then. He did not raise any tobacco on that place, but they did raise tobacco elsewhere. He never

marketed any tobacco on the river. He hauled it on his wagon to the depot here and shipped it to Lynchburg. The river I was speaking about is New River.

The witness on Cross-Examination testified as follows:

I was born in 1871. I was 8 years old the summer following the time when we made this trip down the river. We come in the spring. I don't remember the month, but it was before the time to put out crops. My father rented a farm after we came here. We generally had a season here to put out corn and oats. We usually plant corn from the 15th of May to the 1st of June. A good time to plant oats here is from the 15th of April to the 1st of May. You generally sow oats over on the river a little earlier. We were on the river then on Bluestone about a mile from True. I don't remember that we planted oats that year. I was just a little fellow, and I don't remember. I know we planted corn and other crops.

Q. Do you recall whether there was a rise in the river when you came down?

A. No; I don't remember.

Q. Do you remember the falls of the Narrows?

A. No.

Q. Do you remember Shumate Falls?

A. No. I don't remember anything we dreaded on coming except Bull Falls. My mother was kinder scary of the boat but when we come to it, it was over in just a minute or two—less than a minute maybe.

The following spring I saw my father working on the channel in the river between True and Bull Falls below Bull Falls. He might have worked above there, but I never saw him that I remember.

We left Giles, that is Eggleston Springs, at night. I don't know how far it is from Eggleston Springs to True. I have never had occasion to investigate that. I have never been back to Eggleston Springs since I left, although I have been in that neighborhood.

573 C. H. **Wauhop**, by deposition, on Direct Examination testified as follows:

I live in Bellepoint, which is incorporated in the city of Hinton. I have lived there for about 12 years. I am in the trucking business. I was born in Raleigh County, just across the line from Hinton. I am over 66 years old now.

I have lived on New River, off and on, for the last 30 or 40 years. In all that time I have done business for someone on the river, partly in the lumber business, and partly in the staves business. In the stave business I worked for A. Knabb & Company, barrel manufacturers, of Pittsburgh, Pennsylvania. I suppose my position with that company was that of manager. I done all the business, bought timber and staves. We worked from 1,500 to 2,000 men. The company had 7 mills in operation that I knew of, and more, I reckon, at other places. We had 5 mills on New River. They were located in Pipestem, Mercer Salt Works, Island Creek, and different places along up the river. We cut the trees ourselves. They were in the stave business, and paid a man to go over and cut the soft wood. We didn't handle nothing but all kinds of oak.

Q. Did you handle any staves?

A. Why, Good Lord, man, we handled them by the millions. It took forty million staves a year to handle our plant.

Q. Where was it?

A. Well, there was one at Crug, Maryland, and one at Marcus Hook, Pennsylvania.

Q. When you cut your staves, what did you do with them?

A. We boated them down the river, and some hauled in a wagon, whichever was the handiest way to get them to the railroad.

Q. Did you take more down by the roads than you did by the river?

A. No, I don't think so, but I never kept no account of that. We took more down by the river. You see we had a wharf rented down here, and we had six bateaux that come down the river.

Q. Six that you owned yourself?

574 A. Yes, sir. Well, A. Knabb & Company owned them, I was just Manager for them, you know. I didn't own no bateau myself.

Q. How big a wharf was that you had?

A. Oh, I couldn't tell you but it would hold a couple carloads of staves.

The staves were sawed for barrels with a round saw. The staves were kept for some time to dry and then they were shipped. We saved freight on them. We let the staves stand to dry for from 90 to 100 days and sometimes for a whole year. If we did not need them we would let them stand for a long time.

There was a bad road to Glen Lyn, and it was a long ways, and so we just stored our staves there. We boated the staves from about 12 miles or maybe just about 10 miles below Glen Lyn. I could not tell you the place we boated from. We only made 5,000 up there and the road was so bad that we had to take them in wagons, if we taken them at all, and so we did not buy any more timber in that section. Those that we got we put on boats and boated them down the river.

I would estimate that the staves which we boated ran from 18,000 to 20,000 staves to the carload. That is as much as you could get in a carload. I don't remember the number of carloads that we shipped per year, but I kept at it regularly until the war broke out, and then I sent all those papers to Mr. Knabb at Marcus Hook. I couldn't tell you how many cars we shipped. We bought a lot of staves besides ours too. We bought them all over the country outside of this district.

Mr. Burks' boys made a lot of staves for us and I taken these staves up in the yard and they were shipped out. These boys got their money—the rest of their money—from Marcus Hook, but we advanced them one-half price when the staves were put on the yard. The yard was wherever they were cut, that is, the place we rented and stacked staves. We might put a mill in and stack the staves there.

Now, up here at Crump's Bottom we had land rented there, and Mr. Dickinson and several of the stave men hauled staves there. We bought the timber from Levi P. Morton up here at Red Sulphur Springs and we cut that boundary and hauled down to the mouth of Indian Creek.

Knabb and Company was the biggest operator along the
575 river in the shipping, cutting and manufacturing of staves.
It took from 1,500 to 2,000 men to handle that business. Knabb and Company did not cut any other kind of timber. When we paid the men the other people got the lumber business and we put the lumber in and sold it locally.

Q. Do you mean by that, that other than the staves, you sold it locally?

A. Yes, sir. Now, like the Lilly Lumber Company, they had a wharf up here, and we hauled and boated lumber down here to him, and stacked it up here in Avis at Mr. Joe Hinton's place.

Q. Did you see this other lumber brought down the river that you sold to them?

A. Oh, Lord, yes; time and again.

Q. How was it gotten down the river?

A. Well, it come down in the boat, but we hauled it down to the river in a wagon.

Q. Hauled it to the river upstream, and then you put it on boats?

A. Yes, sir; but we had to take it just the same as staves.

Q. And then it was brought down to your wharf; is that true?

A. Yes, sir.

Q. And it was sold to others here?

A. Yes, sir; the lumber part of it was, but not the staves.

Q. The staves, you handled and shipped all the way through yourselves?

A. Yes, sir; to Knabb & Company.

Q. What other operators were there on the river at that time cutting staves, if you know?

A. Oh, there was several fellows there cutting staves; I don't know who all.

Q. Did you ever know a man by the name of Miller, or Miller Brothers?

A. No; I don't know of any by that name that made staves. They made lumber.

Q. And you don't know whether the Miller Brothers made staves or not?

576 A. No, sir; I don't know.

Q. Mr. Wauhop, why did you cease cutting lumber in this country? But before that, when did you cease cutting lumber in this country?

A. Thirty years ago—cutting staves. We were not in the lumber business—just staves.

Q. Then I should say when did you cease cutting staves?

A. Well, we quit here and then we went on—we quit in this country—that was about when we quit here was about the year 1930.

Q. Oh, 1930. I thought you said ten years ago.

A. It has been thirty years.

Q. Now, let's get this clear. I understood you to say that the stave business, so far as you were concerned, ceased thirty years ago?

A. Yes, sir; that is when we quit here. Because we bought all the timber out, and we went and bought other places.

Q. Do you know whether there was any other stave business going on after you quit here?

A. Very few, because all of these people sold their staves to A. Knabb & Company, and then the Standard Oil Company bought some and sent them to Jersey City.

The witness, on Cross-Examination, testified as follows:

I don't think I ever heard of a company called the Standard Stave Company which operated in the stave business. The Standard Oil Company is all I ever heard it called. I knew the man who was a local representative for that company, but I can't think of his name. He was kind of an old man, as old as I am. I remember now that his name was Arter. It was about 30 years ago that I operated in the stave business on this river.

Q. Well, you just stopped about thirty years ago. When did you start?

A. Well, it has been about nineteen, I guess, somewhere along there—1920, some place like that. We worked for four years and you can figure it back. When the war broke out we had to quit.

I don't know where the Sulphur Springs branch is at. It is on Mr. E. E. French's place that we cut the yard of staves.

577 The staves were boated down the river. The road was so bad to Glen Lyn that we loaded our staves on the bateau and brought them down here cheaper than we could take them the other way. Glen Lyn was much closer. The reason we cut no more up there was the roads were too bad; it was too far to haul them and too far to boat them.

These six bateaux we operated were owned by the A. Knabb & Company. We had regular crews and some of them rented the boats and they hauled them. We had only five boats, we had six and then sold one to a fellow during the year. During the time that we were engaged in this operation, the boat landing was rough here. I could not say how many boat landings there were here at Hinton or Avis, as it is called. They have ferries across the river, or did, and there were different places to land.

Q. Well, were there not certain specified unloading places over here at Avis, where the bateaux unloaded, as you have described?

A. But that is right across there from the lumber people; that is not there; you know the Lilly Lumber Company was there and they sold out to these other people, and they were right there at that place where these people is.

Q. Is that what they call the old steamboat landing, Mr. Wauhop?

A. That's the very place.

I could not tell you whether any of the boats using the river at that time unloaded at any other place than the steamboat landing. There was no other docks, wharves, or structures put up along the river down there only what we put up by Knabb & Company. Lilly Lumber Company docked at this particular loading place—the one Mr. Knabb had—because they used our lumber part of the time when we had any to ship.

There were from 18,000 to 20,000 staves in a carload. A. Knabb and Company mills took 40,000,000 staves in a year and used them at the barrel factory, you see. That is where they was used. They used this many staves to make barrels, but we did not make half of them. They came from all over the country, here and elsewhere.

Q. At the time you were buying staves, here, were other operations going on?

578 A. Yes, sir; I should say so. Why, Tom Beckwith at Princton, and Farley, and all of them—they all sold to A. Knabb & Company.

Q. How many men were employed by the A. Knabb Company in this stave operation?

A. Well, we generally used from sixteen hundred to two thousand men. You see there was all these seven mills to operate, you see.

Q. The men that you employed, were they men living here in Hinton?

A. No, sir; from out here in the country, and just anywhere we could pick them up.

Q. You employed choppers, splitters, planers and everything else in that business, did you?

A. Yes, sir; that's just what we done. We hired a lot of men in them days.

The witness on Redirect Examination testified as follows:

I turned in my books to the company at the time of the war. I was manufacturing staves up to that time down in Kentucky then. I ceased here 30 years ago. Stopped work here and sent out stuff to the places.

It was cheaper to send the staves downstream because the roads were so bad we could not get them up to Glen Lyn. There was only a horse path up there and we couldn't do it. I couldn't tell you how heavy the loads were which the men put on the boats up there. I didn't stay with the boats.

We didn't carry any staves to Glen Lyn by boat. We boated them downstream. The roads were too bad up there to take them up that way and they were too bad all the way down the river to Buck Smith at Bull Falls.

Q. And they were so bad that you couldn't haul staves successfully?

A. That is right.

By Mr. Jackson. I object to these leading questions.

We had six bateaux and we let another fellow have one, leaving five. In addition to the five that we owned we rented bateaux for hauling staves. The fellows who already had bateaux furnished their own and boated the staves down the river themselves.

The capacity of the A. Knabb & Company plant back east was 40,000,000 staves. We also made staves at our mills
579 in Kentucky. We had seven mills here in this vicinity, but they were not here on the river for the whole time, just for about five years. We only had the seven mills here for about three years. We cut the stuff and shipped it down by boat and maybe there were five mills on the river.

The capacity of one of these mills per day was 8,000 staves, if we had good luck. I could not tell you how many staves a year we loaded during the three-year period when we ran the five mills. It depended on the weather, and you couldn't tell about breakdown. They might get over the bank, and the machinery might break down and all, and that would be very hard to say. I have no recollecton as to the actual running days. When there was no breakdown or anything we worked right on with the mill.

(It is stipulated that the witness, C. H. Wauhop, desires to change his testimony as to the location of the sawmill described by him, as being at the farm of E. E. French, to show that the mill he had in mind was below that farm and up on Island Creek.)

Andrew G. Flanagan, by deposition, on Direct Examination testified as follows:

I am 83 years old. I was born in Fayette County, which is 40 miles west of here on the Chesapeake & Ohio. I lived in and around my birthplace for 22 years, then I went to Hinton, and have lived in that vicinity ever since, a little over 60 years. Next April 21 I will have been here 62 years. My birthplace in Fayette County is considered a mile and quarter from New River by county road, but it is only ¾ of a mile from the river in a line directly across the mountain. I was born a little less than ¾ of a mile from New River, directly across the mountain. Hinton was the nearest town to my birthplace.

Since I moved to Hinton, I have clerked in a store, worked for the Chesapeake & Ohio, around seven years as clerk and agent, been Deputy Sheriff for a while, and also Mayor of the town, and Chief of Police of the town for a while, and done various other things. I commenced clerking in the depot here at Hinton
580 on April 21, 1875, and worked there until sometime in
1883. I was clerk a while, and then I was agent a while. There were always two people in the depot, a clerk and an agent. When I was clerk, a man by the name of Gunther was agent. When I was agent, I had two or three clerks. One of them was W. V. Calloway, and another was W. H. Pemberton. I guess I was clerk about four years, and agent about three or three and a half years.

As clerk my duties was to check the yard office and the yard master. I worked at both that and also handled freight and was clerk. After the first year I received and shipped the freight; that is, I checked the freight to be shipped out on the Chesapeake and Ohio Railroad, which was the only railroad here.

Q. In that capacity were you able to see with your own eyes what freight came in, and what was shown by the bills of lading and what came in and where it came from and where it went?

A. Yes, sir; every bit of it.

Q. Was there any movement of commerce, goods, or merchandise there of any sort on boats on New River from 1875 to 1883?

A. Yes, sir; there was wheat and tobacco and some produce that came down the river.

Q. Wheat, tobacco, and some produce?

A. Yes; that came down the river and some goods were shipped back up by bateaux.

Q. How were the goods brought down the river?

A. In bateaux.

Q. Do you recall whether or not the traffic was general at that time, whether or not more than one bateau was moving up and down the river at that time?

A. I don't know how many there were.

Q. Would you say more than one?

A. I think there were, but I couldn't say how many.

Q. Can you recall the names of shippers who brought their goods in on bateaux?

A. I don't know that I could just now.

581 No hay or corn was shipped, but wheat and tobacco were. These products came from the country up New River. I had no knowledge of the shipping points up New River. I don't know where the products came from. I just know it came down the river. I have seen bateaux coming down the river when I was working at the depot and I saw them both before and after that. They said they brought it down the river. I didn't go up there to see if they did. There was nothing on the shipment to show that it came down the river. The only marks on the shipments showed where they were from and where they were going. The bateaux were unloaded up here just under the bluff, over here where that switch going down at the lower end of Avis is. That was the old wharf for the bateaux that came down the river. I have been there during those years.

Q. Did you ever see bateaux unloading there?

A. I have never seen one loading there. I was busy working.

Q. Did you ever see them loading there?

A. I have seen them—I don't know whether they were loading or unloading.

All this tobacco and wheat that was brought down and shipped passed through our freight office and was reloaded on the Chesapeake and Ohio. It was mostly tobacco and wheat, between 1875 and 1883. They brought the goods in and checked them and I gave the parties receipts for them. I did not do the billing out. I would put it on the market books so the billing clerks could make bills out for it. I just made a note on the book of the article shipped, so many pounds of tobacco and so many bags of wheat, who they were from and who they were going to. The shipments were not regular, they were not daily or anything like that. I have run as much as a carload of wheat and a carload of tobacco in one day, but that was not regular.

Q. Do you know whether any of this tobacco or wheat was being hauled from up on New River down to your station at that time?

A. Might have been some, but not very much.

Q. You have no recollection of it?

582 A. Might have been some from short distances.

Q. As far as you know all of that came down on boats?

A. Most of it. Might have been some locally hauled from not so far.

It was all transferred from bateaux to wagons and brought to the depot. The wagons would go to the wharf and get the goods. I paid no attention to who the fellows were who drove the wagons. There were various ones—any teamster that might come along.

I think the greater part of the tobacco went to Richmond and the produce went to Baltimore, I think. It is my recollection that they went there. I am almost sure that the tobacco went to Richmond. I think the wheat went to Richmond or went to Baltimore or Philadelphia. I am not positive that any went to points other than Richmond. It is too long back for me to remember.

Q. During all this time from 1875 to 1883, or about 1883, that you testify you were Clerk or Agent, were there bateaux on the river carrying goods during all of that period, boats going up and down the river with produce on them?

A. They carried this tobacco and stuff and wheat that I was telling you about and some goods went back up.

Q. During all that period were boats on the river? That is what I mean.

A. Yes; they couldn't go nowhere else. There was bateaux.

Q. You knew they couldn't go anywhere else?

A. Sure.

Q. I just didn't make myself clear. I will try and make myself clear to you. What were the products shipped back up the river?

A. Merchandise and stuff they bought here was hauled to merchants up the river.

Q. Did any come through the depot, to the station, and was then sent to the wharf and then sent up there?

A. Yes.

Q. What kind, what type of commodity would that be?

583 A. Such as any country merchant would have. Dry goods, clothing, and such stuff as that.

Q. What were some of the points up the river where the country merchants bought goods?

A. I paid no attention. They came here and had an order to get the goods and I delivered them to them.

I would turn the goods over to them here and the wagons would take them away. They would give me a receipt and pay the bills. All this merchandise was shipped in here from points outside of Hinton. The goods were shipped from Richmond or Lynchburg or other points, were shipped in on the Chesapeake & Ohio.

Q. I am sorry. From what points would these goods come?

A. I don't know where they bought them from—some from Richmond. I made no record of them.

Q. Can you recall now?

A. No; I can't. I don't want to. I don't know anything about it. I can't remember who these people bought from or where.

Q. I have mentioned Lynchburg and Richmond. Did some of the shipments come from those towns?

A. I rather expect some came from Richmond. I couldn't say positive.

I knew some of the persons who ran these bateaux. There was one named Alf Merchant who did more than anybody else at that time. I think possibly some of the Medleys worked with them. Mostly colored fellows worked on the boats. No white people that I know of. I never rode on any of these bateaux. They was perhaps 30 feet long maybe and something like 8 feet wide with rounded sides and round bottoms. After I ceased as agent at this depot I was Deputy Sheriff here and I had various other occupations.

The boats continued to run up and down the river very little after 1883. I think they ran until the Norfolk and Western was completed and that after that they practically quit. I mean until the Norfolk and Western was completed to Radford or somewhere up in there. The traffic up there almost stopped, although
584 there might have been some. I was not connected with the depot and did not know much about it. I didn't pay much attention to it. There might have been some traffic by boat, I am not sure.

The Government cleaned out the channel up New River about 1877 or 1878, I think. I think some boats were run on the river prior to the construction of this channel. I could not say whether or not more boats were used on the river after the channel was constructed, but I imagine there were. I did not see the men working on the river cutting these channels. I seen the channel after they worked on it.

I remember a steamboat being operated on the river along in the early 80's. Its name was the "Cecelia." A man named Miller paid $100 to get it named the "Cecelia" after his wife. The steamboat made a trip or two up the river and back. I don't think it carried anything but passengers. I don't know under what power it was driven. I saw it but I don't think I was ever on board. It was not propelled by oars or poles, but was run by steam as far as that is concerned.

The witness testified on cross-examination as follows:

Q. You don't mean to leave the impression that everything that was shipped from Hinton while you were clerk or station agent came down New River?

A. Oh Lord; no.

Q. Nor that everything that was received here was received for people up New River?

A. No, sir.

Q. How far was the boat landing at Avis where these bateaux used to load and unload from the Chesapeake & Ohio station the freight station, when you were agent?

A. The direct distance is not more than five or six hundred yards, I reckon, but the way they had to come from there it was fully a half mile.

Q. How far was it by river?

A. That would be by the river from the depot up.

Q. Five or six hundred yards?

585 A. Yes.

Q. How close was the freight depot to the river?

A. Right on the railroad track down here right on the river. It was above the track. The track is between the depot and the river.

The witness on redirect examination testified as follows:

There was just a little eddy where the boats stopped there at the wharf at Avis where they unloaded these bateaux. There was no platform or no apron. The boats could not have gone on around to the freight yard because if they did they would get into the shoals and they could not get up and down in the shoals which are in the river between Avis wharf and the depot.

586 T. G. Skaggs by deposition, testified on Direct Examination as follows:

Q. Give the stenographer your name?

A. T. G. Skaggs.

Q. Will you please state your name for the record?

A. Give which?

Q. Give your name, please—your name?

A. My name?

Q. Yes, sir.

A. Skaggs, T. G. Skaggs, is my name, I thought you all knew that.

Q. How old are you, Mr. Skaggs? Watch my lips and read them.

A. If I live until the 23rd day of this coming August, I will be eighty-seven years old.

Q. Where do you live now?

A. I live right up here on James Street with my children.

Q. In Hinton?

A. Yes, sir.

Q. How long have you lived in Summers County?

A. I was born in Summers County, and I have spent my life in it, but it was Monroe County when I was born, but I have spent every day of my life in Summers County.

Q. When did you live, if at all, on the New River?

A. Sir?

Q. When did you live on the New River?

A. I was raised on about half of New River.

Q. Where?

A. Just beyond the mouth of Indian Creek, up there. I have been right on New River all of my life, in about a mile and a half or two or three miles right up New River.

Q. Are you a farmer?

A. I have spent my life farming.

Q. And where did you farm?

A. At Indian Creek.

Q. At Indian Creek?

587 A. Yes, sir; partly, but I lived over here on Wolf Creek for twenty-five years, and then I moved back and spent my days there.

Q. Where?

A. At the mouth of Indian Creek on New River—right where I was raised in about a mile and a half of New River.

Q. Did you ever live with your brother on New River?

A. My brother?

Q. Yes, sir; or any other person of your family?

A. I lived up here on Captain Fowler's farm up here on New River.

Q. Where is that located?

A. Right at the mouth of Indian Creek; that brick house—big red brick house was the old Fowler home.

Q. Did you ever see any bateaux on the river before the Government did any work on the channel?

A. Oh, Lord; yes.

Mr. Jackson. We object to that question.

Mr. Thompson. Yes; I withdraw the question.

Q. Did you ever see any bateaux on the river?

A. Why, yes.

Q. When did you first see bateaux on the river?

A. Well, I just can't tell you the first time I ever saw one on New River, or how long it has been, but they were on there for many years.

Q. Did you ever see them on the river when you were a boy?

A. No; there was no bateaux—well, I was in my teens; you might call me a boy.

Q. When did you first see bateaux on the river?

A. Well, I just can't give you the date.

Q. Can you not give us the date, approximately?

A. Well, they was on New River from the time I was seventeen years old until I was up in thirty or forty.. While I lived right there on the river there were plenty of bateaux on the river.

Q. Did you ever see the Government doing any work on the river, clearing the channel?

A. Yes, sir.

Q. Were there any bateaux on the river before the Government did that work?

A. Oh, yes.

588 Q. Were there few or many?

A. Well, I don't know just how many, but one time my father brought a lot of corn across the river from where we lived from the old man Crump over there, an old Irishman lived there by the name of Quinn, and he brought the bateau and put the corn on it.

Q. How old were you then?

A. I was sixteen or seventeen years old, and that has been a long time ago for I will be eighty-seven years old in August.

On our farm up on New River we raised tobacco, wheat, corn, all kinds of farm products, sheep, horses, cattle, and such as that.

There were no steamboats on New River before the one Captain Fowler put on there. We was just talking about it last night. The name has slipped my mind, you know, but I will tell you about the boat. I believe the name of it was the Cecelia. I first saw that boat one day when I was at the dock and they were making the boat. They built it up here on the bank of the river below the ferry in Avis. I don't know who the man was who built the boat, but he came here and built it. I never got acquainted with them. When they were building it I asked them how long it was and they said it was 125 feet long.

I could see this steamboat running on the river when I lived on Captain Fowler's farm. I could see 4 or 5 miles along New River. The Fowler farm was right at the mouth of Indian Creek. He was a man that owned a great deal of land. They built that boat in the fall of 1874, if I am not mistaken. I told you in the other room what made me remember it. In the fall of the year in December 1873, my second child was born which was before the February I moved to that farm. They built it along in that fall.

I don't remember how long that boat ran on New River, but it did for a number of years. I saw it running during all of the four years I lived on that farm. I never paid any attention to how often that boat made trips up the river. They would go up and down the river and get a load and come back. I have seen this boat loaded with staves, lumber, and the like of that.

Q. Did you ever see any tobacco on that boat?

A. Well, they hauled tobacco, but I don't just know that I saw it on there, but I saw them haul it to the place where they put it on, and they told me they hauled it there to be loaded on the boat.

Mr. JACKSON. Motion to strike the answer.

589 Q. You never saw any tobacco on the boat, did you?

A. I wouldn't be positive about that, but I am satisfied there was because they hauled it to the place where the boat stopped and unloaded it there in an old Blacksmith shop.

Q. Where was this blacksmith shop that you speak of?

A. It is on the bank of the river up there about a mile below the mouth of Indian Creek, and that is where the boat stopped.

Q. Whose farm was it you said you were on at Indian Creek?

A. Elbert Fowler farm.

Q. Did he raise tobacco?

A. Oh, yes. Yes, sir. You see he lived on a large farm there at one time, and they were slave owners and he owned a lot of land.

Q. What did he do with his tobacco, if you know?

A. Well—

A. (Continuing.) Well, I don't know what he done with it, but they shipped it to Danville, Lynchburg, and other places.

Q. Do you know that of your own knowledge?

A. No, sir.

Q. How did he get it from his farm, what did he do with it?

A. It was shipped away.

Q. Did he move it away from his farm?

A. Well, his tenants would ship the tobacco, themselves, or he would do it for them, and his farm lay right along the river.

Q. How would they ship it, if you know?

A. Well, they would ship it by steamboat, bateau, or haul it to Hinton on the wagons—one of the three.

Q. Did they do all three?

A. Not very much. They didn't run wagons very much to Hinton when they could get the bateau or steamboat.

Q. Did you ever ride on the boat?

A. No, sir; and I am at an age that I never want to be on it. I didn't want, to, I was afraid they would get me in there and hang up somewhere and I couldn't get out. No; I never rode on it, but I have been—one time I was on the dock when they made it.

590 Q. And you say it ran for four years?

By Mr. **Jackson**. Objected to as leading.

A. Yes, sir. I heard it after that, but I couldn't see it when I moved away from the river on the mountain, but I could hear it.

Q. How far up New River have you been?

A. Well, I never was any farther up than Pearisburg in Giles County.

Q. Where is Pearisburg, in Giles County—what State is it in?

A. Virginia.

Q. State whether or not you have ever seen in your time any bateaux on the river in Giles County, Virginia?

A. No, now, I have seen them in Giles County, but I can't give you no dates on that, and I don't know just how far up it was, and can give you no positive statement, but I have seen them in Giles County, and was told last night they went into Glen Lyn.

By Mr. **Jackson**. We move to strike that out.

The witness on Cross-Examination testified as follows:

I don't know that anyone came to see me last night. Dr. Skaggs was talking with me where I live. He is my son and lives up here on James Street, close to the funeral home in Hinton. Nobody never come and asked me to testify. My son told me that they come after me to come down here to testify. I believe it was night before last that he told me this. That was the first I heard about coming here to testify. I don't remember talking with anyone else about it. Dr. Skaggs did not tell me why they wanted me to testify. He told me that it was something in regard to the steamboat on the river, but did not talk very much about it.

Q. Well, he did talk to you about the river and the steamboat last night, did he not?

A. Well, he told me that was what you all wanted with me.

Q. And he talked with you about it, didn't he?

A. We had some conversation—some words spoken about it, but I don't remember what.

Q. Didn't he tell you that they wanted to know if you remembered about a steamboat?

A. He asked me that question. Yes, sir.

Q. And he asked you if you didn't remember different

591 things about the river. Isn't that right?

A. Yes, sir.

Q. And he suggested several things to you about the river?

A. Well, he just asked me about the steamboat, if I ever saw it or knew anything about it, and if I was ever on it.

Q. Had you ever talked to Dr. Skaggs about it before that?

A. Oh, not that I remember.

Q. You don't remember talking to Dr. Skaggs about the steamboat until last night, do you?

A. No; it was night before last.

Q. And you talked to Dr. Skaggs about it night before last, and last night, too, I suppose?

A. It was mentioned a time or two, but I don't know that we had any particular conversation about it. He give me to understand that you all wanted me to come down here.

Q. And tell about a steamboat?

A. Yes, sir; and asked me if I remembered anything about it.

Q. And didn't he tell you that they wanted you to come down here and tell about the bateaux on the river?

A. Yes, sir. He asked me about the bateaux and other kind of boats; that was the conversation, but we didn't talk very much about it. I told him I had seen all of those things and knew all about them.

I think I am quite clear that this steamboat was called the Cecelia, but I never could remember the name of the thing. I did not want to get on that boat. I did not know what might happen. You never can tell what is going to happen on a steamboat. I have heard of them getting smashed on the Ohio River and I am afraid of the things and I am not much of a man to get on the river anyway. I never did ride on the Cecelia. In fact, I never did have time. I was a farmer and was always too busy, and I was off from there working and I didn't want to ride on it anyway. I came to Hinton frequently when I was farming. I also came on horseback or in a buggy. I had my own horses and buggies. We didn't bring no produce here to Hinton in those days. We generally sold eggs up there at the farm. Sometimes I would come here and buy things if I could'nt get them up there.

592 Q. Now you are very clear that the Cecelia started to operate in 1874?

A. It was that year, I think. You see it was built down here at Hinton.

Q. Built here in Hinton?

A. Yes, sir; it was built by the man I lived with, Elbert Fowler, who was the foreman, and they built it right close to the Avis Ferry. I was right there on the dock and saw it when they were building it.

Q. Now, Mr. Skaggs, how long was it after the Government cut a channel before you saw the Cecelia on the New River?

A. I don't know. That channel was built before the boat was built, maybe, but I am not sure about that. I believe it was.

Q. That channel was cut then, before the boat was built?

A. That is my opinion.

Q. Is it not true, Mr. Skaggs, that one reason they decided to build the boat was because the Government was cutting a channel, do you remember that?

A. No; I don't remember that.

Q. You don't remember?

A. No, sir. I think that channel was already cut before the boat was built, is my recollection.

Q. And you think——

A. I don't remember, but I think there was a channel cut there for the purpose of running boats in it.

Q. Surely, and that is the channel the steamboat, the Cecelia, run in?

A. It had to run in the channel.

Q. I suppose so.

A. Well, it couldn't run just anywhere in the river, it had to run in the channel. At certain places it had to run in the channel, in the riffles, but outside of that it could run anywhere in the river.

Q. How far above Hinton, how many miles did you live up the river?

593 A. It was twenty miles from Hinton to the farm I lived on, and it was sixteen miles to the mouth of Indian Creek, to the Fowler farm, where he lived.

Q. Could you see the Cecelia from where you lived if it came up the river?

A. There was four years of the time that I could. I lived on Captain Fowler's farm for four years, and that boat run up and down the river all that time—I was on the mountain and I could look down the river. Yes, sir; I saw it, and then my business was down there on the river at the Fowler farm and I have seen it all the way along, from Hinton all the way up there. Yes, sir; I saw it.

I noticed it more the first year because it was something new then. I could not tell you how often I would see it coming up to Fowler's farm the first year, but it came very frequently. I don't know whether it made a trip every day or not, but I don't think it did. I think it would come up one day and go back the next. They would come up and load lumber and when they got their load they would strike out again for Hinton. I could not say that it came every other day, but it came very often. How many times or how many trips I couldn't answer.

I was born in Monroe County about a mile and a half from the river at the nearest point. From the farm where I was born the nearest point to New River would be the mouth of Indian Creek, and it emptied you see into the New River. Yes, sir; that is where I was born. After leaving the farm I was born on and married, I lived for four years up there on Captain Fowler's farm, four

miles below the river. Indian Creek come down there into the river right down there at his farm. After that I bought a little farm about six or eight miles north from where I had lived. That was only three miles from the river. It was down at Pack's Ferry, which is about four miles above Hinton. When I bought my farm, I bought a farm out this way, and I lived right close to Pack's Ferry, about three miles back on the mountain. I moved out there in the latter part of the winter of '78, to the best of my knowledge. I was past my 22nd year when I was married and
moved to the Fowler farm at that time and stayed there for
594 four years. I lived in that neighborhood in all for 25 years
and then eventually moved back to the farm where I was
born and lived there until I had passed my 78th year and then I moved here to town and stayed with my children.

I. C. **Stover**, by deposition, testified on Direct Examination as follows:

I reside at Hinton, West Virginia. I am 37 years old. I have lived in Hinton for thirty years. I am Assistant Cashier of the First National Bank of Hinton.

As a boy I worked near New River. I lived on the south side of the river from 1907 to 1921. That is the opposite side of the river from where we are now. From 1912 to 1918 I lived in Avis, which is now a part of the city of Hinton. When I lived in Avis it was about 100 yards from the house to the river. We were near two lumber docks and two cross tie shoots for loading cross ties.

When lumber was brought down the river it was not very difficult to deliver it on the dock. My work in connection with the handling of lumber was to help unload lumber and staves from bateaux on the docks. I would also help load cross ties, which would burst loose from the rafts. They were in rafts and I helped load them to the shoots and I helped load staves in railroad cars.

I would see bateaux coming up and down the river and would see it land. They contained lumber and barrel staves. I don't recall any merchandise being on them. I never helped with any merchandise.

From 1912 to 1917 I worked principally for the Lilly Lumber Company. There might have been some other firm there also, but I cannot say at this time. I worked on the docks there for the Lilly Lumber Company and on the tie shoot. They used the docks there, but I don't know who owned them. I got the lumber up and unloaded on the docks and subsequently loaded it into railroad cars where it was shipped. I worked directly for the Lilly Lumber Company. As I said, my work consisted of unloading

staves and lumber from the bateaux on the docks and
595 loading staves and lumber from the docks to the railroad
cars and helping unload cross ties from the rafts on the
railroad cars.

Regarding the different kinds of lumber I saw coming through to the Lilly Company lumber docks, there was some heavy timber as I recall, principally just board timber, but some of it was heavier than board timber. There were also barrel staves. The cross ties came down in rafts. There was a distinction made between what they called export lumber and other lumber, but I did not understand it at that time. I was between 13 and 18 years old.

I would estimate the number of carloads per year between 1912 and 1917 that the Lilly Lumber Company loaded on the cars here at 150 carloads. It would average not more than three or four cars a week during the summer months. Possibly that heavy in the winter. But somewhere from 100 to 150 cars per year would be my guess. I loaded this lumber on the Chesapeake & Ohio which had a spur track to the wharf or docks. The road was a broad gauge standard road for standard size cars.

I actually helped to transport the staves from the boats to the cars. The ordinary procedure was to unload the staves and lumber from the boats and stack it on the docks and possibly in a day or two, maybe three or four days or a week, we would load it into the cars. I don't recall for certain, but it was very seldom that we loaded direct from the bateaux into the railroad cars. The same staves that came in by water would be loaded right there at the railroad into the railroad cars. During the period from 1912 to 1917 in which I worked there I received wages.

Q. State when was the last time you saw, or know of, a bateaux being on the river, or going up and down New River, I mean.

Mr. Jackson. Just a moment, I object to the form of that question.

A. Well, I would say between the period from 1920 to 1925—along during that period, but of course I am not certain. I do know that they worked on the river there a few years after I quit there.

I don't recall having seen any merchandise unloaded there. The boats might have taken some, but I don't know that I saw
any.
596 The witness on Cross-Examination testified as follows:
I did this work with the ties and lumber from 1912 to
1917. I did not work continually during that period. I would go to school for nine months and work during the three summer months. A good many times on Saturdays I would go down there and if there was any lumber coming in I would work.

Q. So from necessity, some of your estimates had respect to a period when you were in school, that you wouldn't know very much about, but you are taking that into consideration; I mean, your total estimate?

A. Well, as far as my working there was concerned, I don't know when I was not working there, except that our house was in a hundred yards of the dock, and I knew what was going on there just the same as if I was working. I wouldn't be there during school hours, of course.

Q. Generally speaking, but if you were in school, you, of course, would not know of your own knowledge.

A. No, sir; not when I was in school.

Q. And you say your school years was nine months.

A. Eight or nine months. Yes, sir.

Q. Eight or nine months term?

A. Yes, sir.

I don't recall any bateaux coming up the river from below Hinton. They came down the river to the docks there and returned. They came down loaded and went back empty.

I said the staves and lumber were loaded into standard size cars. The box cars ranged in length from 32 to 34 feet up to 40 feet. 40 was the maximum at that time, and their cubic capacity varied along with that.

There were two docks at this landing. There was one which I supposed belonged to the Lilly Lumber Company where I handled the stuff and there was another dock below that about 50 or 75 yards. Some other lumber company had a tie shoot and small dock which was in charge of Mr. Ebe Gwinn of this town. He was in control of the other lumber dock. In all there were two docks. The larger one must have been from 100 to 150 feet in length along the side of the bank of the river and some were between 30 and 60 feet in width, but I am 597 just guessing at these dimensions. The dock extended out level and was perpendicular with the edge of the water. The perpendicular part of it extended down into the river something like three or four feet. I could not say whether or not it was built on piles. The other dock was not as large. The spur of the Chesapeake & Ohio Railroad that ran down there had a single track.

It would take less than a day to load a car of lumber and staves. The time would vary, depending on how many were working. Sometimes the crew would be larger than other times and they would load 3, 4, or 5 cars of cross ties a day. They averaged a day or a little less in loading staves and lumber. Sometimes they would be working both a crew on the cross ties and a crew on the lumber dock.

The witness on Redirect Examination testified as follows:

When we were loading staves from 3 to 7 or 8 men would be a crew for a car. Ordinarily the loading was done from the docks into the cars and from the bateaux on to the docks and then into the cars. To load ties it took a minimum of about five men or sometimes six or seven to load cross ties.

The estimate I made of 100 to 150 a year was an approximation from my recollection. I lived near there. We would discuss the number of cars with others and I would see the cars in there. I would see them going out. The spur down there is that of the Hinton Builders' Supply Company. That is the same spur that used to be down there.

The cross ties came down in rafts and they had an electric shoot run by electricity with hooks on it and they would bust the ties loose from the rafts and the hooks would catch them at the bank and slide them into the car.

The method of getting the lumber out from the bateau was to hand them out of the bateau to other men and there was a platform there about half way between the water and the top of the dock. There was a gangway there. The staves were always handled in bunches of five. They were stacked that way. The men on the gangplank would hand them to the men on top and put them in stacks.

598 **Robert Calloway**, by deposition, testified on Direct Examination as follows:

I am 62 or 63 years old. I was born in 1873 in Hinton, West Virginia, and left there in 1909. I am the son of Matthew Calloway. I reside here. I am an accountant with the Merchants' Transfer and Storage Company.

When I was at Hinton I saw steamboats, gas boats, bateaux, and skiffs—small boats—on the river. Bateaux are boats 55 or 65 feet long, possibly 70 feet, with a 9-foot beam. A keel-bottom boat is more or less flat on the bottom.

I saw three or four bateaux running on the river at the landing at Hobbs. I was there playing around the river you might say. I worked in the bank at Hinton and I was with the railway company about three years, more or less, as assistant agent doing clerical work. My father has been assistant agent there too. I was with the railroad a long while after he was.

These bateaux carried merchandise of different kinds. They used to pick up freight and take it upstream as far as East River. They hauled tobacco. Downstream, I think, they hauled grain, but I don't remember definitely.

Q. Did you ever see them carry any lumber?

A. I don't recall.

I saw the work of building channels for navigation going on in the channel of the stream in the river. I think the Government was doing this. The first channel was was just outside of town about a mile upstream from Hinton.

I have seen steamboats on the river. The first one was the "Cecelia." I saw that when I was an infant, five or six years old.

I helped build a boat only about twenty feet long which had a steam boiler. It ran on the river and I rode on it.

I do not remember a captain Davis and I do not know of a boat run by him called the Davis boat. Starbuck ran one there about fifty feet long, probably in 1905 or 1906. I remember it running on the river.

The supplies which I saw coming down the river in the bateaux were taken off the boat and delivered to the Chesapeake & Ohio freight station at Hinton by truck.

599 Q. Do you know whether they were put on board the trains or cars?

A. No.

Referring to plaintiff's Exhibits 6, 7, and 8, which you have handed me, I see one Mr. Hobbs right in front of the picture marked Exhibit 7. He is the man with the whiskers in the bateau. That is a bateau all right.

In the picture marked Exhibit 6, I see Mr. Hobbs and Mr. Jake Hoover. He is sixth from the right side of the picture. I see every indication of a bateau in that picture.

In the picture marked Exhibit 8, I see Mr. Hoover about in the middle of the boat. That is a bateau of the type which has been referred to in my testimony. That is the kind I saw on New River. Referring to plaintiff's Exhibit 9, which you have handed me, the boat in the picture looks like Mr. Starbuck's boat. I do not recognize the man who is looking out of the window.

The witness on Cross Examination testified as follows:

I stated that I have seen steamboats and gas boats as well as three or four bateaux and that I had seen the "Cecelia." I also testified that I had built a twenty foot steamboat myself or helped build one and that Mr. Starbuck had a steamboat. There were two gas boats which I saw. I saw the steamboat "Cecelia" at Hinton moored at a landing there.

I stated that I ran my twenty foot steamboat on the river. I did not run it between any special points and had no special landings. We went up the river four or five miles. We played with that steamboat about two years running it on the river.

I could not tell you exactly how long I saw the "Cecelia" on the river. I think parts of it are there yet. I think a portion of the hull is lying down there. I built the twenty foot steamboat for pleasure purposes.

Matthew V. Calloway by deposition, on Direct Examination testified as follows:

I am in my 91st year. I was born in Princeton, Mercer County,
in what was then Virginia, but now is West Virginia. Princeton
is 25 miles from New River. I lived in the country. I was
600 24 when I left the farm for business. That was about 67
years ago. I had a business for a time at Flat Top Mountain,
which is quite a distance from New River. I worked for the
Chesapeake & Ohio Railroad for a short time as Assistant Clerk.

Q. When you had that position, ~~did~~ you have anything to do with freight brought down the river?

By Mr. **Forbes.** We object to the form of question, as leading.

A. Yes, sir; I had something to do with it.

Q. What did you have to do with it?

A. My duties were to check out the stuff to the boats that run up the river.

Q. Did you ever see any bateaux on New River?

A. Certainly, numbers of them.

Q. When was the first time you ever saw them?

A. Along in the early seventies.

Q. What time would you put the early seventies?

A. 73 or 4.

Q. And what were the bateaux doing?

A. They weren't operating very much on the river at that time, but later they operated quite a good deal.

Q. And in the early time, when you first saw them, what were they doing?

A. Handling freight on the river, to and from, up and down the river.

I have been on a bateau, but not very many times. We took excursions on them on the river. The farthest I went up New River on a bateau was about eight or ten miles on an excursion. I rode on loaded bateaux part of the way. They carried merchandise up the river to various points. I could not describe exactly what they carried. I think the freight which they carried up the river came from different points. It would come in on the railroad.

Q. Did you ever see any lumber coming down the river?

A. Yes, sir.

By Mr. **Forbes.** We object to this line of questioning as very, very leading.

By Mr. **Thompson.** I am willing to state I am, to some extent, leading this witness but the witness is very deaf and very old and I feel I am justified in so doing.

Q. State whether or not you ever saw any bateaux coming down the river with lumber on them?

A. Yes; coming down the river with lumber.

601 Q. Where would they be going?

A. To Hinton.

I don't know what use they put the lumber to. I saw lots of staves come down the river. They were loaded on cars and shipped away from the town. I don't know the destination of the freight.

By Mr. Forbes. At this juncture it should be understood that our previous objection stands to all of these questions. In view of your statement, I haven't repeated it.

Q. Do you recall when the Norfolk & Western Railroad was being constructed?

A. Yes; I remember the time.

Q. Where was it being constructed?

A. Between the mouth of the East River, thirty-three miles above our town, and a place they call Glen Lyn. That's the name of the station, I think.

Q. Do you know whether any materials for that railroad were brought in on the C. & O. Railroad?

A. Yes, sir; several carloads, I recall.

Q. What did you do with those?

A. Checked them out to the order of the Norfolk & Western, to a man in charge of the bateau, who carried it up the river to the works.

Q. You know the materials came in on the railroad and was put on the bateaux?

A. Yes.

Q. And the bateaux went up the river?

A. Yes, sir.

Q. But you don't know how far?

A. Supposed to go up to the works, thirty-three miles above our town.

By Mr. Forbes. We move to strike from the answer what he supposes.

A. Purported to go up to the works.

Q. Is that the nearest point the Norfolk and Western would be to the river, at Hinton?

A. Yes, sir; nearest point.

I recall when they were building the Capitol at Charleston. We had some shipments come down there from a mill 20 602 miles from our town. They were transported by water to Hinton and shipped to Charleston for repairs on the Capitol building. I can't remember exactly what time that was. The point 20 miles up was Shanklin's Ferry.

I recall timber being shipped in there which was taken to the sawmills. The William James Sons Company run a mill there at that time. After the timber was sawed up quite a quantity of it was disposed of in town for building purposes. I don't remember whether any was shipped while I was working for the railroad.

Q. State whether or not there was any tobacco shipped down the river?

A. Yes; quantities of it.

Q. Before the building of the Norfolk and Western, it came down by boat?

A. Yes.

Q. What happened to it after it got there?

A. Transferred to the depot and shipped, some consigned to Richmond and probably some to Lynchburg.

Q. Consigned to Richmond?

A. Yes; ostensibly.

Q. Before the building of the Norfolk & Western Railroad all the freight that came into town for shipment came down the river on boats?

A. Yes.

The witness on Cross-Examination testified as follows:

Q. Mr. Callaway, did you ever see any of the products from the country above Hinton brought into your station by wagon?

A. Not very much, sir. I don't recall any quantity. Occasionally they did bring in some by wagon, and a quantity of merchandise was shipped from our station to the country on wagon. We shipped loads of stuff out to Princeton.

Q. Which railroad was constructed first?

A. C. & O. was constructed first.

Q. Before the Norfolk & Western?

A. Yes, sir.

Q. Did you ever see any building materials or material of any kind being unloaded from the C. & O. at Hinton and taken up all the way to Glen Lyn by boat?

A. I checked it out of the cars myself.

603 Q. I asked you if you had ever seen any of the materials leave Hinton and go up the river to Glen Lyn by boat?

A No; I only delivered it to the representative of the company, the man in charge of the business.

Q. So far as your own knowledge is concerned, from what you actually have seen you don't know whether it was loaded on the boat and later transferred to wagon or not?

A. The stuff that was shipped, the material used in construction of the Norfolk & Western Railroad was delivered to a man who came there with his auto for the purpose of loading the boat and shipping it up to Glen Lyn.

Q. Whether that material was transferred to wagon before it got to Glen Lyn, you of your own knowledge would not know, would you?

A. No; I don't know that.

I have gone up the river some 8 or 10 miles occasionally on excursions or picnic trips.

I started working for the Chesapeake & Ohio Railroad about 1881 or 1882. I left the service of the company in 1884. I was stationed at Hinton most of the time. At least I was attached to that office from 1881 to 1884. I can't give you the exact dates. That is the best of my recollection. My duties during that time were very much in the same capacity, in a general business, you know, handling everything that came along. Mr. Flannigan was agent at the time and I was his assistant or clerk or something. Call it whatever you please. I tended to various duties, whatever would come up.

The witness on Redirect Examination testified as follows:

Princeton was 20 or 25 miles from the river at the nearest point. When I took material or freight from Princeton it went by wagon down to Hinton and the merchandise that was shipped from Hinton to Princeton went up on wagons. It would have had to have been hauled 20 miles or so to the river either way to have shipped it up and down the river.

I have spoken of a part of the Norfolk & Western, not the part that went through Radford, but the part that went up near East Lynn or East River. When the materials came on the Chesapeake & Ohio to Hinton the representative of the railroad put them on the boat and they went up the river.

604 The witness on Recross Examination testified as follows:

Regarding whether or not all of the materials remained on the boat after having gone up the river, the intention was that they should. I don't know of my own knowledge how far up the river they went. I did not go with them.

Depositions of A. E. Miller, R. W. Martin, J. C. Martin, E. F. Tomkies, and Dorsey Barton were submitted by plaintiff as part of the record without formally reading them.

Physician's certificate on W. C. Ratcliffe, a witness from Radford, Va., and physician's certificate on Edward Roop, a witness from Radford, Va., and physician's certificate on J. H. Likens, a witness from Radford, Va., were offered in evidence by plaintiff as Government Exhibits 24, 25, and 26, respectively.

Plaintiff offered in evidence in connection with the deposition of Roxie M. Brown Government Exs. 27, 28, and 29, Exs. 27 and 28 being daybooks and Ex. 29 being a ledger of the Lilly Lumber Company.

Mr. **Abbot**. It is understood, of course, the objections we made at the time the depositions were being taken are applicable?

Mr. **Williams**. Certainly.

A. E. **Miller** by deposition testified on Direct Examination as follows:

I am in my 76th year. I have resided in Hinton since 1889. That would be 46 or 47 years. Before I came to Hinton I resided on Lick Creek and on Green Sulphur, near Green Sulphur Springs. Lick Creek is a tributary of New River about 10 miles below here. We have two Lick Creeks—one 20 miles east of here and one 10 miles below. The latter is the one at which I was born.

I am now in the wholesale grocery business and have been for 33 years. Also my brother and I operated a lumber mill on New River. It was located at one time on Pipestem Creek and then on top of the mountain above the creek, two or probably three miles this side of Pipestem Post Office. Then from there the next set we made was on the Lick Creek that runs into New River about 20 miles east.

Our lumber came out by bateaux between 1895 and 1900. Our
mill was a portable one and we moved it around from
605 place to place. It was a combination sawmill and stave
mill. It cost less to move the mill to the timber than the
timber to the mill. When we had exhausted the timber in a
neighborhood we would move it over to a new stand of timber.

Q. Were these various places you speak of on New River where you moved the mill?

A. None were directly on the river, but they were on tributaries and our lumber had to come to the river to be transported to market.

Q. Did you transport all the lumber by water to Hinton?

A. As far as I know we did.

Q. Why didn't you transport it by road?

A. It was too expensive. It would cost as much to bring the staves from Lick Creek to Hinton as we were getting for the staves almost. It was a losing proposition. We could bring them by bateaux twenty miles down the river for one-fifth of the cost of hauling by wagon—maybe less.

I cut other timber than that which I made into staves. I cut oak, poplar, ash, and quite a bit of pine. The first and second grades of poplar we sold to lumber buyers who shipped out of the state. There were both first- and second-grade lumber and also culls and cheap lumber. We found a home market for the culls and cheaper lumber in and around this state.

I would say the capacity of this stave mill we had was five or six thousand staves a day, but I don't suppose we ever operated to capacity. We sold the staves altogether outside of the state. We sold all of them to the Standard Oil Company which had a monopoly on the stave business in this country. I have manufactured staves for them for years. I have been connected with the lumber business for 25 years until the last 25 or 30 years. We shipped staves to the Standard Oil Company to Bayonne, N. J., and we may have shipped some to Cleveland, Ohio. We had a contract with the Standard Oil Company for so much per thousand for inspected staves loaded on cars f. o. b. Hinton. There is not any question but that they were all shipped outside of the state to the various refineries.

The process of making staves is as follows: The tree is cut down and sawed off in stave-length blocks and then split up
606 and brought to the mill where they go to the stave saw and then are run out in the yard and stacked up to be seasoned for 60 days. Sometimes we had them stacked much longer than that before the Standard Oil Company inspector came to the mill to cull the staves. They made us an advance on them after the culls were reported so that we would not be put to a lot of expense. We never cut staves in advance of a contract for shipment. I received pay for the staves from the Standard Oil Company which made an advance payment on them after they were inspected by their inspector and reported. Then when final delivery was made and the staves shipped they paid us the balance. The payments came principally from Cleveland, Ohio.

It has been many years since these staves were manufactured and marketed. My brother kept the records and he is dead. I don't know exactly where the staves went to, but I know they were shipped out of the state. I do not recall the size of any of the orders we got from Standard Oil Company for staves. We always had orders for a sufficient quantity to cover the set that we were making. The timber that we had purchased was estimated to make so many staves and we always had a contract before hand. I cannot give you the number of staves that were called for in any contract which we had with the Standard Oil Company.

This is all Standard Oil business, but in the meantime we cut four or five thousand staves that didn't come by New River. They came directly to Hinton. That was between 1895 and 1900. But the staves we cut on the Pipestem was in the year 1895.

Then we cut another set in another territory and then in September 1897 we moved the mill to Lick Creek, where we brought the staves to the river about 20 miles east of Hinton and we cut there I know positively 403,000 at that set. They were wagoned to the

river and loaded from yards thereon to bateaux and brought to Hinton. We probably had to carry them on wagons 4½ miles down grade from where we cut them to the river. When we got them to Hinton we brought them to the dock up here. Wasn't much of a dock and there was a siding there. We stacked them up there and loaded them on instructions from the Standard Oil
Company. M. D. Tomkies and sons had the contract, and
607 they loaded the staves and no doubt gave the billing of them
to the railroad company. They loaded them on cars of the Chesapeake & Ohio Railroad Company.

I went in the lumber business before I was 25 years old and was connected with the lumber business up until about 30 years ago. That would make at least 25 years that I was connected with the lumber business.

Q. During that period of time did you know that there were other persons or firms or corporations that were cutting timber on New River above Hinton and were boating it down to Hinton, and putting it on the Chesapeake & Ohio Railroad and shipping it?

A. Yes, sir; I do.

Q. What other corporations, do you recall, or companies?

A. I remember D. M. Meador—he was operating at the same time we were and I know there were other mills.

Q. Was the Lilly Company operating in your time?

A. The Lilly Lumber Company?

Q. Yes.

A. I hardly think they were operating at the same time I was.

Q. Do you remember their operating?

A. Oh, yes. They done quite a business all over this country—up this river and the surrounding counties.

Q. Do you remember any other company or firm?

A. There possibly were other firms, but I can't just recall who they were.

Q. During that period of time would you care to give an estimate of the amount of lumber that was boated down New River, put on the Chesapeake & Ohio and shipped out to other parts?

Mr. Jackson. Will you specify the period of time?

Mr. Thompson. The period during which he said he was in the lumber business. That was for twenty-five years.

A. I could not, the exact amount. I could make an estimate.

Q. Will you make an estimate?

A. Yes. I know that 100,000 feet was brought down and shipped and possibly a great deal more.

608 Q. You mean not more than 100,000 feet?

A. I wouldn't say it was more than that.

Q. You mean in the whole thirty years?

Mr. **Jackson**. He said twenty-five years.

Q. In the whole twenty-five years?

A. I thought you had reference to what we loaded and sent in here by bateaux and that was shipped out of the state. We brought it down here and sold to lumber buyers, who would ship it out. I can't say to where.

Q. I don't know that I get your answer clearly. You mean you and your brother shipped out 100,000 feet, or that you sold it to other people who shipped it out?

A. We sold it to other people who shipped it. We manufactured poplar and ash and walnut and export oak, and we cut a great deal of pine and second-grade oak—there was more of a local market for that, although we sold I. N. Johnson and Ward Hahn in Ohio—I can't give the name of the Ohio town now after thirty-five or forty years—we sold them some as well as poplar.

Q. How did it leave the state?

A. Went by the C. & O.

Q. You put in on the Chesapeake & Ohio Railroad?

A. Yes. That went to Ohio.

Q. I am asking you now to make an estimate, if you can, of the amount of lumber that was cut, in feet, and brought down the New River during your time and put on board the railroad and shipped out of the country? I am now including all kinds of lumber.

Mr. **Jackson**. By "your time" do you mean the time this gentleman was in the lumber business?

Mr. **Thompson**. Yes; I fixed that twenty-five-year period.

Mr. **Jackson**. Sometimes we speak of your time as your lifetime.

A. Is that what you want to know all of it that has come down since the C. & O.—Oh, millions and millions of feet; I don't know. I couldn't give you anything like an accurate estimate, but millions and millions and millions—hundreds of 609 millions, I expect. There is a tremendous area up there that was well timbered that come out that way.

We paid so much per thousand staves to the bateau men to transport them from the yard to Hinton. We had a little yard there at Haynes Ferry on the bank of the river where we loaded our staves and lumber or where the wagons unloaded and they were reloaded on the bateaux. It was the same way at Mercer Salt Works and at Lick Creek. It was impossible to bring the staves down the river any other way than by bateaux.

The witness on Cross-Examination testified as follows:

Our mills were portable sawmills—stave and sawmills combined. Most of the sawmills in this territory were portable, except that of William James and Sons here at Hinton. They had a big mill here and they had a big stationary mill at Ronceverte.

Q. What rate per thousand did you pay the bateau men for bringing the staves down?

Mr. **Thompson**. I object to that question on the ground that it is too uncertain. If you will describe the distance——

Mr. **Jackson**. I think Mr. Miller knows the distance better than I do.

A. The staves transported from Mercer Salt Works, we paid $2.25 a thousand, and the ones that were bateau'd from Haynes Ferry, I don't know whether it was $1.25 or $1.50 a thousand.

Q. That included loading and unloading them?

A. Yes, sir; that included loading and unloading.

I don't remember the rates from any other places. That is the only two points we bateau'd any from. It makes quite a difference in the weight of a stave whether it is dry or green. I think 5 pounds—it's been so long. I would say 5 pounds for a thoroughly seasoned stave. They were 36 inches long and ⅝ of an inch thick, and I believe the width varied from 4½ to 6 or 7 inches. That is just an approximate weight.
610 I think that is near it.

The witness on Redirect Examination testified as follows:

I was testifying to the weight of the average stave. I couldn't give you any idea as to how many staves there are in a barrel of average size. I may have known about that but there is so much difference in the width of the staves. I said the weight of one of the seasoned staves was approximately 5 pounds, but that may be a little too heavy. It has been so long since I weighed a stave that I don't remember the average weight of staves.

R. W. **Martin** by deposition on Direct Exmination testified as follows:

I was born in Mercer County, W. Va., and live over here on Madams Creek, which is a tributary of New River and flows into New River opposite Hinton. I was raised at the mouth of Bluestone River and moved here when I was about a year old. I am 67 years old. I work mostly at logging and farming. I have been a farmer all my life.

Q. Did you ever do any work on the river?

A. Yes, sir.

Q. What kind of work?

A. I have rafted cross ties, skidded logs, and worked on the river right along.

Q. Did you ever work on a bateau?

A. Yes sir.

Q. When?

A. Well, for the last fifty years off and on, but I ain't worked none now for about ten years.

When I was a boy there was lots of lumbering going on up the Bluestone River. Staves, lumber, and everything would be hauled down the river to the mouth of Bluestone and loaded on bateaux and brought down here. I worked for many and 611 many a day for a firm by the name of William James & Sons that cut ties up there. They cut lumber on the Bluestone River and run the logs down New River to a place—Pack's, and then they caught them there and rafted them the rest of the way down. Pack's place is three or four miles up here. They brought them across the river and floated them down on the right hand side, that is, the Bellepoint side. They had a good mill up here in Avis, they manufactured and sold some lumber here in town, and they shipped some too.

Q. Those boats came down Bluestone, did they, carrying everything——

A. Carrying everything anybody wanted them to. Yes, sir.

Q. Now, you say everybody, who do you mean by everybody?

A. Everybody who wanted to ship wheat, corn—whole loads of corn, and whole loads of wheat, tobacco, and all such as that, when I was a young man.

I remember tobacco growing up there in that country 28 or 30 years ago. They are not growing tobacco any more here in West Virginia. They must not have been getting a big lot out of it, I reckon, growing it and shipping it, they used to haul it all the way from the Salt Works. I never hauled tobacco down from the Salt Works myself, but I have seen it loaded and hauled. That was about 45 years ago.

The James people did not use any motor boats in connection with their bateaux. They floated their logs up here to James'. They had to raft them to Bellepoint, and they had a wire across the river there. They had a boom up there at Jim Pack's, but that has been 45 or 50 years ago since they went to work there. I did not come down here to town, I just stayed in the woods back by Lerona. I have come down here, but I stayed mostly in the woods when we were doing that work.

They didn't run any bateaux down Bluestone River. I ran bateaux just on the main river. They used to run the bateaux up as far as Mr. Barker's place, which is up about the mouth. They run the bateaux about a mile up there to what they called the old race and loaded a lot of staves there.

I have not worked any on the river for 10 or 12 years; 10 or 12 years ago I was carrying staves mostly for Zack Lilly and another man. They had a stave mill. Zack Lilly
612 was an individual. Caesar Lilly also had a lot of staves.

I brought the staves down to Hinton and delivered them here at this landing. When I went up the river I carried a cargo if anybody wanted us to take anything. I did not carry anything down the river but staves.

The witness on Cross Examination testified as follows:

I was not asked to come here and testify. I just come in here. My cousin, J. C. Martin, come in here and I just come along with him and another man. J. C. Martin is the man who just testified before me. I just happened to be in Hinton today. No one in particular asked me to testify in this hearing today.

The witness on Redirect Examination testified as follows:

I came in with Mr. Coulter. Mr. Coulter talked with me about it before I came up.

The witness on Recross-Examination testified as follows:

I do not mean that Mr. Coulter talked with me at my home. I was here in town and talked with him on the street. I told him my cousin was here and I was coming up to see him and he asked me to testify. I told him about working on the river.

The witness on Re-redirect Examination testified as follows:

Mr. Coulter asked me what I could testify to. He asked me what I ever did on the river. You asked me what I did on the river. You went over with me all of the questions that you asked me before I came in here.

The witness on Re-recross Examination testified as follows:

He did not go over the answers with me, he did not know anything about what I was going to answer.

J. C. Martin, by deposition, on Direct Examination, testified as follows:

I am 62 years old. I live in Raleigh County, W. Va., at
613 the present time. I was born in Mercer County, W. Va.

I have lived on New River at the point known as Crump's Bottom from the spring of 1888 until 1904. When I went there the Government had made a boat shoot or a channel for boats. The Government has not done any work that I know of after I got there. My father was living at Crump's Bottom. He was a farmer and I worked on the farm part of the time.

The rest of the time I boated on the river. My father raised corn, wheat, and things like that. He did not raise any tobacco. I do not know when the tobacco business ceased in this country. They don't raise any tobacco here now. They raised a little in

1904, but not very much. My father consumed most of the crops he raised on his farm.

I saw bateaux on the river and handled one for three years prior to 1904, but off and on for 7 years. I boated lumber for a number of people, including D. M. Meador, Morgan Meador it was, and Boone Burks, that is B. B. Burks, and boated staves for both of them. I boated this lumber from Round Bottom, but Mercer Salt Works was as far up as I boated staves.

While I was working on these bateaux I carried lumber and staves and some corn and tobacco. I carried the cargo to Hinton. Sometimes we would take a load back and sometimes we wouldn't. When we used man power to propel the boat we didn't take very big loads. We took some merchandise sometimes. I never used a motorboat alongside a bateau. I don't recall any store at Round Bottom during my time. There were stores down the river at Mercer Salt Works, at Indian Creek, and Bull's Falls. I carried some merchandise for Cox at Bull's Falls and some—a little bit for a merchant named Mose Webb, a merchant at Indian Creek, and some for a Mr. Shumate, a merchant at Mercer Salt Works.

The last time I have seen the river as an inhabitant of this district was in 1904.

Elbert E. Tomkies, by deposition, on Direct Examination testified as follows:

I reside at Hinton, W. Va. I was born there and have lived
there practically all of my life, with a few years' exception. I
am a merchant and a banker. I am Executive Vice Presi-
614 dent of the National Bank of Summers in Hinton. I will
be 50 years old in October.

I have hauled or carted staves or lumber from the landing down here where the boats land to the railroad for a period of 4 or 5 years, maybe a little longer, between the years 1895 and 1900. My father had a contract for loading staves for the Miller Brothers during all of that period and for D. M. Meador—Morgan Meador—and frequently for some smaller mills along the river.

The bateaux would bring the staves down New River. I saw the bateaux coming down the river and have rode on them when they were loaded with staves and I would land down here at Hinton on the river bank where the Hinton Builders Supply Company is now located, right above the mouth of that little branch. At one time this branch that comes across the railroad, under the railroad, but just above the railroad crossing, went about where the state highway is now and then turned and followed parallel to the river down to the Hinton Builders Supply

Company. The mouth of it is there, but of late years it goes straight into the river. Some of it has been filled in.

The bateaux would bring the staves down to the wharf at the point I have described. Then they would unload right on the river bank. Anywhere from 60 to 70, probably 75 feet, from the side track of the Chesapeake & Ohio. They would unload that right on the river bank. We had the contract to move them up and place them on the cars for shipment.

The amount of staves one of those cars would hold depended on the size of the cars, which varied. Sometimes we would get 25 or 30,000 in a furniture car. A small car would hold 22 or 23,000. The average car had a capacity of from 28 to 30,000, I should say.

After the staves were put on board they were sold to the Standard Oil Company. Most of them went to Newport News, Va., but some would go to New Jersey. At that time the Standard Oil Company had a local agent here and he stayed for a number of years. His name was Mr. Theodore Arter. He was the local purchasing agent. I never had a contract with him, but I know that was his business. He resided in Cleveland, Ohio, but he is dead now.

Q. How many staves do you estimate that you loaded on those cars during that period, or how many carloads did you ship a year?

A. Seventy-five to a hundred cars a year.

The cars held approximately an average of 28 to 30,000. I loaded not less than 14,000,000 staves from the boats onto
615 the train during the 4 or 5 years I worked there, and that is giving it 14,000. (Figuring with a pencil.)

Some staves were loaded and shipped down the river by others. We loaded for two other people for a while—D. M. Meador, he gave his entire time to the lumber business, and the Miller Brothers were just part of the time, it was just a side line with them. Mr. Meador shipped a great many more staves than the Miller Brothers and was in the business a great many years longer..

Q. Were staves being shipped down the river, if you know, and boated down the river, and put on the train and shipped out before you went to work there?

A. Yes, sir. Years before.

Q. And after you went to work?

A. Yes, sir.

Q. And after you ceased to work there?

A. Yes, sir.

Q. State whether or not you observed the lumber business on this river with respect to that that was boated down the river and put on the railroad and shipped out of this country?

A. Yes, sir; for we discontinued the handling of staves. I was in active charge of the general merchandise business, and for a period of about fifteen years we handled a good many railroad ties—cross ties and many of them were rafted down the river, and I was in and out the yards a great deal, checking, etc., and during all of that time there was a great deal of lumber being transported, also staves.

By lumber I mean sawed lumber ready for the planing mills. It is very hard to estimate in feet the amount of lumber which I observed coming down the river by boats and being put on railroad trains and shipped out of this country. The store which I ran was a retail store.

Q. Did you ever sell any goods from your store to the people up the river?

A. Oh, yes, sir; we had quite a number of customers from up the river.

Q. Would you be selling to stores or to individuals?

A. Individuals, mostly.

616 Q. What was the character of stuff that you sold to customers up the river?

A. General line of merchandise, clothing, groceries, feed, and hardware.

Q. How was that carried to your customers up the river, if you know?

A. Well, of course, a good many of them would come in in wagons, but nearly every boat, the bateau, when it would come down the river would have passengers going and coming, and they would frequently bring in their produce on the boats, and then take what they would exchange their produce for, take it back on the boat; you see the people lived along the river and the boat carried passengers—some.

Q. And what did you see in the way of produce that came down the river?

A. Well, while——

Mr. Jackson. Now do you know that landed here?

A. (Continued.) Yes, sir; I know it was landed here for I have seen it many a time. While working up there, I remember on one occasion there was an entire bateau of corn, not shelled, delivered down there, and the mill, which was nearby, hauled it up to the mill and stored it there, and frequently, they had corn and various kinds of products, almost anything that was produced along the river. Sometimes they would bring in livestock. I have seen them bring hogs on the boats and occasionally a yearling or a steer.

Q. Anything that was raised on a farm?

A. Yes, sir; chickens and eggs because the roads were so rough, and there was no breakage on the boat like there was with a wagon.

We do not still have the store which we had then. The road was changed and the store we had is now on a dead street. We discontinued the store when they put in the overhead crossing, but we have a store over on Third Avenue, which is still in operation.

Q. How long since you have seen a bateau on the river?

617 A. I would say that it has been ten or twelve years, something like that.

Q. And were bateaux at that time, carrying commerce, cargo, or everything?

A. It carried cargo, just what do you mean by commerce?

Q. Well, cargoes of farm products.

A. Yes, sir; farm products, and sometimes wholesale houses would deliver their merchandise to the stores. There was not a great many stores along the river, but it would deliver them to the wharf, and all of it would be carried into the bateaux.

Q. And shipped down the river?

A. Yes, sir.

The witness on Cross-Examination testified as follows:

Q. The computation that you made about the quantity of staves, am I right in understanding that was just a multiplication of two hundred and eighty thousand by four?

A. That is just an average of the number of staves in a car. Sometimes there were thirty-five thousand and sometimes twenty-two or twenty-five thousand.

Q. The only computation you made was to say twenty-eight thousand—or two million eight hundred thousand rather, and multiply by four, and you show the result to be fourteen million, is that right?

A. Yes, sir; but I was giving the benefit, to make my estimate low enough—I gave it four years instead of five, but we really loaded it for five years.

Q. And to keep it low enough, is that the same reason you took fourteen million, instead of eleven million two hundred thousand?

A. That is about the average. That paper doesn't show the correct multiplication, but that is about the average as I explained to you.

Q. I mean, you took fourteen million, instead of eleven million and two hundred thousand, is that what you did, please answer the question?

A. Well, that paper shows a mistake in multiplication, but I can explain that. I estimate it for four years, but the 618 reason I put it down there in round numbers, we were about five years at it.

Q. Mr. Tomkies, you undertook to multiply by four, didn't you?

A. Yes, sir.

Q. And you just made a mistake, I suppose, just like lots of times all of us do?

A. Yes, sir.

Q. And you took fourteen million there, instead of eleven million two hundred thousand, when you were multiplying two million eight hundred thousand by four?

A. No, sir; you see we were doing it for five years, and as I told you, I made it round numbers there on that account.

Q. And when you said there a while ago, that you took four years, instead of five, in order to be conservative, you were mistaken, were you not?

A. No, I don't think I was mistaken.

Q. Well, did you take four years or five?

A. You must recollect that I said I was working five years, and when the question was asked, I just made that rough estimate there.

Q. Oh, I agree with you.

A. It would be eleven million and two hundred thousand at four years, and we worked five years.

Q. Did you take four or five years?

A. Four years there.

Q. And that is what you made your estimate on, on the basis of four years?

A. Yes, sir.

Q. And that figure included all the staves that were being trucked from the boat landing to the cars while you were working for your father?

A. Yes, sir.

Q. And you don't mean to say that you individually transferred those staves?

619 A. No, sir; there were three brothers of us working, and my father was working, and nearly all the time he had two or three other men besides us working.

Q. I think you said they boated staves here for years before you were engaged in helping your father in transporting staves from the boat dock to the cars, did you not?

A. Yes, sir.

Q. You are testifying to that from your own personal knowledge, are you?

A. Yes, sir.

Q. And how many years would you say they boated the staves before you started working for your father?

A. Well, I couldn't say before just exactly. I was familiar with that time though and I would say for five years before. We lived very close there, and I could remember that. From necessity, I had to go to work early in life, and if you will look at my dates, there, I was only ten or eleven years old when I started to work.

Q. In 1895? You are not yet fifty, are you?

A. Yes, sir.

Q. Fifty years old next October?

A. No, sir; last October.

Q. I thought you were going on fifty?

A. No, sir; I am past fifty.

Q. Now did you say this Mr. Theodore Arter lived in Cleveland?

A. He stayed a great deal of his time here, but I think his home was Cleveland.

Q. Mr. Tomkies, was there a Standard Stave Company here?

A. Standard Stave Company?

Q. I don't—yes; it is Standard Stave Company.

A. I cannot remember the name. All the time we were loading there were other companies operating, and we didn't load anything like all of the staves that were being delivered to the river bank. We just worked for the Miller Brothers, and one or two sawmills, I don't remember the names, but one for Mr. D. M. Meador, although later on, Mr. D. M. Meador's output was so big that we couldn't look after it and the other too, so we discontinued it, and he employed other people.

Q. But, of course, to be able to make an estimate of all the staves and lumber on the river, you must have kept a pretty close watch on all of the stave companies that were operating here, didn't you?

A. I cannot say that I did.

Q. You wouldn't think that there was any stave company operating here that you wouldn't know about, would you?

A. Well, there were companies just the same as there are today, starting up in business, operating a few months or a season, and then discontinue, and that condition exists today.

Q. Operate a little bit and then go busted?

A. Go busted, or maybe make enough to retire.

Q. Are there many retired stave dealers here now?

A. There was another company operated here extensively, and that was B. B. Burks.

Q. Yes, sir; he has been here and testified.

A. No; that was his son, he is dead.

Q. Well, both sons have been here and testified and told us all about their father's business.

Mr. THOMPSON. I object to all of that going into the testimony, the evidence of counsel; he is not on the witness stand as yet, that we know of.

Q. Mr. Tomkies, did you say you bought staves here?

A. No, sir; cross ties.

Q. How did you buy those, by the thousand?

A. No; we bought them mostly from the farmers. It was quite a custom in those days, every farmer that had a tract of timber would get out during the winter season when he didn't have farm work to do, or he would get out a lot of cross 621 ties and raft them down the river. From the mills, we bought mostly what we called pile ties, hewed out with an axe.

Q. What did you pay the farmers per thousand for ties?

A. The price averaged forty-five cents apiece for first-class ties, thirty cents for seconds, and at that time they only had two grades. They have five grades now.

The witness on Redirect Examination testified as follows:

We made a living at the stave business. I said I hauled staves for Miller Brothers and D. M. Meador, or Morgan Meador, or he was called. Meador was a much bigger operator than the Millers. We did load or hauled some for the Millers, but they had a dairy, a big farm, and also had a general store at Foss, it was called then, and is now called Bellepoint. The sawmill business was rather a side line with them, but Mr. Meador gave his whole time to that business.

In figuring on that piece of paper I made a mistake. My intentions were to figure 2,800,000 in a year for four years, 100 cars. It would have made 11,200,000 for four years, but we worked at it five years and I just put down 14,000,000. I made it five years instead of four years, but we worked for the five years, so I just made it round numbers, 14,000,000.

The witness on Recross-Examination testified as follows:

I told you that the reason I got 14,000,000 instead of 11,200,000 was because I made a mistake in the multiplication. I intended to make the computation for four years and I did not make it different to allow for five years.

The witness on Re-redirect Examination testified as follows:

When I made my calculation I was going to estimate it five years, but was figuring it four years. We have no records now. It is only a rough estimate.

622 The witness on Re-recross Examination testified as follows:

This total appearing as Defendant's Exhibit No. 1 represents my estimate, not my calculation.

Dorsey B. Barton, by deposition, on Direct Examination testified as follows:

I will be 62 years old on the fifth of next March. I was born in Summers County about ten miles up New River. The nearest post office was Bertha. I lived there until about eight years ago next April. Bertha is on the river, but our home place, where I was born, was a mile from the river up on the mountain, but we moved down to Hinton, near the river, about eight years ago. I remember seeing Government men working on the river up at Bertha. They were cutting a channel through the shoals.

Q. Do you remember ever seeing the boats going up and down the river?

A. Yes, sir.

Q. Were you ever on the boats?

A. I have been on the bateaux.

Q. Did you own a bateau of your own?

A. No, sir.

Q. Were there any boats on the river before the channel was cleared?

A. Not to my knowledge.

Q. Were you old enough to remember that if there was?

A. No, sir. I was just a boy about four years old at that time.

Q. What is your recollection about the greatest number of boats that were operating on the river; by that I mean bateaux or keel-bottom boats, as they call them, at any one time?

A. Well, I think I have seen as many as six or seven a day, either going up or down the river.

Q. And they were going regularly up and down the river day after day?

623 A. Usually, in the summer season, they were on the river all the time then. In the winter time, of course, they were not always able to make the trip on account of the ice.

Q. Do you know how long this river, at its longest period, is frozen over in the winter?

A. I don't remember, but I think I do recall one time when I was a boy that the river was frozen over for six weeks, possibly.

Q. Generally speaking, how long is about the average time the river freezes over?

A. Well, in the last several years, it has only been frozen over a short time, but it was only in the still waters then.

Q. But you couldn't operate boats there then, could you?

A. No, sir.

Q. Ordinarily speaking, about how long in the winter would they be prevented from operating boats?

A. Well, I have known boats being run in the middle of the winter.

Q. Would it be fair to say that there are periods in the winter then it freezes over, and then melts, and the boats would start again, and then freezes again?

A. Yes, sir; it freezes over sometimes three or four times in the winter.

Q. But during the summer, fall, and spring, boats could run on this river most any time?

A. Yes, sir.

I remember a boat on this river which was called the "Cecelia." I have seen it running, but never rode on it. It passed my place, I don't remember hardly how often. The best I remember this boat was built with side wheels, paddle wheels, had a roof over it, and had seats fixed for passengers.. I just saw the "Cecelia" from the bank. I saw it the day that it made the first trip. It was quite a show to the folks up there in the country and everybody went to see it.

624 It was about fifty-eight years ago when the channel was cut, and I don't remember when the bateaux were put in.

Q. How recently do you remember seeing boats running on the river?

A. Well, I think, possibly, there was a boat running ten years ago; that was just a little while before I moved down here to Hinton.

That boat came to Hinton and went up the river. I think it hauled stuff up the river about twenty-five miles from here to Shanklin's Ferry. That boat was run by the Lilly boys, Ed Lilly and B. H. Lilly, his brother. They lived up in the country in Pipestem district. They carried lumber and staves in their boat and I think they were boating them down here to Hinton. I don't think that it has been longer than ten years ago since they quit that boat. I can't remember when they started to run it, but they worked on the river for years and years.

I am familiar with what was transported by bateaux going up and down the river. They carried staves, lumber, and farm products, and I have seen corn, wheat, tobacco, loose hay, and other produce being transported down to Hinton.

Q. Have you any knowledge of any commerce being carried back up the river?

A. Yes, sir; they done quite a little bit of hauling for the country merchants and farmers, in the way of supplies and things of that kind.

Q. Did you ever see any bateaux yourself, with these articles you describe on it?

A. Yes, sir.

I rafted some cross ties down the river myself from Bulls Falls for myself and also for other people, including Gore Brothers, who cut a set on my farm—I think about five or six thousand cross ties. I helped them run the ties down here where they were sold to the Chesapeake and Ohio Railroad.

Q. Can you name any other person who brought lumber and cross ties down here?

A. Yes, sir.

625 Q. Who was it?

A. Hense Buckland, he cut a set of staves close to me in a mill there on my place, and he cut—oh, I don't know how many thousand, but it was a set of staves.

Q. Did you help him bring them down the river?

A. No, sir; but I saw him haul them down to the river.

Q. Do you know of your own knowledge that they did come down the river?

A. Yes, sir.

Q. Where to?

A. Here to Hinton, where they were loaded on the cars.

Q. What railroad?

A. C. & O. Railroad.

Q. Is there any other person you can name, close——

A. (Interrupting.) Who manufactured lumber?

Q. Yes, sir.

A. Well, Burks over here in the Sheriff's office, he manufactured lots of lumber.

Q. What are his initials?

A. Z. Burks—Zina V. Burks.

Q. And he carried them down himself, or did you do that.

A. No, sir; I didn't carry them down. He manufactured them, and I know they were boated down here.

Q. Did you see them brought down?

A. Yes, sir.

Q. And they were brought here to Hinton?

A. Yes, sir.

Another man I can name up there was old man Maxwell, who used to live here, but is dead now, I think. I don't believe I remember his initials, but his name was Bob. He operated from Shanklin's Ferry and boated down to Hinton. I did not help him or any of the others I named bring stuff down to Hinton.

There has been many others. There is a fellow Farley
626 lives up there at Crump's Bottom, he manufactured lots
of lumber there ten or twelve years ago. I bought lumber from him when I built a house up there on the river and when he operated a mill just above Bull Falls.

I know John W. Bradberry, who has been located up there on the river for over fifty years. He didn't handle lumber, but he used to raft ties down here from where they were manufactured on the river from Bulls Falls and along in there.

I know Mr. L. D. Neely who is located near Bertha. He manufactured lumber up there which he shipped down the river.

I know Mr. W. D. Eanes. He shipped lumber down the river. I think he ran a bateau. I know he done a lot of work on the river—rafting, and so on.

I know Mr. J. O. Pettry, who lived up in the country at Bulls Falls. He manufactured lumber up there. The most of the work he did was rafting ties. He shipped some down the river.

You asked me about a man by the name of W. G. Farley, and about a man by the name of Joe Farley, and John Webb who is dead. Webb was located at Bertha. He was not in the lumber business. He lived on the river, but I don't think he ever rafted or worked on the river.

I know Harry Medley who was located near Bluestone, about five or six miles from here. I don't remember J. E. Robes. I know J. H. Medley. He was located down in this country somewhere, but I don't know just exactly where. I recall his being on the river. He ran a bateau.

I remember B. D. Trail. He was located at what we call Pipestem, which is ten or twelve miles up the river here. There were two John Bradberrys. ~~One of them is dead.~~ He is the one ~~who used to run a bateau~~ so much on the river.

I remember W. R. Vest, and a firm, Vest & Neely. They shipped lumber on the river down to Hinton.

I know T. B. Ballard. He lived at Indian Mills, two miles from the river. He had a mill and shipped lumber down the river. Replying to your question whether I know H. M. Dickinson, I know Mr. Dickinson, but I don't remember his initials. I know J. H. Dickinson and Laman Dickinson. He was his son. I don't remember H. M. Dickinson. Replying to
327 your question whether I know J. G. Anderson, I know Anderson, but there are so many Andersons, and I don't know his initials. I know him by the name of Jabe Anderson. He lived at Mercer Salt Works. He handled lumber on the iver.

I remember R. G. Houchins who lived about a mile from Bulls alls. He was not engaged in the lumber business, but he was n the river all the time in the summer, rafting ties.

The witness on Cross-Examination testified as follows:

In each instance in which I have testified about boats, I mean ateaux.

Some of the men about whom I have testified who lived at various places up the valley from Hinton lived on farms, but most of them did not own farms. Most of them made their living by working on the river or anything else they could get. Houchins had a farm, but he worked on the river. A lot of those farmers up the river pieced in by cutting ties and selling them. A good many of them cut ties on their farms and sold them, but I would say that a hundred thousand feet of cross ties were cut and rafted down here.

I lived about five miles from Bluestone. I have been along the river near there lots of times. I never waded across the river at Bluestone. There used to be a ford there, but it is pretty deep. I have never seen anyone wade across there at Bluestone. Some persons might have waded at the ford, but it is pretty deep. I saw the river around Bellepoint along about the thirteenth of December of this year. We had a right smart stage of water about that time, but I don't remember the date.

Q. Well, you didn't happen to be observing it at that point on the 15th day of December, and see a tractor being driven across the river at that place, did you?

A. On the 15th day of December of this year?

Q. Yes, sir.

A. I wouldn't be surprised, because I know they were having a time getting a tractor across there, but I was not down there, because I was working away from there, but I know they were
trying to get a tractor across the river, but they just told
628 me about it, and that is only hearsay, because I didn't see
it myself.

Q. You don't want to give any other impression that it was anything else but a man driving a tractor through on its own power, do you?

A. Well, I don't know how they got it across, for I was not there.

Q. Well, I want to be fair with you, and I don't want to leave you giving the impression, any impression, that you would not be willing to assume the responsibility for.

A. I was not there, as I told you, and what I would tell you about it would simply be hearsay.

I was born near Bertha less than a mile from the river, up on the hill overlooking the river. As a small child I could see about four miles of the river. There was a kind of a horseshoe bend and I could see the river on both sides. I couldn't tell how long I saw bateaux on the river after the Government improvement. I was born in 1874.

I remember seeing the Cecelia quite distinctly. We could hear it coming and it was quite a show to us you know and we would have plenty of time to get to the river to see it and I was right there when it landed at Bertha. I have described its appearance, inside and out, as nearly as I can remember it. I was four or five years old at that time, or something like that.

Q. Don't you remember that the Cecelia was built and first run in 1878?

A. I couldn't tell the exact date, because I was very small and don't remember.

Q. I was just verifying the fact that you were that old.

A. Yes, sir.

Q. Have you ever seen the picture of the Cecelia, since that time?

A. No, sir.

The witness on Redirect Examination testified as follows:

The Cecelia had a whistle and we could hear it and when it come around Bluestone everybody would come and see it. It was quite a show, because the hill-billies up there had never seen anything like that before.

629 W. C. RATCLIFFE on Direct Examination testified as follows:

By deposition:

I was born in Montgomery County, Virginia, at Graysontown. I am 59 years old. I have lived at and near my place of birth and in the vicinity of New River all my life. I've never lived anywhere else. I think we come to Radford when I was about seven years old and have lived here ever since. I have seen a couple of boats on New River.

Q. State if these boats were carrying anything on them?

A. I could not say what they were carrying. I know I seen ties on the boat once, they belonged to Mr. Hodge. I was just a small boy then, that is all I can say, that I ever seen carried on boats, that I can remember, except my grandfather said they used to haul down Little Creek on boats. He was running a mill.

By Mr. FORBES. We move to strike out what his grandfather said.

I seen one boat put in the Little River it came down. This boat was launched at Graysontown four miles from New River, on Little River. Graysontown is three or four miles from Little River at the point where it flows into New River. I couldn't describe that boat distinctly to my knowing, I was eight or nine years old. They said Mr. Craft built it to haul flour down Little River on.

(Defendant objected to the statement of the witness as being hearsay evidence and moved to strike it from the record.)

I knew Joseph Craft. I did not see the boat during the process of building, but I saw them put it in the river. I could not say what its exact length was, but it looked to me to be between twenty-five and probably thirty feet long. I suppose it was eight feet wide, maybe six or eight. I never seen any boats at Snowville which is about a mile above Graysontown.

I know of a place up New River called Mack's Creek Furnace. It is a pig iron furnace. I have been at the furnace when I was a boy many a time. My grandfather run a mill there. His name was William Ratcliffe. When I was at the furnace, I could not tell whether it was making pig iron or not, my uncle was foreman there, but I didn't go up to the furnace. The mill was about a mile down. The mill was grinding corn and wheat. I did not see where this corn and wheat went. I could not 630 say I have seen any pig iron on boats floating down the river. My grandfather did not launch any boat at Graysontown. He was not there, he was at Max Creek. The mill was on Max Creek and not over a mile from New River, I could not say positively. There was quite a bit of timber standing up New River in the region from Radford up to Max Creek when I was a young man. I don't recollect that there were any sawmills up there at that time. I never was along the river in them days. I was small. I lived on Little River then.

Q. In your later years, do you know of any lumber being brought down New River, not when you were a boy, but later on?

A. Yes, sir; I have seen lumber brought down New River.

Q. On what kind of craft?

A. Something like a keel boat.

That is a boat which they run by poles and a paddle at the end to guide it. I don't know how long it was, maybe thirty feet more or less. I have seen lumber come down on it, but I could not say whether I have seen lumber come down on it more than once or not. I seen ties come down once. I was down here at New River Depot when they passed. I have no idea where they come from. I just seen them on the boat. I don't know whether the boat was tied at the wharf at New River Depot or not. The ties were on the boat and it was standing there anchored at the wharf. This was the same boat I was speaking about. I don't know how many men it took to operate it. There were always several men with it. I believe I was about nine years old then. It was along after I came to Radford. I came here when I was seven. I am fifty-nine years old the seventeenth of April.

Q. You were born about '75 or '76, then this would be in the early eighties, would it not, when you saw this boat?

A. In my childhood days.

Q. It was a year or two after you came to Radford?

A. I could not recall just how long it was.

Q. How long, would you say, two years after you came here?

631 Q. Do you recall saying awhile ago it was some two or three years after you come down here?

A. I said something about two years. I could not recall.

Q. You were seven when you came down here?

A. It might have been just after I came here; I know it was when I was a small boy.

Q. Somewhere between the age of seven and ten years?

A. I could not say how long it was after I got to Radford, because it may have been a year or may not have been that long, or it might have been two. I can't recall.

The witness on Cross-Examination testified as follows:

Q. I understood you to say you remember seeing two of these bateaux in your time?

A. No, sir; I seen another little boat here. You mean two of them boats?

Q. Yes.

A. I recollect one keel-bottom boat.

Q. I understood you to say that was launched about 3 or 4 miles above the mouth of Little River at Graysontown?

A. No; I didn't say it that way; I said I seen one put in there by Mr. Craft. I don't know that was the same boat or not; that was before I come to Radford.

Q. That one you saw put in there was about four miles above the mouth of Little River?

A. Something like that; yes, sir.

Q. Mr. Ratcliffe, do you know where the dam site is with reference to Little River?

A. Yes, sir.

Q. Was this above the site of that dam?

A. Yes, sir.

632 Q. So the dam is between the place where this first boat you mentioned was placed in the river and New River; is that right?

A. Yes, sir; the dam is right about a quarter or half a mile from the mouth of Little River and this was about four miles up.

Q. And it was Little River in which that boat was put?

A. Yes, sir; the boat I seen put in there when I was a boy.

John Likens, by deposition, on Direct Examination testifie as follows:

I reside in the east ward of the City of Radford; that is, Eas Radford. I came here in 1862. I will be eighty-one the thirteenth of February. I have lived here practically all my life I built a house here forty-three years ago and I am living in i today. I am fairly familiar with this New River which runs b Radford. I see it all the time.

Q. State whether or not you recall seeing men working o New River some fifty or sixty years ago?

A. Yes, sir.

They began working down here at Dudley's Ferry and worke up the river. Dudley's Ferry is right down below the stat highway bridge. That ferry has been there ever since I can firs remember. It was used as a ferry from the time I first cam here until they got a state bridge across, about thirty-eight year ago. Before the bridge was put across they used this Dudley' Ferry. The only other way to get across the river was to for it below the falls which were five or six hundred yards belo the ferry. This was right below the falls. They used the ferr all the time until the bridge was put in, but not since, althoug little skiffs do pass back and forth as ferry boats since the bridg was built. Before the bridge was put up, they used a commo old ferry boat made out of timber which could take a two-hors wagon and automobiles across. In them early days they did no take automobiles. I have seen the ferry running back an
633 forth across there. They carried most everything th farmers had that was haulable—wheat, grain, plows, an everything. They used to send a few stock, that is, animal across in the ferry boat if they didn't go up to the ford and driv them across. I suppose that merchandise went across in tw horse wagons. I have seen such wagons on the ferries about a much as you did back in the country where people used to tran port in two-horse wagons. The cows and things taken acros on the ferry came from the side to the railroad to the depo away back from Giles and everywhere. Farmers brought a their stuff in. Most all the stuff was shipped here to the depo and they come after it. Anything they shipped they put in th station at the depot and sent it East and to Philadelphia an Baltimore. The things they brought on the ferry were put o cars and shipped away.

I have seen men working on the river right down here belo the riffles of the falls as you call it. They were blasting out. saw them working nearly four miles up there.

In addition, I saw little keel-bottom boats on the river whic they pushed with a pole. They were twenty to thirty-five fe long and always had two men in the side pushing with poles when they went upstream.

Q. How would they come downstream?

A. I suppose in eddy water they would push it too.

Q. When you would see it how would it come down?

A. It would float itself, but that didn't last long, that channel filled up with gravel and stuff and didn't last a year. It filled up and didn't amount to anything.

I suppose it was the motion of the current that filled the channel. As long as the channel was open, boats rode up and down there for about twelve months maybe. These boats carried a little of everything. They hauled lumber, and they hauled some pig iron from away up the river down from this old mine across the river, and took a two-horse wagon and loaded it on cars and shipped it off north somewhere.

The pig iron which I saw come down come out of the furnace in bars about three feet long. That didn't amount to nothing, and the pig iron and the boating soon give out.
634
I don't think the capacity of those boats was over four tons. I think one might haul four tons. That would be my estimate now. The boats got this pig iron at some ferry away up the river here. I forget the name of the ferry. I did not go up the river to see it. I know that is where they got it.

The farmers would haul the lumber and other things down and sell to the people. They didn't haul over two or three wagon loads in a boat.

Q. Ever see any cross ties on these boats?

A. I have probably seen a few on the other side of the river, close to the railroad.

The river was a bad one for rafting. The rocks and falls would tear the raft all to pieces.

I knew a man by the name of Richard Gillam. He is the man who was in charge of the Government men in the work of cleaning out that channel.

It was way back yonder, over fifty years ago that these twenty-five and thirty-five feet boats carried pig iron and other things. I don't recall exactly what year it was.

I know a railroad called Cripple Creek. It goes southwest from Pulaski. I don't remember when it was built. Some of the iron ore which was hauled on it went to Pittsburgh, Pennsylvania.

C. E. **Roop**, by deposition on Direct Examination, testified as follows:

I will be 84 years old the 23rd of this month. I was born in Pulaski County a mile or two from Snowville on Little River. I have lived in the County all my life and on New River two or three years. I lived on New River two or three miles from the mouth of Little River on Captain Moore's place, which used to be the Old Cloyd place up above Have Howe's place. Then I lived on Dr. Clark's place up there. That is twenty miles upstream from here I think. It is five or six miles downstream from Allisonia. It is in there about Dalton.

When I lived at Snowville I saw keel bottom boats built there. I suppose they were fifty feet long and six or eight feet wide at the top. The bottom of these boats was sorter round. I
635 remember one of the workmen in the building of these boats was Joe Craft. He was the main man. He worked for Mr. Grayson and lived at Graysontown. I think old Johnnie Grayson had one or two made.

I seen them same boats on New River from Radford to Allisonia. I saw them right near Allisonia anywhere up there within a few miles, and I would see them come down the river. They were carrying pig metal mostly. I have also seen them carrying lumber and I think I have seen them hauling a little wheat and a little corn. I have seen them right here at Radford.

I have ridden on boats of this kind, and helped push them, too. I worked on them just a little. I would get on and help the boys push a little for pastime when they would pass. There was metal on these boats when I was on them. I don't know whether I have ever seen any logs on a keel-bottom boat. I have seen keel-bottom boats with metal and lumber and other things on them, but not logs.

I have seen rafts on the water but not on boats. I saw one raft of logs start up here above Captain Moore's. I helped put it in the river at Have Howe's place. It consisted of forty or fifty logs tied together. I got on and rode down river to Ingle's Falls, where the raft busted and I fell in the river and pretty nearly froze to death. There was snow on the ground. These logs were delivered to this old mill across the river. Ingle's Falls is a mile or two from here upstream and just above the pipeshop, I think. The raft broke up there. The logs were taken to the sawmill up on the bank of the river and sold there.

I think that the pig iron which I saw boated was made up there about the river hills, up there close to Allisonia, but I am not sure of that. I think there was a furnace in there.

I have been at Mack's Creek. There was a furnace at which I have seen pig iron being made. The pig iron that was made there ain't the pig iron that passed Clark's place up there. Mack's Creek is below there, below Allisonia, down the river. It is below where I lived. I don't know the name of the other furnace I mentioned. Allisonia is above Mack's Creek on the river. I don't know whether the other furnace which I spoke of was above or below Allisonia. It's in there close somewhere. I expect it was Boone Furnace.

636 The iron ore I saw come down here came to West Radford, I believe. I don't know. I said I got on and rode a little piece on the boat and walked back home—like a boy will walk a mile to get a ride for a half mile. I know that pig iron came down as low as the lower end of Dr. Clark's place—that is—at Jones' Ford. I know it came that far but I didn't come all the way with it. I rode that far.

There was no railroad between there and Radford then. They just commenced making it.

The witness, on Cross-Examination, testified as follows:

Q. Counsel for the other side asked you something about the boating of iron ore down the river. You never saw any iron ore boated on the river, did you?

A. I don't know that I seen iron ore.

I wasn't born on Cherry Branch, but I lived there pretty near it all my life. I was born right in the neighborhood there. It is fifty-four or fifty-five years since I lived on Dr. Clark's place. I lived there about eighteen months. During that time I saw pig iron boated.

Later I lived down river at Captain Moore's place. It went by the name of the Old Cloyd place. They used to call it Dunkard's Bottom. It's been forty-four or forty-five years since I lived at Captain Moore's place. I don't think I saw any pig iron boated when I lived there.

It was only during the period in which I lived on Dr. Clark's place and before that time that I saw pig iron boated on the river. They was boating some before I went there. When I moved up there I farmed on the river and was right on the river all the time. I think I saw four or five boats up there, maybe six. Not more than that. I don't think they made very many boats.

Q. Who operated those boats, do you recall?

A. Well, the ones I rode on and knowed the most about was Whitt Tate and Eddie Floyd. They was two darkies and there was another old darky who lived on the road back over to Hayne's Ferry. I forget his name. He is gone a long time ago.

637 I seen the boating being done at different times in the year—whenever they could get water enough to run the boats, I think. I have seen many times when my dogs could cross there and not get their backs wet. I was a hunter and hunted on both sides and when I would ford it the dogs would follow me.

I seen one boat broke in two on the river one day and they had a whole lot of trouble getting it out. They couldn't keep it in the sluice and there was a little tide and it hit a rock. I wasn't on that boat.

I never rode on one of those boats from up there to Radford. I just rode a little piece at a time on the boats. I would catch them along up the river somewhere about the mouth of Little River and get on and ride a little piece and get off and walk back. I don't think the boating kept up longer than just a few years—four or five years, I would say. I don't know that I know that.

I seen the boating when I lived on Dr. Clark's place. I seen the boats run as long as I stayed there. We come to Radford nearly every day and I would see them on the river going and coming when there was tide enough to run—every two or three days.

Q. You don't mean that the boating from Boone Furnace kept up for four or five years?

A. And I am remembering a long time back, too.

Q. You are not willing to say that the boating lasted four or five years, are you?

A. Well, there was a heap of it that lasted longer than that. There was boats on the river longer than that. Men got to trading on these boats and I think the boats was bought and sold maybe to different people—just for farmers and people who wanted them to do a little work for themselves.

Q. I am talking about the boating of pig iron from up above Allisonia. I believe you were lead into saying that it was from Boone Furnace by counsel for the Government. I want to know whether you mean that the boating of pig iron from Boone Furnace continued for four or five years?

638 A. I don't know whether that did or not, but as long as I was on Clark's place it come down the river.

Q. Which was in about 1881, wasn't it?

A. Well, you can count it yourself, count back from fifty-five and see—54 or 55.

The witness, on Redirect Examination, testified as follows:

I said the iron ore came from Boone's Furnace as I saw it going down the river. I know it come from there as long as I stayed there and then after I got away from there it might have come from Mack's Creek. I have seen it on the river up here. They had a furnace below there at Mack's Creek.

I didn't see the boat which I spoke of breaking in two, but I seen it on the riffle after it had broke. I heard that the men had trouble on the boat and seen it on the riffle before they moved it away. I think that is the only boat that broke that I ever heard of.

These dogs which I used to have for hunting were about knee high to a horse. I think my horses would cross there and not get their knees wet. I farmed the island down there at Jones' Ford and was down there from the time I went to plowing in the spring until I shocked my corn in the fall.

It was when the river was low that the dogs would cross the river. There were plenty of times when dogs couldn't get across without wetting their backs and horses couldn't get across without wetting their knees, but heaps of times they could.

Q. During the time when the water was high enough the boats would come down and go up the river?

A. I think so when there was tide enough to run them.

I testified that I would get on a boat at Little River and ride up New River, perhaps half a mile, and then I would get off on the bank anywhere it suited me at a good place to land.

The witness on Recross Examination testified as follows:

I have forded New River elsewhere than Jones' Ford. I forded up at Captain Moore's place and at the old Woolwine 639 place, which is in there below Have Howe's. I forded it right up there at Clark's old mill nearly a mile from Jones' Ford up the river and I would get in swimming water sometimes. There was no ford there but I would make one and sometimes I would get in swimming water for my horse. I have forded the river down at Ingle's Ford. I never forded the river at Allisonia.

The witness, on Redirect Examination, testified as follows:

Sometimes I would get in water in which my horse would swim. I don't think his feet could reach the ground, but he might have touched the ground with his feet once in a while. There were places at which I crossed where my horse actually had to swim and where I have pulled my clothes off and swam across. I got in swimming water at Clark's Mill. I also got in swimming water in fording up at Captain Moore's but I reckon I missed the ford.

(Exhibit 30, being photostatic copies of pp. 994–995, of "Index to Reports, Chief of Engineers, U. S. Army, 1866–1912," was offered in evidence.)

Defendant objected to the admission of Exhibit 30 on the grounds that the same was incompetent, immaterial and irrelevant.

(Exhibit 31, being photostatic copies of pp. 52–64 of Report of Secretary of War for year 1873–Vol. 2, including underlying reports of Major Wm. P. Craighill, N. H. Hutton, and C. R. Boyd, was offered in evidence.)

(Exhibit 32, being Moore and Briggs Report of 1819, was offered in evidence.)

(Exhibit 33, being photostatic copies of pp. 62–63, 331–332 of Report of Chief of Engineers of 1877, was offered in evidence.)

(Exhibit 34, being photostatic copies of pp. 69–70, 495–499 of Report of Chief of Engineers of 1878, was offered in evidence.)

(Exhibit 35, being photostatic copies of pp. 79–81, 530–545 of Report of Chief of Engineers of 1879, was offered in evidence.)

(Exhibit 36, being photostatic copies of pp. 107–108, 676–681 of Report of Chief of Engineers of 1880, was offered in evidence.)

(Exhibit 37, being photostatic copies of pp. 144–145, 904–911 of Report of Chief of Engineers of 1881, was offered in evidence.)

(Exhibit 38, being photostatic copies of pp. 140–142, 912–919 of Report of Chief of Engineers of 1882, was offered in evidence.)

(Exhibit 39, being photostatic copies of pp. 144–145, 699–705 of Report of Chief of Engineers of 1883, was offered in evidence.)

(Exhibit 40, being photostatic copies of pp. 149, Part I, and 928, Part II, of Report of Chief of Engineers of 1884, was offered in evidence.)

(Exhibit 41, being photostatic copies of pp. 287–288, Part I, and page 1859, Part III, of Report of Chief of Engineers of 1885, was offered in evidence.)

(Exhibit 42, being photostatic copies of pp. 281–283, 1599–1602 of Report of Chief of Engineers of 1886, was offered in evidence.)

(Exhibit 43, being a photostat of a typewritten copy of pp. 302–303, 2430–2433 of Report of Chief of Engineers of 1891, was offered in evidence—with asterisks being added at the request of the defendant at page 17–c of the Exhibit after the offer of the exhibit by the plaintiff, to show the omission of one paragraph from the exhibit, which omission the exhibit as offered by the plaintiff failed to show.)

(Exhibit 44, being photostatic copy of p. 379, Part I, of Report of Chief of Engineers of 1897, was offered in evidence.)

(Exhibit 45, being excerpt from "The River and Harbor Appropriation Act" of June 13, 1902, was offered in evidence.)

(Exhibit 46, being a letter dated February 19, 1913, from the Secretary of War to Congress transmitting the Altstaetter, Rossell and Bixby reports re examination of New River from Radford, Va., to Hinton, W. Va. (House Document 1410—62nd Congress, 3rd Session—1912–13), was offered in evidence.)

(Exhibit 47, being a letter dated April 18, 1913, from the Secretary of War, in response to a resolution of the Senate of April 8, 1913, and copies of all papers, correspondence, rulings, permits (without maps), etc., of record in the Department pertaining to the construction of dams or reservoirs by private parties in New River, Va. and W. Va., was offered in evidence.)

By Mr. Baker. If this is a convenient time I would like to bring up a matter about which we are necessarily concerned on our side. I wrote to the Secretary of War and asked him to make available some engineers, officers, the District Engineering Officer and his predecessor. I received in reply a statement from him that he could only do that upon a request from your Honor, and I asked your Honor to make that request, and I am told a reply has been received, which at least negatives a part of the request. I don't know what the answer to your Honor is, but it is important to us, in the preparation we have to make to meet the plaintiff's case, to know how far we have to go, and I thought perhaps if your Honor would indicate to us what limitations the Secretary of War has felt necessary to put upon the attendance of these witnesses, perhaps counsel on the other side might take it up with the Secretary of War, through the Attorney General, and supplement our request.

By the Court. I didn't read the letter I received with any great care, but it is my impression there are no limitations or conditions in the letter at all, but simply the Secretary expressed the view it was not fitting that officers of the U. S. Government should testify on behalf of an adverse party in a suit in which the Government was a party. That is what I understand his letter to mean, and he declined to make them available. The letter is somewhat lengthy, but I think that is the substance of it. I will let you look at the letter. (Letter handed by the Court to Mr. Baker and Mr. Thompson.)

By Mr. Baker. Perhaps we might consider this and bring it up again if we have any further suggestion to make a little later.

By the Court. All right.

By Mr. Gatchell. In this case, one phase of the Government's case rests upon the variations of the flow occurring in New River, and the Kanawha River. An experiment was conducted in 1930 dealing with variations in the flow of New River and the Kanawha River, and for the purpose of presenting the basic facts, we desire to introduce at this time certain charts which are the bases upon which subsequent testimony will be presented by expert witnesses. I make this brief explanation so the nature of the presentation may be a little more intelligible affecting the subsequent record.

640 **William Kessler**

Direct Examination by Mr. Gatchell:

Q. Will you state your name and address?

A. William Kessler, 13 Curry Street, South Charleston.

Q. What is your occupation?

A. District Engineer of the Geological Survey.

Q. How long have you been District Engineer of the Geological Survey?

A. Since June 1929.

Q. In what territory have you been located; what does your territory embrace?

A. The State of West Virginia, and the Ohio River basin, which includes the Kanawha River.

Q. In what state?

A. West Virginia.

Q. Were you District Engineer in charge of this territory in the year 1930?

A. Yes; I was.

Q. I show you a chart marked for identification Government Exhibit #48, entitled "Kanawha River at Kanawha Falls, West Virginia, January 24, 1930 to March 11, 1930." Was that secured under your supervision?

A. It was.

Q. What do the vertical lines or the ordinates represent on this chart?

A. The vertical lines represent the gauge height or elevation of water surface above an arbitrary datum.

Q. What do the horizontal lines represent?

A. Time.

Q. How was this chart prepared?

A. This chart was prepared by a recording instrument in the field, which operates automatically.

Q. Was the entire process mechanical?

641 A. Yes, sir; except the clock has to be wound up at regular intervals.

Q. And where was that recording instrument located?

A. This instrument was located in a well on the river bank at Kanawha River at Kanawha Falls.

Q. Do you know this is a chart taken from the gauge at Kanawha Falls?

A. It is.

Q. What, in brief, does this chart purport to show?

A. This chart records the elevation of the water surface above the arbitrary datum for the period January 24, 1930, to March 11, 1930.

Q. I notice on this chart straight pencil lines drawn between certain points on practically every day, overlapping the curved pencil lines. What does that represent?

A. They were drawn in the office after the chart was removed and was our office method of computing the mean gauge height for the day.

Q. What was the curved line put on there to represent?

A. The actual graph drawn by the instrument.

Q. I notice pencil figures at the bottom of this chart just above the date. What do those pencil figures represent?

A. Those pencil figures represent the mean gauge height for each day.

Q. There are penciled notations and ink notations on this chart appearing vertically on the chart; what do those notations represent?

A. Those are field notes made when the instrument is either set at the beginning of the record or sometime during the record when it is inspected.

(Exhibit 48 offered in evidence.)

Q. Does that chart approximately show the stream flow of the Kanawha River at Kanawha Falls?

A. It shows the gauge height.

Q. I show you another chart entitled "Kanawha River at Kanawha Falls, West Virginia, dated March 11, 1930, to April 5, 1930," and ask you if that was prepared under your supervision?

642 A. It was.

Q. And is it similar to the chart which you have just identified?

A. Yes, sir; it is similar and just continued it, for the next period.

Q. Was the method of preparing that the same method as that of preparing the other chart?

A. Yes, sir; identical.

Q. And simply continues for the period following the one for the preceding chart?

A. That is right.

By the COURT. Those charts, as I understood it, Mr. Kessler, simply undertake to show the water level at Kanawha Falls, the height of the river we will call it?

A. That is right.

By the COURT. From day to day and I suppose from hour to hour?

A. Yes, sir; a continuous line.

By the COURT. Over the period the chart purports to cover?

A. Yes, sir.

By the Court. It doesn't undertake to deal with the volume of flow in the river?

A. Not at all.

Q. What is the time interval shown on this chart?

A. What do you mean by that?

Q. How much time elapses between each of the vertical lines?

A. The time scale of 2.4 inches per day for twenty-four of these spaces, so each space is one hour.

By the Court. The paper you use is divided by inches into ten?

A. It is 2.4 inches between the midnight and midnight lines, divided into twenty-four hours. Each one is $\frac{1}{10}$ of an inch.

(Said chart, exhibit 49, offered in evidence.)

643 Q. I show you a chart entitled "New River at Caperton, West Virginia, dated January 25, 1930, through March 10, 1930," and ask you if that was prepared under your supervision?

A. It was.

Q. And where was the gauging station located from which that chart was made?

A. This was located just across the river from Caperton.

By the Court:

Where is Caperton?

A. It is about ½ mile upstream from Elverton, that is the nearest town, roughly about ten miles above Hawks Nest Dam, upstream, as far as I remember.

Q. Does that place it in the gorge?

A. Yes, sir; right in the gorge.

Q. Were the methods used in preparing this chart similar to the methods used in preparing the two preceding charts?

A. Yes, sir; the same type instruments used.

Q. And same notations made in your office?

A. Yes, sir; same notations in the office.

Q. Are there any corrections on this chart?

A. No corrections to be applied on this chart.

(Said chart, exhibit 50, offered in evidence.)

Q. I notice on Exhibit #50 pencil notations "OG 3.5 1:35 PM IG 3.47 2–16–30 Rex E.B." Will you explain that notation?

A. That is—OG 3.5 means outside gauge reading 3.5 feet, IG is inside gauge reading 3.47 feet, and the correct time by his watch was 1:35 PM, date February 16, 1930, and Rex E. B. was the name of the man who inspected the chart. I don't recall his name.

Q. What would you understand from such notation?

A. That was a field inspection of the recording instrument to see if it was operating properly, and to determine what the corrections should be at that point.

. Are periodic or irregular inspections made of these
stations?

A. They are irregular.

Q. Is a notation made on the chart every time it is in-
ted by a field inspector?

. I would say practically every time.

. Now there are also pencil notations on Exhibit #50 appear-
in particular in the period from March 7 through March 10,
he upper portion of the chart. Do those pencil figures have
significance?

. Those pencil figures are office computations to show the mean
harge for the day. The mean height does not give the mean
harge for the day so we have to divide the day up into a
ain number of periods to get the average discharge.

. Immediately under the curved line appear pencil figures.
at do those indicate?

. Those represent the mean *guage* height for the day.

. Do they represent the stream's flow?

. No; they do not.

. In order to interpret these figures shown at the top of the
e in columns, what do they mean with respect to any one day,
you show that?

y Mr. GATCHELL. Counsel for defendant suggest that it might
asier to simply state with their consent we are not offering to
ve any stream-flow records by these charts, and I was trying
how by Mr. Kessler these figures given on the top of the
t, while they may be stream-flow figures, you would have to
hrough the computations to determine them, and he is not
mpting to do that.

y Mr. JACKSON. Those figures are not included in anything
vn by these exhibits?

y Mr. GATCHELL. That is right.

. I show you an exhibit marked for identification Government
ibit #51, entitled "New River at Caperton, West Virginia,
March 12, 1930, to April 4, 1930." Was this chart prepared
r your supervision?

It was.

Is it similar to the chart you have already explained?

It is.

What does it purport to show?

This shows the elevation of the water surface above an
rary datum at Caperton.

I notice on this chart a solid pencil line traversing the chart
horizontal direction, and a broken line on the reverse side of
chart. Will you explain what that broken line indi-
?

645 A. Well, I think I had better start with the solid line. This recorder was set at eleven o'clock on the 10th of March, and it drew a graph until about noon of the 11th, then the mechanism got out of order and the paper apparently stood still while the clock still ran, and it did not draw a true graph as far as time was concerned, but did as far as gauge height was concerned, and I have inked in on the back of the record my interpretation of the true graph as it would have been drawn.

By the COURT. How long did it stay out of order?

A. It stayed out of order until the 12th of March; no, until the 14th of March.

Q. Do I understand that during this period the gauge was out of order, the correct elevation of the stream as recorded at the gauge was shown on this chart, but the time interval was not correctly shown?

A. That is right.

Q. And what were you correctionns designed to do?

A. My corrections were designed to show the true graph as it would have been drawn had the instrument not been out of order with respect to time.

Q. There appears on here, above the date, March 14, an ink notation reading, "Note-Record NGA to G Graph reconstructed through A prime, C prime, d. prime, d prime, f, prime, g. prime." By whom was that note made?

A. I wrote that.

Q. At what time did you write that note?

A. At the time I drew this graph in on the back.

Q. Were there any other corrections appearing on this chart?

A. No; no corrections due to errors of the instrument. Another point, on the 18th of March the recorder again went out of order, the same reason, and it was correct again on the 20th, and I reconstructed that graph also in the same manner with the dashed line on the back.

646 Q. Were these corrections made shortly after the graph was removed from the *guage*?

A. I don't recall just how soon it was.

Q. Was it in a month or six weeks or two months?

A. Now, I could not answer that because we do not work up our records as a rule until sometime after the records are removed.

Q. Was it worked up in 1930?

A. It was worked up in connection with our computations of our 1930 progress report.

Q. When was your 1930 progress report submitted?

A. Probably about March 1930.

A. And to whom was that progress report submitted?

A. That is submitted to the Washington Office of the Geological Survey.

Q. I note at the end of this chart a statement, "5.10 intake plug out 4.60 clock stop added by WK, Pen 5.13 MTT intake flushed." What does that notation mean?

A. That was field inspection by Mr. Thompson, and he found the intake pipe was plugged so the gauge inside the well did not read the same as the gauge outside, and he flushed it with the flushing mechanism we have in the well.

Q. How did that affect this graph?

A. Why I had to estimate the gauge height as it would have been drawn for that one day.

Q. And how did you estimate that?

A. In this case it was drawn in, you might say, by experience, and also by the maximum and the minimum gauge height as drawn by the pencil which left its trace here.

Q. And upon what basis did you estimate the correct reading of that gauge did you use any other gauge or figures?

A. As I recall, we didn't make any corrections due to that
intake pipe being plugged up, because it meant it was just
647 lagging slightly, it wasn't completely closed, but just a
slight lag in this record.

Q. Mr. Kessler, in computing stream flows do you use these gauge-height readings you have just described?

A. Yes, sir; we do.

Q. And what other figures do you have to have in order to determine the flow of a stream?

A. We have to make discharge measurements. The usual manner is to use a current meter.

Q. Is there any other chart you have to have for the purpose of computing stream flow?

A. Yes; we have to determine the rating curve for that station.

Q. What is that?

A. A graphical representation of the relation between the gauge height and the discharge.

Q. I show you a chart entitled "Rating curve of Kanawha River at Kanawha Falls, West Virginia," on which appears several curves. Will you explain what the vertical lines mean on this chart?

A. The vertical lines are the gauge heights or elevation of the water surve above the arbitrary datum.

Q. What do the horizontal lines represent?

A. The discharge in second feet.

Q. I show you a curve on here entitled "1928 to September 30, 1931," and ask you what that curve represents?

A. That curve represents the average curve drawn through our discharge measurements, and which was used for the period 1928 to September 30, 1931, to determine the discharge.

Q. Would you mind illustrating for the purpose of the Court the manner of use of this rating curve, how you use it?

A. The curve is drawn to average all our discharge measurements. After we determine the curve, the figures are tabulated into a form of rating table, and the rating table is used to determine the discharge.

648 Q. In conjunction with the charts you have previously explained showing the variations in the elevation of the river, what use would you make of those charts and this rating curve to determine the stream flow?

A. The mean gauge height determined from the recorded charts is used to determine the discharge from this rating curve.

Q. From what elevation does this rating curve start, and to what elevation does it go?

A. This curve starts at the gauge heights of minus one foot and goes to an elevation of twenty feet.

Q. And show the rating curve between minus one foot and an elevation of twenty feet?

A. Yes, sir.

(Said chart, exhibit 52, offered in evidence.)

Q. I show you a chart entitled "Rating Curve for New River at Caperton, W. Va." And I ask you if that was prepared under your direction.

A. It was.

Q. Is that chart similar to the one you have just testified about at the Rating Curve to the Kanawha River and Kanawha Falls?

A. Yes, sir.

Q. Was this prepared in a similar manner?

A. In the same way; yes, sir.

Q. Does this purport to show the same facts for New River at Caperton, as shown for Kanawha River at Kanawha Falls, by the preceding chart?

A. Yes, sir.

(Said chart, exhibit 53, offered in evidence.)

Q. I show you a paper entitled "Rating Curve for New River near Hinton, W. Va." Was this prepared under your direction and supervision?

A. Yes, sir.

Q. Does it purport to show for New River near Hinton the same rating curve at for New River at Caperton, W. Va., as shown by the preceding chart?

649 A. Yes, sir.

Q. What section of New River is shown on this rating curve?

A. That is a section at Pack's Ferry.

Q. At Pack's Ferry?

A. Yes, sir.

Q. Would you spell it?

A. P-a-c-k-'-s.

Q. I don't know whether I ought to leave that as an exhibit or not, but I now do so, as the Government Exhibit No. 54.

(Exhibit 54 offered in evidence.)

Q. I show you two sheets of paper, marked for identification as the Government's Exhibit No. 55, entitled "Rating Table for the Kanawha River at Kanawha Falls, W. Va., from October 27, 1928, to September 30, 1931," and I ask you if these tables—if that table was prepared under your direction and supervision.

A. It was; yes, sir.

Q. And what does that table purport to show?

A. This table is a tabulated rating curve; it is a rating curve put in tabular form for convenience and use.

Q. Instead of looking at the rating curve to determine the discharge of the Kanawha River at Kanawha Falls, you would look at this rating table and get the same information?

A. Yes, sir.

Q. Is it any more accurate than the rating curve?

A. I would not say it is more accurate, but it is more convenient, because if we were to use the rating curve, it would soon wear out the curve, and this table can be made into group form and we get the same figures every time for the same gauge height, but in the curve you might get something slightly different.

Q. Did you use this rating table in your office?

A. Yes, sir.

Q. I show you two sheets marked "Plaintiff's Exhibit 56" entitled "Rating Table for New River at Caperton, W. Va., November 20, 1928, to September 30, 1930." Was that prepared under your direction or supervision?

650 A. Yes, sir.

Q. What does that purport to show?

A. This is the same as the previous table, showing the tabulated relation between the gauge height and discharge as taken from the Rating Curve.

Q. And it is similar to the one just presented for the Kanawha River at Kanawha Falls.

A. Yes, sir.

Q. Was this table used in your work as District Engineer on the Geological Survey.

A. Yes, sir.

Q. I offer this in evidence.

(Exhibit 56 offered in evidence.)

Q. I show you four sheets of paper, marked for identification as Government Exhibit No. 57, and entitled "Rating Table for New River near Hinton, W. Va., from October 1, 1929, to September 30, 1934, and from December 1, 1923, to ——————., and from December 1, 1923, to September 30, 1929, and I will ask you if these were prepared under your direction and supervision.

A. I will have to modify that. The first sheet was not prepared by me—the first sheet was prepared in 1926 in the Washington office.

Q. Do you mean the first sheet or the last sheet?

A. This is the one that I call the first—it is the earliest in date. I might say that the fourth sheet was prepared in the Washington office, and the third sheet also was prepared in the Washington office, and the second sheet was prepared in the Washington office, and in 1930, I revised the rating curve and prepared a new one covered by the notes on those sheets—which merely uses parts of the other tables.

Q. From what data did you prepare this revision?

A. From the discharge measurements made during 1930, based on measurement 17 of the curve.

Q. Does this rating table apply to the rating curve presented as Government Exhibit No. 54 for the rating curve on New River at Pack's Ferry, W. Va.?

651 A. Yes, sir.

Q. And has this table been used by you in your official capacity?

A. Yes, sir.

(Exhibits 51, 55, and 57 offered in evidence.)

Cross-Examination by Mr. Jackson:

Q. Mr. Kessler, were these discharge measurements made by current meter?

A. Yes; all discharge measurements were made by current meters.

Q. Is there a factor of error in a discharge measurement made on the current meter.

A. Yes, sir; there is, in the very best machinery there is some percentage of it.

Q. In that phase of it in the current meters.

A. Yes, sir; there is always bound to be some.

Q. Are you able to say about what percentage of error is in a single measurement—discharge measurement with the current meter.

A. It varies considerably.

Q. Within what range would you say it varies?

A. I would say they vary over five percent—if it was over five percent, we would discard the measurement.

Q. How would you know it was over 5%?

A. By using an average series of measurements.

Q. You mean that if you took a series of measurements and you found that some of these measurements varied over 5%, above or below the average that you would discard these measurements.

A. We might under certain conditions; in others we would not. It depends on the local conditions at that gauge station.

Q. There would have to be a range of 10% before you would discard the measurement.

A. Yes, sir.

Q. And you might use measurements which deviated from the average more than 5%.

652 A. Yes, sir; in several places.

Q. And you frequently do that.

A. Yes, sir.

Q. And when you make a rating curve, you simply plot on a sheet of paper the number of discharge measurements it records.

A. That is right; yes, sir.

Q. And then you draw, in accordance with your judgment, a smooth curve through these points.

A. Yes, sir; that is it.

Q. And some of these measurements may lie considerably to one side or the other in the smooth point.

A. Yes, sir.

Q. The smooth curve, rather.

A. Yes, sir.

Q. How often do you change your rating curve?

A. We don't change it, if the plot is on one side and then on the other. We call that checking the average curve. If we see they are consistently on one side, we would make a revision in the curve.

Q. Why would you make a revision—what would cause these measurements to vary consistently to one side?

A. Better apparatus developed in the last few years is the main cause.

Q. The cause is that you have detected an error in your old rating curve, isn't it?

A. There probably hasn't been enough measurements to define the average curve.

Q. It would take, as a matter of fact, a great many measurements to define a rating curve with prevision, wouldn't it?

A. It would on some stations, not all.

Q. And you ordinarily, on a rating-curve chart, don't have as many as fifty measurements, do you?

A. It depends on how many we have made—numbered, you see.

Q. You said that this rating curve, as I understood it, aimed to cover a range from one below datum to twenty above datum, at Kanawha——

653 A. At Kanawha Falls.

Q. Did your discharge measurements cover that entire range?

A. The last measurement is minus .65 and the highest one, I don't know that it appears on that sheet, but it is on my list, and it goes to 20½.

Q. Ordinarily the number of discharge measurements, at the intermediate stage or stages is greater than the number of measurements at low or high stages?

A. Yes, sir.

Q. And, therefore, the ordinary degree of accuracy of a rating chart curve is greater at intermediate stations than others.

A. I would think so.

Q. What is meant by control in stream measurements?

A. And control?

Q. Yes, sir.

A. Control could be defined as a riffle below the gauge and some obstruction which will regulate the flow of water.

Q. Does that ever particularly change?

A. This control changes frequently.

Q. Does that modify a rating curve?

A. Yes, sir.

Q. And then you have it corrected.

A. Yes, sir; we make frequent changes where the control what we call shifts.

Q. Would you say frequently—possibly as much as two or three times a year.

A. Usually floods will cause control to change, and we have made two or three changes a year on the rating curve.

Q. Is that likely to result from spring and fall floods on the average streams such as there is in this territory?

A. I would not say spring and fall; they might occur any time; there is no definite time for that in this part of the country.

654 Q. That is true. There is no definite time for floods. You introduced here a number of exhibits of graphical representations of gauge heights, at Kanawha Falls and Caperton, W. Va.

A. Yes, sir.

Q. I understand that they were made by a continuously recording gauge at this particular location?

A. Yes, sir; they were.

Q. How long has there been a continuously recording gauge at Kanawha Falls?

A. I would have to refer to one of the publications to get the exact date, but I believe in the fall of 1928.

Q. Can you now recall how long there has been a continuously recording gauge at Caperton, W. Va.

A. If I remember, about the same period—November 1928.

Q. Are there other gauges operating at Kanawha Falls concurrently with the gauge, the records of which you have produced here?

A. Not a recording gauge.

Q. What gauges are there?

A. What they call the navigation gauge, used by the Weather Bureau at 1,000 feet up stream, called the staff gauge.

Q. Is there any other that you know of?

A. Not that I know of.

Q. Was there any gauge at Kanawha Falls before the installation of this continuously recording gauge in 1928?

A. I would like to refer to my records to get the exact figures on that.

Q. I am not asking you for figures.

A. There was a series of station gauges operated since 1877 and 1878.

Q. At Kanawha Falls?

A. In the Kanawha Falls vicinity.

Q. Is that true at Caperton?

655 A. No, sir; the first gauge was put in in 1928.

Q. And there was no gauge there before that of any kind.

A. No, sir.

Q. How were the records read at Kanawha Falls before 1928, if they were read or kept.

A. There were station gauges read probably once or twice a day.

Q. By whom?

A. By the local observer.

Q. Your department would employ some farmer residing in the neighborhood to read the gauge?

A. At Kanawha Falls, I think we had an official weather bureau observer.

Q. Are you sure of that?

A. Our publication gives the whole history.

Q. He was a farmer paid by the Weather Bureau, wasn't he?

A. I don't know whether he was a farmer or not. I doubt it.

Q. Were there any charts kept that you know of before 1928 at Kanawha Falls?

A. No recording instruments were there at all.

Q. No chart was prepared daily by hand and kept there.

A. None that I prepared.

Q. Or that you know anything about?

A. No, sir; I don't know anything about it.

Q. Do you know what was the relative accuracy of the records at Kanawha Falls—the gauge records before the installation of the continuously recording gauge in 1928 and afterwards.

A. No, sir; I never figured it.

Q. Am I right in understanding that these exhibits 56 and 57, described as rating tables, are simply read off of the smooth curve appearing on the charts received in evidence at rating curves?

A. Yes, sir; they are read off the smooth curve and smoothed out to get each smooth curve, before we can read it. We allow a one percent change at any point.

656 Q. You first select figures from points on the rating curve?

A. Yes, sir.

Q. And then you again adjust those and interpolate them?

A. Yes; adjust it slightly.

Q. And make a smoother curve?

A. Yes, sir.

Q. It is smoother than the one on the rating chart?

A. I would not say that; it is very smooth, but we cannot read it accurately, consequently they are asked to read within one percent.

Redirect examination by Mr. GATCHELL:

Q. The matter was called to your attention about Exhibit No. 52, being the rating curve for Kanawha River at Kanawha Falls, and you were asked if the rating curve shown on there for the period 1928 to September 30, 1931, has been varied since that curve was drawn on that chart.

A. Yes, sir; we have drawn a new rating curve since 1931, beginning October 1, 1931, based on subsequent discharge measurements; and that has been again revised, based on still later measurements.

Q. And can you approximate the percentage of correction of the original curve?

Q. Has it been modified on the exhibits?

A. The dates are shown here when each curve was used and new curves have been drawn on this exhibit.

Q. They have?

A. Yes, sir.

By Mr. GATCHELL:

Q. Can you approximate the percentage of correction shown on the chart, on the curve for 1928 to September 30, 1931?

A. You could not approximate it in percentage, because it varies from zero to a maximum and then it goes back to zero again.

Q. What is the maximum?

A. That is hard to determine offhand. That would have to be worked out to find where the maximum is. It is about
657 eight percent and a gauge height of 18 feet.

Q. It is about eight percent and a gauge height of 18 feet—that is about the percentage of correction shown on the chart, is it?

A. Yes, sir; at that point.

Q. Are these charts used in the work of the Geological Survey?

A. They are; yes, sir.

Q. Was it considered reliable?

A. Yes, sir; they were.

RECROSS-EXAMINATION

Q. Are they prepared in the regular course of the work of the Geological Survey?

A. Yes, sir; in the regular course of the work of the Geological Survey.

By the Court:

Q. You are the resident engineer for the Geological Survey?

A. I am District Engineer in West Virginia.

DIRECT EXAMINATION

Q. Mr. Kessler, I show you a chart entitled "New River, Eggleston, Virginia, July 4 to July 21, 1936," and will ask you if you recognize that paper?

A. Yes, sir; this is the chart that I removed myself from the gauging station at Eggleston.

Q. I show you Govt. Exhibit 121, a blueprint, and will ask you if that is a blueprint of this original chart?

A. Yes, sir; it is.

Q. What does this chart purport to show?

A. This chart shows the elevation of water surface above the arbitrary datum at the gauging station at Eggleston, Virginia, for the period of July 4th to July 21, 1936.

Q. Was this chart obtained from a mechanical recording gauge?

A. Yes, sir; it was.

658 Q. Was it similar to the gauge height chart that you testified to on your previous appearance in this case?

A. It is the same type of recorder but made by another manufacturer.

Q. It is the same kind of recording gauge?

A. The same type of recording gauge.

By the COURT:

Q. Does that purport to show the elevation of the stream?

A. The elevation of the water surface above the arbitrary datum.

By Mr. GATCHELL. If Your Honor please, in order that we may return the originals, may I ask leave of the Court to introduce as Exhibit 121 the blueprint of this original chart?

By the COURT. Very well, you may do so.

By Mr. GATCHELL. I now desire to offer this blueprint in evidence.

(Said blueprint, exhibit 121, offered in evidence.)

Q. I show you chart entitled "New River, Hinton, West Virginia, July 6 to July 21, 1936," and will ask you if you recognize that chart?

A. Yes, sir; I removed that chart personally.

Q. From what place did you remove it?

A. From the gauging station on New River near Hinton, W. Va.

Q. Is this station the station commonly known as Pack's Ferry?

A. Yes, sir; it is.

Q. And was this chart made by the mechanical recording gauge?

A. Yes, sir.

Q. What does it purport to show?

A. This shows the elevation of the water surface above the arbitrary datum.

Q. At Hinton, West Virginia, during July 6 to 21st, 1936?

A. That is right.

Q. I show you Government Exhibit 122, a blueprint, and will ask you if that is a correct blueprint copy of this chart?

A. Yes, sir; it is.

659 Q. What is the time interval between Eggleston, Virginia, and Hinton, West Virginia, in the flow of the water?

A. I do not know.

(Exhibit 122 offered in evidence.)

Cross-examination by Mr. **Jackson**:

Q. Referring to Plaintiff's Exhibit 121, can you tell me what the scale is?

A. Is that the Eggleston record?

Q. Yes.

A. The gauge height scale is 2 inches to the foot.

Q. There is no scale shown on this exhibit, is there?

A. I did not put the scale on, but there is enough evidence to show the scale is there and what the scale is, and what the datum is.

Q. Can you tell us what zero is or what line shows zero or represents zero on the chart, Exhibit 121?

A. The base line is one foot, and the top line is six feet.

Q. The base line is one, at the bottom of the chart?

A. Yes, sir.

By the **Court**:

Q. The paper that you hold in your hand was taken from the recording instrument itself?

A. Yes, sir; from the recording instrument.

Q. If there was a rise in the river of about 6 or 8 feet, would that instrument record it?

A. Yes, sir; when the pencil reaches the top marginal line it automatically reverses and goes in the other direction for the higher stages of the river.

By Mr. **Jackson**:

Q. Do these gauge heights on Exhibit 121 refer to the most recently published rating for that station?

A. I don't know.

Q. Do you know what the mean annual stream flow is?

A. No; I do not.

Q. Eggleston, Virginia, is not in your District, is it?

660 A. No, sir; it is not.

Q. I assume that it is customary for District Engineers in the U. S. Geological Survey to work back and forth from one District to the other?

A. Yes, we frequently change places like that if we are in that vicinity.

Q. You worked back and forth with Mr. Dirzulaitis in these matters?

A. Yes; we have done so. I might visit his district and he might visit mine, to inspect them. Of course, we could remove his record on request, or inspect it, on request, and he could inspect our record or remove it on request.

Q. Mr. Derzulaitis has the Virginia District which includes Eggleston?

A. Yes, sir.

Q. Who requested you to remove this chart?

A. Mr. Derzulaitis.

By the COURT:

Q. For my information only, when you want to determine the stream flow, the exact flow of the stream, does that come directly from the gauge or is it the result of a calculation after measuring the stream height?

A. First we have to make the current meter measurements with the current meter and get the rating of the stream and then when we know the gauge height we can determine the corresponding discharge.

By Mr. GATCHELL:

Q. I wonder if I might go a little further and see if we can get a clearer picture of that, and that is, what particular rating table, what part does that play in the calculation of the discharge?

A. The rating curve or rating table is used to determine the discharge at any instant during any hour or day.

By the COURT:

Q. Is there any formula worked out for that particular method, and then you apply that formula to the gauge reading?

661 A. I would not call it a formula, it is just the relation between the gauge height and discharge, just the figures.

By Mr. GATCHELL:

Q. That figure is obtained by measuring the stream flow with your measurement meter, and putting the mark on the graph, from which you later draw the smooth curve.

A. That is right.

By Mr. JACKSON:

Q. Is that a matter of precision or approximation?

A. It is not precision because there is a certain amount of error in any determination in the field, it is not an exact science.

Q. What you finally get is a number of measurements that will be plotted here and there on the graph when you apply them?

A. Yes, sir.

Q. And then in the exercise of your best judgment, you have to draw a smooth curve through those plotted points, which you will then take as your rating curve?

A. Yes, sir; that is right.

Q. And from that, you will work up or construct the so-called rating table?

A. That is right.

Q. And the fewer measurements the more likelihood of greater error in drawing your curves. Isn't that true?

A. That depends on the station and local conditions.

Q. If you had a large number of stream measurements platted on your curve, you would be more likely to be able to draw an accurate curve, than if you had only a few measurements platted?

A. Yes, sir; that is understood.

Q. And the relative accuracy of that sort of estimate varies between gauging stations?

A. Yes, sir; it does.

By the COURT:

Q. You spoke of it not as a formula but a relation which must be worked out and established for a particular point on a stream?

662 A. Yes, sir.

By Mr. JACKSON:

Q. And that relation varies from time to time?

A. Yes, sir; that will vary.

Q. And that is why you have got to keep constructing new rating curves as they get too far away from reasonable accuracy?

A. That is why we have to do continuous stream gauging.

Q. And of course, you may or may not gauge the changes as soon as they occur?

A. No, sir.

Q. Now I want to ask you about Exhibit 122. What is the scale of that exhibit?

A. That is the same scale as Eggleston, one to six, we call it, two inches to the foot.

Q. And the base line is one?

A. The base line is zero and the top line is five.

Q. And that is true of Exhibit 121, or not?

A. No, sir; there are no two alike.

Q. Which one is zero?

A. This one is zero on the base line.

By Mr. GATCHELL:

Q. Is this the customary method of making stream gauge measurements?

A. What do you mean?

Q. Is this the usual method of making stream-flow measurements?

A. I don't know what you want yet. They are made with the current meter.

Q. Is this the customary method of obtaining the depth of water on the stream?

A. This is the method used and that we use, the recording instrument, and we also use staff gauges, or chain gauges, or various kind of gauges.

By Mr. JACKSON:

Q. I hand you, Mr. Kessler, what purports to be a photostat of a chart of the automatic gauge at Kanawha Falls for the period of from July 6, to July 13, 1936, which I think you
663 offered to supply to us before, and will ask you whether you can identify that photostat as a photostat of the original chart?

A. Yes; that is a photostat of the original chart.

Q. And the original photostat is where; in your office?

A. I don't know where it is right now. It might be in my office or it might be in Washington.

Q. I suppose you have examined the original chart and you can identify this as a photostat of the original chart?

A. Yes, sir.

By Mr. JACKSON. I would like to have this chart just identified by the witness covering the gauge at Kanawha Falls for July 6 to July 13, inclusive, 1936, marked "Defendant's Exhibit 507" for identification.

Q. Did you put the scale on the chart marked "Exhibit 507" for identification?

A. It is a printed figure, it might be mine, and it might be most any engineer's.

Q. You do not have any recollection about that?

A. Several engineers use the same style of printing and you cannot identify them.

Q. Can you tell whether it was done by your office?

A. No, sir; I cannot tell where that was put on.

Q. Can you state whether the scale as shown on there is correct? Please examine it and say.

A. Yes; the scale is correct.

Q. And according to that scale, where is your zero mark?

A. Two inches from the bottom.

Q. And the scale then is what, two inches?

A. Yes; two inches to the foot.

664 **J. J. Dirzulaitis**

Direct examination by Mr. Gatchell:

Q. Please state your present occupation.

A. I am District Engineer in the Geological Survey and Chief Engineer for the State Conservation and Development Commission. I am also Chief Engineer for the State Conservation Commission of Virginia.

Q. What territory do you cover as District Engineer of the Geological Survey?

A. The State of Virginia.

Q. Does that include New River in the State of Virginia?

A. Yes, sir.

Q. I show you a sheet of paper, marked for identification Exhibit No. 58, entitled "Water Records at Glen Lyn for the week ending Saturday, March 15, 1930," and I ask if that was prepared under your direction and supervision?

A. It was.

Q. Is this chart similar to a chart which Mr. Kessler presented?

A. It is determined in the same manner by the same record.

Q. For what date?

A. The week ending March 15, 1930, and the data is from March 8 to March 15.

By Mr. Gatchell. May we enter the same stipulation with respect to this, Your Honor, that we purport to show nothing by this except the rating in the station gauges. No stream-flow figures are attempted to be shown by these charts, or these particular charts presented by Mr. Dirzulaitis. I offered this chart in evidence.

Q. I show you a sheet entitled "Water Records at Glen Lyn, Va., for the week ending Saturday, March 22, 1930," and ask you if that was prepared under your direction?

665 A. It was.

Q. And what does that purport to show?

A. It shows the flow—it shows the stages at Glen Lyn.

Q. For what period?

A. For the period from March 15 to March 22.

Q. 1930?

A. Yes, sir.

Q. I offer that in evidence as Exhibit No. 60 for the Government, which sheet is entitled "Water Records at Glen Lyn for the week ending Saturday, March 29, 1930." Is that continuous with the preceding chart?

A. Yes, sir.

Q. I show you another sheet entitled "Water Record at Glen Lyn for the week ending Tuesday, April 1, 1930." Is that a continuation of the preceding chart?

A. Yes, sir.

(Said chart, exhibit 61, offered in evidence.)

Q. Is there any time interval between the lines on that chart?

A. The time interval is 24 hours.

Q. And between each vertical line—between each two vertical lines, what time interval is it?

A. Two hours.

Q. I show you a chart marked as Exhibit No. 62 for the Government, New River at Eggleston, Va., March 11 to March 31, 1930, and ask you if that was a similar chart prepared under your supervision.

A. Yes, sir.

Q. And that is for New River at Eggleston, Va.

A. Yes, sir.

Q. I offer that in evidence at Exhibit No. 62.

666 Q. I show you Exhibit marked Exhibit No. 63 for the Government. entitled "New River at dam site 'A' at Radford, for the period from March 15, 1930, to April 1, 1930," and ask if that was prepared under your direction and supervision.

A. Yes, sir.

Q. Is that a similar chart for this dam site?

A. Yes, sir.

Q. Where is dam site "A" on New River?

A. It is just a little distance above Radford; I don't know the exact distance above the town there.

Q. Is it upstream from the Mouth of Little River?

A. Yes, sir; it is upstream from the mouth of Little River.

(Said chart, exhibit 63, offered in evidence.)

Q. I show you what has been marked as Exhibit No. 64 for identification for the Government entitled "New River and Allisonia, March 11 to April 1, 1930," and ask you if this is a similar chart for Allisonia.

A. Yes, sir.

Q. Was this prepared under your direction and supervision?

A. Yes, sir.

Q. The next is Exhibit No. 65, so marked for identification for the Government. I show you this chart entitled "New River to Ivanhoe, for the period from March 11 to April 1, 1930," and ask you if this is a similar chart prepared under your direction and supervision.

A. Yes, sir.

(Exhibit 65 offered in evidence.)

Q. I show you Exhibit No. 66, consisting of five pages, rating curves for New River to Glen Lyn, at Eggleston, at dam site "A" near Radford, Va., at Allisonia, Va., and at Ivanhoe, Va., and ask you if these rating curves were prepared under your direction.

A. Yes, sir.

667 Q. Are these similar rating curves to those explained by Mr. Kessler?

A. Yes, sir; they are.

Q. And were they prepared in accordance with instructions from the Geological Survey?

A. They were; yes, sir.

Q. Are they an approximately correct graph of the rating curves for the several stations shown?

A. Yes, sir; they are.

(Exhibit 66 offered in evidence.)

Q. Is the period of each chart shown on the face of the chart?

A. Each chart; yes, sir; each curve is dated for the period of use.

By Mr. **Gatchell**:

Q. The next exhibit is marked for identification for the Government as No. 67. I show you Exhibit No. 67 consisting of five sheets, entitled "Rating Table of New River at Glen Lyn, Va., from August 10, 1927; at Eggleston, Va., October 1, 1920, to September 30, 1931; at Dam site 'A' near Radford, Va., without date; at Allisonia, Va., from September 26, 1929, and at Ivanhoe from December 15, 1929," and I ask you if these rating tables were prepared under your supervision.

A. Yes, sir; they were.

Q. Do these rating tables show in statistical form or put in statistical form the rating curve just submitted?

A. Yes, sir.

(Exhibit 67 offered in evidence.)

Cross-examination by Mr. **Jackson**:

Q. You have introduced in evidence here certain *guage* records as exhibits 58 to 65 inclusive. Are there any corrections on those?

A. I don't know unless I examine them.

668 Q. I thought perhaps you might give me that from your recollection.

A. No, sir; I cannot.

Q. Will you be good enough to look at Exhibit No. 60 and state whether or not any corrections have been made?

A. Just what do you mean—to the graph or what—there are no corrections to the graph of this exhibit.

Q. Has there been any adjustment made in the interpretation of that graph or not?

A. There is a correction of minus .04, supposed to be subtracted from each guage height.

Q. Did you do that?

A. We don't subtract on here each guage height. I didn't check that. This chart was based on the discharge indicator, but to determine the daily discharge, we do not. This machine is set up to take care of that .04 correction.

Q. Who determines the correction that should be made?

A. One of the office force under my direction.

Q. And you don't know how or why he reached that conclusion?

A. Yes, sir.

Q. Why was that?

A. It was one of his own ideas, I suppose. It does not show on the chart.

Q. Do you want to revise your answer? You don't know why he made the correction personally, do you?

A. No, sir; because he left no trace of it here. There is no trace here of why he made the .04 correction.

669 Q. Is the same situation true with reference to the correction at the bottom of Exhibit No. 58? I don't know whether my question is clear. I am inquiring whether or not you know the reason for the correction made on the bottom of that exhibit. Did you shake your head?

A. No, sir; I didn't answer it yet. (Witness examines papers.) Oh, yes; I think what is shown here or interpreted here—he took this off a station guage and read 501 and the graph is interpreted to be read about 500—504 or 503—they possibly used it at 504, which makes minus three in the correction. That is where that correction came from, and I suppose that he interpreted that to mean the same as this chart, and his station reading of 344—the pencil stops at 348, and that makes the .04 correction. That is where he got the correction.

Q. How did he know that the station guage should have read differently?

A. He didn't know. The office man did not know; he accepted this station guage reading put on by the observer and he interpreted that and he took the chart where the angle line ended and he interpreted that reading on the chart, which he subtracted from the reading of the station guage and gave that correction.

Q. It was a matter of interpretation and judgment by some one in the office?

A. Yes, sir.

Q. Look at Exhibit No. 61 and No. 59 and state whether or not they also show corrections and interpretations.

A. Exhibit 59 shows correction of minus .04.

Q. And Exhibit 61, does it show a correction?

A. 61 shows a minus .04 correction.

670 By Mr. JACKSON:

Q. Now, I show you Exhibit No. 63, consisting of four sheets and being the record at dam site, I think you said, and I ask you whether or not that correctly—whether or not I correctly interpreted these four charts here as showing a correction of plus .04.

A. That is right.

Q. Each of your exhibits cover a period beginning about the middle of March 1930. Was there anything unusual about the flow of the river during the periods covered by these charts?

A. There was supposed to be an experiment that was supposed to have been operated in cooperation with the United States Army Engineers in Huntington, W. Va., and the Appalachian Electric Power Company.

Q. And the Geological Survey.

A. Yes, sir; of the water resources of Virginia.

Q. At whose instance was this experiment conducted?

A. Well, I just don't know exactly who it was, but I was in touch with representatives of both the Appalachian Electric Power Co., and Army Engineers in Huntington, W. Va.

Q. Can you state briefly how this experiment affected the stream flow. What was the nature——

A. No; I cannot, because we was only operating the *guages* and not watching the river. However, as I say, I think the representatives of either the Army or the Appalachian Electric Power Co. was operating the gates that sent down the flows, and we set the recorders for that period and left them and come back at the end of the period and checked back on the recorders.

671 By Mr. JACKSON:

Q. To refresh your recollection, do you know whether at this time water was being impounded and released in the Buck and Byllesby Reservoirs?

A. No; I don't, but if I may go on, the understanding was that the purpose of the experiment was to impound water and see its effect.

Q. Impound and release it?

A. Yes; because when we went into it we knew what we were going to try to determine and that is why the instruments and everything were set for that purpose and investigated to see that the experiment would show what happened along the different points in the river.

Q. You said you knew what you were going to try to determine. What was it you were going to try to determine?

A. The wave action of this water.

By Mr. JACKSON:

Q. As the court has said, as I understood when he started, the very purpose of these tests in setting up these instruments was to determine the fluctuation or change in the flow resulting from the impounding of water and its release in the river above. Isn't that what you said?

A. Yes, sir.

By Mr. JACKSON:

Q. When you said affected the wave, you meant the wave produced by the impounding and releasing of large quantities of water at these dams?

A. That is right.

Q. That wave, as I understand, is what is sometimes called a tide that comes down the river with the fluctuation of the larger amount of water in the stream. Am I defining it right?

A. I don't know. I wouldn't attempt——

Q. How long has there been a gauge at Radford or at the dam site?

672 A. I don't know except for that period of record and also for a period back in 1928.

Q. Well, isn't it a fact that the gauge at the dam site, the record of which you have introduced here, was installed solely for the purpose of use during this experiment you have described?

A. This and the previous experiment.

Q. What earlier experiment was that?

A. 1928.

Q. Did you have anything to do with that?

A. Yes.

Q. Who made that?

A. The Water Resources of Virginia and the Army Engineers.

Q. And had it been there continuously since 1928—the gauge?

A. No, sir.

Q. It had been removed?

A. It had been removed.

Q. And was replaced solely for the purpose of this experiment that you have mentioned?

A. That is right.

Q. And at whose instance was it replaced?

A. I don't know just exactly. They say it was a cooperative study, as I call it, between the three agencies.

By the COURT:

Q. Those three being the United States Government, State of Virginia, and the defendant here?

A. That is right, Army Engineers of Huntington.

By Mr. JACKSON:

Q. As a matter of fact, didn't you have that gauge installed t the direct request of the representative of the defendant, the Appalachian Power Company, speaking of the gauge at Radford or the dam site?

73 A. Well, I don't know. I know the machine belonged to us. Who we were paid by to put the gauge there, I lon't know.

Q. You stated this was in cooperation with three agencies, one he United States Army Engineers. Who represented the United States Army Engineers in that experiment, if you know?

A. I don't remember who was District Engineer at that time n Huntington.

Q. Was it the District Engineer at Huntington?

A. That is right.

Q. Whoever was in that office at that time?

A. That is right.

Q. Was that Col. Ardery?

A. Right. I think it was.

Redirect examination by Mr. GATCHELL:

Q. Mr. Derzulaitis, did you have any other records of the treamflow or changes in the stage of New River in 1930?

A. Yes; we have a continuous record during 1930 at Ivanhoe, Eggleston, Allisonia, and Glen Lyn.

Q. And is this part of those records?

A. This is part of those records.

Q. Is that the customary manner of keeping the records?

A. Just what do you mean?

Q. Do you ordinarily prepare your records in the manner which you have presented them here?

A. They are just exactly—no difference.

Q. Are those reports submitted to the Geological Survey?

A. They are published in the Annual Water Supply Papers.

Q. They are published in the Annual Water Supply Papers of he Geological Survey?

A. That is right.

674 Recross-Examination by Mr. Jackson:

Q. Did you, in connection with your part in this experiment, prepare any charts or hydrographs other than those which you have offered here in evidence?

A. Yes; we converted some of the gauge heights over into discharge.

Q. That is you or someone under your direction converted these gauge heights at Ivanhoe?

A. Well, for our own information we converted them, I think, at most of the stations all the way down the river, but we didn't draw no conclusions.

Q. Will you produce copies of those hydrographs?

A. I will give you what I have got here.

By Mr. Jackson:

Q. As I understand it, from the data which were recorded on these charts of gauge readings that you offered in evidence your office prepared a further paper known as a hydrograph which converted those gauge heights into streamflow at the various gauging stations?

A. We did.

Q. And you did that at each of the gauging stations about which you have given testimony here?

A. I think so. I wouldn't say whether we got them for all of them. We may have been interested in some of them.

Q. I show you here this blueprint entitled "Discharge Hydrograph Wave Study of New River at Ivanhoe, Virginia," prepared by F. F. Schrader and T. F. Hanly, engineers, United States Geological Survey, University of Virginia, in cooperation with the United States Army Engineers and Appalachian Electric Power Company, and ask you whether that is a copy of one of the hydrographs which was prepared under your direction?

675 A. Yes.

(Said blueprint, exhibit 500, marked for identification.)

Mr. Jackson. I produce a blueprint entitled "Discharge Hydrograph Wave Study of New River, Allisonia, Virginia, prepared by F. F. Schrader and T. F. Hanly, Engineers, United States Geological Survey, University of Virginia, in cooperation with the United States Army Engineers and Appalachian Electric Power Company," and ask to have it marked for identification, Defendant's Exhibit No. 501.

By Mr. Jackson:

Q. I show you Defendant's Exhibit No. 501 for identification and ask you whether that is one of the hydrographs which you have testified were prepared in your office under your direction?

A. It is.

Mr. JACKSON. I produce another blueprint entitled "Discharge Hydrograph Wave Study, New River, at dam site near Radford, Virginia, prepared by F. F. Schrader and T. F. Hanly, Engineers, United States Geological Survey, University of Virginia, in cooperation with the United States Army Engineers and Appalachian Electric Power Company" and ask to have it marked "Defendant's Exhibit No. 502" for identification.

I produce a further blue print entitled "Discharge Hydrograph Wave Study of New River at Eggleston, Virginia, March 11–31, 1930, prepared by F. F. Schrader and T. F. Hanly, Engineers, United States Geological Survey, University of Virginia, in cooperation with the United States Army Engineers and Appalachian Electric Power Company" and ask to have it marked "Defendant's Exhibit No. 503" for identification, and I produce one further blue print entitled "Discharge Hydrograph Wave Study of New River at Glen Lyn, Virginia, March 12 to 31st, 1930, prepared by T. F. Hanly and F. F. Schrader, Engineers, United States Geological Survey, University of Virginia, in cooperation with the United States Army Engineers and Appalachian Electric Power Company" and ask to have it marked "Defendant's Exhibit No. 504" for identification.

By Mr. JACKSON:

Q. Mr. Derzulaitis, I now show you Defendant's Exhibits 502, 503, and 504, all marked for identification, and ask you to state whether each of these exhibits was prepared under your direction in connection with the experiment which you have described?

By Mr. JACKSON:

Q. These exhibits for identification (hydrographs) are based, as I understand it, upon the gauge records and rating curves which you have offered in evidence here.

A. They are.

676 **CHARLES H. PIERCE**

Direct examination by Mr. THOMPSON:

Q. Will you please state your name to the stenographer?

A. Charles H. Pierce.

Q. Where do you reside, Mr. Pierce?

A. 1900 Jackson Street NE., Washington, D. C.

Q. What is your position?

A. Hydraulic engineer, United States Geological Survey.

Q. How long have you been with the United States Geological Survey?

A. I was first appointed in 1910.

Q. And have you been continuously with the Survey since then?

A. No, I was out for a period of about five and one-half years from November 1925 to May 1931.

Q. Will you please state your training, education, and experience as an engineer?

A. I am a graduate of the University of Vermont with a degree of Bachelor of Science in Civil Engineering, and also have a degree of Associate in Arts, Harvard College, Master of Arts, Harvard University. For about a year, 1904 and '05, I was engaged in railroad work with the Boston & Albany Railroad and the Lake Shore Division of the New York Central Lines.

Q. Was that engineering work?

A. It was. For the college year 1906 and '07 I was teaching Theoretical and Applied Mechanics at the University of Illinois. Four years, 1906 to 1910, I was Assistant Professor of Civil Engineering and Mathematics, University of Vermont. In September 1910 I received an appointment as Junior Engineer in the Water Resources Branch of the United States Geological Survey.

Q. What positions have you held with the United States Geological Survey?

A. The position of Junior Engineer, Assistant Engineer, Engineer, Hydraulic Engineer, and District Engineer, and am now Hydraulic Engineer, Senior Grade.

677 Q. Did you ever do any particular work in the New England District?

A. I was District Engineer in charge of the New England office of the Geological Survey from May 1915 to November 1925.

Q. What did you do after that?

A. I resigned from the Geological Survey and was employed with Charles T. Main, Inc., Consulting Engineers, Boston.

Q. And what kind of work as Consulting Engineer did you do?

A. The work was varied, largely in connection with design and construction of hydroelectric plants and various hydraulic studies in connection with design and operation of power plants, cost estimates, valuations of water rights, and things of that kind.

Q. When did you return to the Geological Survey?

A. May 1, 1931.

Q. What societies are you a member of?

A. The engineering societies of which I am a member—American Society of Civil Engineers, Section of Hydrology, American Geophysical Union.

Q. What are your duties with the Geological Survey as Hydraulic Engineer, Senior Grade?

A. My duties are varied, as I am on the staff of the Chief Hydraulic Engineer and subject to various assignments. I have a great many research problems. At the present time I am in charge of the work being done at the National Hydraulic Laboratory.

Q. Have you ever seen New River, Mr. Pierce?

A. I have at various times.

Q. What part of New River have you seen?

A. I have seen New River from Galax gauging station and all of the gauging stations on New River and the Kanawha River to its mouth.

Q. How recently have you seen New River?

A. I saw most of New River—I saw New River below Galax and that part of the Kanawha River about Kanawha Falls during the week of July 10, 1936.

678 Q. I believe you said you had seen some of these gauging stations. Please state the gauging stations you have seen.

A. I have seen the station at Galax, the station at Ivanhoe, at Allisonia, at Eggleston, Glen Lyn in Virginia, and Hinton, Caperton on the New River, and the station at the Kanawha Falls on the Kanawha River; also the station on Little River at Graysonton and the old Radford station at Radford.

Q. What is the type of gauge being used at these gauging stations?

A. The gauges at the stations now in operation are continuous water-stage recorders which operate automatically with a continuous record of gauge height.

Q. Can you tell when these automatic gauging stations were placed at the different stations on these two rivers?

A. I can tell by reference to my notes.

Q. Please have reference to your notes. The one at Galax—when was that installed with an automatic gauge?

A. That station was established in November 1929, with an automatic gauge at that time.

Q. Where is the gauge with relation to the town of Galax?

A. It is about three and one-half miles, approximately, southwest of Galax.

Q. The station at Ivanhoe—when was that installed?

A. In December 1929, with an automatic gauge that has been used since that time.

Q. And where is that located with respect to Ivanhoe?

A. That is within what is called the boundaries of Ivanhoe. It is practically in the town limits. We estimate that as being two and one-half miles above the mouth of Cripple Creek.

Q. When was the Allisonia gauging station established, the automatic one?

A. In September 1929.

Q. And how near is it to Allisonia?

A. Well, that is about half a mile above Allisonia.

679 Q. What about the station at Eggleston?

A. That station is at the highway bridge at Eggleston, and the automatic gauge was installed July 1, 1926. Previous to that time, from October 1st, 1914, to June 30, 1926, the chain gauge on the downstream side of the bridge was read morning and evening to hundredths.

Q. What do you mean by "to hundredths"?

A. Hundredths of a foot.

Q. What about the station at Glen Lyn, Virginia?

A. That is a water-stage recorder which is approximately one-fourth mile southeast of Glen Lyn and one-third mile above the mouth of East River; an automatic gauge installed in August 1927.

Q. You say southeast of Glen Lyn. Does that mean it is upstream from Glen Lyn?

680 A. My recollection of that is downstream. I won't be positive.

Q. When was the gauging station or the automatic gauge at Hinton, West Virginia, established?

A. The staff gauge was read twice a day at that place from December 1923 to November 1934, after which time the automatic gauge has been in operation.

By Mr. JACKSON:

Q. Since 1934?

A. Since November 1934.

By Mr. THOMPSON:

Q. About the one at Caperton, West Virginia?

A. That is an automatic gauge just downstream from the suspension bridge in the gorge and the automatic gauge which is used there was installed in November 1928.

By Mr. THOMPSON:

Q. When was the automatic gauge at Kanawha Falls established?

A. That was established in October 1928.

Q. Prior to that what did they use at Kanawha Falls?

A. From March 28, 1877, to September 30, 1916, the records were obtained at Staff gauge, about 1¾ miles below the mouth of Gauley River. The records, Lock 2, Montgomery, have been published by the Geological Survey for certain periods, especially for the period January 1, 1888, to September 30, 1918. These records were obtained at Staff Gauge on right bank a short distance above the upper gauge of the Lock and records have been published by the Geological Survey for the period from October 1, 1918, to September 30, 1929, which were obtained by the use of a gauge pipe. The record at the so-called weather bureau gauge, which is about 1,800 feet upstream from the site of the water gauge in use now.

Q. Was that a United States weather gauge that you speak of?

A. My understanding is that the gauge was established by army engineers, but I wouldn't be positive of that.

681 Q. You say it was established by army engineers?

A. That is my understanding, but I wouldn't be positive about that.

Q. Do you know when the gauge at Graysonton, Virginia, was established?

By Mr. **Jackson**:

I did not get where you said the staff gauge at Hinton from 1922 to 1934 was located.

A. The staff gauge near Hinton is at the site of Packs Ferry, and the water-stage recorder is in the same location, only a little bit back from the river.

By Mr. **Thompson**:

Q. Now answer the question I asked you.

A. From October 1928 to November 1931 there was a chain gauge at the highway bridge, which was read twice a day, hundredth of a foot. The automatic gauge has been in use since November 1931, and is located about 900 feet below the highway bridge at Graysonton, about seven miles above the mouth of the river.

Q. Now please state about the old one at Radford, that you referred to?

A. A gauging station was maintained by the Geological Survey at the highway bridge near the railroad station at Radford from August 1, 1898, to July 15, 1906, and from May 6, 1907, to September 30, 1915, when the station was discontinued by the Geological Survey.

Q. Have you made a study of the drainage area of New River?

A. Yes; I have.

Q. What is the drainage area at the Radford dam site?

A. The drainage area at the Radford dam site is 2,382 square miles, from our recent measurements, from the latest topographical maps. These measurements being made in June 1936.

Q. Do you know what the drainage area is at Eggleston, or at the Eggleston Gauge?

682 A. Our measurements made in June 1936, were from the latest maps and show a drainage area of 2,941 square miles at the Eggleston gauge.

Q. What is the drainage area at the Radford gauge?

A. From similar measurements made from the latest maps in June 1936, we found the drainage area at the Radford gauge to be 2,736 square miles.

Q. What is it at the Allisonia gauge?

A. From similar measurements made in June 1936, we found the drainage area at the Allisonia gauge to be 2,202 square miles.

Q. Have you made any investigation of the drainage area of Little River?

A. I have.

Q. What did you find that to be?

A. We found the drainage area of Little River at the mouth to be 335 square miles.

Our measurement at a point where a gauging station was maintained, at the Graysonton station, we found the drainage area to be 298 square miles.

At the old Copper Valley gauging station we found the drainage area to be 238 square miles.

Q. When did you make your last measurement of the last drainage area of Little River?

A. Those measurements were made in June 1936.

Q. And what did you find, at the mouth of Little River, the drainage area to be?

A. 335 square miles.

Q. Do you know what the drainage area of Kanawha River at Kanawha Falls is?

A. We find the drainage area of Kanawha River at Kanawha Falls to be 8,367 square miles, from the measurements we made in February and March 1935.

Q. Have your recent measurements in any way changed

683 the past measurements of the drainage areas in this district?

A. There have been some changes in the figures.

Q. Have they been great or slight?

A. In most cases they have been very slight.

Q. Now you spoke of the recent ones, when did you make those?

A. The recent measurements for those were made in February and March 1935, and in June 1936.

Q. Do you know what the maximum recorded discharge in cubic feet, per second, was at Kanawha Falls?

A. The maximum recorded discharge was about 270,000 feet per second, on September 14, 1878.

Q. 1878 or 1877, which was that?

A. 1878.

Q. Where did you get those figures from?

A. I got those figures from Water Supply Papers that have been published, 536, page 62, and elsewhere.

Q. What are those water supply papers?

A. Those are reports of stream gauges; publication of data by the Geological Survey.

Q. Are they in public circulation?

A. They are available for those who want them.

Q. Under whose authority are they printed?

A. By authority of the Secretary of the Interior.

Q. What is the minimum discharge recorded for Kanawha Falls, and when did it occur?

A. The minimum that has been recorded was 640 cubic feet per second, on August 15, 1930.

Q. Where did you get that figure from?

A. Water Supply Paper 758, page 111, also other Water Supply Papers carry the same information.

Q. Can you give the lowest flow of record at Kanawha Falls for the years 1925 and 1930?

684 A. In 1930 it was 640 cubic feet per second, on August 15th. In 1925 we did not have a continuous record, but there were three days, August 12, September 12th, and October 3rd, when the flow was 1,020 cubic feet per second, from observations made at about 7 o'clock in the morning.

Q. Where do we find those figures?

A. Those will be found in the Water Supply Paper published for that year.

Q. Was that 758?

A. 603. I beg your pardon—I made a mistake; that is 728.

Q. Is it not 758?

A. No; 728.

Q. Page 111, is it not?

By Mr. Jackson:

Isn't that 728?

A. It may be down wrong in my notes, but I had it 728.

By Mr. Thompson:

Q. I hand you Surface Water Supply in the United States for 1934. Please examine it.

A. This one gives the minimum which has been observed, which was on August 15, 1930, 640, page 111, Surface Water Supply, 34, No. 3, Ohio River Basin.

By Mr. Jackson. Is it numbered?

By Mr. Thompson. The number is 758.

By the COURT:

Q. You refer to 758. What is that reference? Is that the number of the publication?

By Mr. THOMPSON: It is the number of the paper, the Geological Survey Paper.

By the WITNESS. If you will refer to Water Supply Paper 728, page 100.

685 By Mr. JACKSON:

Q. One minute; that is the record for 1925 that you are talking about now?

A. Pages 100 and 101.

Q. Can you give me the date of that?

A. On page 101 it gives October 3rd.

Q. You mean for the year 1925?

A. That date is in 1925. Our reports are on the water year beginning in October and running until September the following year, so under the caption of 1925–1926, October 3rd refers to the year 1925, and for that day the flow was 1,020.

By Mr. THOMPSON:

Q. Then, your date for the 640 cubic feet was, as I understand it, August 15, 1930?

A. Yes, sir.

Q. What is the average annual maximum flow at Kanawha Falls?

A. The figures which I had is published for the highest daily flow. I do not have the peak flow for all years, but the average for the annual maximum daily flows for the 58 calendar years, 1878 to 1935, is 117,684.

Q. Cubic feet per second, you mean?

A. Yes, sir.

Q. What is the average annual minimum flow at Kanawha Falls?

A. The average of the lowest days' flow for each year for the 58 calendar years, 1878 to 1935, is 2,047 cubic feet per second.

Q. And how did you arrive at that?

A. By taking for each calendar year the mean flow for the lowest day and averaging it.

Q. And what period of years did you cover there?

A. 58 calendar years, 1878 to 1935.

Q. What is the average lowest flow for a day at the Radford dam site during the calendar year 1925 and the calendar year 1930?

686 A. Those are necessarily computed on those at the places where gauging stations are located, and from those computations I find that for the calendar year 1925 the lowest

average flow for any one day at the Radford dam site was 539 second feet, or cubic feet per second, on September 29, 1925, computed from records at the Eggleston Gauge.

For the calendar year 1930, the lowest average flow for any one day was 521 second-feet, on September 6, as computed from records at the Allisonia and Eggleston Gauges and records of Little River, at Graysonton.

Q. What is the lowest average flow of record at the Kanawha Falls gauge?

A. 1,130 second-feet for the month of October 1930.

Q. And what was the average flow of New River at the Radford Dam site for the month of October 1930?

A. The average flow of New River at the Radford Dam site for the month of October 1930 was 759 second-feet as computed from records at the Allisonia and Eggleston gages and records of Little River at Graysonton.

Q. What was the lowest month of lowest mean flow of Kanawha River at Kanawha Falls in the year 1925, Mr. Pierce?

A. The lowest average flow was September 1925, and the average flow for the month at Kanawha Falls was 1,340 second-feet.

Q. What was the average flow at the Radford Dam site for the month of September 1925?

A. Average flow at the Radford Dam site for the month of September 1925 was 671 second-feet as computed from the Eggleston gauge.

Q. What was the maximum flow of New River at the Radford Dam site during the years 1878 and 1916?

A. The flow was approximately 155,000 cubic feet per second on September 15, 1878, and approximately 146,000 cubic feet per second on July 16, 1916. These figures are approximate,
687 but I believe are as good as can be obtained.

Q. Have you computed the average flow of New River at the Radford Dam site over a period of years?

A. The average for 28 years ending September 30, 1935, was 3,211 cubic feet per second as computed from records obtained at the Radford, Allisonia, and Eggleston gages on New River, and records at the Copper Valley and Graysonton gages on Little River.

Q. What percentage of time is the flow at the Radford Dam site less than 9,000 cubic feet per second?

A. About 96.8 percent of the time.

Q. What percentage of time is the average flow at the Radford Dam site less than 3,211 cubic feet per second?

A. About 65% of the time.

Q. What is the lowest average flow on record for Little River at its mouth?

A. We have no recorded flow at the mouth of Little River, but the lowest flow of record at the Graysonton gage of 298 square miles was 50 cubic feet per second on September 21, 1932. I do not know exactly what the flow was at the mouth, but if it increased in proportion as the drainage area increased, it would have been about 56 second-feet.

By Mr. JACKSON. Average for what period of time?

By Mr. THOMPSON:

For one day, wasn't it?

A. Lowest average flow for period of record is what I understood.

By Mr. JACKSON:

Is that an instantaneous flow or daily flow?

A. One day.

Q. What is the mean flow from Little River at its mouth?

A. About 401 cubic feet per second, as computed from our duration of flow curves.

688 Q. For what period?

A. Covering a 28-year period, ending September 30, 1935.

Q. Have you ever determined the maximum flow of Little River?

A. I have not.

Q. State whether the natural flow of Little River has ever been as low as 25 second-feet?

A. We have no recorded flow as low as 25 second-feet.

Q. Do you know what percentage of time the flow above Little River is below 77 second-feet?

A. About 99.5 percent of the time.

Q. And what percentage of the time is it, the average weekly flow, in excess of 221 second-feet?*

A. The average weekly flow of Little River at the mouth, as computed from records obtained at the gauging stations at Copper Valley and Graysonton for the periods Sept. 28, 1908, to Sept. 30, 1916, and Oct. 29, 1928, to Sept. 28, 1935, a total of 779 weeks, exceeded 221 second-feet for 75.3 percent of the time.

Q. Can you state what percent of time the water that passes Kanawha Falls gauge during the month, or did pass during the month of October 1930, came from above Little River, Mr. Pierce?

A. About 64.7 percent.

Q. Please state the amount of water flowing past Kanawha Falls gauge for the lowest low-water month for 1925 that came from above the Radford project?

---

*Correction on page 494.

A. That lowest month was September 1925, when about 50.1 percent of the water passing Kanawha Falls came from above the mouth of Little River.

Q. Where have you gotten these figures from?

A. These figures were obtained from, or the basic information used, has been obtained from records published in the Water Supply papers in the U. S. Geological Survey and unpublished records for 1935.

689 By the **Court**. You are figuring it for the month and not for the lowest day?

By the **Witness**. As I understood the question it was for the month, the lowest low-water month.

By the **Court**. What was the flow in Kanawha Falls?

By the **Witness**. Kanawha Falls, 1,340, and in New River, above the mouth of Little River, was 671 as computed.

Q. And that was the percentage of 50.1?

A. Yes, sir.

Q. I hand you Plaintiff's Exhibits marked for identification Nos. 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, and 83, and ask you what they are?

A. These are what are commonly called Water Supply papers, the title being "Surface Water Supply of the United States, the Ohio River Basin."

Q. Are you familiar with those water-supply papers?

A. I am.

Q. Who are they published by?

Q. I believe you testified you got the papers, or rather got the figures or basic data you have given here upon which you have testified, from the Water Supply papers of the Geological Survey; is that correct?

A. Yes, sir; and some unpublished records for 1935.

Q. Are the documents which you hold in your lap, and which have been identified, marked for identification; are those the volumes from which you got the basic data from which you have testified today?

A. Yes, sir; the same things.

By Mr. **Thompson**. If the Court please, we offer these in evidence.

By the **Court**. Are they statistical data published under the auspices of the U. S. Geological Survey each year?

690 By the **Witness**. Yes, sir.

By Mr. **Jackson**. We have no objection as long as they do not include any reports, nor do we concede of course the correctness of some of the figures.

(**Note**.—Exhibits marked for the Government "Nos. 68 to 83," inclusive, filed.)

Q. I hand you documents marked for identification Exhibits Nos. 84, 85, 86, and 87, for the Government, and ask you if you know what they are?

A. These are the unpublished records for the year ending September 30, 1935, giving daily and monthly discharge for four gaging stations.

Q. What is Exhibit #84, for what station does that give the figures?

A. The figures for station on New River at Ivanhoe, Va., for the year ending September 30, 1935.

Q. And Exhibit #85, what is that?

A. That is for station on New River at Allisonia, Va., for the year ending September 30, 1935.

Q. And Exhibit #86, what is that?

A. For the station on New River at Eggleston, Va., for the year ending September 30, 1935.

Q. And Exhibit #87, state what that covers?

A. For Little River at Graysontown, Va., for the year ending September 30, 1935.

(Exhibits 84, 85, 86, and 87 offered in evidence.)

Q. What will become of these advance sheets you have filed here as Exhibits #84 to 87, inclusive?

A. Those will appear in published form, in similar forms to those, in a few months.

By the Court:

Q. They will become a part of a volume like those?

A. Yes, sir.

Q. Have you made any computations of the flow of the Kanawha River at the point of its confluence with the Ohio River?

A. Yes; I have computed the flow of Kanawha River at its mouth, at various low-water periods.

Q. Can you state the average flow of Kanawha River at its mouth for the ten-day period, July 10 to July 19, 1918?

691 A. My computations for that period show an average flow of 5,035 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 9-day period, July 23 to July 31, 1918?

A. My computations for that period show an average flow of 7,365 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 8-day period, August 24 to August 31, 1918?

By Mr. Jackson. I should like to enter an objection to the relevancy of this testimony. It seems too remote to go into it in this case.

By the Court. I can't say it is too remote.

By Mr. Jackson. May we have our objection in the record, showing it is overruled and exception noted, and let it be understood it is to apply to this line of testimony?

By the Court. Yes.

A. My computations for the period from August 24 to August 31, 1918, eight-day period, show an average flow of 4,735 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the eight-day period, September 21 to September 28, 1920?

A. My computations for that period show an average flow of 3,950 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for the five-day period, October 8 to October 12, 1920?

A. My computations for that period show an average flow of 4,035 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for 13-day period, October 15 to October 27, 1920?

A. My computations for that period show an average flow of 2,710 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for the three-day period, September 19 to September 21, 1923?

A. My computations for that period show an average flow of 2,365 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the three-day period, September 30 to October 2, 1923?

A. My computations for that period show an average flow of 3,690 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 4-day period, October 8 to October 11, 1923?

692 A. My computations for that period show an average flow of 1,895 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 12-day period, October 14 to October 25, 1923?

A. My computations for that period show an average flow of 1,655 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the six-day period, August 24 to August 29, 1925?

A. My computations for that period show an average flow of 1,430 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the seven-day period, September 4 to September 10, 1925?

A. My computations for that period show an average flow of 1,265 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the four-day period, September 13 to September 16, 1925?

A. My computations for that period show an average flow of 1,170 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the eight-day period, August 16 to August 23, 1929?

A. My computations for that period show an average flow of 3,750 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 17-day period, August 16 to September 11, 1929?

A. My computations for that period show an average flow of 4,020 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the seven-day period, September 24 to September 30, 1929?

A. My computations for that period show an average flow of 2,820 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 31-day period of August 1 to August 31, 1930?

A. The average flow from my computations for that period shows 1,580 feet, second-feet.

693 Q. What was the average flow of Kanawha River at its mouth for the thirty-day period, September 1 to September 30, 1930?

A. My computations for that period show an average flow of 1,330 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the thirty-one-day period, October 1 to October 31, 1930?

A. My computations for that period show an average flow of 1,150 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 27-day period, November 1 to November 27, 1930?

A. My computations for that period show an average flow of 1,785 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 119-day period, August 1 to September 27, 1930?

By Mr. **Thompson**:

That is an error. That should be to November 27, 1930.

A. My computations for that period show an average flow of 1,450 second-feet.

By Mr. **Jackson**:

Was your computation actually for the period Mr. Thompson asked you?

By Mr. **Thompson**:

That was my mistake.

A. This computation is for the 119-day period, August 1 to November 27, 1930.

Q. What was the average flow of Kanawha River at its mouth for the 20-day period, October 25 to November 13, 1931?

A. My computations for that period show an average flow of 2,445 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 9-day period, August 9 to August 17, 1932?

A. My computations for that period show an average flow of 3,935 second-feet.

694 Q. What was the average flow of Kanawha River at its mouth for the 37-day period, August 25 to September 30, 1932?

A. My computations for that period show an average flow of 1,580 second-feet.

Q. What was the average flow of Kanawha River at its mouth for the 12-day period, October 10 to October 21, 1933?

A. My computations for that period show an average flow of 1,760 second-feet.

By Mr. **Baker**. I have read this letter and I regret to find it seems to create in my mind the same impression it did on your Honor. I would like to know if my friends on the other side have any desire to help us get these witnesses. We think they would be valuable to help the Court. If they do not, we will have to take whatever steps we are advised to meet the effect of this letter.

By Mr. **Thompson**. I have had no knowledge of the effect of this letter. I don't know what would be done, so far as the authorities in Washington would be concerned. I am under the Attorney General and would be controlled by what he might say.

By the **Court**. You saw the substance of the letter, that the Secretary of War doesn't seem to feel like making available a witness for an adverse party. I take that to be his position as expressed there.

By Mr. **Baker**. He says there are enough witnesses to the facts without bringing them, and he isn't willing to have them come as experts, and I feel sure if my Brothers on the other side share my view, these are probably the best qualified people to help the Court.

By Mr. **Thompson**. I would like to read this over tonight.

Direct Examination by Mr. Thompson:

Q. I ask you now, Mr. Pierce, this same question corrected: What was the average flow of the Kanawha River at its mouth for the seventeen-day period from August 26th to September 11th, 1929?

A. My computations for that period show an average flow of 4,020 second-feet.

Q. Mr. Pierce, from your study of the records of the flow of the Kanawha River at its mouth, can you break down your figures into averages for shorter periods?

A. I can.

Q. What was the average flow of the Kanawha River at its mouth for the four-day period from August 1st to August 4th, 1930?

A. For that period my computations show an average flow of 1,385 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for the eight-day period from August 13th to August 20th, 1930?

A. For that period my computations show an average flow of 1,370 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for the seven-day period from September 15th to September 21st, 1930?

A. For that period my computations show an average flow of 1,430 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for the ten-day period, September 26th to October 5th, 1930?

695 A. For that period my computations show an average flow of 1,290 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for the period September 13th to September 22nd, 1932, a ten-day period?

A. For that period my computations show an average flow of 1,250 second-feet.

Q. What was the average flow of the Kanawha River at its mouth for the five-day period from September 4th to September 8th, 1925?

A. For that period, September 4th to September 8th, 1925, my computations show an average flow of 1,280 second-feet.

Q. Why did you take a five-day period there?

A. The five-day period was taken for use in comparison with flows of the Ohio River. That particular five-day period was taken for use in comparison with the flow of the Ohio River.

Q. Mr. Pierce, have you computed the flow of New River at the Radford dam site for any low-water periods?

A. Yes; I have.

Q. What was the average flow of New River at the Radford dam site for the ten-day period July 5th to July 14th, 1918?

A. My computations for that period show an average flow of 1,760 second-feet.

Q. The flow of 1,760 second-feet at Radford dam site was what percentage of the total flow of the Kanawha River at its mouth for the period July 10th to July 19th, 1918?

A. About 35 percent.

Q. In these comparisons of flow of New River at the Radford dam site and Kanawha River at its mouth, what time interval have you allowed?

A. I have allowed a time interval of five days.

Q. Why have you allowed that five days?

A. Because from hydrographic comparisons of flows it appeared that a five-day time interval was required for the flow to pass from the Radford dam site to the mouth of the Kanawha River.

696 Q. What was the average flow of New River at the Radford dam site for the eight-day period from July 18th to July 26th, 1918, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations for that period show that the flow of New River at the Radford dam site was 2,140 second-feet, which was 29 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the eight-day period from August 19th to August 26th, 1918, and what percentage was that flow of the flow of the Kanawha River at its mouth five days later?

A. My computations for that period show that the flow of New River at the Radford dam site was 2,260 second-feet, which was about 48 percent of the flow of the Kanawha River at its mouth during the period five days later.

By Mr. **Thompson**:

Q. What was the average flow of New River at the Radford dam site for the eight-day period from September 16th to September 23rd, 1920, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of the New River at the Radford dam site for that period was 1,840 second-feet, which was 46 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the five-day period from October 3rd to October 7th, 1920, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of New River at the Radford dam site for that period was 1,600 second-feet, which was about 40 percent of the flow of the Kanawha River at its mouth during the period five days later.

697 Q. What was the average flow of New River at the Radford dam site for the thirteen-day period from October 10th to October 22nd, 1920, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of New River at the Radford dam site for that period was 1,360 second-feet, which was about 50 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the three-day period, September 14th to September 16th, 1923, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of New River at the Radford dam site for that period was 1,155 second-feet, which was about 49 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of the New River at the Radford dam site for the three-day period, September 25th to September 27th, 1923, and what was the percentage of that flow to the flow of the Kanawha at its mouth five days later?

A. My computations show that the flow of the New River at Radford dam site for that period was 1,500 second-feet, which was about 41 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of the New River at Radford dam site for the four-day period, October 3rd to October 6th, 1923, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of the New River at the Radford dam site for that period was 1,070 second-feet, which was about 56 percent of the flow of the Kanawha River at its mouth during the period five days later.

698 Q. What was the average flow of the New River at the Radford dam site for the twelve-day period, October 9th to October 20th, 1923, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of New River at the Radford dam site for that period was 1,030 second-feet, which was about 62 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the six-day period from August 19th to August 24th, 1925, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of New River at the Radford dam site for that period was 674 second-feet which was about 47 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the seven-day period, August 30th to September 5th, 1925, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of New River at the Radford dam site for that period was 597 second-feet, which was about 47 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the four-day period from September 8th to September 11th, 1925, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the flow of New River at the Radford dam site for that period was 616 second-feet, which was about 53 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the eight-day period from August 11th to August 18th, 1929, and what percentage was that flow of the flow of the Kanawha at its mouth five days later?

699 A. My computations for that period show the average flow of New River at the Radford dam site was 1,930 second-feet which was 51 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the seventeen-day period from August 21st to September 6th, 1929, and what percentage was that flow of the flow of the Kanawha River at its mouth five days later?

A. My computations for that period show that the average flow of New River at the Radford dam site was 1,680 second-feet, which was about 42 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the seven-day period from September 19th to September 25th, 1929, and what percentage was that flow of the flow of the Kanawha at its mouth five days later?

A. My computations for that period show that the average flow of New River at the Radford dam site was 1,680 second-feet which was about 59 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of the New River at the Radford dam site for the thirty-one-day period from July 27th to August 26th, 1930?

A. My computations for that period show an average flow of the New River at the Radford dam site of 980 second-feet.

Q. What was the average flow of New River at the Radford dam site for the thirty-day-period from August 27th to September 25th, 1930?

A. My computations for that period show an average flow of 847 second-feet.

Q. What was the average flow of New River at the Radford dam site for the thirty-one-day period from September 26th to October 26th, 1930?

A. My computations for that period show an average flow of 779 second-feet.

700 Q. What was the average flow of New River at the Radford dam site for the twenty-seven-day period from October 27th to November 22nd, 1930?

A. My computations for that period show an average flow of 1,095 second-feet.

Q. What was the average flow of New River at the Radford dam site for the 119-day period, July 27th to November 22nd, 1930?

A. My computations show that the average flow for that 119-day period was about 921 second-feet.

Q. What percentage of the total flow of the Kanawha River at its mouth during the 119-day period from August 1st to November 27th, 1930, came from above the Radford dam site?

A. About 64 percent.

Q. What was the average flow of New River at the Radford dam site for the twenty-day period from October 20th to November 8th, 1931, and what percentage was that flow of the flow of the Kanawha at its mouth five days later?

A. My computations for that period show that the flow of New River at the Radford dam site was 931 second-feet which was 38 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. The answer which you have given was for the flow at its mouth?

A. My computations for that period show that the flow of New River at the Radford dam site was 931 second-feet which was 38 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the nine-day period, August 4th to August 12th, 1932, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations for that period show that the average flow at the Radford dam site was 1,290 second-feet which was about 33 percent of the flow of the Kanawha River at its mouth during the period five days later.

701 Q. What was the average flow of New River at the Radford dam site for the thirty-seven-day period from August 20th to September 25th, 1932, and what was the percentage of that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations for that period show that the average flow at the Radford dam site was 810 second-feet which was about 51 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of the New River at the Radford dam site for the twelve-day period from October 5th to October 16th, 1933, and what was the percentage of that flow to the flow of the Kanawha at its mouth five days later?

A. My computations for that period show that the average flow at the Radford dam site was 883 second-feet which was about 50 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the four-day period, July 27th to July 30th, 1930, and what percentage was that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations show that the average flow of New River at the Radford dam site for that period was 822 second-feet which was about 60 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the eight-day period from August 8th to August 15th, 1930, and what percentage was that flow to the flow of the Kanawha at its mouth five days later?

A. My computations show that the average flow of New River at the Radford dam site for that period was 810 second-feet which was about 59 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the seven-day period from September 10th 702 to September 16th, 1930, and what percentage was that flow to the flow of the Kanawha River at its mouth five days later?

A. My computations for that period show that the flow of New River at the Radford dam site was 827 second-feet, which was 58 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the ten-day period, September 21st to September 30th, 1930, and what percentage was that flow to the flow of the Kanawha at its mouth five days later?

A. My computations for that period show that the average flow of New River at the Radford dam site was 908 second-feet, which was 70 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the ten-day period, September 8th to September 17th, 1932, and what percentage was that flow to the flow of the Kanawha at its mouth five days later?

A. My computations for that period show that the average flow of New River at the Radford dam site was 766 second-feet which was 61 percent of the flow of the Kanawha River at its mouth during the period five days later.

Q. What was the average flow of New River at the Radford dam site for the five days period, August 30th to September 3rd, 1925, and what percentage was that flow to the flow of the Kanawha at its mouth five days later?

A. My computations for that period show that the average flow of New River at the Radford dam site was 584 second-feet, which was about 46 percent of the average flow of Kanawha River at its mouth during the period five days later.

Q. Have you figured out all the periods of low flow at Radford and Kanawha, Mr. Pierce?

A. We have not used all of the periods of low flow.

703 Q. Are there many others?

A. There are quite a few; many others.

By the COURT: What is the latest time as to which the witness was questioned, when was that, do all the periods precede the Marmet-London Dam?

By Mr. THOMPSON. Yes, sir.

By the COURT. When was the Marmet-London Dam completed?

By Mr. THOMPSON. 1935.

Cross-examination by Mr. JACKSON:

Q. Mr. Pierce, counsel just stated that among the periods for which you have given evidence relative to the flow of New River at the Dam site, there are included some periods of mean flow. Will you state any period of mean flow at the Dam site which is covered by any figures you have given in your testimony?

A. I do not understand the question.

Q. In your testimony have you given figures for any period of mean flow at the Dam site?

A. These figures are figures for average flow for a period of several days.

Q. Yes; but is any one of the periods which you have selected, or someone has selected, and which have been covered in your testimony, a period of mean flow at the Dam site?

A. Oh, you mean mean flow, average for a long time flow?

Q. Yes.

A. I think that these periods are all for flows considerably below the average flow at the Dam site for a long time period.

Q. That is what I was trying to get at. Mr. Pierce, you have in your testimony given a good many figures from Water Supply papers and calculations based upon figures appearing in those papers, have you not?

A. Yes, sir.

Q. You do not personally vouch for the accuracy of the figures appearing in these publications and which you have used as a basis for your testimony, do you?

A. I did not personally make those original computations, which were published in Water Supply Papers, if that is what you mean.

Q. I merely want to bring out the facts, and isn't it true that you didn't make the measurements, or make the records or computations, and you have personally no means of knowing or vouching for the accuracy of those figures?

704 A. I believe I can safely say that I do have means of knowing that the figures published in the Water Supply papers are accurate, so far as they can possibly be made accurate, although I did not make them myself, they were made by my associates, and by my predecessors, covering a period quite a few years back, and followed the same methods which I used.

Q. All I am trying to bring out is that you yourself are not seeking to testify personally as to those figures?

A. Only that they are the published figures as the basis of my testimony is all.

Q. And those are published estimates of flow, are they not, Mr. Pierce?

A. They are.

Q. Counsel asked you whether you had not seen the New River from time to time, and I think you said you had?

A. Yes, sir.

Q. Is there any computation or calculation to which you have testified here which was affected by your observation of New River?

A. No.

Q. Would it be fair to say that your testimony could have been, if it was not, as well prepared in your office in Washington, without going to the New River, as though you did view it?

A. Possibly, although I felt that a personal knowledge of the subject would be helpful in the work.

Q. Did you modify any of your figures because of anything you saw at New River?

A. No.

Q. I think you gave some figures about drainage areas and said that the latest measurements had been made in February and March of 1935, and June 1936; is that correct?

A. Yes, sir.

Q. Now am I right in understanding that these measurements or new measurements are simply calculations made from maps?

705 A. These drainage-area measurements are measurements of areas on topographic maps.

Q. And these new measurements in 1935 and 1936 are, as I understand it, merely the latest calculations that have been made from maps for these areas, about which you have testified; is that true?

A. They are the latest ones which we have made, and on these latest measurements we used later maps, which were not available at the time the original measurements, a number of years ago, were made.

Q. Of course I don't mean to be facetious, but there was no change in the drainage areas between the time of these calculations and the ones previously made?

A. By reason of using better maps?

Q. I don't believe you quite get my question. [NOTE.—Question read.]

A. Of course there were no changes in the physical configurations on the ground which would actually determine the drainage areas of the rivers.

Q. And all of the differences arose from recalculations on maps?

A. Yes, sir.

Q. Now, I think you said that none of your calculations disclosed any significant change; is that true?

A. There were no very large changes, a few square miles.

Q. You testified, I believe, that the drainage of Little River at Copper Valley is 238 square miles; is that correct?

A. Yes, sir.

Q. As a matter of fact, isn't it a fact that the drainage area at Little River at Copper Valley is computed by the U. S. Geological Survey and reported in Water Supply paper #536, page 41, 195 square miles?

A. I believe that is the figure which was used at that time.

Q. It was one of these published figures, was it not?

A. Yes, sir.

Q. And you have a difference of 22% in your calculations of that drainage area, approximately?

A. Something like that.

706 Q. That is a pretty substantial change, I would think, in this kind of work, is it not?

A. That expressed in terms of percentage makes quite a large figure.

Q. Well now I am only trying to get this as a matter of information, Mr. Pierce. I understood your testimony to be that the drainage area at Radford Bridge is presently estimated at 2,736 square miles; is that right?

A. My figure for the drainage area is 2,736 square miles.

Q. It further appears from the Water Supply paper 536 that the drainage area at Radford Bridge is there given as 2,720 square miles, or a difference of only 16 square miles; is that right?

A. I believe that was the figure which had been used prior to these more careful measurements which have just been made.

Q. Is this Little River area included in the Radford Bridge measurement?

A. Yes, sir.

Q. And do you know the explanation of how the drainage area of Little River increased 43 square miles while the drainage area of Radford bridge was increased only 16 square miles?

A. I could only answer that question definitely by referring to the computation books on which were recorded the results of the measurements made by the men who made those measurements at an earlier time.

Q. You mean the map measurements?

A. Yes, sir.

Q. You did not make those map measurements yourself?

A. These later ones, 1935 and 1936, were all made under my mmediate supervision; the earlier measurements I did not make nd had nothing to do with their making.

Q. Am I right in understanding from your testimony that there s a considerable degree of inaccuracy in these earlier measurenents or earlier published figures in these Water Supply papers?

A. Are you referring to these drainage-area figures?

Q. I am at the moment; yes.

707 A. If you are referring to the drainage-area figures, the earlier ones were made at a time when the area was not as fully mapped as it is today, and that is probably one explanation of the differences in the figures which had been used from those which we have now obtained from more careful measurements on the latest maps.

Q. Mr. Pierce, you testified yesterday that the maximum recorded discharge at Kanawha Falls was 270,000 second-feet on September 14, 1878. How was that recorded?

A. The height of water was recorded by an observer who read the gage. The discharge corresponding to that height of water was computed from the rating curve or rating table, prepared by the engineers.

Q. Well, am I right in understanding that a rating curve is made by drawing a smooth curve through discharge measurements?

A. So far as the discharge measurements go, but peaks are hardly ever covered by discharge measurements.

Q. Now the fact is, isn't it, there was no rating curve for 270,000 second-feet, or anything approaching it?

A. There was a rating curve.

Q. It was a theoretical curve, based upon no measurements, was it not?

A. It was extended from the highest measurements which had been made, and was governed in its position to a large extent by results of the other measurements at lower stages.

Q. Is it fair to say it is an estimate of the flow?

A. Oh, of course we can only say it is an estimate, because we did not actually measure that height.

Q. Then you had no other measurements from which to judge the amount of the flow at anywhere near such a high stage, had you?

A. There were other high measurements, of course not as high as that. I do not know where. I do not have that information here as to what the next highest measurement or what the highest measurement was.

Q. Did you have any for half as high?

708 A. Well, I could not say definitely whether it was half or three-quarters. I do not have that curve, or the list of measurements here.

Q. Well, half would be 135,000 second-feet. Can't you say from your own recollection you had no measurement as high as that?

A. I do not remember the figures.

Q. You testified, I believe, that the minimum recorded discharge of Kanawha Falls was 640 second-feet on August 15, 1930; is that right?

A. I do not remember all of those figures. I would have to look it up.

Q. You have it in your memorandum from which you testified here?

A. I have it here, if you will allow me to look it up.

Q. All right. (Witness referred to notes before answering.)

A. That is correct, as published in Water Supply paper 758, page 111.

Q. What was the average, or mean discharge, on August 15, 1930?

A. I think I will have to look that up in the Water Supply paper.

Q. Will you look at Water Supply paper #698, page 67, and tell me if it isn't 1,070 second-feet.

A. The average flow for that day, which was August 15, 1930, was 1,070 second-feet.

By the COURT. Mr. Pierce, do hydraulic engineers use the terms "mean" and "average" as being synonymous, or what distinction is there between the use of the terms?

By the WITNESS:

There is no distinction in their use; they are both used synonymously to mean the same thing.

Q. What was the maximum discharge on August 15, 1930?

A. I do not know.

Q. Was it not substantially greater than 1,070 second-feet?

A. Yes, sir.

Q. Was this recorded measurement or estimate of 640 second-feet an instantaneous flow?

A. Yes, sir.

709 Q. How long did the flow at Kanawha Falls remain at 640 second-feet on August 15, 1930?

A. I could not tell you without having reference to the recording gage chart for that day.

Q. Will you produce that chart, please?

A. I do not have it here, unless it is filed among other exhibits.

Q. If you do not have it here, if it is not included among other exhibits, will you supply it?

A. It can be obtained from Washington.

Q. I will ask you to supply that as soon as it can be obtained, in the event you haven't it here now.

By Mr. **Thompson**:

Do you have it in the office in Washington?

By the **Witness**:

I am not positive whether that is in the Washington office or whether that is in the District office. We did have it in Washington.

Q. Where is the District Office?

A. The District Office is Mr. Kessler's office at South Charleston.

Q. The witness who testified yesterday?

A. Yes; I am not sure if that particular chart may be in his office or in Washington.

Q. You will get it one place or the other?

A. I can get it. It will probably take a few days to get it.

Q. I should like to have you produce at the same time the records that will show the flow for two or three days on either side of August 15, 1930; will you do that?

A. Yes, sir.

Q. So far as you know, this supposed instantaneous flow of 640 second-feet may have lasted only a minute?

A. I saw the record, and made use of the record, and my recollection is that it was a rather short period of time, which might have been perhaps only a few minutes at the minimum, but approaching that and going from that I think it would have taken, of course, more time.

710 Q. Well, if the average flow was 1,070 second-feet, would it not necessarily follow that any minimum flow of 640 second-feet, if it occurred, would be of relative short duration?

A. It would appear so.

By the **Court**:

Why would that be, supposing there had been a sudden storm, local storm, in that part of the country, which would run the flow of the river up considerably say from late afternoon to midnight to raise your average to 1,070, why couldn't it have remained at 640 during most of the forenoon?

By the **Witness**:

Under those circumstances it might have. As I remember that particular record, however, I do not recall that it did have the appearance of a very high stage.

By the **Court**:

I understood you to say that, but Mr. Jackson asked the question if it didn't necessarily follow the average of 1,070 feet for the day indicated the minimum existed for only a very short time—I am just trying to get some information.

By the WITNESS:

I think my answer was not strictly correct, that under the circumstances as you have mentioned that it might have remained at that very low stage for a considerable period of time during the day.

By the COURT:

Although your recollection of the chart, as you visualize it, is to the contrary?

By the WITNESS:

Yes, sir.

Q. Mr. Pierce, when you investigated this question, did you ascertain whether there was any sudden storm or any kind of storm? I mean on August 15, 1930.

A. I do not recall any particular investigation as to storms on that day.

711 Q. I show you page 67 of Water Supply paper #698 and direct your attention to the period from the 11th to the 20th of August 1930, and ask whether you can't tell the Court from an inspection of that table that there was no storm or storm run-off, storm water run-off, at that point during that period?

A. That is a period of low flow, with no indication of there having been any large storm, although on the 16th of August the discharge, average discharge, for the day was 1,450, indicating on that day, August 16, there was a rise, which I do not know how high it went.

Q. Is that a relatively high or low flow?

A. That is a relatively low flow.

By Mr. JACKSON:

Q. Mr. Pierce, there was a reported minimum flow or estimated minimum flow in this same water supply paper for the year ending, as I understood you, September 30, 1930, at Caperton, W. Va.

A. Yes; the minimum recorded discharge at Caperton, West Virginia, for that year was 826 second-feet on September 10th, 1930.

Q. That would be the lowest flow at Caperton any time during the year ending September 30, 1930?

A. Yes, sir.

Q. And it would, I assume, necessarily follow that the flow at Caperton on August 14th must have been larger, by some amount, than 826 second-feet?

A. Yes, sir.

Q. Where is the Caperton gauge with reference to the gauge at Kanawha Falls?

A. It is upstream.

Q. About how far?

A. I could not give you the distance in miles.

Q. Would you think that perhaps 20 miles is about right?

A. I should think it might be in that vicinity.

By Mr. McWhorter:

It is 19 miles.

By Mr. Jackson:

You say say it is 19 miles, Mr. McWhorter?

712 A. Yes, sir.

Q. Mr. McWhorter says it is 19 miles. We will accept that if you will agree to it, Mr. Pierce.

A. That is as near as I can give it.

Q. Is that a steep gradient from Caperton to Kanawha Falls?

A. I don't know what the gradient is.

Q. What is the drainage area at Caperton gauge, estimated by the United States Geological Survey?

A. My measurements show that the drainage area of New River at Caperton is 6,826 square miles.

Q. And what is the drainage area at Kanawha Falls. Your estimate yesterday, I believe, was 8,367 square miles?

A. Yes, sir.

Q. And is that approximately 22% greater than the drainage area at Caperton?

A. I can compute that if you wish me to.

Q. If you are willing to take that as a rough estimate it is all right, but if you prefer to compute it, and it will only take a minute, go ahead.

A. Which is the base in that case—Caperton?

Q. Yes; Caperton.

A. It is about 22 percent.

Q. Mr. Pierce, what was the estimated average daily flow at Caperton for August 15, 1930?

A. The average daily flow for August 15, 1930, at Caperton was 1,190 second-feet.

Q. 1,190 second-feet?

A. Yes, sir.

Q. I think you have already testified that the average daily flow at Kanawha Falls, according to the estimates in the U. S. G. Records of August 15, 1930, was 1,070 second-feet. Is that right?

A. I do not recall having given an estimate for that date?

Q. I will ask you to look it up in the Water Supply paper, but I think you told me that was right, 1,070 second-feet?

713 A. Yes; that is right.

Q. Mr. Pierce, what was the minimum estimated flow at the Glen Lyn automatic gauge for the water year ending September 30, 1930?

A. The minimum discharge at Glen Lyn for that year was 770 second-feet on September 8, 1930.

Q. That, of course, means that the flow on any other day at Glen Lyn was higher than that minimum during the year ending September 30th, 1930?

A. Yes, sir.

Q. That is, the minimum flow?

A. Yes, sir.

Q. What is the drainage area as estimated by you at Glen Lyn?

A. I did not remeasure the area at Glen Lyn. The only figures I have is what has been published in the Water Supply Paper.

Q. And that is what?

A. 3,770 square miles.

Q. Do you accept that figure as approximate?

A. Yes.

Q. You have already stated that the drainage area at Kanawha Falls is 8,367 square miles. Is that true?

A. Yes, sir.

Q. And the percentage of the drainage area at Kanawha Falls would be substantially more than twice as great as the drainage area at Glen Lyn?

A. Yes.

Q. Mr. Pierce, at page 1476 of the record, you testified to a flow of 1,020 cubic feet per second at Kanawha Falls, on August 12, 1930. Should that have been August 30th?

A. I do not get the question exactly, or what the question was before, or what my answer was.

Q. You are reported as testifying to a flow of 1,020 cubic feet per second at Kanawha Falls on August 12, 1930. We do not check that and I wonder if that was an error and it should be August 30th?

A. I believe that I said that in 1925 there were three days——

714 Q. I meant to say 1925. I merely want to know if you meant to testify to August 12th or August 30th as the date of this alleged flow?

A. If I could see Water Supply Paper 698, I could answer your question. No; that is wrong, it should be 758.

(Water Supply Paper No. 758 is here handed to the witness.)

A. May I see Water Supply Paper No. 728?

(Water Supply Paper No. 728 is handed to witness.)

Q. Did you ascertain whether there was any error in the transcript of your testimony in regard to the flow on August 12, 1925, at Kanawha Falls?

A. The answer should have read that in 1925 there were three days, August 30th, September 12th, and October 3rd, when the flow was 1,020 cubic feet per second.

Q. We thought that was correct?

A. Yes, sir.

Q. Were those instantaneous flows?

A. Those were computed from gauge heights obtained at about seven o'clock in the morning.

Q. You did not quite answer my question. Were they instantaneous flows as computed by you?

A. It was computed from one reading, but I do not know how long that flow continued.

Q. The reading only represents the instantaneous flow?

A. Yes.

Q. Mr. Pierce, when you produce the chart for Kanawha Falls for August 15, 1930, and a few days each way, please also produce the chart of the automatic gauges at Caperton and Glen Lyn, which would be comparable with the periods covered by the chart for the gauge at Kanawha Falls?

A. Very well.

Q. On yesterday, Mr. Pierce, you gave an estimate of flow above the mouth of Kanawha River for a ten-day period extending from July 10th to July 19th, 1918. Do you have the figure for the corresponding average flow at Kanawha Falls?

A. From the period of July 10th to July 19th, 1918?

715 Q. Yes. I am asking you what was your estimated average flow at Kanawha Falls for the period which, in your opinion, corresponded with the flow from July 10, 1918, to July 19, 1918, at the mouth of the Kanawha?

A. I will have to get that from the Water Supply Paper No. 536.

(Water Supply Paper No. 536 is handed to the witness, who examines same.)

A. In Water Supply Paper 536 at Page 111, for July 9th to July 18th, I have given the flows of Kanawha River at Lock No. 2. A timing of an interval of one day was allowed for comparison between Kanawha Falls, or Lock No. 2, and the mouth of the river.

Q. That is, your estimate is that for the water at Kanawha Falls to reach the other point is 24 hours?

A. That is what is allowed.

Q. Is that your estimate?

A. Yes.

Q. And your estimate is that from the dam site to Kanawha Falls is four days?

A. Yes. The figures at Lock No. 2 beginning July 9, 1918, are for July 9th, 1918, was 4,800; July 10, 3,590; July 11, 3,270; July 12, 3,950; July 13, 3,770; July 14, 4,150; July 15, 3,770; July 16, 3,770; July 17, 3,270; July 18, 3,270.

Q. Did you compute the average with those flows at Kanawha Falls, or not?

A. No.

Q. Did you make any use of those flows?

A. Those were used in arriving at the flows for the following day at the mouth of the river.

Q. You made no use of the average whatever?

A. We did not make the average until we had arrived at our interval-day figures for the mouth of the river and then averaged those.

Q. That is, you estimated the flow at the mouth each day from daily estimates and from the flow at Kanawha Falls and averaged those?

A. Kanawha Falls and any additional area we had on tributary drainage.

716 Q. These figures you have read are from the gauge at Lock 2, as I understood it?

A. Yes.

Q. What is the difference between the flow at Lock 2 and Kanawha Falls, in your judgment, if any?

A. It might differ individual days between one and the other, but for the average period it should not differ materially.

Q. Mr. Pierce, what is the drainage area at Lock 2?

A. The drainage area at Lock 2 is 8,475.

Q. What is the drainage area at the mouth of Kanawha River?

A. About 12,200.

Q. Those are estimates, are they?

A. The area at Lock 2 was one of our remeasurements made in 1935. The figure 12,200 is an older figure which we have been using, and which we did not remeasure.

Q. Can you tell me the ratio between the drainage area at the mouth of Kanawha and the Kanawha Falls, using the Kanawha Falls area as a base—at Lock 2, I mean, the one you have just given?

A. If I get your question right, you mean to ask me for the ratio between the two; you mean the one divided by the other?

Q. Yes, sir.

A. I make it 1.44.

Q. The drainage area at the mouth is 144 percent of the drainage area at Lock 2. Is that right?

A. Yes, sir.

Q. Mr. Pierce, is there any gauge at the mouth of Kanawha River?

A. The Geological Survey has no gauge. I do not know of any gauge; there might be one.

Q. Well, did you use any gauge at the mouth of Kanawha River?

A. No, sir.

Q. Has the Geological Survey any gauge on the Kanawha River further downstream than Kanawha Falls?

A. No, sir.

Q. Mr. Pierce, when you testified as to the flows at the mouth of Kanawha at various periods of time, am I right in understanding that those are estimates made by you?

A. They are computed figures based on records at other places.

Q. Do they involve any application of your judgment?

A. Somewhat.

By the COURT:

Q. You testified in your examination in chief the other day as to comparison between the volume of flow at the mouth of Kanawha River and at the Radford Dam Site. As I understand it, there is no gauging station at the Radford dam site. is there?

A. No.

Q. And the figures you used were based upon what the station at Eggleston, or computations, rather, from stations both above and below the dam site?

A. For a certain period of time the Eggleston Gauge was the only one available or the only one we had. For periods when there were other gauges we made use of them, so the method differed somewhat, depending upon what gauges there were available.

Q. Your figures as to the flow at the Radford dam site are computations based on known data from other stations?

A. Yes.

By Mr. JACKSON:

Q. Your estimates at the mouth of Kanawha River and at the dam site are not mere calculations based upon figures appearing in this Water Supply Paper, are they?

A. They are based upon definite figures which appear in Water Supply Papers.

Q. The point I am getting at is this: That no one, from the figures in the Water Supply Papers, could by a mere mathematical calculation, involving no judgment, arrive at the estimates which you have given for the mouth of Kanawha or the Radford dam site?

718 A. I could not give you the same answer for both conditions. The computations for the Radford dam site were strictly mathematical computations, and comparisons mathematically is a part of the work in connection with arriving at the figures for the flow of Kanawha River at its mouth, which depends upon certain comparison of data which were not strictly—well, it was mathematically in a sense, but it involved getting the average relation for a certain period from certain data, which would be in a little different category from that at Radford.

Q. That is, there is more of an estimate in the figures for the mouth of Kanawha than there is for the Radford dam site. Is that right?

A. A little-bit more. They did not amount to very much in that connection.

Q. Now at the Radford dam site in order to arrive at an estimate of the stream flow at a point where there is no gauge, from estimates of the stream flow made at some other point where there is a gauge is it not necessary to use judgment?

A. I believe that judgment is always necessary in connection with work of this kind, even though it can be put on a strictly mathematical basis. One of the things to determine is what the mathematics are.

Q. How would you make an estimate for the flow at a point on a stream where there is no gauge, from an estimate of the flow at another point where there is a gauge on a strictly mathematical basis, and solely that?

A. I believe that if one based his estimate upon the drainage-area ratio, it would be a mathematical estimate.

Q. Does not that involve an assumption as to what the run-off is in a drainge area?

A. As I said before, in work of that kind it does require the use of some judgment, but when he has arrived at the method then that becomes a mathematical process.

Q. That, of course, would be true of any formula that you work out. If you once accepted that as a rule, the operation of it would become mathematical, wouldn't it? But the question, for instance, of what the run-off of a drainage area would be, is an assumption, is it not?

719 A. It depends upon circumstances and what data are available, whether it is an assumption.

Q. You have got to make an assumption for the run-off, per square mile of drainage area, you have got to assume it is the same, or you have got to assume some arbitrary factor as a basis, have you not?

A. No, sir; if there are records at only one place, and we desire to obtain an estimate of the flow at another place, the common method is to make a comparison of drainage areas, but that is sometimes modified by other factors, such as the rainfall and weather.

Q. Is the flow per square mile of a river at one point the same as at another point?

A. Not necessarily.

Q. When you estimate those flows for points at which you have no gauging station, you have to make an estimate that the rainfall is the same or not the same, don't you?

A. That is about the only thing that can be done in arriving at any idea of what the probable flow is.

Q. In your estimates at the Radford Dam site, did you assume the same run-off, per square mile, as you found for the station which you were using in your estimates?

A. I don't exactly see how that question can be answered. What do you mean by "we found?" If you will read me the question again please.

Q. Read the question. [Question read.]

A. Did we assume the run-off?

Q. Yes.

A. For the period when the record at Eggleston was the only record available, we used the relation of drainage area, took the proportional flow, or the flow as proportional to the drainage areas, but we did have a verification of that assumption by comparison with the results obtained at other times when we had other records and found that they checked very closely.

Q. You used a different ratio when you got down on Kanawha, didn't you?

720 A. I don't understand the question—ratio for what?

Q. The ratio for estimating your flow.

A. Flow for what?

Q. The mouth of Kanawha; that is the only place I understood you estimated it on Kanawha.

A. I did not get your full question. There were, for various periods, time records of tributaries which joined the Kanawha, between Kanawha Falls and its mouth. For these periods of time, when we had records of these tributaries, we made use of them in estimating the inflow between Kanawha Falls and the mouth, and we did—from the data, or from the computations made in those cases, we arrived at a relation between the flow at

Kanawha Falls or Lock No. 2 and the flow at the mouth. We did not use strictly a drainage area ratio in estimating the flow at the mouth, but brought into the picture all the information we had for those times when we had records on the tributaries.

Q. Mr. Pierce, you testified yesterday as to the average maximum daily flow for a period of 58 years, from 1878 to 1935, at Kanawha Falls. Is that right?

A. Yes, sir.

Q. Am I right in understanding that this average is merely an average of 58 estimates for the 58 years indicated by you?

A. That average figure was obtained by taking for each calendar year the average flow of the highest day—24-hour flow—not the peak—but the average flow for 24 hours, or what we call the mean daily discharge, and obtaining an average of those 58 figures, which, in most cases, were probably somewhat above the highest discharge measurements and obtained by inspections of the rating curves, and in making these inspections, the data of the average area and mean velocity of curves were used. It was not just an arbitrary figure—it was arrived at in our regular methods of doing that work.

Q. And similarly, your estimate of the average of the lowest day's flow for each one of the years, from 1878 to 1935, was the arithmetical average of the estimated lowest mean daily flow for each one of those years?

721 A. Yes, sir.

Q. As shown on the Water Supply Papers?

A. Yes, sir.

Q. Those start in 1878?

A. Yes, sir.

Q. When did the United States Geological Survey prepare this first rating curve for Kanawha Falls?

A. I could not tell you, sir.

Q. Don't you know it was a great many years after 1878?

A. Undoubtedly; yes, sir.

Q. Isn't it true that there were no discharge measurements from which rating curves could be plotted for these early years?

A. That is true; yes, sir.

Q. Am I right in understanding that these figures for these old records are the result of the application of rating curves prepared in relatively recent years by the Geological Survey and the old gauge records?

A. Yes, sir.

Q. And I think you have said that the automatic recording gauge was first installed in 1928 at Kanawha Falls?

A. About that time; I don't remember what the date was.

Q. I think that is the year.

A. (Witness examines papers.) I can check it. I have my dates here [indicating papers].

Q. Unless you have some question about it, I am willing to accept that year.

A. 1928 is correct.

Q. When were the stream flow records of Kanawha Falls first published by the Geological Survey?

A. I believe these were first published in Water Supply Papers No. 536. The date of that publication was 1925, which was several years after the computations were made. The computations were probably made, most of them about ten years earlier; some in the later years, which were published about 1918, were made subsequent to 1918. Many of them, 722 however, had been worked up and concluded prior to that date.

Q. For a large part of this period for which you have given the estimated average daily maximum and minimum flows at Kanawha Falls, didn't the Geological Survey depend upon the old Weather Bureau gauging?

A. Yes, sir.

Q. How often a day was the Weather Bureau gauge read?

A. (Witness refers to papers.) It is my understanding that that gauge was read—was originally read once a day; it possibly might have been read more than once a day, but I do not have any information in regard to that.

Q. You have no idea or no knowledge, I should say, that it was read more than once a day?

A. No, sir.

Q. Up to what date do these records depend on the Weather Bureau gauge at Kanawha Falls—I am speaking about Kanawha Falls?

A. From March 28th, 1877, to September 30, 1916, the records were obtained at a station gauge about one and three-quarters miles below the Gauley River. The records at Lock 2, published for the period—were also published January 1st, 1888, to September 30, 1918, and were used at a station gauge on the right bank, a short distance above the upper gates of the lock. The records published in Water Supply Paper No. 728, for the period from October 1st, 1918, to September 30th, 1929, were obtained by use of a gauge—from a record furnished by the Weather Bureau from a gauge 1,800 feet upstream from the site of the water stage recorder now in use.

Q. Mr. Pierce, have you on hand Water Supply Paper No. 536?

A. Yes, sir.

Q. Turn to page 64.

A. (Witness turns to page as requested.)

Q. I direct your attention to a sentence near the middle of the
page, as follows: "The ratios of monthly discharge (See table,
page 44) are a rough index of the accuracy of the records";
723 and I will ask you to state whether you agree with that
statement.

A. Will you complete the reading of the paragraph?

Q. I will be glad to do so, but do you agree with that statement?

A. I agree with the statement that a comparison and index was made—a rough index of comparison was made to show the differences in results obtained at the different stations, and I know that the conclusion was that, in general, the records at this station—which refers to Kanawha River at Kanawha Falls, are good.

Q. Now, will you answer my question, and tell me whether or not you agree with that statement "that the ratios of monthly discharge was a rough index of the accuracy of the records"?

A. I think there can be no question about that.

Q. You agree with it then?

A. Yes, sir.

Q. I thought perhaps you disagreed, because of your reluctance to state that. Turning to page 44, of Water Supply Paper No. 536, will you look at the ratio between Kanawha Falls and Lock 2 for July—what should be the ratio between the readings at Kanawha Falls and Lock No. 2, according to the table?

A. What should be the ratio?

Q. Yes?

A. I don't know what it should be.

Q. What is the ratio of the drainage areas?

A. That is another thing. They have given the drainage area from Kanawha Falls to Lock No. 2 as 0.98.

Q. What is the ratio in your own estimation between the drainage areas at Kanawha Falls and Lock No. 2?

A. I have not made any.

Q. Will you question that this is approximately accurate?

A. The drainage area—the ratio?

Q. Yes, sir?

A. Yes; that is approximately correct for the ratio of the drainage areas. It might not be the ratio of discharge.

Q. Will you tell me what is the ratio of the geological
724 survey's estimates of the discharge for July—for 1889-90,
between Kanawha Falls and Lock No. 2?

A. That figure was published here [indicating papers] as .85.

Q. Am I right in thinking that that shows a ratio of thirteen percent less than the ratio between the drainage areas at the top of the page?

A. There is approximately that much difference from the drainage areas ratio.

Q. Look at page 45, at the estimates for July 1897, and tell me what is the ratio between the flows—the estimates of flow for Kanawha Falls and Lock No. 2.

A. 1.14.

Q. And that is sixteen percent greater than the ratio between the drainage areas?

A. Yes, sir.

Q. Turning to page 47, will you tell me what is the ratio between the estimates of flow at Kanawha Falls and Lock No. 2, for August 1915, as shown by Water Supply Paper No. 536?

A. That ratio is given here as 1.20.

Q. And that would exhibit a difference of twenty-two percent, or a divergence of twenty-two percent from the ratio between the drainage areas?

A. Yes, sir.

Q. Mr. Pierce, you testified that the mean flow on Little River, at its mouth, for a period of 28 years, is 401 second-feet.

A. (Witness examines paper.)

Q. For a period of 28 years, ending September 30, 1935?

By Mr. **Thompson**:

Will you read the question? (The question is read.)

By Mr. **Jackson**:

I will add to the question.

Q. For a period of 28 years ending September 30, 1935?

A. That is correct, sir.

Q. Did you have any gauge station at the mouth of Little River?

725 A. There was no gauging station at the Mouth of Little River, but my answer as to this figure was obtained from the duration of flow, which, for the 28-year period, ended September 30th, 1935.

Q. Did the preparation of the duration of flow curves involve any estimate or judgment?

A. It did.

Q. For what period in this 28 years did you have any gauging stations on Little River at all?

A. We had a gauging station near Copper Valley from July 25th, 1908, to September 30th, 1916, and on Little River at Graysontown from October 27, 1928, to September 30, 1935.

Q. A total of 15 years?

A. Yes, sir.

Q. And there were 13 years of this period that you made estimates when there were no gauging stations at any place on Little River?

A. Yes, sir.

Q. There is one correction that I want to briefly call to your attention; on page 1484, of the present record, there is this question:[4] "Q. Do you know what percentage or time the flow above Little River is below 7: second-feet?" And your answer is: "A. About 99.5 percent of the time." Should that word "below" be "above?"

By Mr. **Thompson**:

Yes, sir; that should be "above."

By Mr. **Jackson**:

Q. Do you agree with that?

By the **Witness**:

Yes, sir.

Redirect examination by Mr. **Thompson**:

Q. You testified about a change in the area—the drainage area on Little River at some time in the past, as compared with the recent study that you have made. Is that the only substantial variation that you have had in the New River drainage area in the new figures that you have gotten out?

726 A. I think that was the largest difference we found, and it was, by far, the greatest percentage difference, and I am sure it is also the largest difference in actual area.

Q. Could you give any other figures showing changes?

A. I can give the figures as originally previously used and the new figures. I have them tabulated here [indicating].

Q. You have them tabulated?

A. Yes, sir; I have them here [witness produces papers]. A comparison of areas obtained from measurements in June 1936, with those previously used are: New River at Eggleston, June 1936, the measurement was 2,941.43 square miles; previously used 2,945.

Q. What was the difference there?

A. The difference there was about 3½ square miles, and we only used to the nearest square mile.

Q. What percentage would that be?

A. About .01 of one percent.

Q. Give the next one.

By the **Court**. You mean one-tenth of one percent. Wouldn't it be that?

---

[4] See footnote, page 457.

By Mr. Thompson. What is that, Your Honor?

By the Court. He said about .01 of one percent. I thought it would be one-tenth of one percent, because there is a three-miles difference in an area of 3,000 miles.

By the Witness. I am wrong, sir. It would be one-tenth of one percent. New River at Radford, June 1936, measurement 2,736.24; previously used 2,720 up until 1906, for which was used the figure of 2,726.

Q. What is the difference there in square miles?

A. Ten square miles.

Q. What percentage is that?

A. That is about one-half of one percent.

727 Q. Have you any other changes?

A. New River at Allisonia, measurement, June 1936, 2,202.4 square miles. Previously used 2,193 square miles, a difference of 9 square miles, which was about .4 of one percent.

Q. Now, those figures mean practically nothing in estimating the stream flow—those changes?

A. So far as the record of daily discharge, it means nothing whatever. It means nothing in the published records except in computation of the run-off in second-feet per square mile.

Q. You testified, in reply to a question, that the geological survey at one time had an estimated survey of 195 square miles at the Copper Valley station, and that subsequently, under your estimate, it was 238 square miles. Would that have any effect on the flow of Little River at the Copper Valley station or at any other point?

A. No, sir.

By Mr. Jackson:

In the flow or the estimate of the flow?

By Mr. Thompson:

In the flow.

Q. How about on the estimates?

A. It would have no effect on my estimates, because we used the correct figure.

By Mr. Jackson:

You mean the correct figure for the flow?

A. For the drainage area.

By Mr. Thompson:

Q. You spoke of the geological survey taking their data from the Weather Bureau gauging station near Kanawha Falls. Who read that gauging station?

A. I believe that it was read by some man employed in the Army Engineers.

By Mr. JACKSON. We move to strike that answer from the record, if he does not know.

By Mr. THOMPSON. Q. What was your understanding about his office there?

By Mr. JACKSON. We object to that.

The objection is sustained.

By Mr. THOMPSON:

Q. Where is the gauging station located at Kanawha Falls?

A. The present gauging station is about 200 feet downstream from the toll bridge. 728

Q. And where is the gauging station for Lock No. 2?

A. The description of the gauging station for Lock No. 2, I think, that is published in Water Supply Paper, No. 536 [witness produces book]. Its location at Lock 2 is three-fourths of a mile below the Chesapeake and Ohio Railway Station, at Montgomery, in Fayette County.

Q. That is below Kanawha Falls, is it?

A. Yes, sir.

Q. Do you know where the electro-metallurgical power plant is located?

A. Yes, sir.

Q. Do you know where the dam is located for that power plant?

A. Yes, sir.

Q. Where is it located?

A. At Kanawha Falls.

Q. You testified that on August 15th, 1930, that there was a larger flow at the Caperton gauge than there was at Lock No. 2 gauge. Is that correct?

A. Yes, sir.

Q. Could that have been caused by the sudden stopping of the flow of water at the electro-metallurgical dam?

A. I think it could have been.

By the COURT:

Do you mean the flow from Caperton to Kanawha Falls, or Lock No. 2?

A. Yes, sir.

Q. What is the time interval from Caperton to Kanawha Falls—is it as much as 24 hours?

A. I think not, sir; I think it would vary with the stage of the River, but I don't believe it would be 24 hours.

By Mr. JACKSON:

It would not be over 8 hours, would it?

A. I could not say; I have not studied that.

729 **By Mr. Thompson:**

Q. Do you know the distance between the two places—Caperton and Lock No. 2?

By Mr. Jackson:

Mr. McWhorter said it was 19 miles.

By the Court:

He said it was 19 miles to Kanawha Falls.

By Mr. Jackson:

Not from Lock No. 2.

By Mr. Thompson:

Q. How far down is Lock No. 2 from Kanawha Falls, if you know?

A. I don't know the exact distance.

Q. It is about 2 miles, isn't it?

A. Something like that.

Q. So approximately the distance was 21 miles between Caperton and Lock No. 2?

A. That may be.

By Mr. Jackson:

I understand that the gauge reading is at a Kanawha Falls and not at Lock No. 2.

By the Court:

You asked the same question about a specific day, on which the reading at Kanawha Falls was one thousand and something, and at Caperton was eleven hundred and something.

By Mr. Jackson:

That was the average and we asked about the maximum and the one at the lower end was Kanawha Falls and the other at Caperton, and I assume that the distance that they are interested in is between these points and not Lock No. 2.

By the Court:

The witness said, Mr. Thompson, that this reading was at Lock No. 2—I mean he said that it was at Kanawha Falls.

By Mr. Thompson:

The witness says that I am incorrect.

Q. It was at Kanawha Falls?

730 A. Yes, sir.

Q. But that station is below the falls?

A. Yes, sir.

Q. That is about 19 miles from Caperton to Kanawha Falls?

A. Approximately that.

Q. That is at one of the steepest parts of the river from Caperton to——

A. (Interrupting.) Yes, sir.

Q. (Continuing.) To Hawks' Nest?

A. Yes, sir.

Q. Or Kanawha Falls?

A. Yes, sir.

Q. You read from Water Supply Paper No. 536 a comparison of ratios of drainage areas and ratios of discharge. What in your figures was the relationship between drainage area and discharge as applied to your estimates?

A. Which of my estimates—the mouth of the river?

Q. Those at Radford?

A. I had information to substantiate my assumption that the discharge at the Radford dam site was nearly in proportion to the drainage area of that at Eggleston. I believe that is the ratios generally used and I obtained my substantiation of that assumption by comparison with figures obtained from the Radford dam site and other periods when there were records at Allisonia, and a station at Graysontown, on Little River.

Q. How did you estimate the flow of Little River at the time the gauge records were not available?

A. That was done from the duration of flow, by obtaining the mean ordinate of the curve.

Q. What is that? Read that answer. (The answer is read.) What is an ordinate?

A. An ordinate—that is the duration of flow of the curve
line. That was made with a certain area along the curve line
between the line and the axis to which the curve is re-
731 ferred. If we took the same area along a straight line,
then the height of that distance, of that straight line
above the base, would be the mean ordinate.

Q. State whether or not you followed, in arriving at these estimates of yours and figures, the customary methods used by the United States Geological Survey.

A. Yes, sir.

Q. Are these methods generally accepted in engineering computations in the engineering world?

A. I think they are, so far as my experience has gone.

732

Glen E. Edgerton

Direct examination by Mr. Thompson:

Q. Colonel, will you please state your name, residence, and occupation?

A. Glen E. Edgerton; residence, Washington, D. C. I am an officer of the Corps of Engineers, United States Army, at present on duty in the office of the Chief of Engineers.

Q. What department of the Chief of Engineers do you have at this time?

A. I have the River and Harbor section of his office.

Q. Will you please give a statement of your schooling and experience as an engineer?

A. My schooling began in the city schools of Council Grove, Kansas. I graduated from the Agricultural College of Kansas in 1904 in mechanical engineering and took an advanced degree in civil engineering in 1916. I entered the United States Military Academy in 1904, graduated in 1908. I served continuously since in the corps of engineers. I served as engineer on the Panama Canal, as Chief Engineer of the Alaska Road Commission, as District Engineer at Jacksonville, Florida, District Engineer at Rock Island, Illinois, as Assistant Chief Engineer and Chief Engineer of the Federal Power Commission, as Professor of Engineering at the United States Military Academy and in numerous other military and nonmilitary assignments. I graduated from the Engineers School, United States Army, and Command and General Staff School of the United States Army.

Q. Colonel, when did you go with the Federal Power Commission?

A. In June of 1924.

Q. How did you come to go there?

A. I was assigned there by War Department orders. The
Chief Engineer and a number of the assistants were de-
733 tailed from the War Department to establish a staff of the
Federal Power Commission. The Chief Engineer was at
that time by law an officer of the corps of engineers.

Q. What position did you occupy when you first went there?

A. Assistant Chief Engineer.

Q. When did you become Chief Engineer?

A. In May of 1925.

Q. What were your duties as Chief Engineer of the Commission?

A. Well, I had charge of the engineering division. All matters of engineering import that came before the Commission were handled through that division. I also acted as Executive Secretary in charge of the entire office in the absence of the Executive Secretary. In general, the duties were all of those that involved any engineering matters, preparation of engineering reports, the handling of applications for preliminary permits, declarations of intention, applications for licenses and all correspondence connected with those matters.

Q. Colonel, I hand you what is marked for identification Government Exhibit No. 88 and ask you if you know what that is?

A. That is a Declaration of Intention by the New River Development Company covering a prospective project on the New River in the vicinity of Radford.

Q. When was that filed?

A. It was filed on June 26th, 1925, dated June 25, 1925.

Q. Do you recall the time when that was filed?

A. Yes, sir.

Mr. Thompson. This is one of the documents, your Honor, that, under stipulation, it was agreed there would be no objection to.

Mr. Jackson. There is no objection to the receipt of this exhibit. I want to make it clear, however, that the lack of objection is not a concession either that this witness would be a competent witness for proving documents in the possession of the Commission, or that documents so proved will be admissible, but we have no objection to this one.

Mr. Thompson. I offer that in evidence, your Honor.

Note.—This paper was filed and marked Government Exhibit No. 88.

Mr. Jackson. I want the record to show that the exhibit is not complete in that the maps which accompanied it are not attached to the exhibit, and we will reserve the right to supplement it if that seems to be essential. May that be understood?

The Court. All right.

Mr. Thompson. We would like very much to get a copy of that map.

Mr. Jackson. I should think it would be appropriate to get it from the custodian of the files of the Federal Power Commission.

By Mr. Thompson:

Q. Colonel, I hand you what is marked for identification Government Exhibit No. 89 and ask you to look at that and state whether you know what it is?

A. It is an assignment of the right and interest of the New River Development Company to the Appalachian Electric Power Company which accompanied an application for license by the latter company.

734 Q. Do you recall that being filed with the Commission?

A. Yes.

(Exhibit 89 offered in evidence.)

Q. I hand you what is marked for identification Government Exhibit No. 90 and ask you if you know what that is, purporting to be the application for license by the Appalachian Electric Power Company?

A. This is a copy of the application of the Appalachian Electric Power Company for a license for a proposed project at Radford, Virginia, on New River, received on September 4, 1926.

Q. Do you recall that being filed with the Commission?

A. Yes.

(Exhibit 90 offered in evidence.)

By Mr. THOMPSON:

Q. I hand you what is marked for identification Government Exhibit No. 90–A, purporting to be a series of maps, and ask you to look it over and tell what it is?

A. These are copies of Exhibits J, K, L–1, L–3, L–4, and L–5, accompanying the application for a license by the Appalachian Electric Power Company and also another map marked Exhibit J showing the general location of proposed development No. 6, so-called, on New River, and L–1, L–2, and L–3, L–4 and L–5 of the exhibits accompanying the application for license are apparently the originals for which the preceding copies were substituted, and the maps giving duration curve for the period 1914 to 1925, marked Exhibit 1–A, which accompanied application for license to which I have just referred.

Q. Do you recall that being filed with the Commission?

A. Yes, sir.

By Mr. JACKSON:

Q. When were you with the Commission?

A. From May 1925 to August 1929.

Q. I wonder if inadvertently you overlooked the fact that these maps were prepared in 1930, Colonel, and these are, in fact, I am told, the maps that were subsequently submitted with an application for a minor part license, and the only thing I am interested in is getting the record straight.

735 A. As I meant to state, the later maps, later referred to in my remarks, appear to be the originals for which revisions were substituted and the revisions are bound in the first part.

By Mr. THOMPSON:

Q. You stated that in your testimony?

A. Yes, sir.

By Mr. JACKSON:

Q. The maps dated in 1930 are those which were submitted with the application for a minor part license and the maps which are dated in 1925, referring in each instance to Exhibit 90–A, are the maps which accompanied Exhibit 90?

A. Yes.

Q. May that be understood?

A. Yes, sir.

(Exhibit 90-A offered in evidence.)

By Mr. **Thompson**:

Q. Do you remember who was District Engineer while you were Chief Engineer of the Commission—the District Engineer at Huntington?

A. Major H. L. Trippe was District Engineer at Huntington. Except for a short period when Major A. K. B. Lyman took his place until he was relieved—the dates I cannot remember—by Major E. D. Ardery.

Q. H. M. Trippe, I believe?

A. Very likely.

By Mr. **Jackson**:

Q. Col. Edgerton, you left the Power Commission in 1929?

A. August 1929.

Q. And since that time you have had no official connection with that Commission?

A. No, sir.

Q. And you do not now have custody of any of the files or records of that Commission?

A. No.

Q. Your duties do not include anything with reference to those files or records at the present time?

A. No, sir.

(Exhibit 91 was offered for the limited purpose of showing the nature of the investigation made by the Federal Power Commission in connection with Defendant's project and not as proof of any other fact, and not as evidence of the correctness of any statement, recital, or conclusion contained therein and was admitted for such limited purpose over Defendant's objection and exception.)

By Mr. **Thompson**:

Q. Col. Edgerton, I call your attention to page 116, 736 where it says "The 77th meeting held in the office of the Secretary of War, March 2, 1926. Meeting called to order 3:45 P. M.," and I ask if you were present at that meeting?

A. Yes, sir; I was present.

Q. When you were in the Commission and attended these meetings, or did you attend the meetings of the Commission?

A. Most of them, unless I was absent from the city; yes, sir.

Q. And when you were present at the meetings, did you take any part in the meetings?

A. Yes, sir.

Q. Did you take any part in the particular meeting of March 2, 1926?

A. Yes, sir; I took some part.

Q. When the minutes were prepared, did you have anything to do after the meeting with regard to those meetings?

A. Yes, sir. I reviewed the minutes to see there was no error in them, and to see they correctly represented the transaction of business at the meeting.

Q. And who else did that, if you know?

A. They were finally approved by the Executive Secretary and sent to the Records with copies to the three members of the Commission.

Q. Did you ever act as Executive Secretary, Col. Edgerton?

A. Yes, sir; many times.

Q. Was it the rule you acted as Executive Secretary in the absence of the Executive Secretary?

A. Yes, sir.

Q. Please have reference to page 129. In what report was that meeting referred to or reported or set forth?

737 A. The 78th Meeting, the minutes of which occurred in the report for 1926.

Q. Were you present at that meeting?

A. No, sir.

Q. Did you see the minutes of that meetings after the minutes were prepared?

A. Yes, sir.

Q. Did you check on those minutes?

A. Yes, sir.

Q. Does that state accurately what happened at that meeting?

A. Yes, sir.

Q. Now refer to the next one, March 26, 1926, you state you were not present at that meeting?

A. No, sir.

Q. But you did go over the minutes and check them?

A. Yes, sir.

Q. Now please turn to the Annual Report of the Federal Power Commission for the year 1927, pages 111, 113, and 114, and also for the 88th meeting held in the office of the Secretary of War June 1, 1927. Please state if you were present at that meeting?

A. I was.

Q. Did you check on those minutes?

A. Yes, sir.

By Mr. Jackson. May it be understood this is all objected to; that subject to our objection the documents have been received in evidence and we have raised no objection to the correctness of the documents, but only as to their competency.

By the **Court**:

Yes.

Q. Does that state what happened at that meeting, with accuracy?

A. Yes, sir; substantially.

Q. State if you know what was done with the Declaration of Intention when it was filed?

A. It was referred to the Chief of Engineers for field investigation and report and referred by him to the District Engineer at Huntington for field investigation and report to the Chief
Engineer. Report was made and study made in the Dis-
738 trict Office and it was embodied in a report which was
transmitted to the Chief of Engineers through the Divisional Engineer.

Q. Do you remember about what date it was transmitted?

A. Well, it was transmitted about the 23rd of July 1925.

Q. I hand you what purports to be a report dated August 20, 1925, signed by Major General Taylor, marked for identification, Government's Exhibit #92, and ask you what that is?

A. That is a copy of the report submitted by the Chief of Engineers upon the completion of the field investigation of the Declaration of Intention of the New River Development Company.

Q. When was that received?

A. August 22, 1925, in the Federal Power Commission office.

Q. I hand you a document dated July 23, 1925, signed by Major A. K. B. Lyman, and purporting to be a report from Major Lyman to the Chief of Engineers, marked for identification Government Exhibit #93, and ask you what it is?

A. It is the report prepared in the District Office on the results of the field investigation of the Declaration of Intention of the New River Development Company.

Q. State if that accompanied the report of August 20, 1925, marked Government Exhibit #92?

A. It was received by the Federal Power Commission on or about the time the original report was received. I think it was transmitted with it.

Q. I believe——[interrupted].

Q. I believe you stated what dates those were received by the Commission.

A. Except the report of the District Engineer. I see no received mark, but it was about the time the report of the Chief of Engineers of August 20, 1925, was received.

Q. Do you happen to know why this report of the District Engineer is signed by Major A. K. B. Lyman?

739 A. Major Trippe was temporarily absent at the time the report was submitted, and Major Lyman, at Cincinnati, was

assigned that duty in addition to his other duties, consequently he signed the report.

(Exhibits 92 and 93 offered in evidence.)

Q. I hand you a document marked for identification "Government Exhibit #94," dated October 15, 1925, and signed by Major H. M. Trippe, and ask you to look at that and tell, if you know, what it is.

A. It is a letter from Major Trippe, the District Engineer at Huntington, to me, enclosing memorandum on the probable effects of the proposed New River Development Company project on the Kanawha River, submitted in response to my oral request.

Q. When did you make the oral request?

A. October 10, 1925.

Q. Where were you when you made it?

A. Huntington.

Q. Why did you go to Huntington?

A. To obtain first hand as much information as I could get of the character and scope of information available there on the difficulties of navigation on the Kanawha and probable effects of this project on the Kanawha River.

Q. And at that time you asked him to prepare data for you?

A. Yes, sir.

(Exhibit 94 offered in evidence.)

By Mr. Jackson:

X Q. Col. Edgerton, this letter and memoranda which has been marked "Exhibit #94" for identification, did not pass through the regular course of official communications of the Corps of Engineers, did it?

A. No, sir.

X Q. Had it done so, it would have been referred to the Divisional Engineer and Chief of Engineers, etc.?

A. Copies were referred to them.

X Q. But this particular document, it did not go that way?

A. No, sir.

X Q. And you were at Huntington and simply asked
740 Major Trippe to write you a personal letter in regard to some information you had asked about?

A. The circumstances if you want them elaborated on—— [interrupted].

X Q. I just want to know if that isn't so?

A. I went to Huntington to get this information orally from Major Trippe or in any form it might be.

By Mr. Thompson:

Q. Were you Chief Engineer at this time of the Commission?

A. Yes, sir.

A. (Continuing.) And I didn't see him all day. I saw him late in the evening and I could not stay any longer, and we discussed the matter, and I asked him to put it all down in writing for my benefit.

By Mr. Jackson:

Q. And he simply wrote you for your personal information about certain inquiries you had been making, is that right?

A. Yes, sir.

Q. And Major Trippe was not subject to your command or order, was he?

A. Not directly.

Q. He was under no obligation to comply with your request, by statute?

A. No statutory obligation.

Q. No regulation of the War Department obligated him to comply with your request?

A. No formal request made.

By Mr. Jackson. We object to this because it was not a formal communication.

By Mr. Gatchell:

Q. Col. Edgerton, did you consult Major Trippe in your official capacity as Chief Engineer of the Federal Power Commission?

A. Oh, yes.

Q. Did he report to you as Chief Engineer?

A. Yes, sir.

Q. Was he the field representative of the Federal Power Commission? I mean at the time he made this report.

A. Yes, sir.

By Mr. Jackson:

741 Q. Isn't it true Major Trippe whenever he reported officially, reported through the Chief of Engineers?

A. Well it depends on the meaning of the word official. His regular course of correspondence was through the Chief of Engineers.

Q. He was not authorized to make reports to anyone else?

A. He was authorized to give the Engineers any information he had at any time.

Q. But not to make official reports?

A. I don't know about that, it depends on what you mean by official.

By Mr. **Gatchell**:

Q. Col. Edgerton, was it the invariable practice of Major Trippe, as representative of the Federal Power Commission to submit all reports through the Chief of Engineers?

A. I think so.

(Exhibit No. 94 was offered for the limited purpose of showing the nature of the investigation made by the Federal Power Commission in connection with Defendant's project and not as proof of any other fact, and not as evidence of the correctness of any statement, recital, or conclusion contained therein and was admitted for such limited purpose over Defendant's objection and exceptions.)

Q. I hand you, marked for identification, Government Exhibit No. 95, being a letter dated April 7, 1926, addressed to Major General Taylor and signed by Mr. Merrill, Executive Secretary, with chart and memorandum attached, and will ask you if you know what that is?

A. Yes, it is a copy of a letter from the Executive Secretary to the Chief of Engineers transmitting chart showing results of observations on certain stream flow studies on the Pit and Sacramento Rivers, accompanied by a memorandum prepared by one of the engineers in my office, transmitting to the Chief of Engineers in accordance with the request of the Commission.

Q. Please read the last line in that letter.

A. "Early consideration of these data and expression of your opinion with respect to them would be appreciated."

By Mr. **Thompson**. I desire to offer this letter in evidence.

By Mr. **Jackson**. Subject to our objection and, of course, the Court has ruled on it.

(Said letter dated April 7, 1926, together with chart and memorandum attached, is here filed, marked Govt. Exhibit 95.)

Q. I now hand you letter marked for identification Govt. Exhibit 96, being a letter addressed by General Deakyne, to the Executive Secretary of the Federal Power Commission, dated July 23, 1926, and will ask you if you know what that is? 742

A. Yes; it is a report made by the Acting Chief of Engineers, and showing the receipt of a letter just mentioned.

Q. What is the date of the receipt of that letter by the commission?

A. July 31, 1926.

(Exhibit 96 offered in evidence.)

Q. I hand you, marked for identification Govt. Exhibit No. 97, purporting to be a report from General Taylor dated December 29, 1925, addressed to the Executive Secretary, and will ask you what that is, if you know?

A. It is a report by the Chief of Engineers to the Federal Power Commission in reconsideration of previous reports at the request of the Declarant.

Q. I call your attention to the letter number in the right-hand corner, and will ask you what that is?

A. It says "duplicate copy," indicating that this photostat is made from the retained copy and not from the original.

By Mr. THOMPSON. I desire to offer this in evidence.

By Mr. JACKSON. No objection. I understand it is offered for all purposes.

By Mr. THOMPSON. It is offered for the same purpose as all the other documents, for the purpose of showing the investigation and what was before the commission.

(Said letter is filed, marked Govt. Exhibit 97.)

Q. State, if you know, what became of this report of December 29th, 1925, from Major General Taylor to the Federal Power Commission.

A. It was returned to the Chief of Engineers.

Q. About what time was it returned?

A. I think in the spring of 1926, about the early part of April.

Q. And upon whose request?

A. I think on the Chief of Engineers' request.

Q. Was that report ever returned to the Federal Power Commission, so far as you know?

By Mr. JACKSON. We object to the question. It does not matter whether he knows or not.

By Mr. THOMPSON. I am asking as far as he knows.

By Mr. JACKSON. I do not think that is a proper way of proving it. He left there in 1929.

By Mr. THOMPSON. The report went back long before 1929. He states it went back in the early part of 1927.

Q. State whether or not it went back before the time the Commission made its findings, June 1, 1927.

A. I think it went back in 1926.

Q. The early part of 1926?

A. Yes, sir.

743 Q. When was the last time you ever saw this report?

By Mr. JACKSON. We object to the question as irrelevant and incompetent.

A. About three weeks ago.

Q. Where was it?

A. In the office of the Chief of Engineers, in his file.

Q. In Washington, D. C.?

A. Yes, sir.

Q. Was that the original report?

A. Yes, sir.

Q. I hand you, marked for identification, Govt. Exhibit 98, purporting to be a report dated April 12, 1927, signed by Herbert Deakyne, Brigadier General, Acting Chief of Engineers, together with an apparent supporting report to the Chief of Engineers, signed by Major H. M. Trippe, dated December 22, 1926, both documents marked "received by Federal Power Commission as of April 14, 1927," and will ask you if you know what that document is?

A. Yes; it is the report of the Chief of Engineers to the Executive Secretary on the application of the Appalachian Electric Power Company for a license for power development on New River, near Radford, Virginia; accompanied by a report of the District Engineer at Huntington, on the same subject, dated December 22, 1926, and bearing the first endorsement of the Division Engineer, central office, dated January 13, 1927.

Q. Who was that?

A. Col. C. W. Kutz.

Q. Do you recall that report coming to the Commission?

A. Yes, sir.

Q. Were you present at the meeting of June 1, 1927, of the Commission?

A. Yes, sir.

(Exhibit 98 offered in evidence.)

By Mr. **Thompson**:

Q. Was the report of Major General Taylor of December 29, 1925, before the Commission at that time?

By Mr. **Jackson**. I object to the question. I do not think it is a competent way of proving a record.

By the **Court**. I will let him answer it.

By Mr. **Jackson**. We desire to take an exception.

A. No, sir; it was not.

By Mr. **Thompson**:

Q. State whether or not this report of General Deakyne was before the Commission.

A. Yes, sir; it was.

By Mr. **Thompson**:

Q. State whether or not the Commission had knowledge of this report.

A. It did.

Q. State whether or not this report was discussed before the Commission.

A. It was.

Q. I will ask you to read into the record paragraph 12 of General Deakyne's report:

A. "12. I concur in the recommendation of the District Engineer that a license be granted the applicant provided it is subject to the following conditions, articles 3, 4, 5, 7, 8, 9, 10, 11, 12, 15, 16, 19, 22, 23, 24, 25, 26, 27, 28, 29, 30, of license No. 432, and to the following condition:

"The licensee shall at all times discharge a minimum of 8,050 acre-feet per week over or through the dam. Whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 second-feet the licensee, when so directed by the Secretary of War, shall discharge in each 24 hours the minimum flow of the river during that period up to a discharge of 1,150 acre-feet. The above discharge shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent interference with navigation on the Kanawha River."

By the COURT:

Q. Was a license ever tendered on those terms?

A. I do not know.

745 By Mr. THOMPSON:

Q. Colo[illegible] I hand you, marked for identification, Govt. Exhibit 99, apparently consisting of a list of affidavits submitted to Federal Power Commission for consideration upon Declaration of Intention of New River Development Company, by Appalachian Electric Power Company. I will ask you to look that over and see if you know what it is.

A. They appear to be affidavits concerning New River, submitted in connection with the representation of the Declarant in the matter of the proposed Radford Project.

Q. What is the date of the reception of that document?

A. I cannot read it, it is not very clear.

Q. October 22, 1925; it that right?

A. Yes, sir.

(Exhibit 99 offered in evidence.)

Q. Did the Commission know about those affidavits?

A. Yes, sir.

Q. I hand you, marked for identification, Govt. Exhibit 100, purporting to be a hearing before the Federal Power Commission, dated March 2, 1926, the stenographer being Douglas O. Morgan, and will ask you, if you know, what it is?

A. It is a copy of the stenographer's record of a hearing held before the Commission on the Declaration and Intention of the New River Development Company on March 2, 1926.

(Exhibit 100 offered in evidence.)

Q. I hand you a document consisting of a number of pages, marked for identification Government Exhibit 101, and dated from the War Department, U. S. Engineer Office, Huntington,

W. Va., September 28, 1926, apparently received by the Federal Power Commission, on January 15, 1927, and will ask you if you know what that is?

A. It consists of notice of public hearing held by the District Engineer, of Huntington, W. Va., on the application of the Appalachian Electric Power Company.

By Mr. JACKSON:

746 Q. For what?

A. For a license. Accompanied by a list of persons to whom sent, and letter to newspapers giving notice of the hearing and the report of the hearing itself.

Q. Was that received by the Commission?

A. Yes, sir; on April 14, 1927.

Q. Did you ever see it before?

A. Yes, sir.

Q. In the Commission?

A. Yes, sir.

By Mr. THOMPSON. I desire to offer this paper in evidence. (Document filed, marked Govt. Exhibit 101.)

By Mr. JACKSON. In addition to the objections we have already made to this line of testimony, I wish to make the further objection that this exhibit shows on its face, and the testimony of the witness shows it has to do with a hearing for application of the Appalachian Electric Power Company for license and has nothing whatever to do with the hearing upon Declaration of Intention, which is the point in controversy here.

By Mr. THOMPSON. It covers both Declaration of Intention and the Application for a license, and it all occurred prior to June 1, 1927.

By Mr. JACKSON. An entirely different proceeding, and it was carried on concurrently, with the idea that there would be less delay. It further appears that it is a hearing not before the Commission but before Col. Trippe.

By Mr. THOMPSON. I believe you said Major Trippe was acting as a representative of the Federal Power Commission, was he not?

A. Yes, sir.

By Mr. THOMPSON:

Q. Was this document received by the Commission?

A. Yes; on April 14, 1927.

By the COURT. What is the objection to it?

By Mr. JACKSON. The only point involved here is the question of whether or not there was any valid order based upon Declaration of Intention. This had, or this hearing had, nothing to do with the Declaration of Intention, but only application for license.

By Mr. THOMPSON. In view of what counsel have said, may I read a statement at the beginning of the hearing held at Radford? It is very brief.

By the COURT. Go ahead.

By Mr. THOMPSON. "Summary of Proceedings at Public Hearing, held in the Court room of the Corporation Court for the City of Radford, Virginia, on October 28, 1926, in the matter of the Application of the Appalachian Electric Power Company for license under the Federal Power Act to construct a project of water-power development on New River at a point one mile above the mouth of Little River and seven miles above the City of Radford."

By Mr. JACKSON. That is exactly what I said.

By Mr. THOMPSON. This says "application for license."

By the COURT. His objection is that under the statute when Declaration of Intention is filed an investigation shall be made.

By Mr. THOMPSON. I probably should not encumber the record, and I think the Court understands what we are doing showing the steps leading up to this finding under section 23 that was made by the Commission and showing the opportunity that the other side had to present their case and what the Commission was advised of.

By Mr. JACKSON. It is not a step in the matter under investigation, though.

By the COURT. I will let you put it in.

By Mr. JACKSON. We desire to except.

By Mr. THOMPSON:

Q. I show you a letter dated September 2, 1926, signed Curtis, Mallet, Prevost, Colt & Mosle, addressed to the Federal Power Commission, Washington, D. C., marked for identification Government Exhibit 102, and will ask you if you know what that is?

A. It is a letter from the attorneys for the Declarant, in which they advise——

By Mr. THOMPSON:

Q. When was that letter received by the Commission?

A. September 4, 1926.

Q. In view of what counsel said, I would like to have you read the last paragraph on the first page of the letter.

A. "Under the circumstances, we request that action on the Declaration of Intention, referred to in your letter of August 19, 1926, addressed to New River Development Company, be deferred for consideration at the same time as the Application for License by Appalachian Electric Power Co."

(Exhibit 102 offered in evidence.)

By Mr. **Jackson**:

Q. Col. Edgerton, will you please read the paragraph ahead of the one you read on Exhibit 102?

A. "In order to expedite matters, Appalachian Electric Power Company is adopting the suggestion made by you in your 747 letter of July 1, 1925, and is submitting herewith an application for a license for the proposed project, upon the understanding that such application can be withdrawn if it should develop that a Federal license is not required."

Q. I show you five pages of a Western Union telegraph blank, on which there appears to be a lengthy telegram, which is marked for identification as the Government's Exhibit No. 103, and I will ask you if you know what that is.

A. It is a telegram from the Acting District Engineer of the United States Forestry Service, in San Francisco, to the Executive Secretary of the Federal Power Commission.

Q. Whose name is signed to that?

A. Mr. Kramer's name.

Q. Who is Mr. Kramer?

A. Mr. Kramer was an assistant to the District Engineer of the Forestry Service, in San Francisco.

By Mr. **Thompson**:

Q. Did you tell what that was in response to—this telegram?

A. No, sir; I did not.

Q. Tell us, if you know, what this telegram is in response to.

A. No, sir; I do not know.

By Mr. **Thompson**:

Q. You do not know what that is in response to?

A. No, sir.

By Mr. **Thompson**. If your Honor please, we have mislaid the telegram that was sent, in which this is in response to, and we will try to find it. In the meantime, that has been identified, and we will offer it in evidence.

By Mr. **Jackson**: We object to that, because it is not competent. It appears on its face that it is not an official communication, and there is no basis laid for its reception.

By Mr. **Thompson**. It is an official communication. It is the result of a study made of the Pit and Sacramento Rivers. It asks that a study be made and this is the telegraphic reply. We will put a witness on later that signed this telegram.

By the **Court**. The witness testified that this telegram was information obtained by the Commission. Did he testify that the telegram and the information in it was before the Commission?

By Mr. **Thompson**. I will ask him.

By the **Court**. You are introducing it simply as some more data upon which the Commission acted?

By Mr. **Thompson**. Yes, sir. In the reports of March 26th, I think it is, all of this transaction is referred to, March 26, 1926, this is all referred to. What was your Honor's question?

By the **Court**:

Q. As to whether or not it was before the Commission.

A. Yes, sir; it was.

By Mr. **Thompson**. I offer it in evidence as the Government's Exhibit 103.

By Mr. **Jackson**. We except to it for reasons stated.

By Mr. **Thompson**:

Q. When was that received?

A. December 9, 1925.

Q. I hand you a document—the photostatic copy of a document, together with a number of charts attached to it, dated December 15, 1925, addressed to the Executive Secretary of the Federal Power Commission, and signed by Mr. F. E. Bon-
748 ner, District Engineer, by E. W. Kramer, Acting, and I ask you what that is.

A. This is a report to the Federal Power Commission by the District Engineer of the United States Forestry Service in California on certain stream-flow measurements made on the Pit and the Sacramento Rivers at the request of the Commission.

Q. Was that information contained therein presented to the Commission?

A. Yes, sir.

By Mr. **Jackson**. We object to that, because it appears on its face that it is not an official communication. We make that objection in addition to our general objection.

By Mr. **Thompson**:

Q. I hand you a letter on the United States Forestry Service paper, together with maps and data, signed by Mr. F. E. Bonner, District Engineer, addressed to the Executive Secretary of the Federal Power Commission, dated May 2, 1927, and ask you if you know what that is?

A. Yes, sir; that is a report by the District Engineer of the Forestry Service to the Commission on certain measurements made on the stream flow on the Klamath River.

Q. Where is the Klamath River?

A. It is in the northern part of California and the southern part of Oregon.

Q. Did the Commission receive that letter?

A. It received the letter May 7, 1927.

Q. Did it know the contents of that letter?

A. Yes, sir.

By Mr. JACKSON. We move to strike the answer that the Commission knew of the contents of the letter.

By Mr. THOMPSON:

Q. Do you know of your own knowledge that it did?

A. Yes, sir.

(Exhibit 104, being a letter dated December 15, 1925, from O. C. Merrill to Kramer, and Exhibit 105, being a letter dated May 2, 1927, from F. E. Bonner to O. C. Merrill, offered in evidence.)

Q. I hand you a number of photostatic pages, marked for identification Government's Exhibit No. 106 and described as "Memorandum re Declaration of Intention of the New River Development Company, before the Federal Power Commission—Statement of the Case," and signed by Curtis, Mallet-Prevost, Colt and Mosle, and I ask if you know what that is. [Handing paper to witness.]

A. It is a brief by the—or an argument by the attorneys for the declarant on the subject of the proposed—the Commis-
749 sion's proposed action on their Declaration of Intention, of the New River Development Company, and it is accompanied by a supplement from the same source.

Q. Setting forth the position of the applicants?

A. Of the Declarant.

(Exhibit 106 offered in evidence.)

By Mr. THOMPSON:

Q. Here is the first sheet?

A. (Continuing.) October 24, 1925—It is entered in handwriting, and I think it to be received that day.

Q. The reason for that is that the stamp of the Commission is illegible?

750 A. Yes, sir; it is illegible.

By Mr. THOMPSON. We offer the Government's Exhibit 106 in evidence. Do you object to it (addressing opposite counsel).

By Mr. JACKSON. We make our usual objection; yes, sir.

(At this point, at the suggestion of Mr. Horn, of defense counsel, Mr. Horn and Mr. Thompson conferred, after which Mr. Thompson stated that Exhibit 106 for the Government would be filed in evidence in four parts, namely, Exhibit 106, Exhibit 106-A, Exhibit 106-B, Exhibit 106-C.)

By Mr. **Thompson**:

Q. You have identified these papers dated October 23, 1925, addressed to Mr. Micou, and signed by Mr. Bevan?

(Exhibit 106, 106A, 106B, ~~and 106C~~ offered in evidence.)

By Mr. **Thompson**:

Q. Please state what effect, if any, the construction and operation of this Radford project, as described in the Declaration of Intention and the application for a license, will have upon the flow of New River.

A. It will have several probable effects. It would, if the projects were operated in a normal manner for such a project, it would create variations in the flow, depending upon the load that the powerhouse was carrying from time to time. By seasonal storage, it would also tend to decrease the highest flows over a substantial period and to increase the lowest flows, assuming that the project were operated as a hydroelectric project would ordinarily be operated. If the operator ~~should~~ elect to fill the reservoir at periods of low flow, they might decrease the
flow below the dam to almost nothing. There are other
751 methods of operation in between, which would produce
somewhat different effects, but, generally, I think, the effect—the effects would be as indicated in my answer.

By Mr. **Jackson**. We move to strike the answer as not responsive. The question was if the project were constructed and operated in accordance with the Declaration of Intention, and the witness's answer is entirely in disregard of the Declaration of Intention, and is involved in a hypothesis.

By Mr. **Thompson**:

Q. Mr. Edgerton, what is the amount of water necessary for capacity production at the Radford project, according to this set-up in the Declaration of Intention?

A. As a matter of memory, I think about eight thousand cubic feet per second.

Q. How long would the reservoir——

By Mr. **Thompson**:

Q. Do you know what the average flow of New River at the project is?

A. No, sir.

Q. Do you know how long they could run that project during the day, if they ran it at capacity, taking nine thousand second feet of water?

By Mr. **Jackson**. We object to that, because he said he did not know what the natural flow was at the dam site, and could not tell how long—he could not possibly tell how they could run, without knowing that.

A. It would be a matter of some days at low flow.

By the COURT:

Q. (Addressing the witness.) What did you say?

A. A matter of some days at low flow; they could run the plant and deplete the reservoir.

By Mr. THOMPSON:

Q. What effect, if any, would the operation of this project, as a peak-load project, have on the flow of the stream in the Kanawha River?

A. It would fluctuate the flow of water in the Kanawha River.

Q. In what way—to what effect?

A. It would tend to increase it over the stage[5] which you would expect naturally, at certain periods, and decrease it at other periods.

By the COURT:

Q. Do you know what the storage capacity behind the dam is?

A. I don't remember exactly.

752 Cross-examination by Mr. JACKSON:

Q. Colonel, I direct your attention to the third sheet, marked "page 117 of the Sixth Annual Report," appearing in Plaintiff's Exhibit 91, and particularly these sentences: "The meeting was devoted in part to a public hearing on the Declaration of Intention of the New River Development Company to construct a power project in New River about seven miles above East Radford, Virginia," and ask you whether that does not correctly state the fact in that regard?

A. Yes; it does state the fact.

Q. And I am right in understanding that that was a public hearing, held pursuant to formal notice given by the Federal power Commission; is that right?

A. I think so.

Q. And did you attend that public hearing, Colonel?

A. Yes, sir.

Q. And did the members of the Commission attend that hearing?

A. Yes, sir.

Q. Is the report of that hearing included in any of the Commission's reports or documents which you have introduced here in evidence this afternoon?

A. The stenographic report was presented here.

Q. This afternoon?

A. Yes, sir.

---

[5] See page 543 of Redirect.

Q. You don't remember the exhibit number, do you? It is number 100. Will you read the first two paragraphs of the second sheet of that exhibit, marked 13–C, at the beginning of the hearing?

A. "Washington, D. C., Tuesday, March 2, 1926. A hearing was held by the Federal Power Commission in the office of the Secretary of War relative to the Declaration of Intention
753 under the Federal Water Power Act, filed by the New
River Development Company, affecting the New River in Virginia. Present: Honorable Dwight F. Davis, Secretary of War; Honorable Hubert Work, Secretary of the Interior; Honorable W. M. Jardine, Secretary of Agriculture, and Honorable O. C. Merrill, Executive Secretary of the Commission."

Q. You were present, however, as I understand it, although your appearance was not entered?

A. Yes.

Q. Will you please turn to page 5, according to my numbering of this Exhibit 100, and I read to you from page 5 as follows: "A rehearing was requested on the question of the jurisdiction of the United States over nonnavigable streams and a further investigation and report was made by the Chief of Engineers of the War Department. I should like to read that report. It is dated December 29, 1925, and is as follows:"—and then follows a report covering the next—

By Mr. **Jackson**:

Q. I ask you whether you can identify that report which appears in Exhibit 100 at pages 5 to 15, according to my number?

A. I believe that is a report submitted by the Chief of Engineers to the Federal Power Commission in reconsideration of his original report on the Declaration of Intention of the New River Development Company and that it was subsequently withdrawn by the Chief of Engineers.

Q. Did you understand me to ask you whether it was subsequently withdrawn by the Chief of Engineers?

A. No, sir; I didn't.

Q. Why did you volunteer that statement?

A. As a contribution to the information about the identification of the report.

Q. Turning to page 13, I read you the following: "I therefore conclude that New River is not at the present
754 time a navigable water of the United States within the
meaning of the Constitution and laws of the Congress, including section 3 of the Federal Power Act." Is that a correct reading of that part of the Taylor report as it was read before the Committee or the Commission at this hearing of March 2, 1926?

A. I have no reason to doubt it.

Q. I ask you to turn to page 15 and I direct your attention to the paragraph there reading: "Therefore, so far as can be predicted from available data and records, it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the exitsing project." Was that statement read into the transcript at the hearing before the Federal Power Commission on March 2, 1926?

A. I have no reason to doubt that it was. The record so indicates.

Q. And I read you the next paragraph as follows: "I therefore report that, in my opinion, New River in its present condition is not a navigable stream, that navigation on the Kanawha River will not be adversely affected by the proposed power development," and ask you whether or not that statement was read into the record before the Commission at the hearing of March 2, 1926?

A. I believe it was.

Q. And those excerpts which I have read to you were from the report of Gen. Taylor, Chief of Engineers, dated December 29, 1925, were they not?

A. I think they were.

Q. You have no doubt of that?

A. I have no doubt of it.

Q. And those excerpts and the entire report of Gen. Taylor
as Chief of Engineers, under date of December 29, 1925,
755 was read into the record before the Federal Power Commission at this hearing of March 2, 1926, was it not?

A. It so appears. I believe it was.

Q. You do not doubt that?

A. No.

Q. I now direct your attention to the page marked both 13 and 32 of Plaintiff's Exhibit No. 100, and read to you the following, about the middle of the page: "May I submit then that the matter must necessarily be concluded unless there be some countervailing evidence, of which I have heard none. If there be anybody to question that finding we would like to hear it," and ask you whether you recall that that referred to the finding of Gen. Taylor, Chief of Engineers?

A. No, sir; I don't recall that it did.

Q. I direct your attention to the paragraph immediately preceding it which reads—Gen. Taylor, Chief of Engineers, Major General of the United States Army: "Therefore, so far as can be predicted from available data and records, it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project."

and ask you whether you now can say that the finding referred to in the paragraph read you in the previous question was the finding of Gen. Taylor?

A. My reluctance to answer was merely that I thought you asked me to recollect that these incidents took place. I naturally can't recollect these incidents. The record here indicates that they did and I think they did.

By Mr. JACKSON:

Q. You have no doubt of it?

A. I have no doubt of it, but the reason for my reluctance was that I thought I was being asked to recollect these incidents.

Q. You do recall at this hearing of March 2nd, 1926, the report of General Taylor as Chief of Engineers, dated December 29, 1925, was brought to the attention of the members of the Federal Power Commission, do you not?

756 A. I don't recall it as a matter of memory.

Q. Exhibit 100 shows that among those present were Hon. Dwight F. Davis, Secretary of War, Hon. Hubert Work, Secretary of the Interior, and Hon. W. M. Jardine, Secretary of Agriculture. They were the members of the Commission?

A. Yes.

Q. I understood you to testify, Col. Edgerton, in reference to Exhibit 91, that you remembered that at this 77th meeting, held in the office of the Secretary of War, March 2, 1926, there were present all of the members of the Commission as shown in this report?

A. I testified that supporting my memory by the record of the minutes.

Q. You undertook to verify the minutes, I understood, and say they were correct. Was I wrong about that?

A. The minutes are correct. They were verified by me shortly after they were prepared, or before they were prepared and I can't state except as the record shows, the record in which I have confidence, the attendance of so and so at any of these meetings.

Q. Then am I to understand as to all of your testimony about these various meetings of the Federal Power Commission in Plaintiff's Exhibit 91, you have no independent recollection but have testified merely upon the basis of your confidence in the minutes as they were prepared?

A. That is right, sir.

Q. I want to direct your attention to page 41 of Plaintiff's Exhibit 100, reading as follows: "Mr. Scott"—and the first part of this transcript shows that Mr. Scott was an attorney for the New River Development Company, the declarant—

"Mr. SCOTT. We have recited the report of the army officer having that duty and if that report is to be questioned we would like to be heard on that.

757 "Secretary DAVIS. I do not think that will be necessary.

"Secretary WORK. Is there anybody here to speak on the other side?

"Secretary DAVIS. Yes; we would like to know if there is anybody here to speak on the other side.

"Mr. SCOTT. I have not heard of anybody." You don't doubt the correctness of that report?

A. No; I do not. I think that is correct.

Q. I also direct your attention to page 44 and read to you the following statement of Mr. Scott: "If this Commission does not desire to hear any evidence, and I imagine not, that is all we have to say.

"Secretary DAVIS. I thank you very much, gentlemen, and we will give the matter consideration." Do you have any doubt that that is a correct report?

A. No; I have not doubt.

Q. I also want to direct your attention to the following statement at pages 40 and 41 of Complainant's Exhibit 100, beginning one line above the bottom of the page:

"Secretary DAVIS. Does that conclude the hearing?

"Mr. SCOTT. Mr. Chairman, I would like to raise a point of inquiry as to your procedure. The question before the Commission, as I have indicated, as I understand it, is one of fact. The fact has been investigated and reported upon by the Chief of Engineers of the Army, the officer of the Government intrusted with this inquiry. I want to ask if the Commission wants to hear testimony in support of that report or whether it will hear testimony against it, so that we may know how to proceed," and I ask you whether you doubt the correctness of that report?

A. I do not, sir.

Q. Do you have any doubt that this Plaintiff's Exhibit 100 is a full, true, and complete report of the entire proceedings had at the public hearing before the Federal Power Commission on March 2nd, 1926? 758

A. No, sir; I have no reason to doubt that it is.

Q. And I have searched that very carefully and find no evidence offered at that time except——

Q. Col. Edgerton, you have already stated that there appears in the record of this public hearing before the Federal Power Commission on March 2nd, 1926, at pages 5 to 15 of Exhibit 100, the report of the Chief of Engineers, General Taylor, for December 29, 1925. That is right, isn't it?

A. Yes, sir; that is right.

Q. From your examination of the transcript of that public hearing on March 2nd, 1926, can you say whether there is any other evidence in that transcript before the Commission?

A. Yes; there is other evidence in the transcript.

Q. Will you point it out?

A. On page 13 appears to be evidence by the speaker that the Kanawha River is formed by the conjunction of the——

Q. Will you read that?

A. "I might say here that the Kanawha River is formed by the junction of the Gauley River with the New River. The head of navigation of the Kanawha River is about six miles below that junction"—which doesn't seem to be a part of the quotation.

Q. Is there any other evidence offered and received before the Commission in that transcript besides what you have just read and General Taylor's report?

A. Well, sir; I don't know whether there is or not. I thought there was much more evidence than there is.

Q. If there is any other evidence you are not able to point it out, are you, Colonel?

A. Well, not quickly.

759 Q. I don't think you will find it. If you find any more, read it.

A. Shall I go right ahead?

Q. If it will only take a minute.

A. As evidence of the Commission's action or statement of the Commission's action, on page 29. I think it is rather trifling of me to point out these things that I think are evidence, isn't it?

Q. Is there anything that you find in there or that you know of in that hearing that contradicts the report of General Taylor, in that transcript?

A. I don't find anything that contradicts that report in this transcript.

Q. Do you know of any other public hearing that was ever held by the Federal Power Commission upon the Declaration of Intention filed by the New River Development Company for the construction of the project at Radford prior to the finding of June 1st, 1927?

A. No, sir; I don't know of any other.

Q. You would know of it if there had been another public hearing held, wouldn't you?

A. I think so.

Q. I read you from Plaintiff's Exhibit 91, page 138 of the Sixth Annual Report of the Federal Power Commission, as follows: "The Commission after discussion directed that the case, with additional data collected, be returned to the Chief of Engineers for further consideration." Does that correctly state the action taken by the Commission in that regard?

A. Yes, sir.

Q. And at that time did the Commission send back all of the pertinent papers in the case, together with the reports of the Chief of Engineers, to the Chief for that consideration, if you know?

760 A. I don't know.

Q. You said something about the report of General Taylor dated December 29, 1925, being returned to him. Have you the letter of transmittal with which it was returned?

A. No, sir.

Q. Do you know anything about that?

A. No, sir.

Q. You don't know how it was returned?

A. No, sir.

Mr. Jackson. At this point I would like to have this matter clearly understood. Yesterday the line of testimony of this witness very largely had to do with offering in evidence documents and exhibits said to have been before the Federal Power Commission at or prior to the finding of June 1st, 1927. We objected to that for the reasons stated. The court overruled the objection and allowed us an exception and, for convenience, I asked the court's leave that our objection might be understood to run to that entire line of testimony with the same ruling of the court and exception allowed. It is not entirely clear in the record, and while it is fresh in the minds of the court and counsel, I wonder if it may not be understood that that is the situation as to the reception of that evidence.

The Court. Yes.

Mr. Jackson. And the further point that it was received by the court for the purpose of showing what was before the Commission and not as probative of the issues to be determined by the court in this case.

The Court. That is right.

By Mr. Jackson:

Q. Colonel, at the close of the session yesterday I had asked you a question or two about General Taylor's report of December 29, 1925, which was, I think, Exhibit 97. Was there a duplicate copy of this report of General Taylor in the files of the Federal Power Commission at all times up to the making of the finding of June 1st, 1927?

A. So far as I know there was.

Q. And that was a duplicate copy that was received at the Federal Power Commission offices with the original?

Q. (The question was read.)

A. I think it was.

By Mr. JACKSON:

Q. Col. Edgerton, you testified yesterday about a number of documents which you said were before the Federal Power Commission prior to its finding of June 1st, 1927. By that I take it you mean that those documents had been received at the offices of the Federal Power Commission before that date?

A. Yes, sir.

Q. And those documents were severally in the files of the Federal Power Commission?

A. Yes, sir.

Q. And that you, or perhaps some other officer or employee of the Commission, had, to the best of your judgment and belief, seen all of those documents prior to the finding of June 1, 1927?

A. Yes, sir.

Q. And I don't suppose you intended to convey to the
761 court the impression that Secretary Jardine and Secretary Davis and Secretary Work individually examined and read those documents?

A. I didn't intend to discriminate. Some they did and some they didn't.

Q. You don't now, I assume, purport to have any independent recollection as to which of those documents any of those gentlemen saw and read?

A. Not a complete recollection. I know some documents that they saw and some I wouldn't know and some I know they didn't see.

Q. Some of those that you have mentioned here yesterday and which were offered in evidence you know that the Commission members did not see; is that true?

A. I don't recall any that were mentioned in this list that I could be sure they did not see.

Q. You couldn't be sure that they did see all that were mentioned?

A. No; I wouldn't be sure.

Q. And, of course, you couldn't be sure as to which members of the Commission saw any particular document, could you?

A. No, sir.

Q. Col. Edgerton, were these documents which you identified yesterday as having been received at the offices of the Federal Power Commission selected from the files of the Federal Power Commission by you?

A. No, sir.

Q. Who did select them, if you know?

A. I don't know.

Q. Then is it fair to say that a list of these documents was submitted to you and you were asked to identify them as having been received at the offices of the Federal Power Commission before the finding of June 1, 1927?

762 A. I recognized all the documents that were presented here as having been received.

Q. That isn't quite the question. [The question was read.]

A. No, sir; no list was submitted to me.

Q. Well, particular documents were submitted to you and you were asked to identify them; is that right?

A. I was only asked to identify them here in the courtroom. I was shown numerous documents and my attention was invited to records in the Commission's office and I read them over within the last few weeks to refresh my mind for the purpose of testifying here.

Q. The point I am getting at is that the documents which you identified here are documents that were selected by some one else and submitted to you to see whether you could identify them?

A. That is right.

Q. And you don't mean to testify here that the documents which you have identified as having been received at the offices of the Federal Power Commission before the finding of June 1, 1927, were all of the documents received at that office before that time which in any way touched the Declaration of Intention of the New River Development Company?

A. No, sir; they were not all of the documents.

Q. There were a good many other documents received at the offices touching this Declaration of Intention which are not included in the list which you have identified here in court, were there not?

A. Yes, sir.

Q. And do you know why these particular documents were selected?

A. No, sir.

Q. That is something you had nothing to do with?

A. That is right.

763 Q. Do you remember that on or about October 16, 1925, the then Chief Counsel of the Commission, Judge Call, rendered a report, or opinion, to the Executive Secretary advising that there should be no attempt to assume jurisdiction on the ground of navigability?

A. No, sir.

By Mr. **Jackson**:

Q. Was not that opinion laid before the Commission?

A. I don't know.

Q. You don't know about that?

A. No, sir.

By Mr. Jackson:

Q. Col. Edgerton, I show you a document that was offered with your testimony as plaintiff's Exhibit 94, being the letter from Major Trippe and a memorandum to you. Are you willing to testify that that letter and memorandum were submitted personally to the members of the Commission?

A. No, sir; I don't know whether it was or not.

Q. As a matter of fact, the Commission didn't spend much time reading letters and memoranda received at the offices of the Commission, did it, at that time?

A. Not very much.

Q. Col. Edgerton, do you remember that on or about December 29, 1925, there was a Mr. Davenport on the staff of the Federal Power Commission as an engineer?

A. Yes, sir.

Q. Was he connected with the United States Geological Survey?

A. Yes, sir; he was an employee drawn from the Geological Survey to serve on the Commission's staff.

Q. Do you remember that on or about December 29, 1925, Mr. Davenport prepared a report to the effect that the proposed data on fluctuations of flow at the Pitt River were inapplicable to the proposed project on the New River?

By the Court:

Q. Did you ever know of any such report as that?

764 A. I hadn't answered yet. Shall I answer now?

Q. Yes.

A. I don't know of any such report.

By Mr. Jackson:

Q. Do you recall any report by Mr. Davenport at that time?

A. I recall distinctly that he made several memoranda.

By Mr. Jackson:

Q. Do you know, Col. Edgerton, whether any report about December 29, 1925, by Mr. Davenport, went before the Commission?

A. I believe not.

Q. You don't know, you mean?

A. I believe not.

By Mr. Jackson:

Q. I believe you said that you had verified the minutes of March 2, 1926, which appear on the second sheet of plaintiff's Exhibit No. 91; is that right?

A. Yes, sir.

Q. At page 117 it says, "The meeting was devoted in part to a public hearing under Declaration of the New River Development Company to construct a power project on New River about 7 miles above East Radford, Virginia. Attorneys for the declarant were heard by the Commission in appeal from the tentative conclusion of the Executive Secretary that the project would affect the interests of interstate or foreign commerce." What did you mean by an appeal from the Executive Secretary?

A. The Executive Secretary notified the declarant that it was his intention to recommend to the Commission that it find that the interests of interstate or foreign commerce would be affected by this project.

Q. Was it the practice at that time for the Executive Secretary to consider declarations of intention and prepare decisions and then his decision would simply be submitted to the Commission?

A. It was the practice for him to make recommendations to the Commission as to the position they should take in all matters.

765 Q. Isn't it a fact that he made that recommendation on his own examination and that the Commission had nothing to do with the consideration of the Declarations of Intention excepting in a purely formal way until he submitted a recommendation?

A. Only by a personal conversation with the Executive Secretary and the Commission's staff did the members of the Commission participate prior to the formulation of the Executive Secretary's recommendation.

Q. That is, there might be informal conversations between members of the Commission and the Executive Secretary or possibly some member of the staff such as yourself?

A. That is right.

Q. Beyond that the Commission had nothing to do with the case until it was submitted formally to them in the form of a recommendation of the Executive Secretary at some regular meeting of the Commission?

A. I would say the members of the Commission took no formal part in any proceedings.

Q. There was no formal meeting of the Commission to receive or consider evidence or anything of that character and the only way that the matter came formally and, you might say, officially before the Commission was when it was submitted to them at some regular meeting by the Executive Secretary?

A. Yes, sir.

Q. That was the practice that was followed at the time when you were with the Commission?

A. That was the practice.

Q. Will you turn to the 7th Annual Report of the Federal Power Commission or rather to the sheets from that report which ppear in Plaintiff's Exhibit 91, and especially pages 113 to 114 nd tell me whether that is the formal recommendation of the xecutive Secretary in the New River Development Company case the form in which it was brought before the Commission for formal consideration?

36 A. It is very near the form in which it was brought before the Commission. It probably received some odification at the instance of the Commission or other members the Commission's staff at the time of the meeting.

Q. The document that was submitted to the members of the ommission at this meeting was this report of the Executive ecretary; is that true?

A. Yes.

Q. And that was all that was examined by the members of e Commission at the meeting, was it not?

A. I couldn't be sure about that.

Q. Wouldn't that be your best recollection, Col. Edgerton?

A. No, sir, I couldn't say about that.

Q. As a matter of fact, were not the minutes of the meetings the Federal Power Commission at that time drafted by the xecutive Secretary and/or yourself prior to the time when the eetings were held?

A. Yes, sir; a draft of proposed recommendations and the roposed findings was submitted at the meetings and were ecked over by the members of the Commission, modified if they w fit in the light of informal discussion and examination of ch documents as were brought into the Commission room that ey wanted to see.

Q. If there were any?

A. If there were any.

Q. Frequently there were none; isn't that so?

A. No, I think there were always some.

Q. You do?

A. Yes, sir, and then they were returned to the Executive ecretary or to me and rechecked again by all the members of e staff, written in final form and certified and furnished embers of the Commission.

Q. And when you rechecked the minutes, you rechecked them gainst the draft you had prepared before the meeting was held, didn't you?

7 A. Yes, and against——

Q. To see that the Commission had made no mistake?

A. And against the informal draft—I mean against the inrmal notes which were made by the Executive Secretary or yself of the changes desired by the Commission.

Q. And isn't the explanation of how Mr. Thompson expected you to check the minutes of the meeting of March 26, 1926, which you did not attend that you had drafted the minutes of that meeting, at least in relation to New River Development Company, before the meeting was ever held?

A. They were drafted before the meeting was ever held.

Q. And what you were going to do after the meeting was to compare the minutes as finally put in final form for the record and see whether they conformed to the draft that had been made before the meeting?

A. Well, and to see also whether they conformed with modifications directed by the Commission.

Q. You couldn't tell that, could you, Colonel, if you didn't attend the meeting?

A. Well, somebody attended the meeting and recorded the changes or the modifications that they desired made. If I didn't attend, my Assistant Chief Engineer attended and the heads of the other divisions. As a rule there were two or three copies of the minutes with the notes showing modifications that had to be made.

Q. You identified and vouched for the accuracy of the minutes of the meeting of June 1, 1927, at which was made the finding that has been under discussion in this case. Were those minutes drafted in advance of holding the meeting?

A. Yes, sir.

Q. And were there any changes made in them by the Commission during the meeting?

A. I don't know, sir.

768 Q. Yesterday you identified as Plaintiff's Exhibit #105, what purports to be a report of Mr. Kramer, Civil Engineer, in regard to some alleged fluctuations in flow on the Klamath River. Will you look at that and tell me if I am right in understanding it was received by the Commission on May 7, 1927?

A. Yes, sir.

Q. I produce here a document consisting of photostat of four sheets of paper, bearing a title at the top "E-Di- Virginia—May 9, 1927, New River Development Company, Record for Minutes," and ask to have it marked Defendant's Exhibit #505 for identification? [Exhibit was so marked.]

I show you Defendant's Exhibit #505 marked for identification, and ask you if that was a draft of the minutes of the meeting of the Federal Power Commission, held June 1, 1927, so far as that meeting related to a Declaration of Intention of the New River Development Company?

A. It appears to be a draft prepared for submission to the Commission as the record of the action to be taken.

Q. Can you tell from the initials on it whether it is true that draft was prepared by you?

A. Dictated by me, according to the initials.

Q. You have no doubt about that?

A. No, sir.

Q. You have no doubt it was prepared May 9, 1927?

A. I don't doubt that.

Q. And on the second sheet it appears in pen "O. K.—O. P. M., 5-11-27." Am I right that means, O. K. by Mr. Merrill, Executive Secretary, May 11, 1927?

A. Whenever the date shows.

Q. And is it not a fact that these minutes drafted by you May 9, 1927, are substantially, if not identically, the same as the minutes of the meeting of June 1, 1927, appearing on page 769 113 and 114 of the 7th Annual Report of the Federal Power Commission for the year ended June 30, 1927, which you offered in evidence as a part of Plaintiff's Exhibit No. 91?

Q. At your leisure, when you have left the stand, will you examine it, and see if you find any discrepancy in the draft of May 9, 1927, and the actual minutes as you offered them in evidence, for June 1, 1927, will you advise me?

Q. I have here a copy of the 7th Annual Report of the Federal Power Commission, 1927, which I will ask to have marked for identification as Defendant's Exhibit #506. [Exhibit was so marked.] Col. Edgerton, I show you pages 111 and 141 of Defendant's Exhibit #506, for identification, and ask you whether that is the complete minutes of the meeting of the Federal Power Commission held on June 1, 1927, or copy of them?

A. Yes; I think it is.

Q. And do I rightly understand or interpret these minutes as showing the meeting opened at 9:25 A. M.?

A. Yes, sir.

Q. And adjourned at 10:30 A. M.?

A. Yes, sir.

Q. And that during that interval in addition the Commission transacted all of the business disclosed by these thirty pages?

A. Yes, sir.

Q. Col. Edgerton, in your opinion, is it practicable to operate the project of the defendant at Radford without injuring navigation on the Kanawha River; physically feasible to do that?

A. Yes; it is physically feasible to do that.

770 **Redirect examination by Mr. Thompson:**

Q. Colonel, you have been testifying with respect to the manner of presentation of matters to be considered by the Commission at its meetings, and you have testified with regard to the meeting of June 1, 1927. Please state whether or not it was the custom to send out to the members of the Commission, in advance of the meeting, the agendum, which was to be considered at the meeting.

A. It was.

Q. And you sent that out to them some days in advance?

A. As far in advance as practicable.

Q. So when the agendum was presented at the Commission the various members of the Commission had had that in their possession sometime?

A. Yes, sir.

Q. This agendum, who prepared that?

A. It was prepared in the original draft in the divisional offices principally concerned with the subject matter; for engineering matters, including Declarations of Intention, Applications for Permits and Licenses, the Engineering Division prepared the draft; for Accounting matters, the Accounting Division; and legal matters, the Legal Division, and when three or more elements were involved the draft was prepared jointly; one undertaking the basic draft and another modifying or adding to it, and it was then submitted to the Executive Secretary who made further changes, and that became the final draft, which was sent to members of the Commission in advance of the meeting, and at the meeting they produced these drafts, and any questions or comments they cared to make were made informally off the record, and incorporated in the record as it had been drafted so far, and upon the completion, these papers were referred to the original division preparing them, and by them fixed in final form, representing the action finally
771 taken, and they were then certified by the Executive Secretary and placed in the record, and copies sent to the members of the Commission, and excerpt copies made and sent to all outside parties of interest, covering matters of their interest.

Q. So on June 1, 1927, when you state that that document or the record therefor that meeting was reviewed by you, can you state of your own knowledge that was an accurate statement of what occurred at that meeting?

A. Yes, sir; that was an accurate statement of the substance of the meeting. Many off the record comments undoubtedly at all meetings, statements of views by members of the Commission, and sometimes explanations by members of the staff who were present, and in many cases very little. Most of the transmission line cases and land cases were thoroughly thought out by experts and the Commission seldom had anything to say about them, they accepted the record as prepared; but in the more important cases they often had information from personal sources not known to the Commission; each Secretary dealt of course freely with the staff of his department, and often produced comments that represented the views of some Bureau of his Department that had not been communicated to the staff.

Q. Please state if you made any studies in your department and other divisions covering the subject of this New River project.

A. We have made many studies for the Commission as a whole and individually, and for the preparation of these records, which became the official record of the Commission's action.

Q. You have testified to the reception of the report of August 20, 1925, from the Chief of Engineers, General Taylor. I would like to ask you whom, if you know, asked for a reconsideration of that report?

A. The declarent asked for a reconsideration of it.

Q. I call your attention to Government Exhibit No. 91, page 135, which is a part of the minutes of the meeting of the 78th meeting held March 26, 1926, and ask you to read the last
772 paragraph, beginning with the word "proceeding."

A. (Reading.) Proceeding to a consideration of the reports and facts in the case which bear upon the question of the effect of the proposed power development upon navigation: In his first report of August 20, 1925, the Chief of Engineers said:

"This river is one of the principal tributaries of the Kanawha River, which has been improved for about 90 miles by the construction of 10 locks. It is really the Kanawha River under another name, and the flow if not properly regulated could have an adverse effect on navigation during low-water stages in the Kanawha River. * * *

"To fully protect the interests of interstate or foreign commerce any license granted should be made subject to the following conditions:

"1. That the licensee shall permit a continuous flow past its dam not less than the low-water flow of the stream as determined by the records of the stream-gauging stations required by the preliminary permit, subject to such modifications as the Secretary of War may prescribe in the interests of navigation, and shall not at any time interfere with the natural flow of the river to such an extent as to interfere with or impede navigation.

"2. That the operations of the licensee, insofar as they effect the use, storage, and discharge of the river, shall be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation."

Q. I would like to ask you if that particular part you have just read was presented to the Federal Power Commission?

A. Yes, sir.

773 Q. And I would like to ask you also whether you agreed with the statement, which reads as follows:

"To fully protect the interests of interstate or foreign commerce any license granted should be made subject to the following conditions:

"1. That the licensee shall permit a continuous flow past its dam not less than the low-water flow of the stream as determined by the records of the stream-gauging stations required by the preliminary permit, subject to such modifications as the Secretary of War may prescribe in the interests of navigation, and shall not at any time interfere with the natural flow of the river to such an extent as to interfere with or impede navigation."

Do you agree with that statement?

Q. State whether or not you advised the Commission favorably toward that proposal as set forth in the paragraph I just read.

A. I advised them to the same general effect.

Q. (Reading.) "That the operations of the licensee, in so far as they affect the use, storage, and discharge of the river shall be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation."

Did you recommend that proposal?

A. My recommendations were to the same general effect.

Q. I refer, and will come back to this exhibit I have read from, and read the paragraph counsel asked I read, as soon as I finish.

Q. I refer to Government Exhibit #92, and read from the 18th paragraph, being the report of the Chief of Engineers, General Taylor, of August 20, 1925:

"From the above facts it is established that New River has been under Federal improvement for navigation, that navigation has actually existed, and that the river was physically capable of interstate navigation although very light draft. The fact that navigation does not exist at present is not understood to change the legal status of the stream."

774 Do you know whether that part of the report of the Chief of Engineers was brought to the attention of the Commission?

A. Yes; the entire report was brought to the attention of the Commission.

Q. That report which I have just read was dated August 20, 1925. Now I believe you have testified that the reference back to the Chief of Engineers was made at the request of the Power Company, is that correct?

A. Yes, sir.

Q. And another report came from the Chief of Engineers December 29, 1925. Now I call your attention to next to the last paragraph of that report, and ask you to read that statement. This is Exhibit #97.

"I therefore report that in my opinion New River in its present condition is not a navigable stream, and that navigation on the Kanawha will not be adversely affected by the proposed power development."

Q. Read the preceding paragraph?

A. (Reading.) "Therefore, so far as can be predicted from available data and records, it would not be possible to operate the proposed project so as to adversely effect navigation on the Kanawha River under the existing project."

Q. State whether or not when that report which I understand you testified was received by the Commission, it was accompanied with any other evidence or any new evidence other than in the report of August 20, 1925?

A. No, sir.

Q. I call your attention to Government Exhibit #91 and reading from page 113 of the meeting held June 1, 1927, I will ask you not to read it, but to look at the last two paragraphs with asterisks following, and then the quotation. You will note there is a reference there to the report of Gen. Deakyne, Acting Chief of Engineers, of July 23, 1926.

Q. At this hearing of March 2, 1926, did any other parties appear other than the applicant, Col. Edgerton?

775 (NOTE.—Strike out the last two lines of page 542.)

By Mr. JACKSON. We will concede that is the notice of the hearing of March 2, 1926.

(Referring to an exhibit Mr. Thompson had marked as No. 107.)

By Mr. THOMPSON. This is Government Exhibit #107 for identification, and we are offering it in evidence. It is a notice of the meeting to be held by the Commission, addressed to Mr. C. Bascom Slemp, dated February 20, 1926.

By Mr. JACKSON. It may be understood he was of counsel for the New River Development Company at that time?

By Mr. THOMPSON. Yes. I would like to read that.

(NOTE.—Whereupon Mr. Thompson read the following letter; Ex. 107.)

By Mr. JACKSON. We concede we had notice of the hearing of March 2, 1926.

By Mr. THOMPSON. May we have permission to substitute a copy, as that exhibit is an original in the files of the Commission, and we would like to have it back?

By the COURT. You may do that.

(NOTE.—Copy was filed with the record marked Exhibit #107 for the Government.)

Q. At this hearing of March 2, 1926, did any other parties appear other than the applicant, Col. Edgerton?

776 A. Yes, sir: there was some other parties present, representing the State of Virginia, as I recall it.

Q. Were they given an opportunity to be heard?

A. Yes, sir.

Q. Was it on the same matter?

A. Yes, sir.

Q. Yesterday on cross-examination counsel asked you to read a sentence from Government Exhibit #100, page 5. You did not read the preceding part of that sentence or paragraph, and I am going to ask you if you will read that, together with the part which you did read?

A. [Reading.] "Originally, the War Department in an investigation said that they could see no reason why jurisdiction should not be taken. A rehearing was requested on the question of the jurisdiction of the United States over nonnavigable streams; and a further investigation and report was made by the Chief of Engineers of the War Department.

By Mr. **Jackson**. And then follows the report of General Taylor of December 29, 1925.

A. Yes, sir.

By Mr. **Thompson**:

Q. Col. Edgerton, I desire to call your attention to the stenographic report of your testimony given on yesterday, on direct examination, page 1627,[*] in the middle of the page, you were asked the following question:

"Q. In what way—to what effect?"

We were discussing the fluctuation of the flow of the water in the Kanawha River. Your answer was:

"A. It would tend to increase it over the state which you would expect naturally, at certain periods." The word "state" is a typographical error and it should be stage, should it not?

A. Stage, I think, should be the word.

By Mr. **Thompson**. If Your Honor please, I expect that I am going outside of the usual rule, but I am going to ask the Court to let me submit a question, which was submitted to Col. Edgerton on yesterday, on page 1622 of the record, and I want to ask him if he cares to amplify or change that answer. The question is as follows:

Q. Please state what effect, if any, the construction and operation of this Radford project as described in the Declaration of Intention, and the application for a license, will have upon the flow of New River?

---

[*] See page 519 of direct.

777 "A. It will have several probable effects. It would, if the projects were operated in a normal manner for such a project, it would create variations in the flow, depending upon the load that the powerhouse was carrying from time to time. By seasonal storage, it would also tend to decrease the highest flows, assuming that the project were operated as a hydroelectric project would ordinarily be operated. If the operator should elect to fill the reservoir at periods of low flow, they might decrease the flow below the dam to almost nothing. There are other methods of operation in between which would produce somewhat different effects, but, generally, I think, the effect—the effects would be as indicated in my answer."

Do you care to make any statement in regard to that answer?

A. I would be glad to elaborate further and state that the ordinary practice in the operation of a hydroelectric project of this kind is to operate it on a peak-load schedule at low-water flow, and in such an operation it would normally be shut down entirely for a portion of each day, and probably over a period of one or two days at the week ends, legal holidays, &c., when the system to which it was supplying current had a very light load Under such an operation the flow below the dam will be reduced to an insignificant one, when the plant was carrying no load and will be much greater than the natural flow would be at the same time when the plant was carrying a substantial load, or its peak load, and the result would be that the flow in the stream below would vary from very little, or nothing, to a maximum capacity of the wheels, and these variations would be transmitted downstream for a long ways affecting the flow, at least in theory, indefinitely, in distance down the stream.

Q. What effect would this have, if any, on flood-control conditions?

By Mr. Jackson. I object to the question because it is not proper redirect examination.

By the Court. No, it is not proper redirect, but I will permit it on the theory that it should have been brought out on direct but was omitted or overlooked.

By Mr. Thompson. Go ahead and answer the question.

778 A. The effect would be or rather during each period at a plant of this kind would likely be operated on a base load, would be to transmit the high flows through the reservoir as rapidly, or perhaps even more rapidly, depending on the physical characteristics of the reservoir than they would pass the same distance without the project. In the natural state, so that while the tendency would be to manifestly decrease for seasonal storage purposes the moderate floods, that same tendency could not be relied on for the extreme floods, which occur after a prolonged wet

period, and after the reservoir would be full. So that the effects that I refer to in decreasing the high flow was to generally affect flows of moderate height rather than extreme flood. Reliance can never be placed on a power reservoir for substantial flood protection in extreme floods.

By the **Court**:

Q. Do you mean reliance cannot be placed on any dam that would be built?

A. On any reservoir built and operated for power purposes, because the reservoir, if operated intelligently, will be full, or may be full, or may be expected to be full, when the extreme flood comes along, so that when the extreme flood has passed through the reservoir, which it is likely to do more efficiently than it would pass through the natural channel.

Q. By "more efficiently," you mean faster?

A. I mean hydraulically more efficiently, yes; I mean faster.

I think that covers all the elaboration that is needed at this time. I could discuss the subject further if you wish me to.

Q. As to whether these dams in the rivers are being constructed with regard to flood control, or what is the difference in that?

A. A flood control reservoir should be emptied after each flood
just as rapidly as possible, its entire storage capacity or
779 as much as possible to reduce the peak in ensuing floods
which may occur at any time.

Q. There are no dams of that sort on the Kanawha River, or New River, are there?

A. Not that I know of; no, sir. A power reservoir, on the other hand, should be operated or be kept as full as possible consistent with supplying the electric load it is intended to accommodate.

780 Recross-examination by Mr. **Jackson**:

Q. Col. Edgerton, when you said that if a power plant was operated on a peak-load basis, the flow below the dam might vary from almost nothing to a maximum hydraulic capacity of the installation, you were referring to the stream immediately below the dam site, I take it?

A. Yes, sir; before other tributaries enter.

Q. That, of course, would be modified by the tributaries to the stream among other things?

A. Yes, sir.

Q. Were you ever told by any officer of the Appalachian Electric Power Company what kind or scope of peak operation, if any, the company intended to follow? I mean the kind of operation they intended to follow?

A. No, sir.

Q. Col. Edgerton, do you know what is the peak load of the Appalachian Electric Power system?

A. No, sir.

Q. Do you know what time of day the Peak Load occurs?

A. No, sir.

Q. Do you know how the peak load is distributed among the generating stations of the Appalachian Electric Power system?

A. No, sir.

Q. Do you know how it would be distributed among the generating stations of this system two years from now?

A. No, sir.

Q. Do you know the duration of the peak of the Appalachian Electric Power System?

A. No, sir.

Q. Col. Edgerton, when the Chief of Engineers makes an official report to the Secretary of War, or some other agency of
the Government, as his duty may require, does he transmit
781 with that report copies of evidence and data which he has
examined and collected?

A. I think that depends on circumstances. Sometimes he does and sometimes he does not, it depends on the purpose the report is to serve.

Q. For instance, he would not transmit all the miscellaneous data and working memoranda that may have been accumulated in his office in working on a particular problem when he finally shaped his report to official form and transmitted it, for instance, to the Secretary of War, would he?

A. Ordinarily he would not do that except on request.

Q. So that there would be nothing unusual in a report of the Chief of Engineers not being accompanied by working memoranda and underlying data that may have been examined either by him or other engineering officers under his direction?

A. No, sir; there would be nothing unusual.

Q. And is it not a fact that in the Chief of Engineers Department there is frequently very voluminous information and data examined and collected in studies which are made to arrive at engineering answers to questions which come within the jurisdiction of the Engineering Department?

A. Yes, sir.

Q. Now is it not a fact that General Taylor's report, dated August 20, 1925, Government Exhibit 92, was not accompanied by any underlying data, which may have been collected or examined, or studied, if there was any in the office of Chief of Engineers?

A. I do not believe it was accompanied by any other material.

Q. The exhibit indicates no enclosures whatever, does it not?

A. No enclosures; no, sir.

Q. I now read to you from Plaintiff's Exhibit 97, being
782 General Taylor's second report, bearing data of December
29, 1925, this paragraph on the first page: "A careful study has been made of all the data presented by the declarant and a further study has been made of all available data and records bearing on the questions at issue which are available in this office, or which could be obtained from other Government Bureaus. The following report is the result of the additional studies which have been made and the additional information which has been obtained since the date of my previous report."

I will ask you whether you question the veracity of that statement of the Chief of Engineers in that report?

A. I did not.

Q. Col. Edgerton, I will ask you to turn to page 113 of the 7th Annual Report of the Federal Power Commission, for the fiscal year ended June 30, 1927, included in Plaintiff's Exhibit 91, and I will ask you whether pages 113 and 114 are not the minutes relative to the action of the Commission on the Declaration of Intention of the New River Development Company, which you have already testified you prepared prior to the meeting and subsequent to it. Is that true?

A. I have not made that check.

Q. I mean that subsequently you checked them as they appear in the report?

A. Yes, sir.

Q. In the second paragraph of those minutes, after paragraph No. 1, you refer to certain studies made upon Pit River in California, do you not?

A. Yes, sir.

Q. And then at the bottom of the page, after referring to these studies on the Pit River, you quote from the report of General Deaknye, acting Chief of Engineers, bearing date July 23rd, 1926.

783 A. That quotation is here; yes, sir.

Q. Then there are a number of asterisks indicating omissions. Is that right?

A. That is right.

Q. I now read to you from Plaintiff's Exhibit 96, the second paragraph, being numbered paragraph 2, of the report of General Deakyne, dated July 23, 1926, as follows:

"2. After having made a careful study of the data submitted I am of the opinion that due to the peculiar conditions existing in the Pit River as shown by the fact that there is practically no decrease in the height of the wave between its source at Pit #3 and Ydalpom, a distance of about 40 miles, the data do not give a true picture of how a wave travels down a river. Further, due to the totally different character of the two rivers, considerable doubt is felt as to the possibility of computing wave attenuation in the New River from data obtained in the Pit and Sacramento Rivers even if sufficient data on the latter streams were available. In my judgment the only correct procedure will be to study the action of the waves produced by the intermittent operation of the present plant at Ivanhoe on the New River. Such a study has been started and will be continued until a satisfactory answer is obtained."

I will ask you whether that paragraph is one of two paragraphs which you omitted from this report and was replaced by asterisks?

A Yes, sir.

By Mr. **Thompson**:

Q. Please state what happened, if you know, after the receipt of General Deakyne's letter of July 23, 1926, with respect to stream flow studies?

A. I consulted the assistants to the Chief of Engineers and went over information that they had. We communicated with the District Engineer in the Forestry Service at San Francisco, with a view of having further comment from his office, as to
784 whether studies, if any could be found, that would bear upon these rather difficult technical problems. I communicated with a number of District Engineers of the War Department in an effort to secure information concerning their observation of like phenomena of streams under their jurisdiction. I assembled the replies and used them in formulating further studies that were made on the subject.

Q. And what were the further studies that were made?

A. There were a good many office studies made, and the matter was still under consideration when I left the Commission.

Q. Col. Edgerton, are you confining your statement to the time prior to June 1, 1927?

By Mr. **Thompson**. That is right.

Q. State whether or not the District Engineers of the Forestry Service made another survey of any river in California?

By Mr. **Jackson**. I object to the competency of that question.

By the **Court**. You mean which went before the Commission?

By Mr. **Thompson**. Yes, sir. We have already introduced exhibits yesterday in regard to that.

By Mr. **Jackson**. They will speak for themselves and I renew my objection.

Objection overruled. Defendant excepts.

A. They made several studies as I recall it, the principal one of which was the one made on the Klamath River in northern California and southern Oregon.

Q. You testified as to Government Exhibit 105 on yesterday, I believe, it being a letter, or a report rather, of May 7th, 1927, addressed by Mr. Kramer, Hydraulic Engineer, U. S. Forest Service, San Francisco, California, did you not?

A. Yes, sir.

Q. And that is the report on the Klamath River, is it not?

A. Yes, sir; or observations.

Q. You testified on yesterday that that report was before the Commission on June 1st or before June 1st, 1927?

A. Yes, sir.

Q. Now, Col. Edgerton, you came immediately from the Chief of Engineers' office over to the office of Chief Engineer or Assistant Chief Engineer to the Federal Power Commission, didn't you?

A. No; my previous duties were at the command of the General Commander of the U. S. Army at Fort Leavenworth, Kansas.

785 Q. During the time this matter of the New River project was under consideration, did you have contact, or not, with the file of the Chief of Engineers office, or the District Engineers office?

By Mr. Jackson. I object to the question. This is entirely new matter.

By the Court. I think so. Of course, he can take the witness off the stand and bring him back later if he wants to.

By Mr. Thompson. I may be under a misapprehension, but I understood counsel to go into the question of what were in the files of the Chief Engineer's office, and whether he sent data over to the commission, or whether he had data which he did not send to the Commission, and this is simply following up that question, or those questions. I realize that I am, in a sense, violating one of the rules, but as Your Honor says, I can bring this witness back. I think counsel on the other side went beyond what I asked when he cross-examined the witness, but I did not say anything about it.

By Mr. Jackson. I did not ask that question. I asked him about the general practice.

By Mr. Thompson. May I call Your Honor's attention to the fact that Mr. Jackson read from a letter dated December 29, 1925, being the second report of General Taylor, and he read this paragraph:

"A careful study has been made of all the data presented by the Declarant, and a further study has been made of all available data and records bearing on the questions at issue which are available in this office, or which could be obtained from other Government Bureaus."

By Mr. Jackson. Will you please read it all?

By Mr. THOMPSON. "The following report is a result of the additional studies which have been made and the additional information which has been obtained since the date of my previous report."

My recollection of the testimony of this witness is that I asked him if there was any additional data that came over with the Report of the Chief of Engineers of December 29, 1925, and he stated that there was not. Counsel then, having read this paragraph, asked him if there was not prepared a great deal of other data in the office of the Chief of Engineers. My question goes to the fact, if it be a fact, that this witness was familiar with the office of the Chief of Engineers, was going back and forth to that office all the time, and I intended to ask if he was cognizant of what was in the file of the Chief of Engineers.

By Mr. JACKSON. I asked him if he doubted the veracity of that statement, and he said he did not. I do not know whether Mr. Thompson wants to impeach his own witness, and to prove that the statement is not true. If he has that purpose in mind, or if he is asking that question it must be to impeach his own witness, and it is not in response to anything we asked on cross-examination. I did not ask anything about what was sent over with the report of December 29, 1925.

By the COURT. I think he can go ahead.

By Mr. JACKSON. We desire to take an exception.

By Mr. THOMPSON:

Q. Were you familiar with the office of the Chief of Engineers?

A. Yes, sir.

Q. And with the files in the office of the Chief of Engineers?

A. I had frequent contact with the engineers and all records in the Chief of Engineers office, and conversation with the officers and other assistants who worked on such matters.

Q. With reference to this particular Radford project?

A. In regard to every project.

Q. Did you ever see any other evidence in the files in the office of the Chief of Engineers in support of this report?

By Mr. JACKSON. We object to this evidence. He cannot impeach this report by having the witness testify that he had conversations with other engineers. We do not know who they are, and apparently he is going to undertake to say what the Chief of Engineers, General Taylor, considered in making his study and in making his report. I do not think this evidence could possibly be admitted even if the witness were willing to say that.

By the COURT. Objection overruled. Defendant excepts.

By Mr. THOMPSON. Answer the question, please.

A. Could I have the question read again?

By Mr. Thompson:

(Question read.)

By Mr. Jackson. May I ask a qualifying question of the witness?

By the Court. Yes.

By Mr. Jackson:

Q. Col. Edgerton, you are dealing with what period of time now?

A. I am dealing really with the entire period of time before I went on duty with the Federal Power Commission.

Q. And that was from when to when?

A. That was from June 1924 to August 1929.

Q. And during that time did you have charge of the files in the Chief of Engineers' office?

A. At no time did I have charge of the files in the office of the Chief of Engineers.

Q. Was it any part of your duties to keep the files and records in the office of the Chief of Engineers?

A. No, sir.

Q. Was it any part of your duties during that time to prepare the report of the Chief of Engineers?

A. No, sir.

786 Q. In the preparation of this report by the Chief of Engineers, the studies which he made, or had made, the things which he considered were no part of any official duty of yours, were they?

A. No, sir.

(Exhibit 108, being letter dated October 16, 1930, from Curtis, Mallet-Prevost, Colt & Mosle, to the Federal Power Commission, was offered in evidence.)

787 **Mrs. Minnie Lee Ward**

Direct examination by Mr. Thompson:

Q. Please give your name to the stenographer.

A. My name is Minnie Lee Ward.

Q. Where do you live?

A. In Washington, D. C.

Q. Please state to the Court whether or not you were ever in the employ of the Federal Water Power Commission.

A. I was.

Q. When did you go with the Federal Power Commission?

A. October 18th, 1920.

Q. Was that the beginning of the organization of the Commission?

A. That was approximately two months after the beginning of the organization. I think there were about twenty employees there when I went in there from the Forest Service.

Q. What period of time were you there?

A. Until 1930.

Q. What was your position?

A. My position was that of file clerk and assisting with the mails.

Q. Where was your office located?

A. In the new Interior Building.

Q. In Washington City?

A. Yes, sir.

Q. Please describe your duties as file clerk.

A. As file clerk, it was my duty to see that the files were kept in proper workable shape and file the correspondence chronologically, as well as make reports and memoranda and get papers to the persons asking for them with the least possible effort and charge out the material drawn to whom it would go and the date.

788 Q. Did you have anything to do with incoming mail?

A. All incoming mail passed over my desk, after the mail clerk put the Received Stamp on it, and then route it through the office concerned, and matters of routine went to the office concerned, and matters of policy went to the executive secretary and then to the several branches of the Commission concerned.

Q. What were contained in the files generally—was there a New River file?

A. There was a New River Development Company file for the declaration of intention.

Q. As file clerk, state whether or not you ever received a document, dated August 20, 1925, signed by Major General Taylor, and addressed to the Federal Power Commission, on the subject of the New River Development Company's declaration of intention?

A. Yes, sir.

Q. What did you do with that?

A. I sent it to the Executive Secretary and it went to the office of the engineer and eventually it came back to the file room and it was filed.

Q. What did it consist of?

A. It consisted of a report from Major Trippe, the District Engineer at Huntington, West Virginia, with a memorandum sending it from the Division Engineer to the Chief of Engineers, and then the Engineer's discussion and recommendations were put on it.

Q. State whether or not you received another document from General Taylor?

A. I did.

Q. What was the date of that document?

A. December 29th, 1925.

Q. Were you in charge of the files in that office all the time that you have described?

789 A. I was.

Q. I hand you Plaintiff's Exhibit No. 97, dated December 29th, 1925, addressed to the Executive Secretary and signed by Major-General Taylor, and ask you if this is the document to which you refer having been received?

A. Yes, sir; this is a copy of the duplicate copy. It is not a photostatic copy of the original, but of the duplicate copy.

Q. And when this came to you, was there an original?

A. There was.

Q. I hand you a yellow paper, marked for identification Government's Exhibit 109, dated April 15th, 1926, and with the initials below the statement there "M. L. W.", and I ask you if you know what that paper is?

A. Those are my initials and this is a charge sheet that I placed in the file—I placed in the file of the New River Development Company at the time General Taylor's report of December 29th, 1925, was withdrawn.

Q. What was the procedure in regard to documents taken from the files, when withdrawn, so far as identification as to where they went was concerned?

A. When any material was withdrawn from the file—would be removed, a record would be kept of it on one of these yellow sheets, stating what was removed, the date, and by whom, and upon the return of that material to the Federal Power Commission, that sheet was withdrawn and destroyed.

Q. Please read what it says on Exhibit 109.

By Mr. Jackson. It has not been offered in evidence. Before you read it, you should offer it in evidence.

By Mr. Thompson. I will offer it.

By Mr. Jackson. We object to the exhibit being read before it is offered in evidence.

By Mr. Thompson (Addressing the Court). Cannot I have it identified before I offer it?

By the Court. Yes, sir.

By the Witness. Shall I read it?

By Mr. Thompson:

A. Yes, ma'am.

A. (Reading.) "April 15, 1926. Chief of Engineer's Report of 12-29-25, returned to General Taylor by Silas Cooke this afternoon (3:40), upon telephone conversation with Mr. Merrill. M. L. W."

Q. Who is M. L. W.?

790 A. Myself.

Q. We offer that document in evidence.

By Mr. **Jackson**. We object to it, because it is incompetent and it shows on its face that it is nothing more than hearsay about a report——

By the **Witness**. (Interrupting.) It is not hearsay. I made that charge slip.

By Mr. **Jackson**. I will not argue that with you, Mrs. Ward.

By the **Court**. The objection will be overruled.

By Mr. **Jackson**. We except to the ruling of the Court.

By the **Court**. All right, you may have your exception.

Q. What was the occasion of your having made this entry?

A. Mr. Merrill stated that General Taylor said——

By Mr. **Jackson**. We object to the hearsay evidence.

By Mr. **Thompson**. Here is an entry made by the witness, she said she had control of the files, and when a paper was removed from the files, an entry was made, and she has read this entry, and we think it is part of the res gestae.

By Mr. **Jackson**. We object to any conversation about it. We don't mind the entry, but we object to any conversation about it.

By the **Court**. The objection will be overruled.

By the **Witness**. Mr. Merrill said that General Taylor wished to have the report of December 29th, 1925, returned to him and would he return it to him that afternoon by a messenger.

Q. And what did you do?

A. I removed the report from the file and prepared the charge sheet, and put the report in an envelope and I asked Silas Cooke to take it to General Taylor. It was addressed to General Taylor.

Q. Did you hand it to Silas Cooke?

A. Yes, sir.

Q. State whether or not, during the time that you were there, if that report ever came back to the Commission?

A. It did not.

By Mr. **Jackson**. She would not know that. She only knows about the files.

By Mr. **Thompson**:

Q. She said that all the mail came to her, and that it did not come back?

A. It did not.

Q. If it had come back, would you have destroyed this Exhibit No. 109?

A. Yes, sir.

Cross-examination by Mr. **Jackson**:

Q. Is a duplicate copy of Major General Taylor's report in the file?

A. The carbon copy was, but it was not official—it was not an official record of the Commission. They had no occasion to receive a duplicate copy and it came there because it was the procedure of the War Department.

791 Q. Did you understand me to ask you if it was an official record?

A. You can ask it again.

By Mr. **Jackson**. We move to strike the last part of the answer as not responsive to the question.

Q. This copy was in the file, and we will not quarrel as to what kind it was?

A. It was, but it was an unsigned copy, I would like to say.

Q. Why would you like to say that?

A. Because it had no official significance; it was just a carbon of the original.

Q. What made you think it had no official significance?

A. Because it was my duty to know what came in and what was to be preserved in the files, and what could be destroyed or saved, and there might be occasions when we sent carbons out for information.

Q. Did you destroy the carbon in the file?

A. No, sir.

Q. Why did you have to know what was official in the files?

A. It was part of my duty.

Q. Who told you that? Whether it was official or not?

A. Because we have regulations as to what was to go in the files. All original material was, of course, official—they were the official copies.

Q. When did you leave the Commission?

A. March 25th, 1930.

Q. And this was received in 1925?

A. Yes, sir.

Q. Have you thought anything about it since it came in in 1925?

A. Occasionally; yes, sir.

Q. It has been a matter of considerable interest to you, has it?

A. I was interested because the New River Development Company was so very active. I was especially interested because General Taylor reversed himself on his report of August 20th, and I wondered what influence was brought to bear on him.

792 Q. You did not like the report of General Taylor, did you?

A. I did not care; it was not anything to me one way or another.

Q. It was nothing to you?

A. Not personally; no, sir.

Q. But you still kept it in mind ever since 1925?

A. It is in my subconscious mind; it has bubbled up occasionally in my mind.

Q. And you have talked about it quite a bit lately, have you?

A. No, sir; when the matter came up, however, I remembered about the file and I said, "Yes, I put a charge slip in the file," and I took a glance at the file to see if it was still there.

Q. Your name is Mrs. Ward?

A. Yes, sir.

Q. Is your husband an attorney in Washington?

A. Yes, sir.

Q. He is associated with Mr. Thompson, is he?

A. Only in certain cases.

Q. Frequently?

A. They have separate offices.

Q. Are they in the same building?

A. Yes, sir.

Q. Is there a door between them?

A. There are several of them, I think.

Redirect examination by Mr. THOMPSON:

Q. How many floors are between us?

A. Two.

Q. These rules and regulations were made by Mr. Baker when he was Chief of the Department, were they?

A. He assisted in making them; he was the First Chairman of the Commission.

793 Q. And you were an employee under Mr. Baker?

A. I was one of the lower downs under Mr. Baker.

Recross-examination by Mr. JACKSON:

Q. Where did the officials start on the Commission?

A. The Commissioners and the heads of the departments.

794

W. S. WINN

Direct examination by Mr. MCCLERNAN:

Q. Your name is W. S. Winn?

A. Yes, sir.

Q. What is your occupation?

A. I am a civil engineer.

Q. Where do you live?

A. Huntington, West Virginia.

Q. Are you in the employ of the Corps of Engineers of the United States Army?

A. Yes, sir.

Q. What are your duties at the Huntington office?

A. I have charge of the section called Studies and Reports Section, and under that comes hydraulic work.

Q. Tell us briefly what the nature of your work is.

A. I prepare reports on technical subjects and other subjects, and recently the most I have done has been on hydraulic subjects.

Q. Tell us what experience you have had in hydraulic work.

A. Well, I entered the Service of the Engineer Corps on river work in 1891—that is, 45 years ago. Since then, I have put in in aggregate service on river work more than 30 years. I was with the Alabama Power Company, developing hydroelectric power for eight years.

By Mr. JACKSON:

Q. When was that?

A. When I was with the Alabama Power Company?

795 Q. Yes, sir.

A. I was first with them in 1912 and 1913, and next from 1922 to 1929.

By Mr. McCLERNAN:

Q. During your work, you had occasion to work with the volumes of stream flow?

A. Oh, yes; very frequently.

By Mr. McCLERNAN:

Q. I hand you a paper marked for identification as Government's Exhibit No. 110. Do you recognize it?

A. Yes, sir.

Q. Where does it come from?

A. From the United States Engineers' office at Huntington, West Virginia.

Q. Is it an official record of that office?

A. Yes, sir.

Q. Did you use that record in your work?

A. Records like this; yes, sir; and this particular one I have used; yes, sir.

Q. Will you explain briefly what it is?

A. It is a record of the daily gauge readings at Lock No. 24, on the Ohio River.

Q. Where is Lock No. 24 with reference to the mouth of the Kanawha River?

A. It is the second lock above the mouth of the Kanawha.

Q. What use is made of that record in the District Engineer's office?

A. It was primarily made as a record of the navigation conditions on the river, but since then, we have had occasion to use it in making hydraulic studies.

Q. Is that record public, in the sense that anyone that wants a copy can get it, upon payment of the expense of it?

A. Yes, sir; we never hesitated to give it to anybody that asked for it.

(Exhibit 110 offered in evidence.)

796 By Mr. **Jackson**:

Q. Is this published anywhere?

A. No, sir.

By Mr. **McClernan**:

Q. Is that record kept as part of the regular duty in the District Engineer's office at Huntington?

A. Yes, sir. I will qualify that statement——

By Mr. **Jackson**. I don't know that we will want to object to this, but we want an opportunity to examine it, and if we see fit to do so, we wish an opportunity to make our objections later, if any.

By the **Court**. Very well.

By Mr. **McClernan**. You have no objection to that, do you (indicating)?

By Mr. **Jackson**. They are gauge readings——

By the **Court**. It is the same sort of thing that we have had before.

By Mr. **Jackson**. I don't know. It is the same information, but whether or not it is on the same basis, I don't know. We may make our objections later on.

By the **Witness**. I would like to qualify my answer about the publishing of those records. Daily certain readings of the gauge are telephoned down the line and finally find their way into the Weather Observer's office at Cincinnati and published daily in daily bulletins.

By Mr. **Jackson**:

Q. They are not published in the official reports of the War Department?

A. No, sir.

By Mr. **McClernan**:

Q. I hand you Government's Exhibit No. 111. Do you recognize that?

A. Yes, sir.

Q. Is that another official record in the District Engineer's office?

A. Yes, sir; that is Lock 25, similar to the one you handed me just now.

Q. Where is Lock No. 25, with reference to the mouth of the Kanawha?

A. It is the first lock above the mouth of the Kanawha.

Q. Is this also a public record, in the sense that it is kept where anybody can get it—a copy of it?

A. Yes, sir.

Q. What use did you make of this record?

A. The same as 24.

Q. It is the same as Exhibit No. 110, except that it refers to a different lock on the Ohio River?

A. Yes, sir.

By Mr. McClernan. We offer Exhibit No. 111 as an exhibit for the Government.

(The foregoing exhibit marked No. 111 for the Government is filed and made a part of this record.)

By Mr. Jackson. We reserve the right to examine this later on and make our objections, if any.

By Mr. McClernan. All right.

Q. I show you Government's Exhibit No. 112, consisting of four sheets. Do you recognize that?

797 A. Yes, sir.

Q. Do you know where it came from?

A. It came from the Engineer's office at Huntington.

Q. Is that an original record?

A. No, sir; it is copied from the original.

Q. Do you know whether or not that copy is a correct copy?

A. I checked every gauge reading on there with the original.

Q. What kind of a record was the original record?

A. Like the ones that you just submitted for 24 and 25.

Q. But it does not refer to the same location?

A. No, sir.

Q. The records from which these copies were made were likewise records made as part of the regular work in the Huntington office?

A. Yes, sir.

Q. And you are familiar with them as you were with Exhibits 110 and 111?

A. Yes, sir.

Q. And this record is similar in every way to the two exhibits that we have put in, except that this is a photographic or photostatic copy?

A. Yes, sir; it is a photostatic copy.

Q. And refers to Locks on the Kanawha River?

A. It is a photostatic copy of compilations that I had made. They are grouped there—six locks—three on the Kanawha and three on the Ohio. There would be one, say like this over here [indicating] for each one of these, and I copied the gauge readings for a flow for that day at the Kanawha Fall.

Q. You know, then, that these figures are correctly copied from the above records?

A. Yes, sir.

By Mr. McClernan. I offer this as Exhibit No. 112 for the Government.

(The foregoing exhibit is marked as Government's Exhibit No. 112, and is filed with and made a part of this record.)

By Mr. Jackson. We would like to have the same understanding about that.

By Mr. McClernan. All right.

Q. I hand you Government Exhibit No. 113. Do you recognize that?

A. Yes, sir.

Q. Explain to the Court briefly what it is.

A. This is a chart on which has been plotted the graphs or recordings of the gauge stations at various stations on New River, one on the Greenbrier River and one on the Kanawha River at Kanawha Falls, and one on the Gauley River—plotted one above the other to show simultaneous gauge readings for the periods the stations were in use and the curve.

Q. How was this prepared?

A. We got from the United States District Engineer's office and from the United States Geological Survey prints of their graphs at the various gauging stations and then transferred them on there.

Q. Was that done under your supervision?

A. Yes, sir.

Q. You kept track of the work as it went on, did you?

A. Yes, sir.

Q. Was it correctly done?

A. I think so.

Q. You don't know of any error in it, do you?

A. Not at all.

Q. This appears to be a photographic copy.

A. Yes, sir; we have the original in the office.

Q. Is that an official record in the District Engineer's office at Huntington?

A. Yes, sir.

Q. Tell me, could an engineer read this graph and discern or understand it without the help from the person who prepared it?

A. I think so.

Q. This information which it represents can be obtained by an engineer without explanation by you or anybody else?

A. Yes, sir.

Q. I call your attention to a date, July 1932, in the upper left-hand corner.

799 Q. That is when it began, and at the other end, it shows when it ends—August 31st, 1932.

(Exhibit 113 offered in evidence.)

By Mr. JACKSON:

Q. Is this a copy of the one introduced in evidence [indicating]?

A. Yes, sir; that is a copy.

By Mr. MCCLERNAN:

Q. I show you Government Exhibit No. 114. Do you recognize it?

A. Yes, sir.

Q. Where did it come from?

A. From the United States Engineer's office at Huntington.

Q. It appears to be a photographic or photostatic copy?

A. Yes, sir.

Q. Where is the original?

A. In the office at Huntington.

Q. Is it an official record there?

A. Yes, sir.

Q. Explain to the Court what this is.

A. It is the same kind of chart that was presented for 1932.

Q. Except that it is dated July 1930?

A. Yes, sir.

Q. Was it made in the same way?

A. Yes, sir; it was made in the same way.

Q. Was it correctly made?

A. Yes, sir.

(Exhibit 114 offered in evidence.)

By Mr. JACKSON:

Q. What period is covered by the chart?

A. I will examine it.

Q. The date in the upper left hand corner is July 1st, 1930.

A. (Witness examines paper.) It ought to be down here [indicating]—August 31, 1930.

Q. That covers the same stations and the same streams as Exhibit No. 113, does it?

A. I declare I don't know whether it covers all of them. It covers all the recording gauges that were available.

Q. For the Kanawha River, the Gauley River, and the Ohio River?

800 A. Not the Ohio River, just for Kanawha at Kanawha Falls and stations on New River and where we had them on the Gauley River and the Greenbrier.

By Mr. McClernan:

Q. I show you Government's Exhibit No. 115. Do you recognize it?

A. Yes, sir.

Q. Do you know where it came from?

A. From the United States District Engineer's office at Huntington.

Q. It appears to be a copy. Where is the original?

A. The original is in the District Engineer's Office at Huntington.

Q. It is the official record there?

A. Yes, sir.

Q. Is it kept in the regular course of duty in the office?

A. Yes, sir.

Q. Explain what this is briefly to the Court.

A. This is a chart similar to the ones just offered, except this chart is platted in terms of discharge, instead of gauge heights.

Q. These fluctuations in the lines that are here, represent differences in fluctuations of stream flow instead of differences in gauge heights?

A. Yes, sir.

Q. Is this correctly made?

A. Yes, sir.

Q. Did you supervise the making of it?

A. Yes, sir.

Q. Is this chart of such a nature that an engineer could discover the information it contains without explanation from you or anybody else?

A. I think so; yes, sir.

(Exhibit 115 offered in evidence.)

By Mr. Jackson:

Q. What is the time period covered by that chart?

A. July 1930.

801 Q. July 1930, to when?

A. From the 15th to the 25th, inclusive.

Q. Of July 1930?

A. It was a short section in there. It takes part of the 16th and not the whole day on the 16th.

Q. It doesn't take the 15th in there either, does it?

By the Witness. I was thinking of the other end.

By Mr. Jackson:

Q. Did I understand you to say that it was July 16th to July 30th?

A. The 16th is right. July 25th—July 16th to July 25th, just ten days.

Q. I show you Government Exhibit No. 116. Do you recognize it?

A. Yes, sir.

Q. Where did it come from?

A. From the United States Engineer's office at Huntington.

Q. It appears to be a photostatic or photographic copy of the original. Where is the original?

A. In the Huntington office.

Q. Is it an official record there?

A. Yes, sir.

Q. Is it kept as part of the regular duties of the office?

A. Yes, sir.

Q. Explain to the Court what this is.

A. This shows the back water.

Q. Explain it to the Court.

A. It shows the back water effect just below Winfield Dam, the Marmet Dam, and the London Dam. Flows of 2,000, 6,000, and 10,000 feet per second in the Kanawha River.

Q. Did you supervise the preparation of this?

A. Yes, sir.

Q. Is it correct?

A. Yes, sir.

Q. Is it of such a nature that an engineer, on an examination of it, could get the information it purports to show, without any explanation from you or anybody else? 802

A. I think so.

By the COURT. It shows what?

A. The effect of back water due to floods in the Kanawha River. You are able to keep water at the same level or same elevation at the top of the dams; there is more water comes in at the upper end of the pool. The upper part of the pool raises, but it does not at the dams, and this shows what it does at 2,000, 6,000, and 10,000 cubic feet per second.

By Mr. McCLERNAN:

Q. Why is it the upper end of the pool behind the dam can be higher than the lower end?

A. They can keep it regulated at the lower end by raising the gates and letting the water pass underneath, instead of over them.

Q. Isn't it a fact that water will not flow unless it has somewhere to flow?

A. Yes, sir; that is true.

Q. Did you offer this? I offer this as Exhibit No. 116 for the Government.

By Mr. Jackson:

Q. This shows that this exhibit was prepared July 7, 1936?

A. Yes, sir.

Q. And was it prepared for use in this lawsuit?

A. It was prepared by me at the direction of my superior.

Q. Did he tell you that it was prepared to be used in this lawsuit?

By Mr. McClernan. We object to that as being immaterial, irrelevant, and incompetent.

By the Court. The objection will be overruled.

By the Witness. I knew it was.

803 By the Court. Did you make them up for the purposes of this suit?

A. I made them up for the purposes of this suit.

By Mr. Jackson. If it has not been covered by our general understanding, I want to reserve an objection that this is not an official document, but I do not want a ruling on it now until we examine them.

By Mr. McClernan. There is a sheet lacking in this set [indicating].

Q. I show you Government's Exhibit marked "117-a," "117-b," "117-c," "117-d," "117-e," and "117-f." Do you recognize them?

A. Yes, sir.

Q. Where did they come from?

A. From the United States Engineer's office at Huntington.

Q. Are these official records of the Huntington office?

A. Yes, sir; those are copies.

Q. Those are photostatic copies?

A. Yes, sir.

By Mr. Jackson. I have not been objecting to counsel stating whether or not they were official records. I think it is an improper way to ask questions, because I think that is for the determination of the Court. I presume that no harm has been done.

By the Court. No, sir; I don't think any harm has been done.

By Mr. McClernan:

Q. This is kept as part of the regular duty of the Huntington office?

A. Yes, sir.

Q. Where is the original?

A. In the Huntington office.

Q. Explain what these exhibits are.

804 A. These are rating curves for various dams on the Kanawha River and for dam No. 26 on the Ohio River.

Q. Tell us what 117-a is.

A. 117-A is the rating curves for old dams Nos. 2 and 3 of the New London Dam.

Q. Along the Kanawha River?

A. Yes, sir.

Q. What is 117-b?

A. 117-b is rating curves for old dams 4 and 5 on the Kanawha River, and for Marmet new dam.

Q. What is 117-c?

A. That is rating curves for dams 6, 7, and 8 on the Kanawha River.

Q. What is 117-d?

A. That contains rating curves for old Lock No. 9 and New Winfield Dam on Kanawha River; that should be dams, instead of Locks; old No. 9 at Winfield.

Q. What is 117-f?

A. E is next.

Q. What is 117-E?

A. That is rating curves for old dams 10 and 11.

Q. In the Kanawha River?

A. Yes, sir.

Q. What is 117-f?

A. That is rating curve for dam 26 in the Ohio River.

Q. The Court asked you, in connection with Exhibit 116, as to whether or not it was made for the purpose of use in this trial. Was this exhibit, or these exhibits, made up only for the purpose of use in this trial?

A. Yes, sir.

Q. That is, the photostatic copies?

A. The whole work was done for that purpose.

Q. Including the original rating curves?

A. Yes, sir.

Q. Didn't you have any other use for that in the Huntington office?

805 A. We have not had so far.

Q. What information do they show?

A. Well, they show different discharges—gauge heights, especially below those dams.

Q. Are they made up and do they show that information correctly?

A. Yes, sir; so far as we can get it.

Q. It is as nearly correct as possible?

A. Yes, sir.

Q. Is it made up in such form that an engineer could obtain the information they furnish without information from you or anybody else?

A. Yes, sir.

(Exhibits 117a, 117b, 117c, 117d, 117e, 117f offered in evidence.)

Q. Mr. Winn, I show you Government Exhibit No. 118. Do you recognize that?

A. Yes, sir.

Q. Do you know who prepared it?

A. It was prepared under my supervision in the United States Engineer office at Huntington.

Q. Is that true of all the detail on here?

A. No; this was information that was collected from different sources and put on this, but all from data in our office.

Q. Was it all prepared under your supervision?

A. All except this coloring matter was put in by Col. Watkins.

Q. That is everything on the exhibit was prepared in the Huntington office except the colored parts; is that right?

A. Yes, sir.

Q. Does it show correctly the data that it purports to show?

A. Yes, sir.

Q. Was it made up in the course of the regular duty of the Engineering Office?

A. It was.

Q. Is this a photographic or photostatic copy?

A. Either that or a print; I don't know which. It is a copy.

806 Q. Where is the original?

A. It is in our office in Huntington.

Q. Is it an official record there?

A. It is.

(Exhibit 118, being a diagram entitled "Kanawha River Profile—Six and Nine Feet Projects, etc." was offered in evidence.)

Q. Mr. Winn, I show you Government Exhibit 119. Do you recognize that?

A. Yes, sir.

Q. Do you know who prepared it?

A. Prepared in the United States Engineer Office at Huntington, West Virginia.

Q. Did you supervise the preparation?

A. Yes.

Q. Is it correct, as far as you know?

A. It is.

Q. Is this an original or a copy?

A. A copy, a print.

Q. Where is the original?

A. In the office at Huntington.

Q. Is it an official record there?

A. It is.

Q. Was all of this material appearing on the exhibit prepared under your supervision?

A. All except the coloring matter which was put on by Col. Watkins; also these two projects up here that are lettered with red.

Q. The part reading "Centralia Project" and "Ralph Project"?

A. Yes.

Q. Other than those two titles and the coloring matter, it was prepared in the Huntington office?

A. Yes; that is right.

Q. Does it show correctly the data which it purports to show?

A. Yes, sir.

Q. You say you put everything on it except the coloring matter and the titles?

807 A. No; he put on a couple of projects up here that weren't on the map that I sent him. They were projects that were studied in the Huntington office but no official report was ever made on them. They are not included in any printed official report. Col. Watkins put those on after he got them.

(Exhibit 119, being a diagram entitled "Kanawha River and Tributaries—Proposed Improvements, etc.," offered in evidence.)

Q. Mr. Winn, I show you Government Exhibit No. 120. Do you recognize it?

A. Yes, sir.

Q. Do you know who prepared it?

A. Prepared in the Engineer Office at Huntington, West Virginia.

Q. Did you supervise the preparation?

A. I did.

Q. Is it correct?

A. Yes, sir.

Q. Where is the original?

A. In the office at Huntington.

Q. An official record?

A. Yes, sir.

Q. Will you tell the court briefly what this is?

A. These are profiles of these streams.

Q. Name the streams.

A. The Greenbrier, New River, Gauley and Elk, showing the elevations of dams that were depicted on the map that you just handed me.

Q. Isn't it true that the vertical scale on this exhibit is very much different from the horizontal scale?

A. Yes, very.

Q. Isn't that true also of some of the exhibits we have already put in?

A. No; I don't think so. There might have been on that profile of the Kanawha River. Of course, the vertical scale there is a whole lot more higher than the horizontal.

Q. Did I ask you whether this correctly depicts the facts
808 that it purports to set forth?

A. Yes.

Mr. McClernan. I offer in evidence Government Exhibit No. 120.

A. The same thing holds there about the coloring matter. Col. Watkins put that on.

Q. That is, the coloring matter was not done in the Huntington office?

A. No.

Q. But everything else was?

A. Yes.

Cross-examination by Mr. Jackson:

Q. Mr. Winn, I first want to direct your attention to Exhibit 110, daily readings at Lock 24 on the Ohio River for the month of August 1918, and ask you where the gauge is located from which those readings were taken?

A. There are three gauges at the locks, one called the upper gauge which is above the dam. That has reference to the upper pool. The one called the lower gauge is downstream from the lock in the lower pool and a middle gauge about the middle of the lock. When the dams were up, the upper and lower gauges are read, but when they let the dams down only the middle gauge is read.

Q. Was there any construction work going on while any of these gauge readings were taken?

A. Only the first one. I have forgotten the exact date when that dam was put in operation but it shows on there by the magnitude of the gauge reading.

Q. Can you look at Exhibit 110 and tell me during what period covered by that exhibit construction work was going on?

Mr. McLernan. May I ask the witness a question?

Q. Mr. Winn, do you have personal knowledge of this construction work that is being discussed?

A. I have not.

The Court. He can say from that how far those readings were affected by construction work.

809 A. It is a matter of record. I just don't have it in mind.

By the Court:

Q. You can tell from that record?

A. Not exactly. I wouldn't want to swear to it, but I think I can tell it pretty well.

Q. Tell us what you know about it?

A. There is when they begun to read two gauges and the proper uniform gauge readings.

By Mr. JACKSON:

Q. The dates, Mr. Winn?

A. October 1923.

Q. And continuing how long?

A. Went right on after that.

Q. I am not clear. You mean up to that time construction work was going on?

A. Probably. It was certainly here.

Q. By "here" you mean——

A. 1918.

Q. August 1918?

A. Yes. It was here [indicating].

Q. And that is July 1918?

A. Yes. It looks like it had been partially constructed there because the lower pool gauge reading—no; it looks like it was constructed because here is the upper pool which shows a good-sized gauge reading, in 1920.

Q. October 1920?

A. Yes.

Q. Do you mean that the structure had been completed at that time?

A. It looks like that from these gauge readings, the size of them.

Q. You couldn't say definitely that the construction work had been completed even in October and September 1920?

A. No; I couldn't say that.

Q. And I suppose the same thing is true as to subsequent sheets?

? A. No. After it is constructed, why then it goes straight on through.

810 Q. And when do you first get to the point where you can tell that definitely, is that October 1923?

A. Yes; it looks like it is. I can give you the exact dates, but I haven't them with me now.

Q. You can't at the moment, I understand?

A. No.

Q. Were these gauges automatic gauges?

A. No.

Q. They were not continuously recordings?

A. No; staff gauges.

Q. And read by some person from time to time?

A. Yes.

Q. How often were these gauges read, if you know?

A. They are read twice a day and during certain periods they are read every hour, but not on there.

Q. These data which you have here in Exhibit 110, are cases where the gauge was read merely twice a day?

A. Yes.

Q. It appears on the sheet headed October 1933, that the readings are for eight o'clock in the morning?

A. That is right. They are actually read twice a day, but some of them are recorded only once.

Q. You mean only one of the readings made was recorded?

A. And sent into the office; yes.

Q. Why was that?

A. Well, it was running along so uniformly that one reading a day indicated what happened.

Q. Then as far as the Exhibit 110 is concerned, we have only one gauge height and that is at eight o'clock in the morning?

A. Yes, sir.

Q. Do all of these gauge readings refer to the same datum plane, as far as you know?

811 A. Yes. It gives the elevation of the zeros of the gauges.

Q. The zero is the same on this for all the readings?

A. For all of the readings at each lock; yes.

Q. I meant Exhibit 110?

A. No; all of the gauges have different zeros. You asked me if they referred to the same datum. They do refer to the same datum—which is the United States Engineer datum. I mean that they refer to the same sea-level datum.

Q. Do all of the gauge readings on Government Exhibit 110, for Lock 24, refer to the same zero?

A. No. If you will notice the bottom of some of those reports, it gives the elevation of the zero of the middle gauge and the others it gives you the upper and lower.

Q. I think you said that these gauge readings on Exhibit 110 have not been published in any official report?

A. No; except as I qualified it. Sometimes they were telephoned to Cincinnati.

Q. And, as I understand it, you do not personally vouch for the correctness of any of these gauge readings?

A. No; I couldn't vouch for them. I didn't make the records.

Q. Mr. Winn, to the extent that these gauge readings are used or might be used to compute stream flow, would it make a difference whether the river was in part obstructed by construction work?

A. Oh, yes; that would give you different conditions for computing flow.

Q. And, of course, that would change from time to time, depending upon the status of the construction work?

A. Yes.

Q. And, of course, you don't know what the status of that construction work was from time to time or what variations occurred?

A. Not except as shown in those reports, because I wasn't even in that district.

Q. From the reports you deduced that there is a period 812 covered by this exhibit when construction work was going on but you are not able to tell what the status of the construction work was for different periods covered by the report?

A. No; I cannot.

Q. Before going to the other exhibit, will you tell me how far Lock 24 is above the mouth of the Kanawha River?

A. I can't give it to you offhand, but something like 25 miles, I would say. It is the second lock above the mouth of the Kanawha River.

Q. Could you verify that readily?

A. Well, not right here. I haven't the records here. I could if I were at the hotel.

Q. Will you give it to us informally?

A. Yes; I will be glad to.

Q. I direct your attention to Government Exhibit 111. This appears to deal with Lock 25 gauge readings. Do you recall that exhibit?

A. Yes, sir.

Q. And will you tell me where Lock 25 is with reference to the mouth of the Kanawha River, if you know?

A. It is five or six miles above the mouth.

Q. Will you in the same way verify that accurately from your data at the hotel and either directly, or through your counsel, supply it to us?

A. Yes.

Q. Will you look at Exhibit 111 and tell me whether or not construction work was going on in the river at the time when those gauge readings were taken?

A. It looks like for the first two periods, that is August 1918, and July 1918, and two months in 1920, there was construction but beginning with 1923 evidently the dam was in operation.

Q. As I understand you from your examination of the exhibit, it is your judgment that all of the gauge readings shown in the exhibit for any period of time prior to 1923 were readings 813 taken at a time when construction work was going on?

A. Yes.

Q. Did you make up these exhibits, 110 and 111?

A. I extracted them from our regular files—those sheets.

Q. These exhibits 110 and 111 are certain sheets extracted from certain files of gauge readings for these two locks?

A. Yes.

Q. Was that a selection that was made by you?

A. No.

Q. You were directed to extract certain particular sheets and have them bound into an exhibit?

A. Yes.

Q. And who directed you to do that?

A. Mr. Davenport, I believe, asked me to it.

Q. Who is Mr. Davenport?

A. He is an engineer in the Division Engineer's Office at Cincinnati.

Q. Were these exhibits made up recently?

A. Just, in fact, since I came to Roanoke. I extracted them from the regular files which are about this thick [indicating] for each lock.

Q. Are there three gauges at Lock 25, arranged in somewhat the same fashion as you described for Lock 24?

A. Yes.

Q. And what kind of gauges are they?

A. Why, I really couldn't tell you. They are staff gauges. I think they are tiles set right into the lock walls up to the top of the lock walls, and from there on up they sometimes go on the stairway leading up to the lock house and different ways, but I am not familiar with them.

Q. Particularly, are they automatic continuous recording gauges?

A. They are not.

Q. They are staff gauges which have to be read?

A. Yes.

Q. And how often are they read a day?

814 A. Usually read twice a day, I think, except during high stages and then they are read every hour.

Q. Is it true that the sheets which are shown on Exhibit 111 contain only one reading a day for the period covered?

A. I don't see but one reading a day on any of them.

Q. And that I understand from the charts to be an 8 A. M. reading?

A. Whatever it says on that chart.

Q. And I suppose, as in the case of Lock 24, you personally can't vouch for those readings?

A. No.

Q. You say that Exhibit 110 is gauge readings at Lock 24. Will you describe what Lock 24 is like: Is there a dam in connection with it?

A. Yes; a movable dam composed of a certain section called the navigable pass and a certain other section called the Weir section and it has one or more bear traps. I don't remember how many 24 has. That is to regulate the water in the pool so as not to have to manipulate the wickets.

Q. Would you, for my information, describe the bear traps and the wickets and navigable pass?

A. Well, the wickets are what is known as Chanoine wickets. They are fixed so they can be tripped, four feet wide and of varying heights, depending on the height of the dam, and they can be tripped so that they let down in the water and when the water gets low enough they are raised back in an upright position to keep the pool up.

Q. Can you describe the navigable pass?

A. That is usually from five to six hundred feet wide and is surmounted by these wickets which are let down, and over that the navigation takes place when it is not necessary to have the dam up.

Q. That navigable pass is where the wickets are?

A. It is on the weir too, the Chanoine Weir. We have a weir that they control until they get ready to throw the whole dam down and then they let the navigable pass down and the boats go over that.

815 Q. Will you spell that name?

A. C-h-a-n-o-i-n-e.

Q. Am I right in understanding that the weir is a low concrete dam in the bed of the river?

A. It has a low sill, but it is surmounted by these Chanoine wickets just like the navigable pass.

Q. You say the wickets are four feet high?

A. Four feet wide.

Q. And the height varies from what?

A. They span four feet with the needle that goes on them. They don't fit exactly together so they have square timbers that they let down in there to tighten up the dams when they have a lack of flow of water and they put them in there on the diagonal, float them into these cracks to make the dam tighter. They call them needles.

Q. Did this apply to the navigable pass?

A. To both; wherever the Chanoine wickets are used, they use those needles.

Q. Do wickets extend across the whole length of the dam?

A. Oh, yes; across that part of it. Of course, the bear trap takes up some and the locks take up some more.

Q. Starting from the end where the locks are, what comes next, what section of the dam?

A. I think the navigable pass comes next to that, then the Chanoine weir comes next to the bear trap and then the bear trap. They vary at different locks, different dams.

Q. Is there any weir in the navigable pass at all?

A. No; it is a weir in itself.

Q. Could you describe it for me, I don't quite get it?

A. These navigable passes are about five to six hundred or more feet wide, the purpose of which is when they have to let the dam down more water flows down than they can take care
of through the bear traps; they have to let the whole dam
816 down and the boats pass through those spaces five
or six hundred or more feet wide.

XQ. You mean the wickets by letting the whole dam down?

A. Yes, sir; the movable part of the dam.

XQ. You don't have to let all the wickets down at once?

A. No; you can't let all down at once.

XQ. You can have part down and part up?

A. Oh, yes.

XQ. In the weir section are they all concrete?

A. They have some fixed weirs that are all concrete. They vary at different locks, some stand three feet.

XQ. It is Lock 24 I want you to describe?

A. I could not tell. I have not had any connection with the operation section and am not familiar with that district. I can get you that information if you want it. I can give you a sheet with all that on it.

XQ. Could you describe a little more fully what the bear trap is?

A. Well, it is a gate composed of two leaves, one working over the other. It is held up in position by pressure of water from the upper pool, and when they get ready to let it down, they close off the water from the upper pool and let the water out from under the leaves, and it comes out in this position [indicating with hands], and when they want to raise it they close the lower valves and let the water in under these leaves, and that is usually a space 90' wide. That is about as well as I can explain it.

XQ. Is it two leaves, 90' wide?

A. Yes, sir.

XQ. One over the other?

A. Yes, sir.

XQ. So as far as the bear trap is concerned, the whole 90 feet has to be operated at once?

A. At one time.

XQ. Will you furnish us the sheet you said will make that a little clearer?

817 A. I will give you the dimensions. I don't know it will make it any clearer to you.

XQ. I understand from you the greater part of the length of this dam is topped with wickets, or composed of wickets?

A. Yes, sir.

XQ. And what is the space between the wickets?

A. Generally supposed to be about four inches, but they are not very rigid, so some are wider and some narrower, they use square timbers that are either 5 x 5 inches or 6 x 6 inches, and they are dropped in there on the diagonal so it will fit in the crack and stop it up.

XQ. Dropped in there to stop the water?

A. Yes, sir; to stop the leakage.

XQ. And if those are not put in then a considerable quantity of water flows between the wickets?

A. Yes, sir; at low flows if they didn't put the needles on, the pools above would drop below the crest of the dam, in fact the needles don't stop it at low stages, they have to chink the cracks with leaves, and cinders and things of that kind.

XQ. Are those needles always in place when the wickets are up?

A. No; only when there is such a low flow water would get below normal, normal pool level, if they didn't put them in.

XQ. And then, as I understand you, when the water gets very low they have to chink up these needles?

A. They have to further chink up the cracks of the dam with cinders and other things.

XQ. Is that always done in a fashion to prevent leakage?

A. Doesn't entirely prevent it; no.

XQ. Well, I presume, that the effectiveness of the chinking up varies a good deal from tiem to time, with the manner in which it is done; is that true?

A. It might be; yes.

XQ. Well, do they have to rechink from time to time,
818 during low-water season?

A. I don't know, as I said I have never been in the operating end of the office down at Huntington.

XQ. As far as you know that may be required more than once during a season?

A. Yes, sir; it can be, I can readily see why it would be.

XQ. Mr. Winn, to the extent that there is leakage through those wickets, would there not be a different stream flow for a given gauge height at the upper pool?

A. Yes; you mean if the leakage was greater or less.

XQ. Yes.

A. Yes; it would affect it.

XQ. That is, the gauge height at the upper pool might corre-pond with a good many different flows at that particular point, epending on how much chinking or needling had been done at hat dam?

A. Yes, sir.

XQ. Does the volume of flow at the dam, or rather the rate of low at Dam #24 depend wholly upon the gauge height at the pper pool or is it affected by the difference between the gauge eight at the upper pool and lower pool?

A. No; that is illustrated in the case of the Roller dams, they im to keep that at the same level, yet you get a tremendous amount f flow under the dam and your gauge above the dam won't change.

XQ. So that the mere knowledge of the gauge heights above he dam wouldn't permit any accurate determination, standing lone, of the flow?

A. No.

XQ. It wouldn't even permit an approximate determination of he flow, would it?

A. Not without taking other things into consideration, the mount going through your cracks, between your wickets.

XQ. Mr. Winn, I direct your attention to Government Exhibit
#110, and ask you whether the report shows the extent
19 to which needles were in place in the dam or the extent to
which chinking may or may not have been used?

A. I don't see any reference to it in here.

XQ. Will you look at Exhibit #11. and tell me if there was nything on that exhibit to tell the extent the needles may or ay not have been in place or chinking may or may not have een in place?

A. I can't tell anything about it, as far as I have gone, it doesn't ay anything about chinking in the dam, but does give some of he operation of the Bear traps.

XQ. Will you state on what sheets of Exhibit #111 there is hown the operation of the bear traps?

A. September 1925 shows bear trap and fifteen wickets down, nd bear trap and fifteen wickets up next day, and bear traps and en wickets down and then up. There is some more information n the sheet of August 1925.

XQ. Where that says on one line bear trap and fifteen wickets own and the next line bear trap and fifteen wickets up, that eans they put back those fifteen wickets?

A. Yes, sir.

XQ. There may have been more wickets up, however?

A. The rest were apparently up.

XQ. I direct your attention to the third sheet of Exhibit #110 hich is headed for the month of October 1920, and particularly direct your attention to the third column showing some pencil figures under the heading "Dam down" middle gauge, while there is concurrently shown two other columns "Dam up" upper and lower pool, and ask you how there could be concurrent records for the "dam down" and the "dam up," if you know?

A. I take that to mean that is what it would have read on the old low-water gauge, because it was put in in pencil and not on the typewriter.

X Q. What did you mean by old low-water gauge?

A. One they used before any dam was there, and it was usually referred to as low-water gauge.

820 X Q. Is that the same as middle gauge on this chart?

A. Yes; same thing. I can only interpret this. I don't know just what those figures mean.

X Q. What do you mean by low water in reference to this low water gauge?

A. That was one that referred to low water before any dams were built, in other words, the zero of the gauge was supposed to be at low water.

X Q. Was that supposed to be above sea level?

A. Yes, sir.

X Q. Are you sure these figures on Exhibit #110 beginning with the sheet for October 1920, in the third column from the left under the heading "dam down" and continuing similarly for the rest of the sheets of the exhibit do not have something to do with construction?

A. No; I can't tell you what those figures mean.

X Q. I ~~gather from what you say you~~ don't know what they do mean?

A. I think they mean what the water in the upper and lower pool would have read if it referred to that middle gauge, but I can't be sure.

X Q. If it does mean that, you don't know if the figures are accurate or not?

A. No; I wouldn't say that those pencil figures are accurate, but I would rely on these others.

X Q. The typed figures?

A. Yes, sir.

X Q. Will you look at the sheet of October 1920, and tell me if you don't think that page indicates construction?

A. I could not tell by that.

X Q. Now, I direct your attention to Government Exhibit #112, and ask you who prepared that exhibit?

A. It was prepared under my supervision at Huntington.

X Q. Was it a routine matter?

A. No; for this particular case.

XQ. Prepared for this lawsuit?

A. Yes, sir.

821 XQ. I direct your attention to the first column on the left at each of the sheets of Exhibit #112, which purport to show "Stream flows at Kanawha Falls" for certain dates, and ask you where you got those stream flows?

A. From the Water Supply papers of the U. S. Geological Survey.

XQ. Can you tell me what paper number it was?

A. No; I can't for those particular days, though the dates are put there.

XQ. You, of course, merely copied them, or had them copied out of the Water Supply papers, and do not vouch for them in any way?

A. I had them copied and checked them.

XQ. You checked them with the Water Supply papers?

A. That is all.

XQ. And have you any other information, or is that all you know about them, that they appear in those papers?

A. Yes, sir.

XQ. Now on the first sheet the second column is headed No. 2, and that refers to "Dam 2" does it not?

A. Old Dam #2, on the Kanawha River.

XQ. Was that the first dam below Kanawha Falls?

A. It was.

XQ. Isn't it a fact there never was any dam built higher upstream than Dam #2 by the Government?

A. That is a fact.

XQ. There was never a #1 Dam by the Government?

A. No.

XQ. What kind of a dam was that, do you know?

A. It was a fixed dam.

XQ. Fixed dam with a lock?

A. Yes, sir.

XQ. Was it built of concrete?

A. I think it was a timbered crib, stone-filled, and
822 possibly concrete slab on top. I am not sure. I never
saw it.

XQ. It didn't have any wickets, did it?

A. No wickets in it.

XQ. Was lock #2 on the Kanawha known as a tight dam or leaky dam?

XQ. Well, you have been testifying about the records in this office, Mr. Winn, doesn't it appear from those records that Dam #2 was a very leaky dam?

A. Haven't you the record before you? It shows it is leaky.

XQ. The record shows it is leaky?

A. Yes, sir. The upper gauge on that dam would read 19 feet at normal pool when at the crest of the dam and you can see at times it gets 1½ feet below the crest of the dam.

XQ. What does that indicate with reference to the dam being leaky?

A. It means it is leaking more water through it than the flow of the river is supplying, if you had 1,000 feet flow at Kanawha Falls more than 1,000 feet were leaking through that dam.

XQ. Do you know whether the rate of leakage was constant?

A. I don't know as to that.

XQ. Do you know whether the leakage was constant from time to time?

A. I know only what those records show there, and similar records.

XQ. Now, Mr. Winn, referring to Exhibit #112 these streamflows from Kanawha Falls were obtained from what gauge readings, according to the Water Supply papers, from which you compiled them?

A. I took them from the Water Supply Paper. I don't know what the gauge readings were. I just took the flow as published in those Water Supply papers.

XQ. You don't know what the gauge readings were?

A. No; not offhand.

XQ. Do you know if there was an automatic gauge there at that time?

A. I know there wasn't, but later on the next sheet will show the period when there was.

XQ. You mean that was in 1925?

823 A. I think not, I think it was put in in 1928, according to testimony given here by U. S. Geological Survey people.

XQ. You mean that wouldn't be true until the third sheet. The second sheet is for 1925.

A. There are four sheets.

XQ. The next column, the third one on each sheet of four sheets, of Government Exhibit #112, has No. 3 above it, and as I understand it refers to dam #3 on the Kanawha River?

A. It does.

XQ. Is that the same kind of dam as dam #2?

A. It was a fixed dam and I think of the same type.

XQ. That is one of these crib dams?

A. Yes, sir.

XQ. Does the record show whether it leaked?

A. You can tell by that (referred to the exhibit). Yes; it shows it is below the crest.

XQ. The water level?

A. Below the crest. 20.67 is the gauge reading for normal pool.

X Q. The next one is 18.5, September 1, showing it is over two feet below the pool, normal pool?

A. The difference between that and 20.67. Yes, sir.

X Q. That, I understand, shows the leakage is greater than the flow of the stream at that time?

A. Yes, sir.

X Q. The next column is #4, dam on the Kanawha, as I understand it?

A. Yes, sir.

X Q. Can you tell me what kind of dam that was?

A. That was a movable dam.

X Q. And can you briefly describe what you mean by movable dam?

A. Wickets that are laid down and raised as conditions require.

X Q. With a lock?

A. Lock; yes, sir.

824 X Q. And the wickets are operated generally in the same way you described in connection with dam #24 on the Ohio River?

A. Yes, sir; I think so.

X Q. They required needling and chinking at low water?

A. You will find in there where it was chinked once and raised two feet the next morning, you will see a footnote on one of those pages there.

X Q. I notice on dam #4 it shows September 4th gauge height 12.8 and September 5th gauge height 14.7 and a footnote saying #4 caulked with cinders on September 5, 1925, that is the instance to which you had reference?

A. Yes, sir.

X Q. Does this record show this #4 dam was also a leaky dam?

A. All of those movable dams are leaky.

X Q. And the amount of leakage depended upon the amount of needling and caulking?

A. Yes, sir.

X Q. And possibly upon any other defects that might be in the dam?

A. Yes, sir.

X Q. The last three columns are headed, respectively, 26, 27, and 28. What are those dams?

A. They are on the Ohio River.

X Q. Your Exhibit #110 was for dam #24 and #111 for dam #25, is that right?

A. Yes, sir.

XQ. And these are for entirely different dams?

A. Yes; coming right on down the river.

XQ. Where is dam #26, approximately, with relation to the mouth of the Kanawha River?

A. It is down ten or twelve miles below the mouth.

XQ. Ten or twelve miles below the mouth?

A. This note says 13.2 miles so I guess I was a little off, but
825 that is approximately.

XQ. And dam #27, where is it with reference to the mouth of the Kanawha?

A. It is about five miles from Huntington.

XQ. And 28?

A. At the lower edge of Huntington city limits.

XQ. Which one of the old Ohio river dams is nearest to the Gallipolis?

A. Dam #26.

XQ. Is that #26 below the Gallipolis dam?

A. Above.

XQ. It is above the mouth of the Kanawha?

A. No; it is below the mouth of the Kanawha.

XQ. Is the Gallipolis dam under construction?

A. Yes, sir.

XQ. What effect does it have on dam #26? That is on the Ohio River, ~~I believe~~.

A. Covered up.

XQ. The completion of the Gallipolis dam will flood out dam #26.

A. Yes; and 24 and 25.

XQ. Mr. Winn, I direct your attention to data for October 29, 30, and 31, on Sheet 1 of Exhibit #112, which as I read the chart, shows the three days of low flow at Kanawha Falls and shows Locks 2 and 3 as substantially, or at least, somewhat below normal pool levels, and locks 4 and 26 above normal pool levels, and ask you whether that indicates that the subnormal levels in the pools at the upper dams Nos. 2 and 3 in comparison with the above normal levels in dams 4 and 26, results from the leaky condition of dams 2 and 3?

A. Dam 26 certainly wouldn't be affected by it, 26 is on the Ohio River, and probably had enough water there to maintain it.

XQ. How about the relation between the stages of pools
826 2, and 3, and pool 4?

A. Well, I would say that pool 4 had been chinked up and was good and tight and much tighter than fixed dams that were leaky.

XQ. Mr. Winn, can you tell me whether any construction work was going on in the river, either the Kanawha or the Ohio, at the time of the gauge readings shown on Government's Exhibit #112?

A. I can't except as indicated there "dam incomplete" note there.

XQ. On Sheet 1, under dam 4, there is a notation that for the period October 11 to October 18, 1921, the dam was down; why would the dam be down during a period of low water?

A. I don't know unless it was for repairs.

XQ. And then under lock 27 on the Ohio on sheet 1, 1921, appears the notation "dam incomplete"; are you able to say from that whether that would indicate according to your records there was construction work going on at that time?

A. I couldn't tell from that. I could give you the figures, they are available exactly when that dam was put into operation.

XQ. The notation "dam incomplete" shows the construction has not been finished.

A. Yes, sir.

By Mr. Jackson:

Q. Mr. Winn, last Friday I asked you to give the distance of Lock 24 above the mouth of the Kanawha River which you agreed to do as soon as you could check it. Have you that information with you?

A. What is the information?

Q. What is the distance of Lock 24 above the mouth of the Kanawha River?

A. It figures 23.2 miles. Does that agree with the memorandum?

Q. I have 22.8 on the memorandum. Is it about 23 miles?

A. 22.7 is right. I had the wrong figure. I had a bridge instead of the mouth of the river.

827 Q. Give us the distance of Lock 25 above the mouth of the Kanawha River?

A. It figures near 5 miles.

Q. And what is the distance of Lock 26 below the mouth of the Kanawha River?

A. 12.8 it figures by this. This is the old Ohio River book. It has been revised in the last year but I didn't know the distances had been revised.

Q. It would be approximately accurate for those distances?

A. Yes.

Q. What is the distance of Lock 26 above the Gallipolis Lock?

A. This was made before the Gallipolis Dam was started and I haven't that, but it is just a short distance above Gallipolis. Lock 26 is just a short distance above the Gallipolis Lock.

Q. What would be your judgment, one mile or five?

A. Less than a mile.

Q. Your exhibits on these gauges, 110, 111, and 112, show the upper pool level for dams 26, 27, and 28, but they do not show the upper pool levels for dams 24 and 25. Will you state the upper pool level for dams 24 and 25?

A. If I have it here.

A. I can give you those elevations here now from this book.

By Mr. JACKSON:

Q. Will you give the normal upper pool elevation for Lock 24?

A. 535.5.

Q. And normal upper pool elevation for Lock and Dam 25?

A. 528.5.

Q. Your Exhibit 112, for instance, has a line that reads "upper pool elevation," and another line below it reads "upper pool gauge readings, normal pool." Am I right in understanding that the first column is the datum plane of the upper pool when it is at normal level?

828 A. Yes; that is the elevation.

Q. And the upper pool gauge reading, normal pool, is the reading that the gauge should have when the pool is at its proper elevation with reference to the datum plane?

A. Yes.

Q. By proper I mean normal?

A. Yes, sir.

Q. Referring again to the pencil figures under the column headed "Dam down" on sheets 3 to 16, inclusive, of Exhibit 110, and 5 to 18, inclusive, of Exhibit 111, were those figures added after the original report was received at the Huntington office?

A. Yes.

Q. Do you know who added them?

A. I do not, nor for what purpose. I can only assume for what purpose.

Q. You don't know why they were added of your own knowledge?

A. No. Somebody was making a study of back waters or something of the kind and just put them in there as what the gauge would have read if the dam was down.

Q. You don't know when that was done?

A. I do not.

Q. Isn't it a fact that those figures represent only a hypothetical condition?

A. Yes; I think so. That is my idea.

Q. The dam wasn't down at those times, so there couldn't have been any actual readings corresponding to that condition; is that right?

A. Yes; that is right.

Q. Do you vouch for the accuracy of those pencil figures?

A. No, sir.

Q. Do Government Exhibits 110 and 111 show the status of the dams for which gauge readings are given during the periods included in the exhibits in the matter of needling and caulking?

829 A. No; I don't think so, only in a few cases. No; I don't think any of them show that from my recollection.

Q. The exhibits are here and they will be handed you if you have any doubt about it?

A. You know we discussed the other day the operation on two occasions or more when it referred to bear traps down and so many needles down and bear trap up and so many needles up. They were the only gauges that I could pick out.

Q. Those were only so many wickets up. There was nothing with reference to needles?

A. Nothing about needles—wickets.

Q. So there is nothing on any of these exhibits to show the condition of the dams with respect to needling or caulking at any time, is there?

A. Not that I recall.

Q. And do you, in fact, know the status of these dams in the matter of needling and caulking for the periods covered by Exhibits 110, 111, and 112?

A. No, sir; I know nothing about it, because I wasn't there at the time and I haven't had anything to do with operating the dams since I have been in the Huntington district.

Q. Can you say, from your observation, whether lock attendants at times failed to needle and caulk dams when they should be needled or caulked?

A. I have no information on that subject at all as I have had no connection with it.

Q. You haven't made any observation?

A. A good many locks on that river, I have never been to—down on the lock walls.

Q. Do you recall, Mr. Winn, that the sixth sheet of Exhibit 111, being the reading for Dam 25 in the month of September 1925, shows maneuvering of the bear trap and 15 of the wickets?

830 A. Yes, sir.

Q. I show you the sixth sheet of Exhibit 110, being the sheet showing the gauge readings for Dam No. 24, likewise during the month of September 1925, and ask you whether that sheet shows any maneuvering of the dam during that month?

A. It does not.

Q. As bearing upon the probable accuracy of those sheets, would you think it likely that if Dam 25 required maneuvering of the bear trap and wickets during September 1925, it would not be necessary to maneuver dam 24 also?

A. I can't answer that.

Q. You have no judgment about that?

A. No; I wouldn't know the conditions.

Q. You are not sufficiently informed on the subject to express any opinion as to the probable accuracy of records which show one of two successive dams manipulated with no manipulation of the other during the same period?

A. No; I haven't any knowledge of the accuracy of any of those figures except that they are the official records of the Huntington office and I have handed them in for that purpose.

Q. On that point, Mr. Winn, you will observe on Exhibit 110 that the sheets in connection with Dam 24 for November 1931, October 1931, September 1932, August 1932, and October 1933, are not signed by the Lock Master and do not bear any stamp of the United States Engineering Office at Huntington. Is it not a fact that records of that character are not official records of the Huntington office or of the readings of the Lock Master at that lock?

A. These all seem to be signed.

Q. I direct your attention, for illustration, to the sheet for November 1931, on Exhibit 110, and ask you whether that sheet is signed by the Lock Master?

831 A. Not the Lock Master but he was connected with the operation, probably had charge of the office from which this was sent to the Huntington office. It is signed by a representative of the——

Q. Signed by Assistant Engineer.

A. Yes; but right now this man has charge of all the operations of all the locks in the district.

Q. But he doesn't take the readings at the locks?

A. He does not. He just makes a transcript of the record as sent in from the various locks and then enters them here.

Q. Did he have charge of the operation of that lock at that time?

A. I don't know. I wasn't there.

Q. Does that sheet bear any stamp of the United States District Engineer's Office?

A. I don't see any date of receipt on here.

Q. Isn't it a fact that the records of gauges which are made and signed by Lock Masters do bear a stamp of the Engineer's Office when they are received?

A. They are supposed to be stamped when they come in—all communications—but sometimes they didn't stamp them.

Q. Is there any significance that in this case the sheet signed by the Lock Master are so stamped and those signed by the Assistant Engineer for the periods which I have described are not stamped?

A. I don't know that that has any significance. As I say, I have no personal knowledge of those things. I simply extracted them from the official records of the Huntington Office.

Q. You understand I am not criticising you. I am trying to get the facts.

A. I don't know the facts as connected with that.

Q. Isn't it a fact that the original records of the gauge heights are made by the Lock Master at the lock?

A. Yes.

832 Q. They are signed by him, are they not?

A. I don't know whether they are signed by him or not.

Q. For instance, is the report for October 1923, signed by J. A. Graham, Lock Master, typical?

A. That is signed by him but I don't know the practice in that because I have nothing to do with the operation of the locks.

Q. You don't know whether any of these sheets which you have produced and which have been bound up into Exhibits 110 and 111 are the original gauge sheets made up in the regular course of business of the Huntington office, do you?

A. I don't know whether they are not. I simply know they are recognized as the official records of that office and have been so used in the past.

Q. I also observe that on Exhibit 110 the gauge sheets for Dam 25 for November 1931, October 1931, September 1932, August 1932, and October 1933, are not signed by a Lock Master and do not bear the stamp. I suppose you do not know anything more about those records than about the records for the similar months for Lock 24 which are included in Exhibit 110?

A. I do not.

Q. Mr. Winn, I direct your attention further to your Exhibit 112 which is the gauge readings at Locks Nos. 2, 3, and 4, Kanawha River and Locks Nos. 26, 27, and 28, Ohio River, during low water periods of 1921, '25, '30, and '32, and ask you whether those gauge readings shown for those various dams are only the gauge readings at the upper pool?

A. Yes.

Q. Do you know for what hour of the day those gauge readings were taken?

A. They were taken from sheets similar to the ones we have just been discussing and while it is not put down here, I assume they are 8 A. M. readings.

833 Q. That is they show a single reading for the day, taken at 8 o'clock in the morning?

A. Yes; that is my recollection of it.

Q. And, of course, they severally refer to staff gauges and not automatic recording gauges?

A. Yes.

Q. Mr. Winn, in the case of movable or wicket-type dams like Nos. 24 to 28, shown on these exhibits which you have offered, and taking them particularly during periods of low water flow, I understand from your testimony last Friday that for a given flow in the river the gauge of the pool is affected by the amount of leakage through the wickets of the dam which retains the pool; is that right?

A. Yes.

Q. Am I right in understanding that for that reason the relation between stream flow and gauge height for any particular gauge height is not constant but depends upon the degree to which the needles have been placed and the dam has been caulked?

A. In some measure; yes.

Q. Would that inconstant relationship between gauge height and river flow apply during relatively low water to the stages at the upstream end of such a pool, the upper gauge, in other words—the lower gauge of the dam above but the upper gauge on that pool?

A. I don't know that I get your question just exactly.

Q. You have just said that in interpreting these charts the relation between the gauge height as shown by the upper gauge and the flow depends upon the amount of leakage through the dam that retains the pool?

A. Yes.

Q. And from that I understand that the relationship between the flow of the stream and the gauge height shown on the upper gauge would vary in accordance with the variation in the leakage through the dam retaining that pool or the dam immediately below the gauge; is that right?

834 A. Not entirely. They might open up the bear trap of the upper one, you know.

Q. I understand, but assuming no other complicating conditions, there would be a variation in proportion to the variation in leakage?

A. Not directly in direct proportion, but it would have some effect on it certainly.

Q. The question I am asking you is whether at low flow there would not be a similar variation between the flow of the stream and the gauge height shown by the gauge at the upper end of that same pool which I understand to be ordinarily described as the lower gauge for the dam immediately above?

A. Yes; that would depend in some measure on the height of the water at the dam downstream. If you had it just at the crest of the dam, it would be one thing and if you drew it down a foot it would be another and if you had a foot over the crest, it would be another effect at the upper end of the pool.

Q. But leakage would tend to pull it down, would it not?

A. It depends on the height of the water at the lower dam.

Q. Leakage would never tend to raise the pool, would it?

A. No; it wouldn't. It would reduce it.

Q. Something might overcome the effect of the leakage, but the effect of the leakage would always be in the direction of lowering the pool?

A. Yes.

Q. Mr. Winn, you offered Friday, Exhibits 110 to 120, inclusive. Do you have them well enough in mind to tell me whether Exhibits 110 and 111 are not the only routine or regularly kept documents of the Engineering office included in those exhibits?

A. You mean whether there is any other record?

Q. I want to know if all the other exhibits offered by you, other than Exhibits 110 and 111, are not documents especially prepared for this lawsuit?

A. Yes.

835 Q. Referring back to Exhibits 110 and 111, do you know that those sheets which do not bear the signature of the Lock Master and which do not bear the stamp of the United States Engineering Office at Huntington, were not prepared especially for this law suit?

A. They were not. Those sheets were in a big folder covering a number of years, month after month, and I simply extracted them from those folders.

Q. I want to direct your attention now to Exhibits 117–A to F. Would you like to have them?

A. I would; yes.

Q. First, I direct your attention to the curve on Exhibit 117–A which is labeled "Lower London Pool with old Lock No. 2 in place," and ask you when the condition described by that curve or label existed?

A. These curves were all made up by bringing flows or discharges down from the Kanawha Falls gauge or Lock 2 gauge and then selecting——

Q. You don't understand.

A. I was going to explain how they were made and that will probably answer your question.

Q. No; it doesn't. I ask you when the condition shown on your exhibit and described as "London Lower Pool with old Lock No. 3 in place" existed?

A. For a number of years.

Q. Give me the period of years?

A. I have forgotten now. I can't recall just how many years we considered in there.

Q. Lock No. 3 was the second of the old dams on the Kanawha River, was it not?

A. From the head; yes.

Q. And the London Dam took the place of what dam?

A. It was between 2 and 3.

Q. It took the place of what dam—just No. 2?

836 A. It replaced 2 and extended the navigation further up the river.

Q. Was 3 just downstream from the London Dam?

A. Yes; some distance down stream.

Q. Approximately how far?

A. I can tell you if you will let me look at the book.

Q. You can look at the book if you like.

A. All the distances are in here. I thought I had it, but I don't believe I have.

Q. Give your best judgment. You know about what it was?

A. I would say a couple of miles.

Q. Isn't it a fact that Dam No. 3 was being removed before the London dam was completed and its pool filled?

A. I don't remember just when it was removed but I think most of it was removed before the London pool was raised.

Q. Is it not a fact that there never was a time when the London dam was completed and its reservoir filled and Lock No. 3 also in place?

A. I don't know. I can't tell you that. I had nothing to do with the removal or with the operation of the lock.

Q. This exhibit was made up under your direction, was it not?

A. Yes.

Q. Don't you know it to be a fact that Lock No. 3 was removed before the London dam ever went in operation?

A. I assume that it was, but I don't know.

Q. So that there never could have been a time when there was a flow through the London pool at normal level and Lock No. 3 in place, could there?

A. No; that was just figured from backwater curves.

Q. And this curve headed "London Lower Pool with old Lock No. 3 in place" is just a hypothetical development of a condition that never, in fact, existed, isn't it?

A. Probably so.

Q. And old Lock No. 3 is not now in existence?

837 A. No.

Q. And hasn't been in existence for several years?

A. The dam hasn't.

Q. The dam and lock?

A. I think the locks have been removed too, all except one wall of it.

Q. Now, you have on this plaintiff's Exhibit 117–A several other curves which are respectively designated "Lock No. 2—open river," "Lock No. 2—lower pool," "Lock No. 3—lower pool." I ask you whether it is not a fact that both dams 2 and 3 are no longer in existence?

A. No; they are not.

Q. And those dams have not been in existence for several years; is that right?

A. No; they have not.

Q. So that those curves which purport to reflect conditions with relation to certain pools or open stream flows of Lock Nos. 2 and 3 deal with conditions that do not now exist and have not existed for a considerable time past; is that so?

A. No; they haven't, but this curve shows what did exist, what did happen when those locks were in existence.

Q. That, of course, wasn't true with reference to the first curve, the London lower pool with old Lock No. 3 in place, the top curve?

A. (No response.)

Mr. **Jackson.** If your Honor please, I desire to make a motion to exclude all curves on Plaintiff's Exhibit 117–A dealing with Lock No. 2 or Lock No. 3, because it appears that they relate to conditions which do not now exist and did not exist for sometime, at least, prior to the commencement of this lawsuit and they can, as I see it, have no relevancy to the determination of the suit and will only introduce a collateral issue.

The **Court.** They may have some materiality on the general question of the water flow of the river. I don't know. You can point out in your argument the lack of materiality. I will let them stay in.

Mr. **Thompson.** We are going back as far as 1925, the conditions in 1925.

Mr. **Jackson.** May the record note our exception to the refusal of our motion.

X Q. I direct your attention to the curve which is entitled "Lock #2 Open River." What do you mean by open river, Mr. Winn?

A. The dams down or without any dams in the river.

X Q. Which do you mean?

A. That lock #2—what is that question?

X Q. I asked you what you meant by open river, and I understood you to say either with the dams down or without any dams in the river.

A. Taking them to be the same thing; yes, sir.

838 X Q. What do you mean by open river?

A. What we refer to as open river is when no dam is up or it might apply to the condition before any dam was built.

X Q. Well, is the dam with the wickets down the same as no dam in the river?

A. Practically, it may be a little swellhead right at the dam, but its effect is not felt for any distance in the pool.

X Q. Referring to curve "Lock #2" in the river, which you say is with dam down; what dam down is that?

A. It just shows where this curve ties in to Lock #2, with all the dams down, ties in with it above the lock.

X Q. You said with all the dams down?

A. Yes, sir.

X Q. You mean all the dams on the Kanawha River?

A. This one and the ones adjacent.

X Q. That means lock #2 and what other dams down?

A. #3 and #4 if you want to put it that way.

X Q. Then Exhibit #117-a is supposed to show a condition with locks 2, 3, and 4 down, or dams 2, 3, and 4 down; is that right?

A. Yes; this upper part of this curve is the line that represents that flow, and that just shows how this curve below the dam ties into that, because at a certain stage before you get up to that point, the dams would be down, up in that section of the curve the dams are down.

X Q. Tell me how they got dams 2 and 3 down?

A. I think when the water got a certain flow in the river.

X Q. How do you put a fixed dam down?

A. You didn't, if a fixed dam. This is open river.

X Q. Dams 2 and 3 are fixed dams.

A. Yes, sir; this shows a flow in that stretch of the river above the dam.

X Q. Flow under what conditions?

A. Under open river conditions.

839 X Q. And open river conditions means with two fixed dams in place, and one dam below with some wickets dropped; is that right?

A. It might be that.

X Q. Is that a common definition of open river flow?

A. I don't know if I can get you to exactly understand what I mean.

X Q. I think I understand you, but I don't reconcile it with the terminology of open river.

A. Here is what I mean: when the water gets a certain flow in there, those fixed dams are wiped out, as if they were not there, and the upper end of this curve shows that condition.

X Q. What flow was that?

A. That seems to be at gauge fourteen feet up there, it seems.

XQ. What?

A. Gauge fourteen feet.

XQ. Don't you know, Mr. Winn, from your knowledge of this river and your investigation, when you prepared this chart, you can't wipe out fixed dams at any flow shown on this chart?

A. They are wiped out temporarily when your flow gets big enough.

XQ. But no flow shown big enough on this chart, is there?

A. It starts out from zero to fourteen feet.

XQ. to how may second-feet?

A. It don't show—yes; it does. Up at this point it is about 18,000 second-feet.

XQ. Don't you know it to be a fact 18,000 second-feet wouldn't wipe out either of those fixed dams?

A. I have forgotten just what stage they are wiped out.

X Q. You really never investigated that; did you?

A. We did when these were made, but I have forgotten now, without the figures before me.

XQ. Maybe I can help you with one of your exhibits here, Mr. Winn. I now direct your attention to your Exhibit #118, and particularly to dam #2 there near the right-hand end of the exhibit.

840 A. Yes, sir.

XQ. You there show various flood flows. Do any of those flood flows, other than the flood of September 14, 1878, show dam #2 drowned out?

(NOTE.—There was some discussion at this point between counsel and the Court.)

A. It shows they have had some drop.

XQ. That is true then, isn't it, except the flood of 1878?

A. Yes, sir.

XQ. Returning again to Plaintiff's Exhibit 117-a, were there actual stream measurements for the conditions shown or purported to be shown by the curves on Exhibit 117-a?

A. No; except as brought down from Kanawha Falls, or #2 lock.

XQ. Is it fair to say that each of the curves shown on Exhibit #117-a are hypothetical curves?

A. I can only explain that to you by telling you how they were made.

XQ. Well are they curves that have been computed, or are they curves that have been traced from actual measurements of discharge and gauge heights under the conditions supposed to be shown?

A. They were curves computed from discharge measurements at Kanawha Falls and Lock #2 as applied to gauge heights at the points designated on the curves.

XQ. And each of those computations involved assumptions and exercise of judgment; did they not?

A. No; I would not say so, for the discharges shown here you could bring the discharges from Kanawha Falls or Lock #2 down to the point under consideration with pretty good accuracy, and your gauge heights, we have those recorded.

XQ. Well, take your curve for Lock #2, lower pool, and explain how you constructed that curve, I mean Lock #2 lower pool, open river?

A. At open river only applies to the upper end of that curve and not to the lower end.

841 XQ. Looking at your Exhibit 117-a, what is the curve that drops sharply to the left-hand side of the page below the line labeled "Lock #2 lower pool?"

A. That is the pool showing discharges for certain gauge heights on the lower gauge at Lock #2.

XQ. Open river or what?

A. No; it isn't open river, the open river comes on above that.

XQ. Will you tell me which is the curve that shows Lock #2 open river, where it begins and where it ends?

A. Well it begins down here, right on this line [indicating on exhibit].

XQ. Near figure four?

A. Yes; and follows on up, and here is your lower #2 pool.

XQ. Then it joins that line marked "Lower #2 pool" at about 10,000 second-feet?

A. Yes, sir.

XQ. Then the lower end of that curve is part of your curve or Lock #2 open river; isn't it?

A. Yes, sir.

XQ. How did you get that?

A. By considering it before the dams were built.

XQ. Did you make any measurements before the dams were built?

A. No; simply took them from old charts.

XQ. Did you have any gauge heights?

A. Yes, sir.

XQ. What gauge?

A. At Kanawha Falls.

XQ. Before any dams were built?

A. Yes; I think so.

XQ. What year was it?

A. I don't know. I haven't those things in mind.

XQ. Isn't it a fact the gauge wasn't installed at
842 Kanawha Falls until the dam was built?

A. I can't recall that.

XQ. It may have been, so far as you know?

A. Yes, sir.

XQ. Can you for illustration tell me how you get a specific point on the lower end of the curve Lock #2, open river flow, on the left-hand side of the page?

A. No; I can't tell you right now.

XQ. Was it done under your direction?

A. Yes, sir; and checked at the time.

XQ. Checked with what?

A. With whatever data that was used.

XQ. You don't know what data that was?

A. Not right now, I don't.

XQ. I notice on your chart you have this label "Lock #2 zero flow." How did you get the zero flow at Lock #2; did you measure it?

A. We took the gauge reading when the lowest flow was recorded.

XQ. Did you have any record of zero flow, have any measurements at zero flow?

A. That is what it would have been at zero flow.

XQ. How did you find that out?

A. By taking it with reference to the height of the dam next below, I imagine.

XQ. You don't know that?

A. No; but that is the only way we could have gotten it.

XQ. How would you do that?

A. If you knew the elevation of the height of the dam below level 586.7 the zero flow would have been at that stage.

XQ. But this was an open river flow curve.

A. This is open river with reference to fixed dams.

XQ. Well, then, all right, take your next label, "Lock #3 zero flow"; how did you get that?

843 A. The same way.

XQ. Was there a fixed dam below Lock #3?

A. No; but take it with reference to the crest of the dam next below.

XQ. That was an open river flow curve, too?

A. Yes, sir

XQ. I thought you said a moment ago that the lower end of your curve, Lock #2, open river, was for conditions before the dams were built; did I misunderstand you on that?

A. That is my recollection of it. I don't know.

XQ. If it were for conditions before the dam was built, you obviously could not have obtained your zero flow by the level of the crest of the dam below, could you?

A. No.

XQ. You had to estimate it in some fashion other than that, didn't you?

A. I imagine it was zero flow. Has reference to zero flow on the gauge of open river.

XQ. Now take for instance Lock #2, zero flow, your label gauge 3.8 elevation 586.7; was that elevation in fact the crest of the dam below?

A. It gives the zero of the flow at elevation 3.8 on the gauge; that is what the zero flow means.

XQ. To get back to your previous explanation that also applied or corresponded with elevation 586.7?

A. Yes, sir.

XQ. What is the elevation of the crest of dam #3?

A. I don't remember.

XQ. Your Exhibit #112 shows it to be 591.7, is that right?

A. I was wrong. This zero flow means flow at zero on that gauge, on the old low water gauge, I imagine.

XQ. Zero on the gauge—your exhibit says the gauge reads 3.8?

844 A. Yes, sir.

XQ. You don't mean what you just say that it corresponded to zero on the gauge, do you?

A. I understand [interrupted].

XQ. Isn't it a fact that you don't know how that zero flow was obtained?

A. No; I don't right now. It has been sometime since this was made.

XQ. Isn't it also a fact that is purely an estimate or guess of someone?

A. It is not a guess.

XQ. There never was any measurements for that condition?

A. I will tell you how we made this [interrupted].

XQ. Just answer my question first.

A. No; there wasn't any flow, I can recall, unless it was held off somewhere above.

XQ. You don't know of any such condition?

A. No.

XQ. And you don't know of any such condition before the dams were built?

A. No, sir.

XQ. And this open river curve as you said was for a condition before the dams were built?

A. I mean this lower end was made from the gauge reading

X Q. Before the dam was built?

A. After the dams were built, the open river is on the upper end and refers to where the two tie on together.

X Q. Awhile ago you told me the lower end was also for open river. Do you want to change that?

A. I said in the beginning the open river referred to only the upper end.

X Q. Later you said the lower end referred to open flow conditions before the dam was built?

A. I didn't mean that. I meant this part of the curve was taken from gauge readings from discharges brought down, from these measurements.

X Q. Was it open river flow?

845 A. Not there.

X Q. With the dams in?

A. Yes, sir.

X Q. And the dams up?

A. The dams are always up.

X Q. Dams 2 and 3 are always up?

A. Yes, sir; that is what we are referring to here.

X Q. That isn't true of #3. You have a curve also for Dam #3?

A. Yes, sir.

X Q. Now; Mr. Winn, you have already pointed out that this curve, the upper end of which, or right-hand end of which, between the designation of Lock #2 open river, at its lower end, diverges, with another line marked upper pool, and the lower one drops sharply below point four on the gauge scale; what is the upper one if the lower one with the sharp drop means Lock #2 lower pool, with the locks or dams up?

A. I just can't recall how that was.

X Q. They can't both represent Lock #2 lower pool with dams in place?

A. Now, I can't recall that.

X Q. Now, you have already said the zero point on this curve is a matter of estimate?

A. Yes, sir.

X Q. Isn't all the rest of that curve a matter of estimate?

A. I can tell you better by telling you how these curves were prepared.

X Q. If you can, I would rather you would answer directly.

A. I would not consider they are a matter of estimates.

X Q. They had to be computed?

A. Yes, sir.

XQ. No actual readings or records from which they could be computed directly?

A. Readings of the gauges and estimate of the flow as brought down from Kanawha Falls.

846 XQ. But no measurements of stream discharge simultaneous with the gauge readings?

A. No; I don't suppose so.

By the COURT. Tell us how they were prepared. You have offered to do that, now explain it.

A. If your Honor please, we took periods when the flow was comparatively uniform for different discharges, 1,000, 2,000, or 3,000 second-feet, and so on, for several days, maybe three days or more, and then we had the gauge heights for those periods and plotted the gauge heights as functions of the discharge for those days, just as you plot them from current meter measurements, discharges for certain gauge readings, and then draw a uniform curve on there, supposed to represent the average of all these points that were plotted, and that is what we did here, took different flows at Kanawha Falls and brought them down to the point under consideration and plot those on the chart, then we tried to draw a smooth curve representing the average of all those conditions.

XQ. Mr. Winn, when you do what you have just told his Honor, that is, prepare a rating curve, you actually make measurements, don't you, of stream discharge?

A. Yes; they were made at Kanawha Falls.

XQ. Did you understand me to ask you that? Answer my question, please, and we will get along faster. You make actual measurements and plot them on paper, don't you?

A. Yes, sir.

XQ. And then you draw a smooth curve through actual measurements?

A. Through the group of actual measurements; yes, sir.

XQ. And you have to know the gauge heights as well as the actual measurements of stream discharge, don't you?

A. Yes, sir.

XQ. And they have to be simultaneous, don't they?

Y. Yes, sir.

847 XQ. When you get to the lower end of these curves of Exhibit #117-a, did you in fact have actual gauge measurements?

A. Yes, sir; at Kanawha Falls.

XQ. Did you at the points covered by the charts?

A. No, sir; except Lock #2, we had gauge records there.

XQ. Did you for the open flow condition or when the dams were not in place?

A. No.

XQ. And did you have actual stream or discharge measurements for the lower end of these curves, the low flows shown on this curve Exhibit 117–a, before the #3 dam was built?

A. No.

XQ. Well then, isn't it all estimate for that part of the curve that deals with the conditions before the dam was built?

A. Before the dam was built; yes, sir.

XQ. That is the open river conditions, isn't it?

A. Yes, sir.

XQ. Now, for the purpose of the rating curves you did use in preparing these charts, did you not make the assumption Dams 2 and 3 were tight dams?

A. Didn't make any assumptions.

XQ. Didn't give any consideration to the question of whether dams 2 and 3 were tight or leaky dams?

A. No, sir.

XQ. And of course you didn't give any consideration to what the leakage was if they did leak?

A. No.

XQ. Will you look at your Exhibit 117–a which has on the left-hand side a straight line labeled "london lower pool with Marmet in place," and that intersects with the line Lock #2, or does that intersect with the line Lock #2 open river?

A. Yes, sir.

848 XQ. Now doesn't the wording "London lower pool with Marmet in place" pertain to the curve above the right end of that label and not the line immediately below the label?

A. The line above.

XQ. As a matter of information will you tell me how you developed the curve Lock #3, lower pool?

A. The same way we did the others.

XQ. What was that, did that development of that curve have any relation to the condition of the pool below?

A. It did.

XQ. What was the condition of dam #4?

A. That was taken into consideration, and all the things we plotted in getting the mean.

XQ. What condition did you assume for dam #4?

A. We didn't assume any conditions. We plotted the points and took the median between all of them.

XQ. Wasn't it possible to have considerable variety at dam #4?

A. There was a great variety.

XQ. The dam might be up or down?

A. Yes; or partly up or down.

XQ. And the pool might be exactly at the crest of the dam?

A. Yes, sir.

X Q. And either under or over?

A. Yes, sir.

X Q. What did you assume among all those conditions?

A. As I said we took periods of uniform flow at Lock #3 for instance over a period of several days, that seemed to indicate about the same conditions each day, then we plotted those and got a variety of points plotted, and the ntried to find the smooth curve to get the average of all.

X Q. You plotted a number of conditions and got a variety of results?

A. Yes, sir.

X Q. And then you drew a curve?

849 A. Yes, sir.

X Q. And for what you thought was an average curve?

A. Yes, sir.

X Q. Which may not be true for any actual condition?

A. That is it.

X Q. In other words, if you use that curve, it is not certain you would get a correct answer for any particular condition to which you might wish to apply it?

A. No; supposed to represent average conditions.

X Q. Am I right in understanding from your testimony so far, that for the purpose of the curves on plaintiff's Exhibit #117–a, you did not take into consideration any question of leakage?

A. No; I did not.

X Q. Mr. Winn, I direct your attention to the upper curve, labeled "London lower pool with old Lock #3 in place" and the line intersecting with that curve labeled "Lock #3 normal upper pool, gauge 13.6 Elevation 584.5, and ask you at what point they intersect; that is, is that at the 2,000 second-feet flow?

A. It is pretty close to that.

X Q. If you follow the ordinate the two lines do intersect approximately on that line, don't they?

A. Lock #3 upper river?

X Q. No. London lower pool with old Lock #3 in place is one curve, and the other line is right below that, bearing the label "Lock #3 normal upper pool."

A. Yes, sir.

X Q. The lines there intersect approximately at the 2,000 level line, do they not?

A. Approximately that.

X Q. For flows lower than that you show the London lower pool dropping below the normal pool, do you not? That is with Lock #3

850 A. I don't get your question, Mr. Jackson.

XQ. Turn your attention to the curve labeled "London lower pool with old Lock #3 in place," does not that curve show the pool level is dropping below the normal upper-pool elevation from the lower reservoir of Lock #3 for flows below 2,000 second-feet?

A. Yes; it goes on down.

XQ. And why is that?

A. I don't exactly get that either, Mr. Jackson. This has reference up here to the London, the new dam, #3 is below that, just below that.

XQ. But it has no reference to the lower pool of the London dam?

A. The normal pool is 584.5 elevation.

XQ. And that is the same as the lower pool of the London dam, isn't it?

A. Now, I have forgotten the elevation of those, but——

XQ. Let's get this straight. If there ever was a time which you have assumed the London dam was in place and dam #3 was in place, then dam #3 was immediately below the London dam, wasn't it?

A. Yes, sir.

XQ. And the upper pool of dam #3 ran up to London dam, didn't it, or backed up to it?

A. Yes, sir.

XQ. And that is the same pool that would be called "London dam lower pool," wouldn't it?

A. Not after #3 was torn out.

XQ. Let's keep on the same place. Your curve is with Lock #3 in place?

A. Oh, yes.

XQ. And under the conditions shown by your chart, the London dam lower pool and dam #3 upper pool is the same pool?

A. Yes, sir.

XQ. Now, I want to know why for flows less than 2,000 851 second-feet your curve shows the London lower pool as dropping below the normal pool level?

A. Well, when they tore that dam out (interrupted).

XQ. Mr. Winn, you can see your curve is without the dam being torn out. Now let's stick to your own hypothesis.

A. I don't know what they could be unless they took into consideration some of those cases when dam #3 leaked and they let it down, I can't see anything else.

XQ. Don't you know what the fact is about that?

A. No, I don't.

X Q. And that was prepared under your direction?

A. Yes, sir. Sometime ago, and I have forgotten.

X Q. I direct your attention to the fact the exhibit says "Revised July 9, 1936."

A. That is with reference to the revision right in here [indicating on exhibit].

X Q. Where?

A. London lower pool with Marmet in place, and based on gauge readings, after the dams were put into operation. These curves were first made before the dams were put into operation.

X Q. The revision was to reflect actual curve conditions and the preceding curves represented estimates of hypothetical conditions?

A. Yes, sir; very small changes.

X Q. The fact is on this curve at "London lower pool with old Lock #3 in place" there could be no explanation of the dropping of that pool level below the normal elevation for London lower pool at flows below 2,000 second-feet, except leakage in dam below exceeding that flow?

A. That is all I can see.

X Q. That is on the basis of your estimates and figures?

A. Yes, sir.

X Q. The leakage at Lock #3 might exceed 2,000 second-feet?

A. Yes, sir.

852 By Mr. **Jackson**:

Q. Now, Mr. Winn, I want to ask you a question or two in regard to Exhibit 117-b.

A. That is four and five and Marmet.

Q. That purports to show the reading of the curves for locks 4 and 5 and Marmet on the Kanawha River?

A. Yes, sir.

Q. A number of curves on your Exhibit 117-b purports to reflect certain conditions with Locks 4 and 5 in place. Are Locks 4 and 5 in existence?

A. No, sir.

Q. Is it not a fact that the locks and dams four and five on the Kanawha River have been removed for a considerable period of time?

A. I think so; yes, sir.

Q. And they have been replaced by the Marmet Dam?

A. Yes, sir. No. 5 is below the Marmet Dam; yes, it was really replaced by the Marmet Dam.

Q. So that insofar as Exhibit 117-b deals with conditions alleged to exist, with reference to dams and locks 4 and 5 on the Kanawha River, it deals with a nonexistent condition?

A. Yes, sir.

By Mr. JACKSON. I judge the Court will receive it, but I should like to make a motion to exclude all evidence on Exhibit 117–b relating to locks 4 and 5 on the ground that the condition does not now exist and has not existed since this lawsuit commenced.

By the COURT. I will admit it because it might have some evidential value as showing the condition of the flow and water supply in that stream and while it might be remote, it might have some evidential value.

By Mr. JACKSON. I do not wish to argue the point, but would like to make this observation in explanation of my objection, and that is, I assume that any rights of the Government must be based upon injury under actual conditions, and that we are not going by what were the conditions or what were not the conditions in 1878 or 1918, or 1925, but what the conditions are under which the Court is asked to issue the injunction.

By the COURT. Yes; that is true. However, the whole condition or the various conditions might have some bearing as evidential value or might tend to have some evidential value.

By Mr. JACKSON. I just want to make the record up on that point, so that ~~our~~ position may be clear. And we desire to take an exception to the ruling of the Court.

By the COURT:

Q. Mr. Winn, the Marmet Dam is the first one above Charleston?

A. Yes, sir.

By Mr. JACKSON:

Q. I now want to direct your attention to the curve on Exhibit 117–b marked "Marmet with Winfield Dam in place." That, of course, deals with a condition that has never existed, does it not?

A. Yes, sir.

Q. And naturally the curve is a result of a computation or estimate?

A. Yes, sir.

Q. You will observe as you approach the left hand side of the chart, Exhibit 117–b, the curve separates with one line dropping sharply and the other proceeding at a moderate decline
853 towards the left side of the exhibit?

A. Yes, sir.

Q. What is the line that drops sharply?

A. That is with Marmet and Winfield Dam in place.

Q. What is the one that does not drop sharply?

A. Marmet with Pool No. 6.

Q. Read the question to the witness. (Question read to the witness.)

A. I see what you mean now. I was reading it wrong. I take it that No. 1 is the condition before the Winfield Dam was in place, and the other one that comes down there will be as it will be when the Winfield Dam is put in.

Q. Do you know anything about it?

A. Not right now, I do not.

Q. There is certainly nothing on the exhibit to indicate that the line with the less sharp decline is the condition before the Winfield Dam is in place, is there?

A. No, sir, but this other one is the one with the Winfield Dam in place.

Q. You mean the one that drops sharply?

A. Yes, sir.

Q. Now, take the next curve which is marked "Marmet, 1935, with Pool No. 6," which also diverges towards the left-hand side of the chart, with one of the diverging lines dropping sharply towards the ordinate on the left-hand edge of the exhibit. Please explain what the curve and the two diverging ends of it mean.

A. As I recall it, that top line, which is more or less straight, represents conditions with Pool No. 6. Wait a minute. I take it that straight line above there is open-river conditions, and this other shows with Pool No. 6.

Q. Is there anything on your exhibit to support your statement that it is open-river conditions?

854 A. No, sir; there is not, but this I know represents the discharge for different gauge heights below the dam with No. 6 in place, and this one represents it with Winfield in place.

Q. What do you mean by "This"?

A. Marmet with No. 6, where it drops down this way [indicating].

Q. You mean sharply?

A. Yes, sir. That is with reference to No. 6 in place, and this other one is with Winfield in place.

Q. I see that you state "The other one," referring now to the upper curve?

A. Yes, sir.

Q. When you said "The other one," which means with Winfield in place, are you referring to the top curve that I asked you about a little while ago?

A. Yes, sir.

Q. That is the one labeled "Marmet with Winfield Dam in place?"

A. Yes, sir.

Q. Did you state what was meant by the straight line there and "Marmet with Pool No. 6?"

A. I think that is with open river. It shows the use of the river here, No. 5 and No. 6, and I think all those straight lines are open river and the others where it drops off.

Q. Referring to your curve, Lock 5 open river, and Lock No. 4, open river, will you state as briefly as you can what was meant by open river for the purpose and the assumptions which you made in preparing these curves.

A. Those straight lines there represent open river, that is, without any dams in place, and the curve showed what effect the dam had.

Q. You say curves, you mean the ends of these curves that diverge and drop sharply to this lower left-hand corner of the exhibit?

A. Yes, sir.

855 Q. I am still not quite clear in regard to your statement as to dams for Locks No. 4 and No. 5, open river. What dams were down?

A. I assume they were all down and that would establish open river conditions.

Q. That is, all the dams below either dam 4 or 5 were down?

A. Yes, sir.

Q. That is a condition that never existed when any of the measurements which you used were taken, is it not?

A. I don't know. I think they probably were down and a lot of those measurements were brought down from Kanawha Falls.

Q. Do you know anything about that?

A. Yes, sir; I think that is what happened.

Q. What period of time was that?

A. I couldn't give you that off-hand.

Q. Now, Mr. Winn, I want to direct your attention to the sharply curving part of the upper curve, Marmet with Winfield Dam in place, and the sharply curving part of the second curve entitled: "Marmet, 1935, with Pool No. 6," which you have said in each instance represents the open flow conditions.

A. Yes, sir.

Q. Or dams in place conditions?

A. Yes, sir.

Q. Why do those curves, which represent respectively condition "Marmet with Winfield Dam in place" and "Marmet, 1935, with Pool No. 6 in place" come together at about a point six or seven hundred second-feet flow or about a thousand second-feet flow?

A. Because at low stage there wouldn't be any difference, or it wouldn't make much difference whether you take it from No. 6 or from Winfield, as I take it.

Q. Do No. 6 and Winfield have the same normal pool level?

A. No, sir; they have a different one where they come together. The Winfield will have 2.85 hundredths greater elevation than No. 6.

856 Q. You would not expect Marmet, with Winfield in place, and No. 6 in place to coincide anywhere, would you?

A. Let me see now. I don't know whether that is right or not. No, I would not, that looks like it is wrong; I cannot explain it.

Q. I direct your attention to the curve of Lock No. 4, lower pool, and ask you whether that curve does not show a drop below the normal pool level for flows of perhaps one thousand second-feet or less?

A. That is for No. 4?

Q. Yes.

A. Yes, sir; it seems to.

Q. What is the explanation of that?

A. I don't know, unless some of the records showed it dropped below the crest of the dam at No. 5, or went below the normal pool. If it went enough below it would draw it down below the normal pool.

Q. What would make it go below the normal pool with a flow of one thousand second-feet?

A. If the dam was down it would go way below.

857 Q. Is the dam down on this curve?

A. It don't show it, no, sir. It is possible it could be drawn down below normal pool considerably and usually is when they get a low flow.

Q. As a matter of fact, would they ever put a dam down with a flow of thousand second-feet, or less, in the river, unless it was necessary to make necessary repairs?

A. No, sir; I don't think so, with that much flow, or for repairs or maybe leakage.

Q. Do you think a record or any chart which reflected that condition, when the dam was down during low water flow for repairs, is representative?

A. This is down to zero flow, you will notice that?

Q. Read the question. Do you think a record or any chart which reflected that condition, when the dam was down during low water flow for repairs, is representative, or typical?

A. I don't think that means much, thousand second-feet flow.

Q. You can answer my question directly, can't you?

A. Yes; I say it does not reflect the probable conditions.

Q. Were your curves intended to reflect the usual or ordinary condition or unusual condition?

A. Down to the low water flow of the river, down to the thousand second-feet we did try to represent actual conditions; beyond that it did not matter much, but it is just a hypothetical case, and if it went below that it would come out as shown.

Q. Your understanding is that the part of this chart that carries the curves down below a thousand second-feet doesn't amount to much?

A. Not unless the water was shut off above, and it got down to that.

Q. If the dam were down, how could the pool elevation be two-tenths below normal on that curve?

858 A. On this curve here [indicating]?

Q. Yes, sir.

A. The dam might not be down, but if the water was shut off above it would drop down to that two-tenths of a foot.

Q. What would cause it to drop below the pool level?

A. Shutting the water flow off. This showed zero flow. If you shut all the water off, and there is no flow, it would drop down to that.

Q. Don't you think the leakage in the dam might have something to do with it?

A. It might, but that still would not be zero flow at the upper end.

Q. But you understand that your chart began at thousand second-feet and not at zero.

A. As I understand you are talking beyond where it goes below normal pool?

Q. It starts at a thousand second-feet?

A. Yes, sir; it starts at a thousand second-feet.

Q. And it goes from there down to zero?

A. Yes, sir.

Q. Now, another question in regard to Exhibit 117-b. Mr. Winn, I want to direct your attention to the curve which drops sharply at the lower left-hand corner of the exhibit, for illustration the curve dropping from the one labeled "Lock No. 4 Open River" and will ask you how you obtained the point which you used to plat those curves at the lower end of the curve.

A. By gauge readings of the flows from Kanawha Falls and No. 2.

Q. That is, you computed the point from certain gauge readings that you had at Kanawha Falls?

A. Yes, sir.

Q. You had no gauge readings at Locks 4 and 5, did you?

A. Yes, sir; there is where we got the gauge readings, and we got the flow from Kanawha Falls.

859 Q. And you computed the flows from data at Kanawha Falls?

A. Yes, sir.

Q. So that we may check these matters, will you tell me the date when the conditions which you describe at Lock 4, Low Water Gauge 4.64 occurred?

A. No, sir; I cannot tell you.

Q. Can you look it up and supply it later on?

A. Yes, sir.

Q. Will you do that also for the next one, Lock 5, Low Water Gauge 3.72?

A. Yes, sir.

Q. I think you have two similar annotations, three in fact, on your Exhibit 117–a?

A. Yes, sir.

Q. At the same time will you give us the date and reference to any editions of the Water Supply Paper from which you obtained those figures?

A. Yes, sir; I will.

By Mr. Jackson:

Q. Just before recess I asked you to obtain and produce dates of the gauge readings shown on Exhibit 117–b. I understand from you that during the recess you have refreshed your recollection as to the date of these readings on Exhibit 117–b, designated as "Lock No. 4, Low Water Gauge 4.64; Lock No. 5, Low Water Gauge 3.72." Am I right in understanding that?

A. Yes, sir.

Q. Are those readings for the low water of 1879?

A. Yes, sir.

Q. Isn't it a fact that there were no discharge measurements in 1879 for those gauge readings?

A. I don't know as to that, if there have been a number of occasions——

Q. One moment.

A. I will have to explain my answer, if I am permitted to do so.

860 A. There have been a number of occasions where measurements made at a later date were referred to gage heights for previous flows.

By Mr. Jackson:

Q. But you don't know of any measurements made for the gauge heights of 1879, do you?

A. I do not.

Q. Now, on your Exhibit 117–b you have this, "Gauge reading at low water of 1879 platted for a flow at thousand second-feet."

A. At No. 5?

Q. Yes, sir.

A. Yes, both of them are platted.

Q. For a flow of thousand second-feet?

A. Yes, sir.

Q. I direct your attention to page 85 of Water Supply Paper 536, one of the Government exhibit, I have forgotten the number, and ask you whether that does not show in the second column a minimum discharge for 1879 of one thousand five hundred and forty second-feet at Kanawha Falls. It is checked with a pencil mark for your convenience.

A. Yes, sir; I see that.

Q. Is it a fact that that Water Supply Paper does show a minimum flow at Kanawha Falls for 1879 of fifteen hundred and forty (1,540) second-feet?

A. Yes, sir; that seems to be it.

Q. And Kanawha Falls is upstream from the point from which you show a flow of thousand second-feet on your chart?

A. Yes, sir.

By Mr. **Jackson.** The Water Supply paper which I have just shown the witness is Government Exhibit No. 68.

A. I would like to state that I don't know that the Water Supply Paper was used for that low water flow. They had a certain gage height, and according to the Lock 2 rating curve it might have been one thousand second-feet, instead of fifteen hundred and forty second-feet.

Q. You do know, from your inspection of your Exhibit 117-b, that the flow shown on page 85 of Government Exhibit No. 68 was not used, that is a thousand second-feet?

861 A. No, sir.

Q. You don't know where the thousand feet came from, do you?

A. No, sir; I do not.

Q. I would like to ask you a question or two about your Exhibit 117-c which you have before you?

A. Yes, sir.

Q. Am I right in understanding that that exhibit purports to give ratings curves for Locks 6, 7, and 8 on the Kanawha River?

A. Yes, sir.

Q. Isn't it a fact that Locks and Dams 6, 7, and 8 on the Kanawha River will be superseded by the Winfield Dam?

A. Yes, sir.

Q. And isn't it a fact that the Winfield Dam is now under construction?

A. It is.

Q. Isn't it a fact that the Winfield Dam will be completed at least by the autumn of 1937?

A. I think that is the schedule.

By Mr. **Jackson.** May I have the record show a motion to exclude the curves relating to Locks 6, 7, and 8 on the ground that it appears that those dams will no longer be in existence at the time when the Government asks the Court to grant an injunction, which I presume the Court will overrule.

By the **Court.** Yes.

By Mr. **Jackson**. I am making this motion purely for the record.

Q. Now, will you tell me as briefly as you can why you assumed open river conditions for the purpose of curves for Locks 6, 7, and 8?

A. For the reason there were no dams there or that they were all down.

Q. You drew no distinction between conditions where the dams below each of these locks were all down and where there were no dams whatever in the stream?

A. I don't think so; no.

Q. I direct your attention to the upper curve on Exhibit 117–c, designated "Lock 8, Open River," and ask you to state what is meant by the two diverging branches, curved at the left-hand side of the chart; I want to know what each of those branches represent.

A. One represents open river and the other one is the dam in place.

Q. Which represents the open river?

862 A. The upper one.

Q. The one which has a relatively low rate of decline?

A. Yes, sir.

Q. That represents the open river?

A. Yes, sir.

Q. And the branch which drops very sharply to the lower left-hand corner is with all dams in place?

A. Yes, sir.

Q. Now, similarly, was the curve for Locks 6 and 7, diverging towards the left-hand side of the Exhibit, with one branch proceeding with a low rate decline, and with one branch dropping rapidly?

A. Yes, sir.

Q. In each of those cases does the more nearly straight or horizontal line represent the open flow, and in each case the rapidly dropping the line condition, with all dams below in place?

A. Yes, sir.

Q. I assume what you have said before with respect to these other charts is applicable here, that is, that you don't know the conditions of the dams below, nor whether they were assumed to be in place; and with reference to leakage or wickets, condition of construction, or anything of that kind; I assume that what you have stated with respect to the other chart is applicable here.

A. That is correct.

Q. Similarly each of these curves is computed—that is, no one of these curves is based upon actual gauge records, plus simultaneous discharge measurements for the conditions purported to be shown by these curves?

A. Not at that point the curve is drawn.

Q. They are all built-up curves? z

A. Yes, sir; they are curves built up from flows at Kanawha Falls on No. 2.

Q. Do any of these curves rest upon simultaneous gauge
863 readings and discharge measurements made actually?

A. I don't know of any.

Q. I direct your attention to the more nearly horizontal portion of the upper curve, Lock 8, open river, and I ask you whether or not the lower left hand end of that curve shows any leakage?

A. No, there is nothing there to indicate any leakage, no, sir.

Q. Do you know that the dam which maintained the pool was free from leakage?

A. I do not.

Q. If, in fact, the dam maintaining that pool was subject to leakage during the period the records upon which it rests indicates, the curve would be in error, wouldn't it?

A. I could not answer that yes or not.

Q. Then answer it the fairest way you can answer it.

A. I told you the way we made the curves—just as if we had current meter measurements; we referred to certain gauge heights.

Q. But you didn't have any, did you?

A. We did not, but we had some that we considered good during low flow periods, and the liability of error in bringing the flow down to the lower locks is very small, and I would consider that we had pretty close approximations to local current meter measurements.

Q. You don't know whether or not any of these dams, 6, 7, or No. 8, leak, do you?

A. No; I do not.

Q. You don't know whether or not any leakage to which they were subject varied from time to time?

A. I could not say definitely.

Q. And you don't know whether or not such leakage as may have existed at the three dams was synchronized as to the condition between the dams. Was there always maintained a constant relationship between the dams?

A. No, sir; I could not say that.

864 Q. The ratio between the leakage in two of these dams might vary from time to time?

A. Certainly.

Q. And your curves do not take that into consideration, do they?

A. No; not directly.

Q. You do not have any records of those leakages?

A. No, sir.

Q. And you did not study leakage?

A. No, sir.

Q. But you do know as a fact that all wicket-type dams leak, more or less?

A. All I ever saw did; yes, sir.

Q. You know that, as an engineer?

A. Yes, sir.

Q. On Exhibit No. 117–c, you show six items of low-water gauge readings. Do you find them?

A. Yes, sir.

Q. The first is Lock 8, low-water gauge 527?

A. Yes, sir.

Q. Were these readings obtained in the same way as the ones for Exhibit "D," about which you testified awhile ago?

A. I am not sure. I can look at the charts and tell.

Q. You yourself are not able to say whether or not they were based on the low-water flow of 1879?

A. No, sir.

Q. In each instance, your chart shows 1,000 second-feet?

A. Yes, sir.

Q. As a matter of fact, that low-water flow at Lock 8, seems to be the same as at Lock 2?

A. It might be.

Q. Is it ordinarily?

865 A. For extreme cases, I would say it is pretty close to it. So close you could not make any distinction on this chart.

Q. If the chart—a variation between 1,000 and 1,100 second-feet to 1,500 second-feet, you would show that on this chart?

A. Yes, sir.

Q. Will you supply us later, Mr. Winn, the dates for which those gauge readings were obtained, shown on your Exhibit 117–c, together with the official publication in which they appear?

A. Yes, sir.

Q. You show at the bottom some zero flow—are these estimated flows the same as in the case of the exhibits about which you have just testified?

A. Yes, sir; I think so.

Q. Turn to Exhibit 117–d, am I right in understanding that this exhibit purports to show rating curves of Locks 9 and Winfield?

A. Yes, sir.

Q. Is it not a fact that the Gallipolis dam on the Ohio River will supersede dam No. 9?

A. Yes, sir.

By Mr. JACKSON:

Q. State whether or not that Gallipolis dam will be completed late in 1936, or in early 1937?

A. Late in 1937.

Q. Late in 1937?

A. That is the schedule; it depends on the condition as to whether or not that will be fulfilled.

By Mr. JACKSON. I ask that the record show a motion to exclude data with reference to Lock No. 9, on the ground that it will be superseded, and ask for the Court's ruling, and have our exception noted.

By the COURT. All right. The motion is overruled and your exception is allowed.

By Mr. JACKSON:

Q. Mr. Winn, you have one curve labeled Winfield site, average open river. What is meant by that?

A. That was the average for open river conditions. It varies with different gauge heights, you know.

Q. That is, it might not be true for every particular condition——

A. Yes, sir.

Q. (Continuing.) To which you might seek to apply it?

866 A. Yes, sir.

Q. Can you state just briefly what were the conditions considered in making up the average of open-river conditions?

A. As I recall, it depends on the back-water condition from the Ohio River. No, that would not be right. No; I cannot state that without reference to our notes.

Q. This was also made under your supervision, was it?

A. Yes, sir.

Q. In the lower hight-hand corner, it indicates it was made July 8th, 1936; is that correct?

A. Yes.

Q. I mean your right-hand corner?

A. Yes, sir.

Q. But you are not able to tell the Court what conditions, the variable conditions that were considered in arriving at the average open-river stage?

A. One is the average, and the upper one is for the minimum conditions of both streams.

Q. I am asking you for the variable conditions that entered into the determination of the average open river?

A. That would be—let's see if I can state that. The upper one is lower pool minimum elevation; that is, the least elevation you can get with no back-water effect from the Ohio River, but if we had a big tremendous flow from the Ohio, it would back up to Winfield, and that would give what the average conditions will be—that is, the average condition of the Ohio and the average conditions of the Kanawha River.

Q. They are the back-water conditions—the average back-water conditions?

A. The average conditions of flow, taking them from the rating curves of both rivers.

Q. Well, isn't it a fact that, for any given flow, as much as 6,000 or 8,000 second-feet, you can have any number of conditions on the Ohio?

867 A. You might have; it is a variable condition.

Q. Very much so over different conditions?

A. Yes, sir.

Q. And the same would be true on the Kanawha River?

A. Yes, sir; but I will say this——

Q. Now, Mr. Winn——

By the **Witness** (continuing). That with the Gallipolis dam built, the effect of the back water up to the mouth of the Kanawha River is very small, even with 150,000 second-feet flowing in the Ohio; it comes up very small.

Q. Do your curves here deal with conditions with the Gallipolis dam in operation—Exhibit 117–d?

A. Yes, no—yes. It don't deal with that yet.

Q. No, sir; you can lay that to one side.

A. Yes, sir.

Q. Unless you knew the simultaneous conditions in the Ohio River and the Kanawha River, having in mind the great number of variations which you have already referred to, how can you compute an average open-river condition for Winfield site?

A. Just by plotting, as I showed you, a great number of points and getting a median line.

Q. Of course.

A. That is the way this was done.

Q. I understand the mechanics of it, but you could not be sure which result is applicable to any thing——

A. (Interrupting.) No, sir.

Q. (Continuing.) Unless you knew you were plotting comparable conditions on the two rivers?

A. No, sir; all we can show is average conditions.

Q. Where is the scale for Lock 9, the gauge height of Exhibit 117–d?

A. I don't believe it shows it.

Q. Do you know what the scale is for that?

868 A. No; I don't know, except that it drops to zero on the gauge, and you can take it from that.

. Is it possible for one to read the chart without having a scale?
. No; you would have to figure it.
. That is the copy that you said an engineer could read that
understand it.
y Mr. McClernan. Can I clarify that?
. Can you determine the scale from an inspection and compu-
on on the exhibit alone?
. Yes, sir.

By Mr. Jackson:

. Tell us what the scale is.
. You have to figure that. You have the zero gauge and then
get the elevation. The elevation is along in here [indicating].
figure the discharges and get the elevation.
. Where is the gauge height that corresponds to the discharge
ock 9 curve?
. I haven't got that; it does not show it. I will take that back.
hows zero and discharges for ——
. You have on the lower left-hand corner of this chart "Zero
flow Winfield gauge 2.5?"
A. Yes, sir.
Q. What is the basis for that information?
. I don't recall that.
. Will you look it up and give us the dates of the readings?
. Yes, sir; this was determined as shown on the gauges at
ks 8 and 9, because there was no gauge at Winfield probably at
time, and this zero was given.
. This is an estimated gauge height at Winfield site?
. Yes, sir.
. Of course, in fact, there was never a zero flow at Winfield
to be measured?
. No, sir.
. Mr. Winn, will you look at your upper curve of the chart,
ranch of which is labeled "Lower pool minimum elevation,"
the lower branch Winfield site average open river flow, and
me at what flow they come together?
. They come together at about 20,000 second-feet.
. Does that mean that the back water effect of the Gallipolis
n on Winfield disappears at 21,000 second-feet flow?
. No, sir; but that would have to come into the same elevation
pen river flow at that point and above that, it would only come
pen river.
. It doesn't include some back water effect above that?
. Above that?
. Yes.
. No, sir; it was just average open river flow.

Q. Does the curve show where the back water effect of Gallipolis dam disappears?

A. No, sir.

Q. According to this chart, in this lower branch of the curve, Winfield has the average open river flow. As to the open river flow at Winfield, doesn't the Gallipolis dam effect that flow
870 at 21,000 second-feet?

A. No, sir.

Q. Doesn't it affect the gauge at all?

A. At 21,000 second-feet on the Kanawha River, it might; yes, sir.

Q. Your chart does not show that, does it?

A. No, sir; it just says average open river conditions.

Q. From your study and working up these curves, don't you know it to be a fact that the back-water effect of Gallipolis dam affects the Winfield site for flows of at least 100,000 second-feet at Winfield?

A. This is 100,000 second-feet to Winfield?

Q. Yes.

A. I could not answer that right off.

Q. That would mean at least 100,000 second-feet at Gallipolis, if it had 100,000 at Winfield?

A. Yes, sir; a flow of 100,000 at Gallipolis has little back-water effect at the mouth of Kanawha River, and at 175,000 second-feet flow at Gallipolis, the dams are raised and has no effect on Kanawha River.

Q. Mr. Winn, I don't suppose you now have it, but will you supply us with the data as to the minimum elevations to which your chart refers, in connection with the upper curve on Exhibit 117-D—as to the lower pool minimum elevation on the upper curve?

A. Zero—oh, the upper curve. I don't see that particular place on this.

Q. Your curves read lower pool minimum elevation?

A. Yes, sir.

Q. Will you supply those minimum elevations?

A. I can tell you now what that was. We picked out the minimum flow of Kanawha River from the rating curve, and then we took these others, 6, 8, and 10,000 second-feet, and checked off the flow duration curve of the Ohio River at some point in percent of time, and this was the curve produced by using those.

Q. Wouldn't these be the average elevations rather than the minimum?

871 A. No; at that time, no—that is the minimum on each stream. The average might be larger.

Q. I will ask that the last question and answer be read. (The last question and answer are read.) Mr. Winn, I have here a chart labeled Corps of Engineers, United States Army, Ohio and Kanawha Rivers, Gallipolis to Winfield Locks, back-water profiles, dated August 12th, 1932, and ask you to examine it and state whether or not, from that chart, you can, whether you can refresh your memory as to the back-water effect of a flow of 150,000 second-feet at Gallipolis upon Winfield, at the mouth of the Kanawha rather, upon Winfield—that is, the effect due to the Gallipolis dam.

A. This is the latest one, but that does show some effect.

Q. How much?

A. 100,000 second-feet at Point Pleasant; 100,000 was about 1.4 feet.

Q. Where, at the mouth of the Kanawha River?

A. At the mouth of the Kanawha River.

Q. What flow was that?

A. 100,000 second-feet.

Q. How about 150,000 second-feet?

A. It doesn't give 150,000, but it gives 192,000, and goes away up to——

Q. To what?

A. The dam would be up at that time, so there would be open river conditions and there would be no back water due to the dam. There would be back water in the Kanawha River.

Q. It would not be open at 150,000?

A. Not altogether—at 175,000.

Q. And the back-water effect at 150,000 would be substantially more than 100,000, at the mouth of Kanawha, would it?

A. It would come up, yes, sir; 100,000 would have back-water effect.

Q. 150,000 would have substantially a greater back-water effect?

A. Yes, sir.

872 Q. Was your answer, did you say 4 feet?

A. As I recall, our latest figure shows there was a back-water effect at the mouth of the river, at 150,000 second-feet flow, it would be slightly in excess of three feet. I had heard it was three-feet-pool elevation and, when we got to the mouth of Kanawha River, we didn't expect that.

Q. I now want to ask you a question or two about your Exhibit 117–e. Am I right in understanding that the exhibit shows the purported rating curves for Kenawha River at Locks 10 and 11.

A. Yes, sir.

Q. And is it not a fact that the Gallipolis dam will supersede both locks 10 and 11?

A. Yes, sir.

By Mr. Jackson. May the record show a similar motion for the exclusion of this and the ruling of the Court and our exception noted?

By the Court. Yes, sir. The motion is overruled, and you except and your exception is granted.

By Mr. Jackson:

Q. Now, referring to your first curve of Lock 11, the lower pool. Upon what rates of flow on the Ohio is that based?

A. The same as the one I spoke to you about. Points of different flows in the Kanawha River at the percent of time they occur, and get the flow that occurs there the same percent of time as in the Ohio.

Q. That is, this curve is based upon the length of time and average conditions?

A. Yes, sir.

Q. And that average is a kind of a process that we are talking about as to Exhibit 117-d?

A. Yes, sir.

Q. For open-river average conditions?

A. Yes, sir.

Q. There are, of course, wide departures from that average?

A. Yes, sir.

Q. The same situation exists with reference to the other curve of Exhibit 117-e, labeled Lock No. 10, lower pool?

A. Yes, sir.

Q. Now, the curve to Lock 10, lower pool, is that based
873 on the assumption that Lock 11 on the Kanawha did not
leak?

A. No, we did not take that into consideration, as to whether or not it leaked or not.

Q. As in the other exhibits, about which you have testified, you gave the leakage and the variation in the leakage no consideration in preparing these curves?

A. We did not.

Q. Referring to curve Lock 11, lower pool, is the situation the same with reference to the controlling effect of dam 26 on the Ohio? That is, the question of leakage was not considered?

A. Yes, sir.

Q. You will notice that the curve, Lock 10, open river, separates towards the left-hand side and the upper part is marked Lock 11, lower pool, and the lower branch is not designated?

A. Lock 11, lower pool, just refers to that part of the curve below open river. It should be down here.

Q. It was, as in other cases, you did not have actual gauge readings and simultaneous discharge measurements, but the curves are the result of computation?

A. Yes, sir.

Q. I was asking about the curve marked 10.

A. Oh, I see.

Q. And the lower part of that lower branch of that curve at the left hand side does not appear to be labeled?

A. Yes, sir.

Q. I want to be sure what it represents is all?

A. I take that to be the discharges and the gauge heights just below the dam.

Q. Under what conditions?

A. Under conditions with the dam up.

Q. That is, with dam 11 up?

A. Yes, sir.

874 Q. You have, on the lower left-hand corner, several entries showing certain gauge readings, low water?

A. Yes, sir.

Q. I assume you don't remember just the date of those readings. Will you supply to use the dates of each gauge reading, together with reference to the official publication from which you obtained them?

A. Yes, sir. If you will give me a memorandum of those, so I will not forget it. All except the first sheet, I think.

Q. I went back to the first sheet later and asked about those?

A. We have got some of those.

Q. Yes, sir; that is all right. Will you turn to your Exhibit 117-f?

A. I do not have it. [Paper is supplied to the witness.]

Q. Am I right in understanding that Exhibit 117-f purports to show rating curves for Gallipolis dam and dam 26?

A. Yes, sir.

Q. On the Ohio River?

A. Yes, sir.

Q. Isn't it a fact that Gallipolis dam will supersede dam 26?

A. Yes, sir.

By Mr. Jackson. May I ask that the record show our motion to exclude the data with reference to dam 26 on the Ohio River and the ruling of the Court and that the exception is allowed?

By the Court. Yes, sir.

By Mr. Jackson:

Q. Will you explain the basis and method of plotting the curve designated Gallipolis dam and supply us——

A. (Interrupting.) Shall I explain this?

Q. Yes. Do you want the question read?

A. No, sir. This top curve shows the effect just below the junction of the two rivers—the different flows after the Gallipolis dam is built, say for 100,000 second-feet, it shows how much it will be in discharge in elevation.

Q. In elevation?

A. Yes, sir.

Q. What I asked for was not what it showed, but the basis upon which you had plotted; what data had been used?

875 A. From back water studies, we made to show what effect backwater would be up there.

Q. That was purely——

A. (Interrupting.) Backwater above the dam.

Q. That was purely a hypothetical study, was it?

A. They were computed flows; yes, sir.

Q. They were studies for the hypothetical condition?

A. Yes, sir.

Q. It has never existed and never been measured or determined?

A. Yes, sir; that is right.

Q. I showed you awhile ago a chart on backwater effect, which had been prepared in the District Engineer's Office?

A. Yes, sir.

Q. Were they based on data shown in that chart?

A. I don't think they are comparable at all; no, sir.

Q. Was that based on any published document?

A. No, sir; just office studies.

Q. Well, this curve is based upon studies which were made for the purpose of preparing an exhibit to be used in this law suit?

A. No, sir; they were studies made as to the effect of backwater above the Gallipolis dam, to know what floodage of lands we would have to buy. That is primarily what was shown.

Q. Is that the reason that the curve refers to dam 26, to determine what lands you would have to buy for the Gallipolis dam?

A. No, sir; that was just to determine the effect it would have, after the Gallipolis dam was built, what effect it would be at No. 26.

Q. These two curves on Exhibit 117–f were prepared for use in this suit, were they?

A. Yes, sir.

Q. And not for use in any routine business in the engineer's office?

A. No, sir.

876 Q. You have shown in the lower left hand corner a zero flow elevation 508. How was that determined?

A. I don't remember just where that came from.

Q. That was not based on any actual measurement, of course?

A. It was based on gauge readings.

Q. Not gauge readings actual zero flow, of course?

A. No, sir.

Q. You mean simply that it was estimated?

A. Yes, sir.

Q. By some kind of gauge reading?

A. Yes, sir.

Q. Will you supply, if you do not have it now, the low water at #26 and elevation 530.15?

A. That was taken from the Ohio River chart, and these charts were plotted there and the survey made for the complete canalization of the Ohio River.

Q. Give us the name of the official publication. Can you do so?

A. I can give you the name of the paper; yes, sir.

Q. Your survey was in low water; is that correct?

A. No, sir; just in different cases, in high water, too, at various places.

Q. You don't know the date of low water, then?

A. No, sir.

Q. Are you able to furnish it?

A. I don't know if I can. We took charts. They were prepared in the Louisville District office and we took them as the official records.

Q. How do you know whether they are correct?

A. As and except as shown by the official record.

Q. And you will give us the citation of that record?

A. Yes, sir.

Q. Look at the lower branch of the curve, dam 26, and tell me how you arrived at that sharp curve at the lower left-hand mark?

A. It was plotted from open river gauge readings or gauge heights.

877 Q. They were not actual measurements?

A. No, sir.

Q. That was estimated?

A. Yes, sir.

Q. In some fashion?

A. Yes, sir.

Q. Mr. Winn, for a moment I wish to direct your attention to your Exhibits 113 and 114. Am I right in understanding that your Exhibit 113 is a stage graph of the gauge readings at Galax, Ivanhoe, Allisonia, Glen Lyn, Caperton, Kanawha Falls, the Greenbrier at Alderson and Gauley River at Belva for the period July 1, 1932, to August 31, 1932?

A. Yes; you left off Eggleston. Isn't it on there?

Q. Yes; I should have included Eggleston.

A. Yes.

Q. Exhibit 114 is a graph of the stage of the gauges at the same stations for the period July and August 1930; is that right?

A. I don't believe there are as many gauging stations on that one as the other.

Q. Exhibit 114 has only the gauging stations at Galax, Ivanhoe, Allisonia, Eggleston, Glen Lyn, Caperton, Gauley River at Belva, Kanawha River at Kanawha Falls?

A. There is one left off.

Q. The Greenbrier at Alderson is left off?

A. Yes.

Q. The labels on these exhibits 113 and 114 describe them as hydrographs. They are really simply stage graphs of the stages of the gauges, are they not?

A. Yes.

Q. They show merely the height of the gauges and do not show the rate of flow?

A. Yes; there is one of them where the rates of flow were put on there at points.

878 Q. 113 and 114?

A. Yes; one of them. They are not averages. They were picked off of the rating curves for those particular points shown there. The published record would show daily averages and we just simply put in some flows picked off of the rating curves for those particular places and those particular times that are shown there.

Q. These exhibits 113 and 114 are based upon chart records at the various gauging stations; is that right?

A. Yes, sir.

Q. And they are not under your jurisdiction, of course?

A. No. We got prints from the United States Geological Survey Engineers and simply transferred them to this sheet here.

Q. But you yourself cannot vouch for those records or the corrections that were made or the conditions under which the gaugings were taken?

A. No.

Q. You don't know whether any corrections were applied to the charts or whether any were needed?

A. They were. Nearly all of those charts will have some minor corrections and they were made before they were transferred to these sheets.

Q. Those corrections you know nothing about except that they appeared on the chart as it came to you?

A. That is all.

Q. These stage graphs were then copied from a blue print or iotostat furnished you by the United States Geological Survey?

A. Yes, traced right from that tracing from which this was ade.

By Mr. JACKSON:

Q. Who asked to have these exhibits 113 and 114 made?

A. Col. Watkins, I think.

Q. And who supplied you the records from which you made em?

A. Mr. Kessler for the State of West Virginia and Mr. Dirzulaitis for the State of Virginia, District Engineers for the 9 United States Geological Survey. We have the blue prints they sent us and will be glad to send them in. I don't see y objection to that.

By Mr. JACKSON:

Q. As to these figures for rate of flow which appear occasionally Exhibit 114, do you know definitely whether they are averages not?

A. No; they were taken for those elevations on there, taken from e rating curves for those elevations shown on there, the gauge ights, and represent the peak where they come at the top.

Q. You had a rating curve for each of these gauging stations?

A. Yes.

Q. And applied that rating curve to some of these gauge ights?

A. Yes.

Q. And from that read off a figure which you superimposed on is chart?

A. Yes.

Q. Will you supply to us the rating curves for each of these uges from which you computed the figures of rate of flow which u have superimposed on Exhibit 114, and the same thing for xhibit 113, if there are any figures of that character on it? It is t quite clear to me whether some of those figures are rate of flow not.

A. Yes. As a matter of fact, I think all of those rating curves ll be introduced in court by another witness.

Q. If they are not, in any event you will supply it?

A. We can supply it.

Q. Will you look a moment at Plaintiff's Exhibit No. 115. Am right in understanding that Plaintiff's Exhibit No. 115 is a hyograph which shows the rate of discharge at a number of gaug- g stations on New River, to wit, Caperton, Eggleston, Glen Lyn, anawha Falls, Ivanhoe, Allisonia, and Galax?

A. Yes.

Q. And that chart has on the left-hand margin a scale showing rate of discharge in second-feet; is that right?

880 A. Yes.

Q. And a horizontal scale at the bottom showing the time factor as extending during certain days of July 1930?

A. Yes.

Q. So that the chart is intended to show the rate of flow simultaneously occurring at a given time so far as the chart extends at each of those stations?

A. Yes.

Q. To find the flow at a lower gauging station which might correspond with the rate of flow shown—for instance at Ivanhoe on July 18th—one would have to know the lag between that station and such other stations as might be used for purposes of comparison?

A. Yes.

Q. Can you tell me the date of the rating curve that you used for each of those stations?

A. No; I cannot.

Q. Will you produce for us a copy of the rating curve?

A. The same rating curve as for the chart just presented?

Q. If you used any published rating curves, it will be satisfactory to supply us with references to the published ratings curves which you used?

A. I don't recall whether any of them are published. They are all issued by the United States Geological Survey and we get them from them regularly.

Q. I should like to direct your attention to Exhibit 116 for a moment. Do you recall that your Exhibit 116 is a profile drawing of the Kanawha River showing backwater studies?

A. Yes.

Q. At the Marmet Dam you show backwater elevation for 2,000 second-feet, 566.10; 6,000 second-feet, 566.83; 10,000 second-feet, 567.97. If you will turn to your Exhibit 117-B, you will see that you show corresponding backwater elevations for
881 2,000 second-feet of 566.35; 6,000 second-feet, 567.15; and 10,000 second-feet, 568.20. Will you explain the reason for the discrepancy in those backwater figures?

A. They are entirely different problems, Mr. Jackson. These curves were based on average conditions. They might be above or might be below the crest of the dam below, but on this curve that you have there now, backwater curve, we have definite assumptions. The water was to be at the crest of the dam next below and with a given flow, given discharge of 2,000, 6,000, and 10,000 second-feet, so we had all the assumptions we needed to figure those backwater effects.

Q. Is it 116 that gives averages?

A. Gives what?

Q. Average conditions?

A. No; that gives a fixed assumption there of so many second-feet and with a certain elevation of the lower end of the pool.

Q. On Plaintiff's Exhibit 116 you show a low-water flow of 1,000 second-feet. Where did you get the data for that?

A. Low-water flow of 1,000 second-feet? I don't remember just where we got it. We got it from some publication, from some record in our office. This low-water profile was evidently based on that flow. The low-water profile is shown right here [indicating].

Q. I didn't know whether that was just an assumed flow?

A. No, I am pretty sure that is based on some record that we have showing that low-water profile of the Kanawha River.

Q. Will you furnish us the information as to the data upon which you based that low-water flow of 1,000 c. f. s. and the citation to some official publication and also the gauge heights?

A. All the information we can give you, yes.

Q. The gauge heights at the points you show here on this profile?

A. Yes.

Q. On this profile you show the jagged line representing the bottom of the channel?

A. Yes.

882 Q. Where is that taken from, from what part of the bed?

A. Supposed to be the sailing line of the navigation channel.

Q. Is it the thread of the stream?

A. Sometimes it is and sometimes next to one bank, the way the boats go, as I recall it, generally plotted on the sailing line.

Q. It isn't necessarily the deepest point?

A. No; the sailing line ordinarily goes near the deepest point.

Q. The deepest point in a stream is not always in the channel, is it?

A. No; certainly not, but generally the channel tries to get near the deepest point.

Q. Will you tell me what you mean by the sailing line?

A. The line of the center of the channel that the steamboats are supposed to follow.

Q. Mr. Winn, have you got Exhibit 119? This Exhibit 119 is entitled "Kanawha River and Tributaries, proposed improvement." What is meant by "proposed improvement?"

A. Well, they are projects that have been studied and reported on.

Q. By whom?

A. By the District Engineer at Huntington and by him through the Division Engineer in Cincinnati to the Chief of Engineers at Washington.

Q. Do you mean that all of the projects that are shown on here with the dotted line, according to your legend at the bottom, are projects which have been studied and approved by the Corps of Engineers?

A. Well, as stated here, those with the dotted lines are proposed projects in the 308 Report.

Q. Can you identify that report by official description?

A. Yes; I can give you a copy of it. It is printed, but I don't remember the number now.

Q. Will you supply that?

A. Yes.

Q. Am I right in understanding that you mean by all of these projects covered by the legend "proposed project, 308 Report" that they were studied and favorably reported upon in some report of the Corps of Engineers made to the Secretary of War or to Congress? 883

A. They were reported on, but I wouldn't say favorably reported of all of them because there wasn't any definite recommendation that some of them be built.

Q. Have you projects on here as to which there has been a recommendation that they not be built?

A. I don't know whether there was any direct proposal that they not be built, but the indication was that it wasn't economically feasible to build some of them at the present time.

X Q. As I understand you this exhibit was entirely prepared under your direction, except for the coloring?

A. Yes, sir; and these two projects up here on Elk River.

X Q. The Centralia and Ralph projects?

A. Yes, sir.

X Q. As I understand you do not vouch for those but they were put on by Col. Watkins?

A. He got the information out of our office, but they were not published in any reports.

X Q. Are they private or public projects, do you know?

A. They are all governmental projects.

X Q. I direct your attention to the project designated as the Radford project, just above the Little River. Is that the same as the project of the defendant?

A. Yes, sir.

X Q. Mr. Winn, did you put on all of the outlines on this Exhibit #118 or chart?

A. All except those within these colored areas that Col. Watkins has put on.

XQ. You now refer to certain lines which deal with pool elevations and which are colored in part brown and in part blue?

A. Yes, sir.

884 XQ. And were those lines put on by you or Col. Watkins?

A. I think they were put on by Col. Watkins; at least he colored them in there.

XQ. I would like to get at that because I want to know whether you are vouching for the lines or whether Col. Watkins is?

A. I just can't answer that right now.

XQ. Take for instance the lines above.

A. I am pretty sure I didn't put those on just looking at them; but I can say almost positively I didn't put those on.

XQ. Anyway you don't vouch for those lines?

A. No.

XQ. ~~Is that~~ true of all the dotted lines inside of which the area has been colored either brown, red, or blue, as it appears on this map?

A. Yes, sir.

XQ. At least one color is blue or orange or red, or something of that kind?

A. Yes, sir.

XQ. I refer to those coloring on the lines dealing with levels at the upper end of the pools. Those lines as well as the coloring you do not vouch for, is that right?

A. No; I do not vouch for those.

XQ. You did outline the bottom of the stream as it appears on the profile?

A. Yes, sir.

XQ. And the brown coloring which has been placed on part of that outline or the bottom of the stream was placed there by Col. Watkins, and not by you; is that right?

A. Yes, sir.

XQ. Now will you look for a moment at the right-hand part of your chart and particularly the pool above the London dam, and what was formerly the pool above the old dam #2, 885 you show there a line with an elevation of 611, do you find that?

A. Yes, sir.

XQ. The depth from that line to the bottom of the pool is how much?

A. At what point?

XQ. Well, at the upper end of the pool?

A. Why, practically nothing right at the mile—I don't see the mileage now.

X Q. Take it at mile 90.5.

A. Well, at 90.5 it seems to be about three feet deep there.

X Q. Three feet?

A. Yes, sir; according to mine here—maybe I am wrong.

X Q. Isn't it 9.10 feet plus?

A. No; right at 90.5 it shows about three feet.

X Q. Did you say 90.45?

A. No; 90.5; follow that up right at the middle there. I thought you meant from the old low water—do you mean to go to elevation 611?

X Q. Yes.

A. Yes; that would be very different, that would be, looks like, about 17.5 feet. You can't tell exactly.

X Q. What is the elevation at 90.5?

A. I take it to be 597.5. What do you make it?

X Q. That seems to be about right.

A. That would make 13.5—597.5 from 611, makes 13.5.

X Q. That 90.5, as I understand from your Exhibit #116, is the head of navigation, isn't it?

A. Yes, sir.

X Q. I want to hand you a document officially entitled, "House Document 91, 74th Congress, 1st Session," and ask you whether that is the 308 report to which you refer to on exhibits 119 and 120?

A. Yes; this is the 308 report.

886 X Q. Am I right in understanding Exhibit 120 is merely a profile of the rivers designated showing thereon a profile of the various projects which you have otherwise shown on Exhibit 119?

A. Yes, sir.

X Q. Now, for instance, if you will refer a moment to the project designated "Bluestone project" on Exhibit #120, did you put the lines showing low water, usable storage, reservoir project, on that exhibit, or were those lines put on by Col. Watkins?

A. I don't recall whether I put them on or not.

X Q. Are you able to vouch for the accuracy of the lines delimiting the reservoir project and usable storage and low water?

A. As proposed in that 308 report, I can vouch for the fact it was supposed to have a maximum pool at elevation 1,520; that shows there that the power pool was to be at 1,490, that is shown, and that will show you the amount between the power pool and the maximum pool, the storage was to be devoted to flood control. Low elevation 1,490 was for power purposes, so to that extent I can corroborate this here.

X Q. Are you able to vouch for the other lines which undertake to delimit the draw-down?

A. The draw-down—no; I could not vouch for that right now.

X Q. As far as you know, that is not in the report?

A. I don't recall whether it is or not. It is in the supplemental report if anything.

X Q. At any event you don't vouch for the line which delimits the draw-down?

A. No; if anything, it would go lower than is shown here; it might go lower.

X Q. As a matter of information you have here a number of mileage figures, such as, for instance, 54 miles Sandstone Falls?

A. Yes, sir.

X Q. Can you tell me the source of those figures; what you took them from?

A. I believe we stepped them off from the U. S. Geological Survey maps.

887 X Q. Your best recollection is you took the U. S. Geological Survey maps, and undertook to measure along the river?

A. Backed up by any Government surveys we might have had.

X Q. Do you recall any you had?

A. No; I don't recall now which ones we checked up.

X Q. I think you told me at the end of the noon recess that you wanted to make some corrections in your testimony with reference to exhibits 117-a to 117-f, inclusive, and I will be very glad to have you make any correction you would like to make.

A. There was some confusion in going from one of these rating curves to another, and I want to make one statement that will cover all of it. These lines showing where they divide, for any particular project, this top part of that line represents the flows or gauge heights with the dams in place. That is the only thing we have basic information for. The bottom part of that curve is more or less sketchy, sketchy representation of what the gauge height would have been for different flows with open river, without any dams built or dams down.

X Q. A more or less sketchy estimate?

A. Yes, sir; and the only reason for putting it in this is to bring in the fact this curve shows the backwater effect from the next dam downstream, instead of popping up like an ordinary rating curve would on the river it takes this shape.

X Q. You want your testimony to show in relation to Exhibits 117-a to 117-f, inclusive, in each case wherever a curve separates into two parts at the left-hand side of the page, the upper side of the curve, is the one with dams in place?

A. Yes, sir.

X Q. And the lower branch which drops rapidly is a sketchy outline of an estimate of what the gauges might have been if there had been no dams in the river?

A. That is right.

By Mr. McClernan. May I ask a question there? Are 888 you using the word "sketchy" advisedly?

A. I mean we didn't have the basic data we had for the other. The other is the important one, and is the one that shows the effect of the next dam below the rating curve below each dam and that rating curve shows the effect of the back-water from the next dam downstream. I don't think that other end means anything at all if we hadn't put it on there.

X Q. You don't mean to change your testimony that even the upper branch of the curve on these exhibits, the curve is a matter of estimate, and not of a record of observations of gauge heights, with concurrent or simultaneous gauge or discharge measurements?

A. No, sir; everything in my testimony will stand except in some places with regard to the high point of the curve, and I wanted to be clear the same thing obtained for every one of the locks.

X Q. Mr. Winn,-I want for illustration to direct your attention to Exhibit #117-d, the upper branch of each curve, such as for instance the curve labeled "Marmet with Winfield Dam in place" and ask you if the left end of that curve does not show the level of the pool dropping below normal?

A. Yes, sir.

X Q. And that is true for the other curve for Marmet with Pool #6?

A. Yes, sir.

X Q. Is there any basis for the ending of those curves?

A. Not unless the water was shut off above and it drained out that much, is the only thing I can see.

X Q. You will notice there has been erasures on those curves. Do you know why that was?

A. No, sir.

X Q. Did you make them?

A. They were made in my office down there. I didn't make them personally.

X Q. Wouldn't it be improbable, if not impossible, that 889 those levels could drop below the normal pool levels, unless there was leakage at the dam below?

A. Yes, sir; unless the water was cut off from above.

X Q. At these low flows that wouldn't happen, would it?

A. Not likely. I will have to change that, too. It might cut them off with a power plant.

X Q. I asked you for some information this morning and perhaps it will help you if I show you this. Could you supply us with that information for the dams on the Ohio comparable with this information for dams on the Kanawha, which I exhibit to you, in order you may know precisely the nature of the request? Will you do that?

A. Yes; we will be glad to.

By WITNESS. May I say this. There is a book published called the Ohio River Book, and it has got all of this information in it. You can get a copy of it for a dollar. You can get the distances, the lay-out, locks, heights of pools, and everything else, if you want to get that.

Re-Direct Examination by Mr. McCLERNAN:

Q. Mr. Winn, the cross-examination has been directed to the possibilities of errors or defects in these figures that you prepared or had prepared. Were the computations made on regularly accepted theories?

A. Yes; I would say so.

Q. Were the methods you used the methods that engineers use in general?

A. The methods they would use; yes, sir.

Q. Did you distort any facts you found?

A. Not at all; no, sir.

Q. Are the figures which you have produced here the best figures of that nature that are available?

A. They were the best we could do, and the best available.

890 Q. I have here Exhibits 110 and 111. These, as I understand, are originals that you have been asked about, and I want to know if you removed them from their regular place in the Huntington office and brought them here?

A. Yes, sir; that is all.

Q. What use is made of these records in the Huntington Office?

A. They were originally intended to preserve a record of the navigable status of each one of these locks for the years that they were in operation, but since then they have been used for hydro studies in a number of cases.

Q. Can you tell us briefly how these records are made out at each lock, whether by the Master or one of his assistants, who goes out and reads the gauge?

A. At present, they are reading them every hour in the day, but that has not gone back very far.

Q. Those readings, are they open to the public?

A. Yes, sir.

Q. In what way?

A. We supply copies of those records to anybody who asks for them.

Q. Before these records were made up, were the lock readings available to navigators?

A. Yes, sir; they are posted at the power house and they could read them from the stream.

Q. Do you have any complaint that the figures are unreliable?

A. Never, to my knowledge.

Q. Do you know whether or not navigators on the stream actually read those figures, and use them?

A. I just have to presume they do. They are put there for their benefit. I have not traveled over that part of the river on a steam pilot boat, and I don't know that they actually do that or not.

Q. But they are posted in such position that they are visible from the stream?

A. Yes, sir.

891 Q. My recollection is that opposing counsel asked you on Friday concerning some construction work which was presumed to have been done on the Ohio some years ago. Do I understand that the remarks you made about the construction work are inferences that you drew from Exhibits 111 and 112?

A. That is all I had to draw from during the time you are speaking of.

Q. You infer from examining some of those figures that there was construction work going on?

A. Yes, sir.

Q. Could the characteristics of those figures which led you to that conclusion have eben caused by anything else?

A. Yes; they could have been by operation of a dam upstream or downstream, and back in the early days before all the dams were completed it was the practice to collect traffic in a pool upstream and then bring the water down the river in a wave, over sections of the river where dams had been put in, and it might have been caused by something like that.

Q. As a matter of detail, Mr. Winn, there was some discussion about these wicket-dams, or movable dams. Isn't it true that the wickets which made up the dams, or at least a large part of them, are about three feet nine inches wide, with a space approximately three inches between each pair?

A. Something like that. There is supposed to be a wicket for every four feet of the dam.

Q. I think you testified that these exhibits which were introduced on your direct examination, except these gauging records, Exhibits 111 and 112 were prepared especially for use in this case?

A. Yes, sir.

Q. But even so, they do not deliberately distort the facts they purport to represent?

A. No, sir; a great part of them are based on previous drawings and charts, and we just put in new information for this case.

Q. They are as correct as they can be under the circum-
892 stances, are they not?

By Mr. **Jackson**. I object to that question.

A. Yes, sir.

By Mr. **McClernan**:

Q. Calling your attention now to Exhibits 110-111, were these exhibits or records prepared for the purposes of this case?

A. No, sir.

Q. Do you recall that Exhibit 112 is a tabulation made by yourself from some other records?

A. Yes, sir.

Q. These records from which that tabulation was made were not prepared for the purpose of this case?

By Mr. **McClernan**:

Q. There was also some discussion here that in preparing some of your exhibits you did not take in consideration the leakage from the dam. Why was that?

A. It was not necessary because we were basing it on gauge heights below the dam we were considering.

Q. It is a fact when a dam leaks that the leakage may vary and prevent accurate computation of stream flows?

A. The stream flows were not based on that. They were brought down from Kanawha Falls and Lock 2, and they were simply referring to gauge readings below the dam for which rating curves were being made.

Q. You have not answered my question. As a general proposition, it is a fact there may be dams in the stream, and the dams leak, which would prevent the computation of the flow of that stream?

A. No, sir; because the flows did not have anything to do with that. They were based on measurements upstream from them and whatever happened down below would not have anything to do with it. That much flow was going by there, we figured.

Q. Was it possible to determine the flow of a stream regardless of the fact that the water in it may be very low?

A. You cannot determine it very accurately when the flow gets so low or the velocity gets so low that you cannot get any click
out of your current meter, and you cannot measure it with
893 any accuracy. You could then measure the float, but it
would be pretty hard to do it.

Q. As I understand it, the Kanawha River, where it joins the Ohio, flows into a pool which is formed by Dam 26. Is that correct?

A. Yes, sir.

Q. And this pool behind that dam extends up above the mouth of the Kanawha?

A. Yes, sir.

Q. Referring again briefly to these Exhibits 110–111, there have been some discussion of some figures in pencil. Were they on the exhibits when you got them out of the files?

A. They were.

Q. Now, Mr. Winn, does the fact that some pages of these Exhibits 110–111 do not have the impression of a rubber stamp showing the date when they were received, have any effect upon the accuracy of the figures?

A. Nothing at all; no, sir.

Q. That is merely a device that is used in order to keep a record of when the sheets came into the office. That is all it is made for?

A. Yes, sir.

Q. Have you any reason to believe, Mr. Winn, that there is any substantial error in those records, Exhibits 110–111?

A. No, sir; I have no reason to believe it.

Q. I recall also some discussion about the fact that in preparing your rating curves for points below Kanawha Falls you used the volumes of stream flow at Kanawha Falls. Would there be any substantial difference between the flow at Kanawha Falls and points down below in the river?

A. At extreme low stages there would not be, to speak of, because the smaller streams dry up and do not put out anything.

Q. That is, you mean the tributaries to the river?

A. Yes, sir.

894 Q. I think you were also asked a question concerning the computations of volume of stream flow from gauge heights and I believe you were asked whether it was done contemporaneously, or something to that effect. When you have a *guage* height record in your department of the stream flow, is it necessary to make a computation immediately?

A. I do not understand that question, or what you mean by it.

A. I understood Mr. Jackson to ask me if there was any discharge measurement made right at this point for this particular purpose; there wasn't any.

By Mr. McClernan:

Q. Will you answer my question, if you can?

A. I will have to have the question read.

A. No, sir; it is not necessary.

By Mr. McClernan:

Q. Mr. Winn, in your testimony, having to do with the Winfield Dam and the Gallipolis Dam, have you assumed in part when those dams will be completed upon schedule?

A. I have no reason to believe they will not be completed on schedule.

Q. Although there is no certainty that they will be?

A. No, sir.

Recross-Examination by Mr. JACKSON:

Q. One question, Mr. Winn. When you computed your flow from stream measurements upstream at Kanawha Falls, there was involved in that computation gauge readings made down below the other dam, was there not; that is, you developed the rating curves to apply to gauge readings also downstream?

A. Yes; but not with reference to gauge readings on the Kanawha River, but with reference to gauge readings of tributaries that came in below.

Q. When you took gauges at Locks 2, 3, and 4 on the Kanawha River, as you did in your Exhibit 112; you took readings at those locks, didn't you?

A. No, sir; we took readings or probably took discharge as shown by our rating curves at old Lock No. 2, and then transferred them down to 3 and 4 by proportional drainage areas.

895 Q. Your Exhibit 112 shows your flows at Kanawha Falls.

A. Yes, sir.

Q. And it shows gauge heights at the dams downstream, doesn't it?

A. Yes; but that was for a different purpose, to show how much leakage there was through those dams for certain flows at Kanawha Falls.

Q. If you have a flow of a thousand second-feet above the dam, the stage in the pool at the dam will depend upon how much leakage there is, will it not?

A. Yes, sir.

Q. And it will vary with the leakage?

A. Yes, sir.

Q. That is, you might have a flow of thousand second-feet at Kanawha Falls?

A. Yes, sir.

Q. And at Lock 2 Dam that might produce a different gauge reading, dependent upon variations in leakage at Dam 2?

A. I would produce different gauge readings above the dam, but we are making rating curves below the dam. And the only way leakage would affect that would be the leakage that would draw a little bit above that pool every day and bring it a little lower.

Q. If you undertook to apply your thousand-foot flow to gauge reading below No. 2 Dam, then you immediately become affected by variations in leakage in No. 3 Dam, don't you?

A. Yes, sir.

Q. So that all that would happen if you took the flow upstream from dams, with a gauge height at dams downstream, if they are leaking, it will vary for that given flow in accordance with the variations in the leak?

A. Certainly.

896 **COLONEL HARRY M. TRIPPE**

Direct Examination by Mr. THOMPSON:

Q. Please give your name to the reporter.

A. Harry M. Trippe.

Q. Where do you reside?

A. Wilwaukee, Wisconsin.

Q. What is your occupation?

A. District Engineer.

Q. Of what?

A. The Milwaukee District.

Q. For the United States?

A. Yes, sir; Corps of Engineers.

Q. How long have you been located at Milwaukee?

A. Practically six years.

Q. Were you ever located at Huntington, West Virginia?

A. Yes, sir.

Q. In what capacity?

A. District Engineer.

Q. During what years?

A. From June 20, 1923, to May 27, 1927.

Q. Colonel, will you please give a statement of your schooling and experience as an engineer?

A. I graduated from the University of Wisconsin with degree of B. S. C. E. in 1896. Spent three seasons as assistant topographer for the United States Geological Survey, 1896 to 1898. From 1898 to 1912 I was on railroad location, construction, and maintenance. From 1912 to 1913 I was contracting. From 1913 to 1916 I was acting as consulting engineer. From 1916 to 1917 I was civil engineer for the United States Commerce Commission. From 1917 to 1919 I was in the Army with rank from Captain of Engineers to Colonel of Engineers. From 1919 to 1920 I was on the staff of the Wisconsin Railroad Commission for the State of Wisconsin. From 1920 to the present time I have been in the United States Army with rank of Major and Lt.-Colonel of Engineers.

897 Q. Have you ever had any experience in river and harbor work?

A. Yes, sir; four years in the Huntington District and six years in the Milwaukee District.

Q. Were you ever located in Panama?

A. Yes, sir; three years.

Q. What kind of work were you doing there?

A. Military duties, mapping and military work.

Q. What were your duties as District Engineer at Huntington?

A. I had charge, representing the Chief of Engineers of the Huntington District, looking after the public property, river and harbor work, care and preservation and operation of the public works in that district. The district comprised the Ohio River, from Dam No. 12 at Wheeling, West Virginia, to a point a little below Stout Run, Ohio, a distance of practically three hundred miles. The district takes in all of the waters draining into that section of Ohio River.

Q. That includes, does it, New River and Kanawha River?

A. Yes, sir.

Q. When you took charge at Huntington, I believe you said in 1923, state what engineering data there was available there with respect to the New and Kanawha Rivers?

A. There was a great deal of data, including annual reports of Chief of Engineers from 1871 to the time I was there, the Geological Survey Water-Supply Papers were on file there, with a great deal of other data that I cannot recall now, that is, I cannot recall all of it. There was a report made by Moore and Briggs, I believe in 1819, and a great deal of other data that I cannot recall just now.

Q. Do you remember the condition of the Kanawha and Ohio Rivers during the year 1925, in the summer time?

A. I remember them very distinctly in the month of September.

Q. What was the condition of the Kanawha River?

A. Very dry, very low.

Q. What was the condition of the Ohio River?

A. Very low.

898 Q. What was the state of navigation on those two rivers at that time?

A. Navigation was interferred with quite considerably, due to the low stages. We had a great deal of trouble in maintaining the pool, and on the Kanawha River it was not possible at all times to keep the pools up to the required depth, especially at Dams 2 and 4 on the Kanawha River. I remember those particularly.

Q. If there had been any diminution of the water in the Kanawha River flowing from the New River at that time, what effect would it have had on navigation in the Kanawha River?

A. It would have had a very serious and bad effect on navigation.

Q. State whether or not you ever had any complaints during 1925 as to the condition of navigation on the Kanawha River?

A. Yes, sir; I had.

Q. Describe those to the Court, if you please.

A. I cannot recall the exact reports, but I know we were getting reports from both rivers. I made several inspection trips on both Rivers to see that everything possible was being done to maintain navigation.

Q. Was there much difficulty in maintaining navigation?

A. Very much so.

Q. Do you recall a plant called the Electro-Metallurgical Plant?

A. Yes, sir.

Q. Where is that located?

A. At Kanawha Falls.

Q. Did you ever have any business with them with respect to navigation during the year 1925?

A. Yes, sir.

Q. State what that was.

A. In September 1925, due to complaints received as to navigation in the Kanawha River I had my assistant go to the manager of the plant at Kanawha Falls and direct them to cease fluctuating the water, that is, letting out the water and then storing it for a short time, as it was having such a bad effect on our maintaining the pool for navigation.

899 Q. What is there at Kanawha Falls that was fluctuating the water?

A. A power plant.

Q. There is a dam there, isn't there?

A. Yes, sir.

Q. And who owns that dam?

A. The Electro Metallurgical Company of America.

Q. Roughly speaking, is it a large storage dam, or a small one?

A. A very small storage, and yet it was fluctuating the water coming through there.

Q. And that power plant or project was affecting navigation below?

A. Yes, sir.

By the COURT:

Q. How far was the Kanawha River navigable at that time, I mean how far up the river?

A. My recollection is there were five or six miles below Kanawha Falls, from the mouth of Kanawha Falls, up to about five or six miles of the Falls.

Q. All of those old dams they had in there at that time, had locks in them, did they not?

A. Yes, sir.

By Mr. **Thompson**:

Q. You mean what kind of navigation by what you said, navigable to within five miles?

A. Six-foot navigation.

Q. Was it possible to navigate boats drawing less than six feet further up the stream?

A. Yes, sir.

Q. State whether or not there is a pool back of the dam at Kanawha Falls?

A. Yes, sir; there is.

Q. I hand you, marked for identification, Government Exhibit 123, dated August 29, 1919, and signed by W. J. Knapp, Vice President, Electro Metallurgical Company, and will ask you if you know what that is.

900 A. It is a letter from Mr. Knapp to the Secretary of War, requesting a permit to make such repairs and replacements as are shown on the enclosed blue prints and tracings.

Q. Will you look through this document, and say whether the permit was granted or not.

A. I don't know, but I understand there was no objection to it.

By Mr. **Thompson**:

Q. Will you please look at the letter dated March 2, 1899, and read it.

A. "Office of the Chief of Engineers, United States Army, Washington, 1899, March 2, addressed to Major W. H. Bixby, Corps of Engineers, Cincinnati, Ohio. Major: There is sent you herewith a copy of an instrument, dated the 27th ultimo, granting the permission of the Secretary of War to the Willson Aluminum Company to construct a dam on the crest of the Falls of the Great Kanawha River, West Virginia, as shown on the attached blue print. Your attention is invited to the conditions upon which the permission is given."

By Mr. **Jackson**. We object to the letter which has just been read, because it was not in response to the request for the letter which counsel first addressed to the attention of the witness, which was dated October 29, 1919, and this letter was dated in 1899.

By the **Witness**. Twenty years apart.

By Mr. **Thompson**. We have them in the reverse order, 1899 and 1919.

By Mr. **Jackson**. You confined the letter which you first asked him about on the fourth sheet, the one dated October 1, 1919.

By Mr. **Thompson**. My point in introducing this is to show the permit which is appended in the back part of this document.

901 Q. I now call your attention to the last two pages of the document, not including the map, and ask you what that is.

A. This is a permit issued to the Willson Aluminum Company by the Secretary of War on the 27th day of February 1899, giving them permission to construct a dam on the crest of the Falls of the Great Kanawha River.

By Mr. JACKSON. Is there anything to show that was sent to the Company?

By Mr. THOMPSON. We will introduce evidence to show that.

By Mr. JACKSON. We were supplied with a copy of this exhibit in advance, but the exhibit you now offer seems to contain less material than the one we were supplied with.

By Mr. THOMPSON. You can introduce any material that is not in here. You have a copy of the document now being introduced.

By Mr. JACKSON. The only point I make is, I have a further objection to the exhibit insofar as a part of the material has been removed from the exhibit now offered, and which was in the exhibit as supplied to us by the Government as the exhibit to be introduced, a change having been made to facilitate examination. I object to it until there is included in it the additional material.

By the COURT. The additional material may not be material.

By Mr. JACKSON. It is a letter requesting a permit, and recites in it that while it seems perfectly manifest that the river is not navigable, out of abundance of caution they ask for a different permit.

By the COURT. If what they offer is material, I think they should introduce it. You say the exhibit they gave you had more material in it than is now in this exhibit. It may be what they omitted is not regarded as material by them. I cannot control that. You may develop it in cross-examination.

(Exhibit 123 offered in evidence.)

By Mr. THOMPSON:

Q. I call your attention to a map that goes with this license, and will ask you if there is anything on there indicating a sluiceway for logs.

A. I do not see any; no, sir.

Q. What is this here [indicating]?

A. Section of proposed dam.

By Mr. THOMPSON:

Q. Now, state by what authority you approached the Company that had charge there at that time, the Electro Metallurgical Company.

By Mr. JACKSON. You mean by what legal authority.

By Mr. THOMPSON. By what legal authority then. They had to approach them to stop sending this water through that dam under certain conditions, and I asked him upon what authority he, as a Federal officer, approached them.

By the COURT. He can answer that question.

By Mr. JACKSON. We desire to take an exception.

A. On the fact they had a revocable permit by the Secretary of War for that structure.

By the COURT. What was your objection, Mr. Jackson?

By Mr. JACKSON. If it is material with what legal authority an officer of the United States approached the Electric Metallurgical Company or any other company, or to give them orders or directions, then I think it will be for this Court to determine what that legal authority was, and not for the witness to state it. Obviously the question and answer is to argue to your Honor that they had a revocable permit, and there would have been no occasion for a Federal officer to remonstrate because under the Act of 1899 there would have been full authority whether there was a permit or not.

By the COURT. As I indicated a minute ago, the Secretary of War may have granted a permit, the fact that this Company thought the Secretary of War had control of it, or thinking the Secretary of War asserted control over it, they thought they would rather have his consent, rather than have any argument about it.

By Mr. JACKSON. I was discussing the proposition that it is not dependent upon whether this is a revocable permit, that being a legal point which we will eventually argue to your Honor, and I do not think this witness ought to express an opinion on it without objecting.

By the COURT. Very well.

By Mr. THOMPSON:

Q. In answer to what counsel has said, I will ask you to read what is designated as paragraph 3 on the bottom of this license, or this permit.

A. "That the work herein permitted to be done shall be subject to the supervision, and approval of the Engineer Officer of the United States Army in charge of the locality." There is one word in there I cannot make out, but it looks like "Army."

Q. Have you ever been up the New River?

A. Yes, sir.

Q. On what occasions have you been up New River?

A. As well as I can remember, I have taken at least two trips up to the mouth of Wilson and one trip quite a ways beyond.

I held a hearing at Bluefield at the time I visited New River. I held one at Roanoke at the time I visited New River. I held one at Radford for the Central Power Company.

Q. You say you held meetings up there? What do you mean by that? Do you mean that you held hearings for a license to the Central Power Company?

A. I held a hearing at Roanoke, Virginia, on the application of the Central Power Company. They wanted the right 902 to divert water over the Yadkin River. That was held, if my memory serves me correctly, in January 1925. I held one in January 1925 on the application of the Eastern State Development Company to divert water from New River into the Atlantic Ocean, I forget the name of the stream. I held a public hearing at Radford on October 28, 1925, on the application of the Appalachian Electric Power Company to construct a dam about six miles above Radford, Virginia. On these three occasions I visited New River, and I have visited it at other times.

Q. That hearing you spoke of that you held on the application of the Appalachian Electric Power Company, that was held as I understood you to say, at Radford, was it not?

A. Yes, sir.

Q. Do you remember the date of that hearing?

A. October 28, 1926. I gave that wrong before when I said 1925.

Q. Was a stenographic report of that hearing made?

A. Yes, sir.

Q. I hand you Government Exhibit 101, and will ask you if any representatives of the Appalachian Electric Power Company were present at that hearing, according to this record. First of all, did you send out notices of this meeting?

A. Yes, sir.

Q. What kind of notices did you send out?

A. I sent out a notice that there would be a public hearing held on the application.

Q. Did you advertise these notices in the Press?

A. Yes, sir.

Q. The Press of what States?

A. I will have to refresh my memory on that.

Q. All right, do so.

(Witness examines Exhibit 101.)

A. Do you wish me to read a list of all the newspapers?

Q. No; just give the States, I believe it says Virginia, West Virginia, and New York.

A. It says West Virginia, Maryland, Virginia, Chicago, 903 Ill., and New York States.

Q. Did you also send word to the Postmasters of the Country?

A. Yes, sir; I sent notices to the Postmasters in Virginia and West Virginia.

Q. Now, look at the index of the contents and tell us who were the parties present representing the Appalachian Electric Power Company.

A. There is a long list here of the interested parties present. R. E. Scott, R. J. Noell, A. H. Chumbley.

Q. Now, turn over to a summary of the proceedings at the hearing.

(Witness does so.)

A. There seems to be one page left out of this exhibit, Summary of Proceedings gives the place and names of representatives of the Appalachian Electric Power Company that were present: L. J. Bevan, H. W. Buck, John S. Draper, R. J. Holdren, H. E. Sledd, C. M. Micou, counsel for the A. E. P. Co., R. E. Scott, counsel for the A. E. P. Co., Col. F. W. Scheidenhelm, Engineer for the A. E. P. Co., and R. S. Slocum, for the A. E. P. Co.

Q. Suppose you read the opening paragraph of your statement to the meeting, found on page 2 here.

A. (Witness reads.) This meeting has been called for the purpose of hearing evidence on the application made by the Appalachian Electric Power Company, Richmond, Virginia, to the Federal Power Commission. The company has asked for a license for a project of water power development on New River at a point approximately one mile above the mouth of Little River and seven miles above the City of Radford, Virginia. They have asked for a license allowing them one year from the date of such license to begin construction and four years for completing construction of the project works. The license, if granted, will authorize the construction, operation and maintenance for certain project works, the principal ones of which are designated as follows——

Q. Don't read that description there. Read next the last paragraph on page 3.

A. (Reading.) It is desired to have a frank and full expression
of the views of all interested parties and as complete a
904 statement as possible of all information bearing upon the
question at issue.

Q. Read the next paragraph.

A. (Reading.) "The Department will give full weight to all evidence and arguments presented at the hearing; and all pertinent material which the parties wish considered should be brought out at this hearing.

"Later ex parte evidence and arguments are not desired by the reviewing authorities unless it is clearly shown that the matter is new and material and that there are good reasons why it could not have been presented at this hearing."

Q. Just by description of the paragraphs, will you state what part of the law of the Federal Water Power Act you read from—Section 4 (d)?

A. The law applicable is Federal Water Power Act, approved June 10, 1920. (Sec. 4 (d).)

Q. You called attention and read that section 4 (d), did you?

A. Yes, sir.

Q. And Section 6?

A. Yes, sir.

Q. And part of Section 10 (c)?

A. Yes, sir.

Q. Wait a minute. And Section 10 (f)?

A. Yes, sir.

Q. And Section 27?

A. Yes, sir.

Q. State whether or not you had protests at that meeting against offering or granting a license of this kind?

A. Yes, sir; there were four protests received at the hearing, and I believe two letters received later.

By Mr. JACKSON. I should like to have our objection to this line of testimony entered in the record, on the ground that it is immaterial, irrelevant, and incompetent, with reference to any hearing that they had or any objections. There is no link with any proceedings as to the findings.

By the COURT. The objection is overruled.

By Mr. JACKSON. May we have our exception for reasons heretofore stated?

By the COURT. Yes, sir.

By Mr. THOMPSON. The record of this hearing is already in evidence. We introduced it by Colonel Edgerton.

By the COURT. You were holding this in connection with the Chief of Engineers, were you?

A. The Chief of Engineers ordered me to make a report on the Application for a License with the Federal Power Commission; yes, sir. I was doing it under him.

905 Q. And you did make a report to him?

A. Yes, sir.

By Mr. THOMPSON:

Q. When you say that the report was sent to the Federal Power Commission and has been introduced—I desire to call the Court's attention——

By the COURT (interrupting). This witness testified as to what he did—his part of the investigation made by the Water Power Commission?

A. Yes, sir.

Q. He conformed with it?

A. Yes, sir.

Q. Through the office of the Chief of Engineers?

A. Yes, sir.

By Mr. THOMPSON:

Q. Refer to page 11 there, to the objection made by the Virginian Railway Company, and read the last paragraph—the next to the last paragraph.

A. (Reading.) "Accordingly The Virginian Railway Company prays that if a license be issued for the proposed dam it may be upon condition that said dam shall at all times be so operated as to pass through sufficient water, with the water entering New River below the dam, to afford all persons and property owners below the said dam, including said Railway Company, sufficient water for their needs."

Q. The last line of the letter says what?

A. (Reading.) "A copy of this letter is being sent to the Federal Power Commission."

Q. Turn to the objection made by the Electro Metallurgical Company and read the top paragraph on page 14.

A. (Reading.) "Electro Metallurgical Company does hereby protest however against the granting by Federal Power Commission to the said Appalachian Electric Power Company of the license applied for in the aforementioned Application or any
amendment thereof or any substitute therefor unless such
906 License shall contain as a condition thereof a provision
to the effect that no interference shall be permitted to be made in the flow past such dam as shall be authorized by or constructed in pursuance of such License, that may at any time restrict the natural flow of the said river or the continuous use thereof for power purposes at points down stream from such dam, in such manner that there would be through the operation of such dam or project, any diminution of the flow of the said river:

"(1) either below the natural flow of the said river whenever its natural discharge is less than its mean natural discharge, or

"(2) below the mean natural discharge of the said river whenever its natural discharge exceeds its mean natural discharge."

By Mr. THOMPSON:

Q. Now, did you have any other protests?

A. There were four, yes sir.

Q. Where were they sent to?

A. They were received at this hearing and two later ones were sent to the office at Huntington, West Virginia.

Q. Turn to page 15 and read the statement there by Mr. Scott. Who was Mr. Scott, by the way, according to the record?

A. (Reading.) "Robert E. Scott, counsel of Appalachian Electric Power Company, Richmond, Virginia," is the way I have it in the record.

Q. Read then on page 15, it would be the second paragraph.

A. (Reading.) "Mr. Scott: * * * I do not know that there is anything that I can add to what has already been done or to the proof that is already in. The nature and character of the proposed project is well known, and the character and nature of the stream is well known, and the navigation is a matter which is yet to be determined, and I do not understand whether that is expected to be gone into here or not."

By Mr. **Thompson**:

Q. Did you have any answer to that?

A. Yes, sir. I said: [Reading] "Have you anyone else that you care to present anything?"

Q. What did Mr. Scott say?

907 A. (Reading.) "There is nothing further now. I may have to introduce someone later."

Q. At the top of the next page. Read what it says there?

A. I said: [Reading.] "I am now ready to hear anyone in opposition to the project."

Q. Now, the third paragraph, where it starts "Major Trippe."

A. [Reading.] "Are there any further protests?"

Q. No; where it says, "Judge Scott."

A. [Reading.] "Judge Scott, have you anything further you wish to say?"

Q. And you say below there: "Are there any further protests?"

A. Yes, sir.

Q. And then on page 17, the last two lines.

A. I said: [Reading.] "Anyone else desired to be heard? If not, the meeting will be adjourned and is adjourned."

Q. I hand you a letter consisting of two pages, being a photostatic copy, dated November 30th, 1926, addressed to Major H. M. Trippe, U. S. A., District Engineer, Huntington, West Virginia, and signed by F. W. Leahy, Secretary—I don't know just what that name is——

A. This is copy of a letter received from the Great Kanawha River Improvement Association, addressed to me at Huntington, West Virginia, and dated November 30th, 1926.

Q. Is that one of the protests sent in regard to this meeting or at this meeting?

A. Yes, sir.

By the **Court**. What is the purpose of that; just to show there were protests?

By Mr. **Thompson**. Yes, sir; protests going to the question of allowing the natural flow of the river to continue on down, and this is the purpose—Major Trippe follows this up by making a report which is the report sent with General DeKyne's report, and went to the Commission, and was with the Commission June 1st, 1927, when he made this report. I offer this document Pl. Ex. 124 in evidence.

By Mr. **Jackson**. We object to its introduction in evidence, because it is immaterial, irrelevant and incompetent.

By the **Court**. Is that from the Chamber of Commerce?

By Mr. **Thompson**. It is from the Great Kanawha River Improvement Association.

By Mr. **Jackson**. That was admitted in evidence?

By Mr. **Thompson**. Yes, sir. Government Exhibit 1-4.

By Mr. **Jackson**. We except to the ruling of the Court for reasons stated. Our exception is granted, is it?

By the **Court**. Yes, sir.

By Mr. **Thompson**. This is in evidence.

Said exhibit is marked as Government's Exhibit 124 (No. 124) and is made a part of this record.

Q. I hand you, marked for identification Government's Exhibit No. 125, being entitled: "In the Matter of The Application of the Appalachian Electric Power Company, a Virginia Corporation, to Federal Power Commission—For a License, Project No. 739, with respect to water-power development on the New River at a point approximately one mile above the mouth of Little River and seven miles above the city of Radford, Virginia, upon which application a public hearing has been advertised to be held in the County Court room, at the City of Radford, Virginia, on Thursday, October 28, 1926, at 1:00 P. M." It is signed by the 908 Public Service Commission of West Virginia, by its attorney, I cannot read the name, and is dated November 3, 1926, and I ask if you know what that is?

A. It is a protest to the Federal Power Commission, dated November 3, 1926, by the Public Service Commission of West Virginia, by F. M.—some attorney; I don't know what that name is.

Q. Can't you make out the name. The signature?

A. It looks like Leahy. It was received in the Huntington, West Virginia, office November 13, 1926.

Q. Does it bear the mark of the Federal Power Commission?

A. Yes, sir; it bears the mark of the Federal Power Commission, "received April 14, 1927."

Q. Is that one of the protests that came in as the result of this meeting?

A. Yes, sir. It was under the Application.

Q. Please read, starting on page 52, the last paragraph.

By Mr. **Jackson**. May it be offered so that we may object and have our exception?

By Mr. Thompson. Yes, sir; we offer it in evidence.

(Said paper is filed as Government's exhibit 125, and made a part of this record.)

By Mr. Jackson. We object for reasons stated. May we have our exception.

By the Court. Yes, sir.

By Mr. Thompson:

Q. All right, you may read the paragraph to which I referred.

A. (Reading.) "The Public Service Commission of West Virginia, on behalf of the State of West Virginia, the citizens of said state, and especially those industries and individuals enjoying riparian rights and privileges on the New River and the Kanawha River, within the said state, hereby protests against the granting by the Federal Power Commission to the said Appalachian Electric Power Company of the license applied for in its said application, or any amendment thereof, or substitute thereof, unless such license shall contain as a condition thereof, a provision to the effect that no interference shall be permitted to be made in the flow past such dam as shall be authorized or constructed in pursuance of such license, that may at any time restrict the natural flow of the said river, or the continuous use thereof for power purposes or navigation at points downstream from such dam and within the State of West Virginia, in such manner, that there would be through the operation of such dam or project, any diminution of the flow of said river:

"(1) either below the natural flow of the said river whenever its natural discharge is less than its mean natural discharge, or

909 "(2) below the mean natural discharge of the said river whenever its natural discharge exceeds its mean natural discharge."

By Mr. Thompson:

Q. Major Trippe, you were ordered by the Chief of Engineers to make an investigation of New River under the Declaration of Intention of the Appalachian Electric Power Company?

A. Yes, sir.

Q. Did you proceed to do so?

A. Yes, sir.

Q. Who was the Chief of Engineers at that time?

A. I believe, General Taylor.

Q. Do you know whether or not General Taylor made a report in regard to the Declaration of Intention?

A. To the Federal Power Commission?

Q. Yes, sir.

A. I have seen a letter making his report; yes, sir.

Q. I hand you Government's Exhibit No. 93, and ask you what that is?

A. This is a report made by the District Engineer at Huntington, West Virginia, July 23, 1925, on the Declaration of Intention.

Q. And do you know whether or not that accompanied the report of the Chief of Engineers?

By Mr. **Jackson**. The report of the Chief of Engineers to where?

By Mr. **Thompson**. To the Federal Power Commission.

By Mr. **Jackson**. I object to the question. This witness could not know that except by hearsay, as to whether or not it was received.

By Mr. **Thompson**. He has been to the Federal Power Commission time after time and seen the files there.

910 Q. Who signed this report?

A. Major Lyman.

Q. Who is Major Lyman?

A. I took my annual leave during the months of July and August 1925, and Major Lyman was District Engineer at Cincinnati, and he was assigned to the district while I was on leave; he was assigned by the Chief.

Q. Had you been preparing the data before you left?

A. Yes, sir.

Q. And you turned the data over to him?

A. Yes, sir.

Q. State whether or not this report of his coincides with your views?

By Mr. **Jackson**. We object to that as immaterial and irrelevant and incompetent. They cannot build up evidence by bringing in documents and asking the witness to make a case for them.

By Mr. **Thompson**. Here is a series of events. The Chief of Engineers called on Major Trippe to make an investigation under the Declaration of Intention. He proceeds to make the investigation under the Declaration of Intention and the report is signed by Major Lyman, and I desire to get an explanation from the witness as to why Major Lyman signed it.

By Mr. **Jackson**. That is all right.

By the **Court**. And whether or not it modifies—as to whether it embodies the result of the investigation of this witness?

By Mr. **Thompson**. Yes, sir. Because he gathered the evidence and submitted it and Major Lyman signed the report. Read the question. (Question read.)

By Mr. **Jackson**. We renew our objection to the question in that form. It seems to me that it is wholly inadmissible to call a witness and ask him as to whether or not his opinion coincides with someone else's. It might be on cross-examination but not here.

By Mr. **Thompson**. He has already testified that he turned it over to Mr. Lyman, after he collected the data himself. Mr. Lyman probably made such use of it as it appeared to him proper. I don't know what that was.

Q. This is the report signed by Major Lyman and summarizing the information you had gathered, is it?

By Mr. **Jackson**. We object to that. He should not be permitted to give that kind of testimony. If it is competent, how could we check that?

By the **Court**. If it is the same report he made, or based on information he gathered and that he says it contained and information that he required, I think it is all right.

By Mr. **Thompson**:

Q. Is this report based on evidence that you gathered, or data?

A. Yes, sir.

Q. Does that contain data that you gathered in response to the order of your Chief?

By Mr. **Jackson**. We object to that as immaterial and incompetent. May I have my exception.

By the **Court**. Yes, sir; the objection is overruled and you may have your exception.

By Mr. **Thompson**:

Q. What is the customary procedure when a request is made for an investigation by the Federal Power Commission, to the Chief of Engineers, so far as consulting the district office is concerned?

A. I didn't get that—the Federal Power Commission?

Q. No; when the Federal Power Commission requests the Chief of Engineers to make an investigation?

A. The procedure generally is that the Federal Power Commission asks the Chief of Engineers to make a report on their investigation. They would direct the district engineer to make up the investigation and a report to the Chief.

By Mr. Jackson. Who is "they"?

A. I thought I said "he." The Chief of Engineers would direct the district engineers to do so and he would—the district engineer would then make his report to the chief of engineers, through the district—I mean through the Division Engineer. Generally the Division Engineer puts his endorsement on it.

Q. After you made, or Major Lyman made his report on August 20, 1925, when were you next consulted with respect, if at all, with respect, to any investigation of the Applachian Electric Power Company project?

A. I made a formal investigation of the application for license—the Declaration of Intention.

911 Q. No; later on.

By Mr. JACKSON. Is it on the Declaration of Intention?

By Mr. THOMPSON. No, sir.

By Mr. JACKSON. What is it?

By Mr. THOMPSON. The application for license.

By the WITNESS:

A. I made an investigation and report that I have already testified about on the application for a license.

Q. I didn't know that you had testified as to that.

A. In the public hearing I was talking about.

Q. You mean that investigation?

A. Yes, sir.

Q. I hand you Government's Exhibit No. 97, being the report of Major General Taylor, to the Executive Secretary of the Federal Power Commission, and ask you if any request came to you to make an investigation—this is dated December 29th, 1925—if any request came to you from the Chief of Engineers to make an investigation of the application for license.

By Mr. JACKSON. We object to that as immaterial, irrelevant, and incompetent.

By the COURT. What is your objection?

By Mr. JACKSON. It doesn't make any difference if a request was made to the District Engineer to make the investigation or not. There are only two possible issues here in this phase of the case. One is what was before the Commission as a justification for their action. We say that it could only be what was before it at a formal hearing. They cannot bring evidence here which may be on a question of jurisdiction or constitutionality which are matters to be determined by your Honor in this case. As to the letter, I am of the opinion that testimony of this character would never have any relevancy. I don't see how it could be relevant to show whether the District Engineer was ever asked to make an investigation and a report.

By the COURT. This particular question more or less develops evidence that is negative evidence, more or less, if he answers as I anticipate.

By Mr. JACKSON. I have perhaps confined byself to too narrow a point. The only pertinent testimony can be what official reports were prepared in the field and brought to the attention of the Commission, and here we have the alternative of some personal report of an officer before the Commission advising them orally. It would involve an entirely collateral matter, whether or not the District Engineer made a report on the basis of information collected by him, and he could not possibly know what influenced the other Engineers and whether the other Engineer made further investigations and reports cannot be material. If he made a report, it can be produced and identified, and if it is competent, that can be decided by you, but it is not appropriate to do so in this way and to build up evidence by a series of reports of this kind, and it seems to me to be utterly incompetent and wholly irrelevant, and I feel so strongly about the point, I think it is my duty to preserve these objections in the record, and that I would not be doing my duty if I did not preserve the record in this way.

The COURT. I don't want to interpret the purpose of the plaintiff here, but, as I understand, what they are seeking to establish is this: Assuming, first, that the statute directs the Commission to make an investigation or have an investigation made, in this instance, and I presume in other instances, it did it through the agency which was readiest and handiest to do it, and in a position to do it, an agency that had a great deal to do with the waters of the country in one way or another, that is the Corps of Engineers of the United States Army, and it asked the Chief of Engineers to have this investigation made. The Chief of Engineers made a report. Now, they seek to prove that that report was based on an investigation that was actually made, not that the Chief of Engineers, in his office without any data or information at all, made a report, but they want to show that the investigation was carried right down to the field, right down to the banks of the river, and hearings were had and all that sort of thing.

Mr. JACKSON. If your Honor please, if the course of the examination were directed to asking this witness what examinations he had made at the direction of the Chief of Engineers, and what reports he had made and identifying those, I think it would follow that the situation would be as your Honor has just suggested. The attempt here is to show that the District Engineer was not asked to make as many investigations as Mr. Thompson or somebody thinks he could have been asked to make, and therefore an attempt, I presume, to impeach or otherwise discredit reports of the Chief of Engineers, the superior officer of this witness.

The COURT. I think that last objection applies more particularly to this last question. What the purpose of that is, I don't know. He may answer.

Mr. JACKSON. May our exception be noted.

Q. (The question was read as follows.) I hand you Government's Exhibit 97, being the report of General Taylor to the Executive Secretary of the Federal Power Commission and ask you if any request came to you to make an investigation under that—dated December 29, 1925, if any request came to you from the Chief of Engineers to make an investigation of the Declaration of Intention.

A. I don't recall any; no, sir.

Q. Did you gather any data and forward it to him with respect to the report of December 29, 1925?

A. I don't recall any.

Q. Did you know anything about the report of December 29, 1925, having been sent out by the Chief of Engineers until after it was sent?

A. I knew nothing about it until I saw a letter later.

Q. When is the last time you have seen the original report of the Chief of Engineers, if you recall, of December 29, 1925—what approximate time?

A. You mean this report addressed to the Executive Secretary?

912 Q. Yes.

Mr. Jackson. May our objection be noted to the competency and relevancy of this question?

By the Court:

Q. These hearings that you testified to having been held, I think you said at Radford and other places, and notices published in newspapers in several states and the appearance of all of these parties objecting, were when?

A. Two of them were in January 1925.

By Mr. Thompson. Not with respect to this particular Declaration of Intention. Those were with respect to other investigations on New River by different applicants. He is now referring to the one at Radford.

By Mr. Jackson:

Which was not on a Declaration of Intention.

A. It was an application for license.

By Mr. Thompson:

Q. What was the date of that?

A. October 28, 1926.

Q. And at that time you hadn't made any report, had you, on the application for a license?

A. No, sir.

By Mr. Thompson:

Q. State whether you ever made a report on the application for a license.

A. Yes, sir.

Q. When did you make that report?

A. December 22, 1926.

Q. And what course of procedure did that report take?

A. I addressed it to the Chief of Engineers, Washington, D. C., through the Division Engineer at Cincinnati, Ohio.

Q. I hand you Government Exhibit 98, and ask you if your report is contained in that exhibit?

A. Yes, sir.

Q. And what else is contained in that exhibit?

913 A. Duration curve.

Q. State whether the report of Gen. Deakyne is in that exhibit?

A. First, endorsement by the Division Engineer, the report of the Acting Chief of Engineers to the Executive Secretary of the Federal Power Commission dated April 12, 1927.

Q. I believe I asked you a while ago when I was interrupted when you last saw the report of December 29, 1925, signed by General Taylor?

A. Sometime within the last two months, I believe.

Q. Where did you see it?

A. In the office of the Chief of Engineers, in the files.

Q. I hand you Government Exhibit 98 and ask you to have reference to your report on page 20, and state whether you made any recommendation in that report?

A. "It is recommended that the license be granted.

"26. Special conditions.

"It is recommended that the following provisions be inserted in the license: The licensee shall furnish detailed plans of all structures when such plans are completed for approval by the Federal Power Commission. The licensee shall establish and maintain a stream gauging station with automatic recording gauge in New River above the reservoir created by the project works. The licensee shall clear the reservoir area of all trees and brush between elevations 1830 and 1841 to the satisfaction of the Secretary of War and the Federal Power Commission. The licensee shall pass continuously through its dam, during and after construction, a flow not less than the minimum natural flow as determined from a gauging station to be established by them in New River above and sufficiently close to the reservoir created by project works.

"5. The operations of the licensee, so far as they affect the use, storage and discharge from storage of the waters of New River, shall at all times be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interest of navigation and as the Federal Power Commission may prescribe in the interest of flood control, damage to other interests and for the fullest practicable utilization of the waters of the said river for power purposes."

914 Q. That went forward with Gen. Deakyne's report, did it not?

A. Yes.

Q. To the Federal Power Commission?

A. Yes.

By the **Court**:

Q. Did you discuss with any of the officials of the Appalachian Electric Power Company the substance of your recommendations before you made them?

A. Did I discuss it with them?

Q. Yes.

A. I believe I did, sir; although I can't testify exactly.

Q. Did they indicate a willingness to comply with the conditions that you recommended?

A. I wouldn't say that; no, sir.

Q. Do you know whether or not any license was ever tendered them embodying those conditions?

A. I do not.

By Mr. **Thompson**:

Q. During your investigation of this application for a license and Declaration of Intention, did you ever visit the Federal Power Commission?

A. Yes, sir.

Q. Did you ever have any conferences with Major Edgerton?

A. Yes, sir.

Q. Where did you have them?

A. I had one in the Federal Power Commission in January or February of 1926, and Major Edgerton visited the Huntington office, I believe in October 1925.

Q. Do you recall whether you had a conference with him after the hearing that took place at Radford—in Washington?

A. That would be October 28, 1926. I do not recall it.

Q. Did you make any study of the documents on file in the Federal Power Commission that had related to New River and Kanawha River?

A. In the Federal Power Commission?

915 Q. Yes.

A. I do not recall making any study of any documents that I didn't have at Huntington.

Q. You had mostly duplicate copies of the documents?

A. Yes.

Mr. **Thompson**. Yesterday counsel raised a question as to our not having put in evidence a document, that is all of the letters that had to do with the permit at the Glen Ferris Dam and the permit for the construction of what is known as the Kanawha

Falls Dam or the Glen Ferris Dam. I read the record over last night. What I was trying to do was to shorten this record, but evidently in attempting to do so I have not made this as clear as possible, so counsel objected at the time and said that all of these letters, all of the correspondence, ought to be here.

Mr. Jackson. My objection was that there were two things included in your exhibit. One was the proceedings leading to the issuance of a permit dated February 27, 1899, and another entirely separate thing was a letter by an entirely different company dealing with the request for permission to make repairs, which letter is dated in 1919. My objection was that the letter of request and the pertinent documents or reports of the Engineering officer as to each of those separate transactions should all go in if either one of the transactions is to be offered in evidence, but I can bring that out on cross-examination.

Mr. Thompson. We are perfectly willing at this time to substitute the complete correspondence, together with the permit, for the exhibit which we introduced yesterday, and I offer to do that now at this time.

The Court. That relates to permission to construct the dam in 1899?

Mr. Thompson. Yes. And then the subsequent correspondence where the permit was granted to change the form of the dam, and I ask that this document which I now offer be designated as Government Exhibit 123-A. I think the other one was Exhibit 123.

Mr. Jackson. We have no objection, your Honor, to the amplification of Exhibit 123 by Exhibit 123-A, but we don't wish to be understood as waiving our objection.

The Court. You don't waive your objection.

Mr. Jackson. We don't waive our objection to either one.

916 H. M. Trippe

Direct examination by Mr. Thompson:

Q. Colonel, will you please state to the court whether in your investigation, under the application for a license by the defendant or at any other time, you made a study of the wave conditions on New River?

A. Yes, sir; I did.

Q. Please state to the court what you did in that study.

A. It was in 1926, and in order to determine, if possible, the effect of a wave from the proposed plant at Radford, I started an investigation on the waves in New River. At that time it was possible to get the wave from the Buck and Byllesby plant about forty miles above Radford when they would shut the water off and then open it up again. I had a man take charge of this ork who posted observers down the stream at intervals, if I emember correctly, of about fifty miles and he took gauge heights. ach observer took the gauge heights. As I recall it, there was o rating made of the stream at these points so there was no ossibility of converting these gauge heights into actual flow. he experiments were made with waves, as I recall it, of some- here between two and three thousand second feet ordinarily, nd the waves were of comparatively short duration and there- re of a rather limited volume of water, nothing like the fluc- uations that would occur or that could occur with the Radford am in operation and the installation proposed to be made there. t was simply an attempt made to determine if waves persisted for ng distances down the stream.

Q. And what was your conclusion so far as you went in this udy?

A. The experiments were very valuable, but they were not in fficient number or of sufficient volume of water to make a formal eport and deriving a definite conclusion. I did recommend that further studies be made to amplify the information we
17 already had. The trouble with the experiment or some of the troubles were that the waves were started approximately orty miles above the proposed dam at Radford. The weather onditions were not very favorable during the time the experiment n account of a great deal of rainfall in the mountains. The aves were definitely traceable at least ninety-five miles down, nd some of them were traceable on a chart down to the Kanawha iver. There were frequent interruptions from rain which would pparently either make the wave bigger or wipe it out. It couldn't determined because we had no rating tables but the storms did terfere considerably. The experiments were very valuable as owing tendencies.

Q. They were not sufficiently complete to be satisfactory?

A. No, sir.

Q. I hand you Government Exhibit No. 94, and ask you hether that is your signature on there?

A. Yes, sir.

Q. And what is Government Exhibit 94?

A. This is a letter that I wrote to Major Edgerton, enclosing memorandum on the effect of navigation of proposed New iver Development Company project on New River near adford, Virginia.

By Mr. Thompson:

Q. Colonel, I ask you whether during the low water periods at you testified to yesterday in the year 1925 in the Kanawha ver it was necessary to caulk the wickets on the dams in the anawha River?

A. Yes, sir; it was.

Q. And was the same condition true on the Ohio River?

A. Yes, sir.

Mr. Jackson. I object to any testimony with reference to the conditions on the Ohio because it is not included in the complaint. There is no complaint in the bill with reference to the Ohio River.

The Court. The objection is overruled.

Mr. Jackson. I note an exception.

Mr. Thompson. I offer this document in evidence also as having been prepared by Col. Trippe and as having been sent to the Federal Power Commission or rather to Major Edgerton who was then Chief Engineer of the Federal Power Commission.

Mr. Jackson. It has already been offered and we interpose the same objections that we interposed before.

By the Court:

Q. When was the report made?

A. October 15, 1925.

Mr. Thompson. It has already been in evidence.

918 By the Court:

Q. Following the Declaration of Intention?

By Mr. Thompson:

Q. Was that after the date of the Declaration of Intention?

A. I believe so.

Q. Was it later than the filing of the application for a license, if you know?

A. It was prior to that.

By the Court:

Q. What I am getting at is this, whether the matters embodied in that report went before the Commission as a part of the investigation which it was making on the Declaration of Intention or whether it had that report before it and considered it as a part of the investigation? Was it made for that purpose?

A. I cannot answer that question. I sent it to Major Edgerton.

Mr. Jackson. I want the record to show that we have fairly invited the court's attention to the fact that our objection to this particular exhibit 94 which was urged when it was offered through Col. Edgerton was that this exhibit is not an official report in the ordinary course of official business and through the regular official channels. That was brought out before, and I thought that it being an unusual type of objection, I should state it again.

Mr. Thompson. We have shown since the testimony of Major Edgerton that Major Trippe, responding to the order of his Chief, o, in turn, was responding to the order of the Federal Power nmission, made this investigation and that this document we offer is one which was sent to Major Edgerton to advise him, ough the agency of the Chief of Engineers or through Major ppe, acting for the Chief of Engineers, as to the situation that found over there.

he Court. As a part of that investigation.

Ir. Jackson. Of course, to keep the record straight, the Chief Engineers never instructed Col. Trippe to make this report never instructed Col. Trippe to make any report, so far as record shows, on the Declaration of Intention to Col. Edger-, or directly to the Federal Power Commission. Of course, nstructed the Colonel to make his investigations and reports in regular course as Chief of Engineers who was responsible for t might be the ultimate advice given to that Commission, and was not handled in that way, but I suggest that Col. Edgerton t into this very fully, and it appears from his testimony just t was done with Exhibit 94. It was sent to him by Col. ppe, and I see no reason for inquiring further about it from . Trippe, who obviously doesn't know what Col. Edgerton did h it.

he Court. I don't think Mr. Thompson was inquiring about t. The court was inquiring about the nature of it. I did not ember Colonel Edgerton in connection with it. All I wanted now was whether that report contained matters that went be- the Commission as a part of its investigation or whether it considered by them as a part of the investigation and whether le for that purpose or not.

Ir. Thompson. That was so testified by Col. Edgerton.

Ir. Jackson. We will point it out in the record. Col. Edgerton l he couldn't say that it went before the Commission.

By the Court:

. Major Trippe, you spoke of some experiments, sending waves vater down the stream. How did you accumulate the water to duct those experiments?

. The Appalachian Power Company cooperated with us in giving us access to their records, their flow records at their two dams, and, as I recall it, when they were going to run their generators with water we would get a record of their through the turbines and then we had observers who took rvations during the 24 hours, and we could trace those waves n the river. The reason I did that was because, if I may say , on the Ohio River during the dry years from the war until dams were completed, it was customary to make coal waves, what we call coal waves in order to get coal down the river. I was quite familiar with the transmission of waves through pools and through ordinary river channels where the dams were built, and, for that reason, I wanted to find out what would happen in a stream that had no dams in it.

Q. As a result of those experiments, have you any data as to the time interval between the dams above Radford and Kanawha Falls, how long it would take the water to get down?

A. I had a plat made of the results; yes, sir. I haven't it with me, but I have that information.

By Mr. **Thompson**:

Q. Passing from your study and investigation of the Declaration of Intention and from your study of the application for a license and the evidence which you considered, I now call your attention to your recommendation which you made in your report of December 22, 1926, which accompanied the report of Gen. Deakyne to the Federal Power Commission in which you recommended that a license shall be issued upon condition that there pass through the dam not less than the minimum natural flow as determined from the gauging station to be established in New River above and sufficiently close to the reservoir, and then I call your attention also to the final concluding paragraph of General Deakyne's report (Government Exhibit 98, 3rd page) which is as follows: "The licensee shall at all times discharge a minimum of 8,050 acre-feet per week over or through the dam. Whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 second-feet, the licensee, when so directed by the Secretary of War, shall discharge in each 24 hours the minimum flow of the river
920 during that period up to a discharge of 1,150 acre-feet. The
above discharge shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent interference with the navigation on the Kanawha River." I would like to ask you what was the reason for your making the recommendation which you did make.

Mr. **Thompson**. I can separate the question and ask him then why he recommended that a license be issued upon condition that there pass through the dam not less than the minimum natural flow as determined from a gauging station to be established in New River above and sufficiently close to the reservoir.

A. The reason for that recommendation was that under existing conditions the total low water flow of New River was not sufficient for navigation without interfering with it. Therefore, if anything less than the minimum flow itself or any more water was held back by any project it would seriously interfere with navigation.

By the **Court**:

Q. You say the minimum flow itself?

A. The minimum flow itself was not sufficient to maintain navigation without difficulty. Dam No. 4 in September of 1925 was considerably over a foot below the crest of the dam for a long period of time, in spite of everything that we could do to bring the pool back.

Q. Which dam is that you are speaking of?

A. Dam No. 4.

Q. Where is that?

A. It is the third dam from Kanawha Falls down Kanawha River. It is the first movable dam.

Q. In other words, you say you thought the minimum flow of New River in its natural state was not sufficient to maintain navigation under then existing conditions?

A. I know it was not.

Q. And you didn't want it further interfered with?

A. That is it, exactly.

By Mr. **Thompson**:

Q. State whether or not the natural flow of the Kanawha River was necessary for navigation on the Ohio River during the year 1925 below the confluence of the Kanawha and the Ohio Rivers?

Mr. **Jackson**. May we have our objection noted that that question is not within the issues presented by the bill of complaint and I think under your Honor's previous ruling——

The **Court**. On what theory?

Mr. **Jackson**. As I read the bill, the only claim of interference with navigation made by the Government is on the Kanawha River and I don't understand that any claim is made of interference with navigation on the Ohio in the bill.

The **Court**. I am frank to say I don't recall whether it is or not.

Mr. **Jackson**. I therefore make my objection and if the court feels it should be over-ruled, I would like to note the exception.

The **Court**. I think I will over-rule it.

Mr. **Jackson**. We note an exception.

The **Court**. We all know the course of these rivers, that the New runs into and becomes the Kanawha and the Kanawha runs into the Ohio and we also know that in flowing water the effect is felt everywhere pretty near, where the water flows, to a more or less extent. I don't think we will confine it merely to the effect on navigation on the Kanawha or lowering the height of the Kanawha River if it does have an appreciable effect on the waters below that.

Mr. **Jackson**. May I make this statement: I want to make it clear that my objection was based upon no such technical consideration as to whether there is an allegation that the Kanawha flows into the Ohio but in our minds, at least, it is perfectly fanciful to suggest that any effect is discernible upon the Ohio and, as far as we read the bill of complaint, no such claim has ever been advanced and it is on that basis that we have prepared the defense of this suit.

The **Court**. But, Mr. Jackson, it is conceded, I take it that the Kanawha River is navigable waters.

Mr. **Jackson**. It is conceded, at least under present conditions, that the Kanawha River is a navigable water of the United States from its mouth to a point ninety miles above.

The **Court**. The flow of New River affects the navigability of the Kanawha and I don't think you are hurt at all by showing that effect may still be transmitted down to the Ohio to some extent because it is certainly a lesser extent. As it goes on into the larger streams the importance of the flow of New River is minimized and you might carry it on to the Mississippi, and I suppose by that time the effect of New River would be dissipated completely, but you can't be hurt by showing a slight effect on the Ohio if there is at the same time shown an appreciable effect on the Kanawha. I will let you answer it.

Q. (The question was read as follows:) State whether or not the natural flow of the Kanawha River was necessary for navigation on the Ohio River during the year 1925 below the confluence of the Kanawha and the Ohio Rivers?

Mr. **Thompson**. And I might add—during the low water periods of 1925.

921 A. Yes, sir; it was very necessary. The dams were all movable below the mouth in the Huntington district from Dam 26 to 31, inclusive. 32 was not completed. It was open river navigation at that time. It was very necessary and it was necessary to caulk all the dams from 26 to 31 to maintain the pool with the water then flowing.

Q. And that included all the water coming down the Kanawha River?

A. Included all the water from every source.

Q. Will you please state whether or not in your opinion the flow of New River is necessary for navigable purposes on the Kanawha and Ohio Rivers?

A. Certainly.

Q. Why do you say that?

A. Kanawha and New River are practically one river, but different names though.

Q. State whether ~~or not~~ in your opinion if the flow at New River was interfered with for any length of time, by cutting off he flow from the Radford project, it would affect navigation on he New, Ohio and Kanawha Rivers?

By Mr. JACKSON. I object to that question, because it assumes here is navigation on the New River, and I think there is no proof. f that, and I further object to the form of the question because it ses the word "affect" which is the legal form of the Federal Water Power Act, and I think involves a legal conclusion. I think the uestion should be more accurately framed, if admissible at all.

By the COURT. He may answer, although I think the question s Mr. Jackson says, assumes there is navigation on the New River.

By Mr. JACKSON. I object further because the question does not tate with any degree of accuracy so the question is understandable, he period of time during which it assumes the flow is cut off, the luration of the period of time, or the physical conditions on the Kanawha River, and then I would like to note my exception to the uling of the Court.

By the COURT. All right. That can be developed on cross xamination.

A. As I understand that question, would the construction of a lam as proposed, interfere with navigation on the New and Kanawha Rivers?

By the COURT:

No, he asked you if you cut off the flow of New River above Radford, would it affect navigation?

A. I believe I have already answered that, that it would, yes, sir.

Q. I will ask you whether prior to the request by the Chief of Engineers that you make an investigation of New River upon the Declaration of Intention of the Appalachian Electric Power
22 Company, you had any other request by the Chief of Engineers to make an investigation of the Radford project?

A. Yes, sir.

Q. I hand you, marked for identification, Government Exhibit 126, dated May 28, 1925, and addressed to Major General H. aylor, and signed by C. B. Slemp, and ask you if you know what at is?

A. It is a letter written to Major General Taylor by C. B. Slemp, ated May 28, 1925, received in the Huntington office on July 3, 925.

(Exhibit 126 offered in evidence.)

Q. Will you read that letter now Col. Trippe?

A "I am sending herewith letter from Mr. Buck which is in cordance with our conversation recently. We will be glad to rnish any further information desired at any time. Thanking you for your kindness and courtesy in the matter, I am, Very truly yours, C. B. Slemp."

Q. The letter refers to an enclosure. I hand you three pages of a photostat letter, signed by Viele, Blackwell & Buck, by H. W. Buck, Engineers for New River Development Company, and ask you whether you have ever seen this before, as well as the map also enclosed?

A. The letter was received in the Huntington office on June 3, 1925, and I saw it there, while the map is not stamped with our office stamp it is referred to in the letter, and I have seen the map.

Q. You have seen it before?

A. Yes, sir.

Q. Is that the enclosure referred to in Exhibit #126 for the Government?

A. Yes, sir.

(Exhibit 126a, being letter dated May 27, 1925, from Viele, Blackwell & Buck to Gen. Taylor and exhibit 126B, being map No. R-7656 referred to in exhibit 126a (enclosed with exhibit 126) were offered in evidence.)

Q. What is Government's Exhibit #127, Col. Trippe?

A. It is the first instruction from the Chief of Engineers to the District Engineer at Huntington. I will read it:

923 "Subject: Project on New River. It is requested that the District Engineer submit report as to what effect, if any, the power development discussed in the inclosed communication will have on the navigability of the New River and its effluents, and whether, in his opinion, there is any objection to the construction of the project without Federal jurisdiction."

Q. That was received was it not June 3, 1925, by the office at Huntington?

A. Yes, sir.

(Exhibit 127 offered in evidence.)

Q. Col. Trippe, I hand you a photostat consisting of two sheets, and marked for identification. Government Exhibit #128, "Subject: Project on New River, Va.," signed by H. M. Trippe, and ask you if you know what that is?

A. Yes, sir; that is my reply to the letter of the Chief of Engineers, just referred to.

Q. What is the date of that letter?

A. June 15, 1925.

Q. And that was before your office had any notice of any Declaration of Intention being filed with the Commission by the New River Development Company, was it not?

A. That is correct.

By Mr. THOMPSON. We offer that letter in evidence.

By Mr. JACKSON. May I ask a question before the offer is passed upon?

By Mr. THOMPSON. If he is going to ask about the contents I will object.

By Mr. JACKSON. Perhaps you can tell better when you hear my question.

By Mr. JACKSON:

Q. Col. Trippe, is it a fact that Exhibit #128, being your report and reply to the direction of the Chief of Engineers, was transmitted through your Division Engineer, Col. Kutz, was it not?

A. Yes, sir.

By Mr. JACKSON:

Q. And is it not also a fact that in the regular course of that official report it bore the endorsement of your Division Engineer, C. W. Kutz?

A. It should, when it left my office I mailed it to the Chief of Engineers through the Division Engineer, and it was customary for him to put his endorsement on it.

924 Q. I hand you a single photostat sheet marked for identification, Government's Exhibit #129, signed by Col. C. W. Kutz, Subject, "Project on New River," and ask you if you know what that is?

A. Yes, sir, my reply was headed "2nd Ind." and this is "3rd Ind." to the Chief of Engineers.

(Exhibit 129 offered in evidence.)

Q. I now read from paragraph two: (Government's Exhibit #128.)

"In view of the proposed increase by the construction of this power project of approximately 500 second feet of the low-water flow of the New River, the proposed project would in no way interfere with navigation on the Kanawha River which is formed by the junction of the New and the Gauley Rivers and which is canalized for the greater part of its length by the construction of locks and dams. The said project would on the other hand be a benefit to navigation on the Kanawha River if the low-water flow be augmented as proposed.

"3. As to the proposition of the New River Development Company that they be permitted to construct the proposed development without Federal jurisdiction, it is not seen how this can be permitted for two reasons: first, the New River while not navigable in fact is legally a navigable stream, the Government in the past having expended moneys on this stream for channel improvement; second, because of the fact as previously stated that the New River is considered a navigable stream it would be inconsistent with the policy that has prevailed in the past to require power developments on this stream to be under the jurisdiction of the Federal Power Commission and now permit the project here under consideration to be constructed without such jurisdiction. The following proposed developments for water power on the New River have been projected since the enactment of the Federal Water Power law and have been considered as coming within the jurisdiction of the Federal Power Commission." And then gives the list of four projects.

"4. It is, therefore, the opinion of this office that the proposed water-power project of the New River Development Company 925 will be no obstruction to navigation but rather a benefit provided the low-water flow of the river be augmented as proposed and that there is no objection to proposed development from the standpoint of its influence on navigation.

"5. In view of the past policy of considering the New River a navigable stream and of the fact that four previous applications for water-power development on this stream have been considered as coming under the jurisdiction of the Federal Power Commission it is not seen how the New River Development Company can consistently be permitted to construct their proposed project without Federal jurisdiction unless the stream now be declared not navigable and Federal Jurisdiction over the four previously proposed water-power projects be cancelled and all applicants for such developments be placed on the same basis."

Q. Now, Col. Trippe, I would like to ask you what you understand by this phrase in your letter or report——[interrupted].

By Mr. Jackson. Was this a question or what was the purpose of this?

By Mr. Thompson. I will submit to your Honor, here is a line that is ambiguous unless we have it explained.

By the Court. Mr. Jackson asked, what was the purpose of reading the letter or what is the question connected with reading it?

By Mr. Thompson. As to his understanding. He is an expert—as to what navigable water is.

By the Court. Ask him first if he wrote that letter?

By Mr. Thompson. I did.

By the Court. Now you want to ask something in connection with it?

By Mr. Thompson. I would like to have him interpret this phrase: "The New River while not navigable in fact is legally a navigable stream," and ask what he understood by that when he wrote it.

By Mr. Jackson. I object to that question. I don't know what they are seeking to prove by it. They offered a document that speaks for itself. Now they cannot ask him to interpret it.

By the COURT. I think the letter indicates very clearly the witness termed it legally navigable, because some improvements had been made on it by the Government, and it was his idea that, in law, made it a navigable stream.

By Mr. JACKSON. I also object because there is no ambiguity in the report.

By the COURT. He may answer.

By Mr. JACKSON. May our exception be noted.

I don't want to be a nuisance, but I want to know the purpose of this report, and what it is offered for? I repeat there is an attempt here to make affirmative evidence by bringing along a witness and ask if some report he has made states his view—and I think this calls for not only the interpretation of an unambiguous instrument, but a legal interpretation of the witness.

By the COURT. I will let him explain what was in his mind when he drew a distinction there.

By Mr. JACKSON. May our exception be noted?

By the COURT. Yes, sir.

A. I will have to explain to some extent on this. The phrase I used "was not navigable in fact" is that at the time this report was written, there was no commercial navigation, at least to any extent, in existence on that river. There had been previously commerce on that river. If I might illustrate by a condition in some of the ports on Lake Michigan, where sailing vessels carried commerce to a very large extent, the Government spent money improving those harbors. I have one case in mind where the Government built parallel piers, and commerce was carried on, and when the lumber commerce stopped commerce stopped, and then you could walk across with dry feet; and it is quite probable that other traffic will develop in the future, and the Government can simply go in and dredge that out and restore navigability. The Fox River is navigable water by the U. S. Supreme Court decision, and at the present time it is only possible to go through the four-foot project of boat drawing, one foot of water will strike bottom going through that, but it is simply necessary to dredge it 926 out to have commerce resumed. That is what I meant by the statement, the river while not navigable in fact it is legally a navigable stream; as I understand the matter, when Congress has assumed jurisdiction over a navigable water, the only way they relinquish that is by a specific definite act of Congress.

By Mr. JACKSON. I move to strike out the answer on several grounds: (1) The witness, in his direct testimony, undertakes to draw into the case about the Fox River and the Great Lakes, and of course, I think it is too well settled to require comment that an expert witness cannot give testimony about other situations on his direct examination, or we would never get through, but wo be trying to determine the conditions there.

By the Court. The witness is always entitled to explain statements. The Court doesn't necessarily accept those.

By Mr. Jackson. I wanted to make the point about bring in these extraneous cases. The other grounds for striking it is, I think it appears clearly, the statement is nothing more t a legal conclusion, and so far as it relates to any conditions this river, it would be based on hearsay and something that pears in official reports and is the best evidence. May the rec show our motion is overruled and exception noted?

By the Court. Yes, sir.

Cross-examination by Mr. Jackson:

Q. Col. Trippe, I think you said that you were District En neer at Huntington for sometime in 1923 until sometime in 19

A. Yes, sir.

Q. And that was your only duty in that District, I take it?

A. Yes, sir.

Q. And other than such personal knowledge as you acqui while you were District Engineer at Huntington, I assume y information about New River is derived from official repo and things of that character?

A. Yes, sir.

Q. In answer to question of counsel, I understood you to say reference to conditions when you were on New River in 1925, t the minimum flow of New River under existing conditions w not sufficient to maintain navigation at low water?

A. Yes, sir.

Q. Now, when you said under existing conditions, I assu you referred to the conditions which existed when you were the Huntington District?

A. That is correct.

Q. And you also said, I believe, that you thought that the f of the Kanawha River was necessary, at low water, to av possible interference with navigation on the Ohio River be the Kanawha?

A. I don't believe I said I thought so, I said I knew so.

Q. And you were, as I understand it, dealing then again w conditions that obtained on that stream when you were Dist Engineer and had charge of it?

A. That is correct.

927 Q. And you referred during the course of your testim to a practice that prevailed on the Ohio River of releas a wave or tide in order to float down tows of coal barges. Wa right in so understanding?

A. I don't believe I said tide.

Q. Well a wave?

A. Yes, sir.

Q. So that you mean you impounded water, or someone did, and then released it suddenly so as to make a wave in the river below?

A. Let me explain just what happened. At that time it was customary to congregate the coal and possibly steel fleets at or near dam #26 in order to give them sufficient water to go down the river to Cincinnati, and possibly beyond. The pools were as full as they could be made by caulking the dams and holding the water back, all the pools were as full as possible, and then the Division Engineer gave the time the wave would start, the District Engineer, who was myself, at that time was responsible for carrying that wave down to #26 and carrying the fleets to Cincinnati and beyond, and in order to do that, depending on the stage of the water, it was necessary to start this wave somewhere near Pittsburgh. The last dam I had charge of was Dam #12 at Wheeling, W. Va. Sometime in the night, at a time we had determined it was necessary, the bear traps and some of the wickets were lowered, say at Dam #10 for example, then at the right time when that wave reached #11 the bear traps and wickets were lowered on that, and on down the river, so about daylight in the morning the wave would reach dam #26, and then the bear traps and wickets were kept open so the flow continued one, two, or three days, as long as that was necessary; then it was necessary to put the dams up, re-caulk them, and fill the pool; during that time the dams were not complete, navigation was practically stopped.

928 By Mr. Jackson:

Q. Col. Trippe, at that time, as I understood your direct testimony, there were below the Kanawha a number of dams still under construction. Is that right?

A. Yes, but No. 32 was the only one in my District. Further down there were others under construction, and still further down construction had not yet commenced.

Q. So that there was a considerable stretch of open river on the Ohio?

A. Yes, sir.

Q. That project called for a series of 56 dams, I think?

A. It wasn't quite that many, but there were different projects.

Q. There was some fifty dams to canalize the Ohio River?

A. Yes, sir.

Q. And that project had only proceeded to the stage which you have described when you were District Engineer at Huntington?

A. Yes, that is correct.

Q. Do you know when they ceased the practice of sending barges down with the waves on the Ohio?

A. No, I do not.

Q. You do know they did cease that practice later on, don't y

A. I am quite sure they did.

A. And that had to do, I suppose, with the completion of p ects below so as to provide the intended canalization of the str as distinguished from the open river navigation when you v there?

A. Yes, sir.

Q. In your direct testimony on yesterday, you stated that w you were in charge of the Huntington Office there was some tro with navigation during the low water season of September 1 on the Kanawha River.

A. Yes, sir.

929 Q. And I think you said that this trouble occurred e cially at Locks 2 and 4?

A. That is my recollection, yes, sir.

Q. Am I right in understanding that in September 1925 leak at Locks on the Kanawha River, particularly above Charles was very great?

A. Yes, sir.

Q. Do you now recall that the leakage at Lock 2 for insta under 1925 conditions was on the order of eight hundred or thousand second-feet?

A. I would not be able to give you the number of second- at this time, without studying it up again, no, sir.

Q. I produce and ask to have marked for identification se sheets which are photostats of the fourth endorsement, of fifth endorsement and the six endorsement, in a series of c munications which the Government has offered in evidence Government Exhibit No. 98, and ask to have the document I h described marked as Defendant's Exhibit for identification.

(Exhibit 508 marked for identification.)

I direct your attention to this endorsement dated February 2 1927, signed by you according to this copy, and the endorsemen Colonel Kutz, which follows your fifth endorsement, and me to see if it refreshes your recollection I direct your attentio paragraph 2 of Colonel Kutz's endorsement:

"The rating curve for the U. S. G. S. Gaging Station at Dam 2 indicates leakage at this fixed dam of approximately eight h dred second-feet."

And ask you whether that refreshes your recollection as to order or magnitude of the leakage at the time you were on dut the Huntington District.

A. I presume that is correct.

930 By the COURT:

Q. How far is Huntington below Point Pleasant?

A. As I recall, it is roughly just 47 miles.

By Mr. JACKSON:

Q. Col. Trippe, I read to you from House Document No. 190, 70th Congress, First Session, being a report on the Kanawha River, West Virginia, and particularly from paragraph 41 on page 27 of your report, which is included, as you will recall, in that document, as follows:

A. (Interrupting counsel.) Is that on the report of application for license?

By Mr. JACKSON. No, this is a report on the improvement of Kanawha River.

By Mr. THOMPSON. For what year?

By Mr. JACKSON. It is Colonel Trippe's report, and is dated February 13, 1923.

A. February 13, 1923? I was not at Huntington at that time.

By Mr. JACKSON. I may have the wrong date. I beg your pardon, it appeared on top of page 18, which is marked March 14, 1927. This has nothing to do with the Declaration of Intention, or application for license, it is only, or has to do with the condition of leaky dams on Kanawha River.

A. That is from the annual report.

Q. It is also from House Document 190, 70th Congress, First Session, and is a report to the Chief of Engineers on the dams on Kanawha River. You recall that, do you not?

A. Yes, sir.

931 Q. Now, I desire to read to you the following statement from paragraph 41 of your report on page 27:

"41. Of the items of reconstruction and improvements provided for in this report, the urgent ones are those pertaining to the passes and weirs of the dams and the gates at Locks Nos. 4 and 5. The tops of the foundations and the sills, hurters, anchorages for wickets, and bridge trestles on these structures are in poor condition. Considerable difficulty is being experienced now in operating these dams and maintaining the pools. It is necessary that if these dams are to be continued in service much longer that the reconstruction be commenced at an early date."

I ask you whether or not that is an accurate description of the condition of these dams on the Kanawha River to which reference is made when you were District Engineer.

A. From ten years ago I cannot recall it, but it sounds all right, yes, sir.

Q. It is a part of your report?

A. Yes, sir.

Q. Referring again to page 2 of House Document No. 190, 70th Congress, First Session, paragraph 4 of the report of the Chief of Engineers, dated February 17, 1928, transmitting your report to the Secretary of War I direct your attention to this statement of the Chief District Engineer as follows:

"4. The District Engineer states that the four upper locks and
dams, all of which were completed prior to 1887, require
932 extensive repairs at an early date. The fixed dams, Nos. 2
and 3, are built of timber cribs, and the deterioration has
been so extensive that reconstruction in concrete appears necessary. In the upper approaches to the locks and in the lower guide walls the exposed tops of the timber cribs require reconstruction or capping with concrete. The practical reconstruction of the two movable dams, Nos. 4 and 5, is required."

I will ask you whether you agreed with that description of the condition of those old dams, at and prior to 1927 for several years?

A. Yes, sir.

By Mr. Jackson:

For identification I ask that House Document No. 190, 70th Congress, First Session, from which I have just read to the witness, be marked as Defendant's Exhibit 509.

(Exhibit 509 marked for identification.)

Q. In 1925, in addition to the question of leakage, needling and caulking were necessary to maintain pool levels at the lower dams, such as Nos. 4 and 5, were they not?

A. Yes, sir.

Q. And does it not at times happen, even though the greatest care is exercised by the supervising officer, that the personnel fails properly to look after the needling and caulking as required?

A. It would happen very seldom, if ever.

Q. However, it is something that, as District Engineer, you had to watch constantly, isn't it?

A. Yes, sir.

Q. And, is it a fact that if there should be a failure of needling and caulking, of the upstream dams as soon as it should have been
done, the result would be when the pool falls say two feet, the
effect of caulking and needling that dam will be to
933 cut off the flow from lower dams every time until the deficiency has been made up?

A. That is correct.

Q. And then if it should happen that the upstream dam were inadvertently to fall below its proper level, through failure to needle and caulk, that would produce successive low pools for the time required to fill the upper pool and any pool below the upstream reservoir would fall below its proper level?

A. The effect would be very small. It would work out the way you say, but in caulking a dam up it is such a slow progress it would extend over a long period of time.

934 Q. It would not be an abrupt cutting off of the flow?

A. No, sir.

Q. Now you stated that your principal trouble in 1925 was with locks and dams 2 and 4. Are those locks and dams any longer in existence?

A. No, sir.

Q. Am I right in understanding that Dams 2, 3, 4, and 5 have for some time been superseded by London and Marmet Dams?

A. Yes, sir.

Q. And the old dams have been removed, or removed so far as necessary, I take it?

A. Yes, sir.

Q. Am I also right in understanding that the following wicket dams on the Kanawha River, to-wit: Dam 6, 7, 8, 9, 10, and 11 will be superseded by the Winfield Dam and the Gallipolis Dam now under construction?

A. Yes, sir.

Q. Am I also right in understanding that the London and Marmet Dams are concrete roller-gate dams?

A. Yes, sir.

Q. Am I right in understanding that the Winfield Dam and the Gallipolis Dam are severally being constructed as concrete roller-gate dams?

A. Yes, sir.

Q. And is it not a fact that the quantity of leakage through a concrete roller-gate dam is very much less than through a wicket dam?

A. If properly constructed; yes, sir.

Q. You say, if it is properly constructed?

A. Yes, sir.

Q. You have no question but that the London and Marmet Dams were properly constructed, have you?

A. No, sir.

935 Q. Nor have you any question that the Winfield and Gallipolis Dams are being properly constructed?

A. No, sir.

Q. Isn't it a fact that the amount of leakage through a concrete roller gate dam, such as London and Marmet is very much less than the quantity of leakage through a crib and rock dam, such as ld dams 2 and 3.

A. Yes, sir.

Q. That would be true, even through the crib and rock dams ad not deteriorated, that is, the concrete new dams would have less eakage than rock and crib dams? Is that right?

A. Not necessarily. You could build a crib dam that 'ould have very little leakage if properly constructed.

Q. I believe I am right in saying that the quantity of leakage through a concrete roller gate dam, such as London and Marmet, would be very much less than the quantity of leakage which prevailed through old type fixed dams at Locks 2 and 3, on the Kanawha River, in 1925?

A. Yes, sir.

Q. When you referred to a "little leakage" of dams on a stream of the width of the Kanawha, could you give some idea of the order and magnitude of a leakage which you would regard as "little leakage"?

A. I don't think I quite get that question.

Q. I was just asking you to give a rough idea of what a "little leakage" would mean to an engineer in cubic feet per second.

A. That is rather hard to give.

Q. You could not give that?

A. No, sir.

Q. With a wicket type dam such as are some of the old dams on the Kanawha that are to be replaced and some of the dams on the Ohio, could the leakage without needles in place exceed as much as two thousand second-feet?

A. Yes, sir.

936 Q. Now to summarize the condition which you describe as existing in September 1925, on the Kanawha River, Colonel Trippe, is it not a fact that the principal loss of water or leakage which resulted in the dropping down of pools was caused by the condition of the dams?

A. Partly so. Any wicket dam leaks, no matter what you do to it.

Q. I am not talking now merely about a wicket dam, I am talking about the deteriorated condition of these particular dams above Charleston on the Kanawha.

A. The two fixed dams, yes, sir.

Q. They were in bad condition?

A. Yes, sir.

Q. And had this large leakage?

A. Yes, sir.

Q. And isn't it also true that Dams 4 and 5 which were wicket dams, were in bad condition?

A. Yes, sir.

Q. And isn't it also true that they had a great deal of leakage other than what might be incident to the difficulties of needling or caulking?

A. That is rather hard to answer. No matter how good the dams were, there is a considerable leakage in a wicket dam.

Q. I produce a letter, consisting of two sheets dated February 25, 1927, written on the stationery of the U. S. Engineering Office, Huntington, West Virginia, addressed to F. W. Scheidenhelm, and purporting to be signed by H. M. Trippe, Major Corps Engineer, District Engineer, and ask to have it marked for identification, Defendant's Exhibit 510.

(Said letter is marked for identification Defendant's Exhibit 510.)

Q. Col. Trippe, I show you Defendant's Exhibit 510 for identification, and will ask you whether you can identify that as a letter which you write to F. W. Scheidenhelm?

A. That is my signature; yes. That is a letter I wrote to him, yes.

Q. I take it from this letter that some six questions had been submitted to you, requesting you to give some information about.

A. That has been sometime ago, and I would have to look it over.

937 Q. You can look it over if you like, merely to refresh your recollection.

Q. You have examined that letter, have you?

A. Yes, sir.

By Mr. **Jackson**. Now that Colonel Trippe has examined Defendant's Exhibit 510 for identification, I produce what purports to be a copy of a letter addressed to Major Trippe, dated February 4, 1927, with the initials "F. W. S." and will ask to have it marked Defendant's Exhibit 511, for identification.

(Said letter is marked Defendant's Exhibit 511 for identification.)

A. I see nothing specially wrong in that letter.

(Witness referring to Exhibit Defendant's 510, for identification.)

By Mr. **Thompson**. Isn't it rather unusual to have the witness testifying about the contents of a letter before it has been introduced in evidence.

By the **Court**. He has not asked the witness anything yet about the contents of the letter.

By Mr. **Thompson**. Will you read the answer that the witness made.

"I see nothing specially wrong in that letter."

By the **Court**. That was a statement by the witness. He volunteered that statement.

By Mr. **Jackson**:

Q. I have here, Colonel Trippe, a copy of a letter marked Defendant's Exhibit 511, for identification, which appears to be a copy of a letter, to which your letter marked Exhibit 510 for identification is a reply. I produce it merely that you may examine it, if you will, in order that you may be fully informed about your letter, Defendant's Exhibit 510, for identification.

By Mr. Thompson. Who was that letter signed by?

938 By Mr. Jackson. F. W. Scheidenhelm.

You can wait until I ask the question, and then the letter would be available for Mr. Thompson's use, if there should be anything in it that he does not understand.

Q. Colonel Trippe, on yesterday you stated, on your direct examination, that the principal defect, from the standpoint of navigation, in the low water of September 1925, was at Dams 2, and 4, on the Kanawha River, or rather, I will read your answer to question one, in your letter marked Exhibit 510 for identification as follows:

"The main difficulty in maintaining pools during the dry season of 1925 was at Dams 3 and 4. There was some slight trouble at Dam 2, but not serious."

I will ask you whether that refreshes your recollection, and whether you would like to correct your statement on yesterday, with reference to which of the dams were the ones that caused the chief difficulty in 1925.

A. We had trouble at all four of these dams, 2, 3, 4, and 5. The opinion I expressed in that letter was correct at that time; we had trouble with them all.

Q. The opinion that you expressed in your letter, which I read to you, correctly states the facts with reference to the experience in 1925, does it?

A. It was my opinion at that time.

Q. And nothing has happened since that to change your opinion as to the condition in 1925?

A. After I answered on yesterday I studied the information I had and concluded from that study that Dams 2 and 4 were the ones we had most trouble at at that time, but we had trouble with all of them.

939 Q. I merely thought you inadvertently mentioned the wrong dams. I now direct your attention to paragraph headed "Question 3" of your letter marked Defendant's Exhibit 510, for identification, and read to you as follows:

"The principal loss or leakage is caused by the condition of the dams. All of the dams above Charleston are old and are not in good condition. Dams 2 and 3 are timber cribbed dams, and it is not possible to cut down leakage very much. The wickets in dams 3 and 4"——

Q. I understand that is a typographical error, and should be 4 and 5.

A. Yes, sir; it must be.

Q. (Continuing reading letter.) "Are in bad condition with he boxes loose and they require an especial amount of caulking uring the dry season. The principal difficulty is at Dam No. 4, hich is in poorer condition than any of the others."

I will ask you whether that correctly states the facts, so far s it goes, with reference to the condition and experience of the ow water in 1925.

A. Yes, sir.

Q. Major Trippe, in connection with Plaintiff's Exhibit No. 123, ounsel, yesterday, directed your attention to a letter appearing n the first sheet, and purporting to be signed by a Mr. W. J. Knapp, vice president of the Electro Metallurgical Company, ddressed to the Secretary of War, and which, as you read it, equested permission to make certain changes, or do certain work t the dam on the top of Kanawha Falls, in accordance with rawings and tracings, and——

A. (Interrupting.) Yes, sir.

Q. And counsel asked you whether or not there was any reply y the Chief to that request. I direct your attention to sheet 4, nd ask you whether or not that is the final disposition of the atter by the Chief, or the Chief's office?

A. Yes, sir.

Q. And you referred to the endorsement which reads: "In view of the explanation made to the applicant comany by the office of Chief of Engineers, this office will take no urther action and will make no objection to the company's proeding with the work as described in its application." Is that e disposition made by the Chief's office?

A. I was referring to the third indorsement of the Chief of ngineers, which says: "If the company concludes to proceed ith the work on this understanding, it is thought that no objecon should be raised by the District Engineers."

By Mr. **Thompson**. What is the number of the Exhibit?

By Mr. **Jackson**. It is No. 123.

Q. This morning counsel for the Government has produced further Exhibit marked Exhibit 123–a. I direct your attenon to the second sheet, which purports to be a letter on the ationery of the Wilson Aluminum Company, dated November , 1898, addressed to the Secretary of War, and signed by meone, described as president of the Wilson Aluminum Comany, and ask you whether or not you can identify that letter being the request for the permission of February 27th, 1899, out which you testified yesterday?

A. Yes, sir; this starts out "We beg to present herewith a tition for permission to dam the Kanawha River on the crest the Great Kanawha Falls, West Virginia."

Q. Will you read the second paragraph of that letter?

A. (Reading.) "The Falls are situated 98 miles from the mouth of the River at the Ohio. Your petitioners are not aware that the stream was considered navigable above the Falls, but out of abundant caution, they ask permission to erect the above mentioned dam."

Q. Would you be good enough to read the bottom paragraph on the second sheet of that letter, beginning, "There is no——"?

941 A. (Reading.) "There is no navigation whatever over Kanawha Falls. Logs are not even rafted over. From Kanawha Falls up New River to the mouth of Greenbrier is 65 miles. Within this distance the stream falls 741 feet. It runs through what is practically a canyon or gorge with rocky and precipitous banks, the water working its way over shoals and falls and around large rock, and presenting so many difficulties to navigation that the flexibility of an eel or the agility of a salmon could not safely risk the dangers of its navigation. There is no present navigation for the dam to obstruct, and if the Government should decide to erect any further locks and dams, the dam which we will erect and the pool that would be above it would be utilized and would not be an obstruction. Therefore, we respectfully pray that we may be granted permission to erect a dam on the crest of Kanawha Falls, as shown in the accompanying plan."

Q. Do these drawings contain any provision for a lock for a dam on the top of Kanawha Falls?

A. Yes, sir.

Q. They do?

A. Yes, sir.

Q. Point it out to us.

A. (Witness indicates on paper.)

By Mr. Jackson:

Q. You are pointing to a point on the diagram which is opposite the designation "Sluice-ways"?

A. Yes, sir.

Q. What kind of a lock is that?

A. It is a lock for sluice-ways.

Q. It is not a lock, is it?

A. No, sir; I thought you said sluice-ways; no, sir; there is no provision for a lock there. I misunderstood your question.

942 Q. Among the diagrams which the Government has added to this exhibit this morning, under the designation of Exhibit 123–a, is a letter purporting to be signed by Major Bixby of the Corps of Engineers, dated February 13th, 1899, and addressed to Brigadier-General John M. Wilson, Chief of Engineers, U. S. Army, Washington, D. C., and I direct your attention

to this statement, on page 2 of the letter: "The only possible interference with navigation would be to the floating of saw logs from Gauley River. As stated by the last annual report of the Gauley, there is at present no lumbering out of Gauley by river. There is a large quantity of lumber on the Gauley and though, owing to the rough character of the stream, there is little probability of much, if any, of it being sent out by river, some business of this kind may be developed in the future"; and I ask you if I have correctly read that report of Major Bixby of the Corps of Engineers?

A. Yes, sir.

Q. Was General Bixby subsequently the Chief of Engineers?

A. I am not able to answer that.

Q. In your testimony on yesterday, you stated, I believe, that you found it necessary, or expedient, to direct your assistant to communicate with the operators of the plant of the Electro-Metallurgical Company at Kanawha Falls, because that plant was fluctuating the water in such a way as to cause serious trouble in maintaining the pools?

A. Serious interference with navigation, I should have said.

Q. That had to do with the question of maintaining the pools, didn't it?

A. Yes, sir.

Q. How far was the Kanawha Falls power plant above the head of the up-stream navigation pool on the Kanawha, in 1925?

A. The whole river, you mean, above the six-foot stage?

943 Q. Above the six-foot stage of the upper pool of the Kanawha?

A. My recollection is, it is approximately 5 miles.

Q. About five miles, approximately. Now, under these existing projects, is it true that the head of navigation here is at mile 90.5 from the mouth of Kanawha River?

A. The head of the six-foot project is there, I think; yes, sir.

Q. Not the six-foot project, but the existing project?

A. I am not familiar with the new project. It is a nine-foot stage.

Q. I believe that appears from Government Exhibit 119 or 120. Am I right in understanding that the head of the old six-foot project was mile 89?

A. I would have to check that on the map. You asked if it was 90.5.

Q. I asked you about that—that is, the present project, and you said you did not know about that. I want to know if the old six-foot project that existed while you were District Engineer at Hungtington, was not at mile 90.3 rather than 89?

A. I would want to look at a map. I cannot remember exactly.

Q. Major Trippe, I want to direct your attention to paragraph headed Question 4, in your letter of February 5th, 1927, marked "Defendant's Exhibit 510," for identification, which I will read: "Question 4. The Assistant in charge of the Kanawha River states that, in his opinion, very little of the difficulty was caused by the holding back of flow at the Kanawha Falls plant of the Electro-Metallurgical Company. He states that this plant does cause a variation of a few tenths at times, but that this has not interfered seriously with navigation." And I ask you if you made that statement in your letter of February 5th, 1927?

A. You correctly read it; yes, sir.

944 Q. You tried in that letter to state the facts, to the best of your knowledge and belief, did you?

A. Yes, sir.

Q. You perhaps recall that you yourself made inquiries of your assistant at that time?

A. I don't remember.

Q. I mean before you wrote this letter?

A. Undoubtedly, I did. It undoubtedly expresses what he told me.

Q. Now, Major Trippe, you were asked a great many questions yesterday about Plaintiff's Exhibit 101, which purported to be a stenographic report of a hearing, which you held at Radford, on or about December 28th, 1926?

A. It was October 28th, 1926.

Q. Yes, sir; October 28th, 1926. And I think you testified that that was a hearing upon an application for license, and not upon a declaration of intention. Is that right?

A. That is correct; yes, sir.

Q. I direct your attention to this statement. It is difficult to follow it in this exhibit [indicating exhibit], the pages are not numbered in any fashion. What I have here is, if I am counting correctly, it is sheet 21, of Complainant's Exhibit 101.

By Mr. THOMPSON. What is it at the bottom of the page?

By Mr. JACKSON. It follows a letter signed by Ben J. Smith, Attorney. I will read as follows: "Major H. M. Trippe: I will now ask Judge Scott to present anything that he desires for the Appalachian Electric Power Company.

"Mr. Scott, Sometime ago the Appalachian Electric Power Company filed a Declaration of Intention under the last paragraph of Section 23 of the Water Power Act, which provides——"

By Mr. JACKSON. I will omit Judge Scott's quotation of the Act there, but Mr. Scott continues as follows: "I understand that the Commission has not yet passed upon that proposition. This proposition is made subsequent to that Declaration of Intention, and subsequent to future action of the Commission, and in the event the Commission decides to take jurisdiction, then this application is to be considered."

By Mr. JACKSON:

Q. Major Trippe, should not the statement contained in that last phrase "this proposition is made subsequent to that Declaration of Intention," should not that be, "subject," instead of "subsequent;" and it also says "subsequent to future action of the Commission." Shouldn't that be "subject" to the future action of the Commission?

A. I cannot remember. I think subsequent is correct.

Q. You do not think "subsequent" is correct, do you?

A. It would not be very good English.

945 Q. It would be worse than that. It would be contrary to all possibilities or probabilities. I will continue reading (reading): "This proposition is made subsequent to that Declaration of Intention and subsquent to future action of the Commission, and, in the event the Commission decides to take jurisdiction, then this application is to be considered." Am I right in understanding from that, that Judge Scott explained at this hearing that the Appalachian Electric Power Company had filed a Declaration of Intention, and there had been no determination on that as to whether the Commission would assert jurisdiction and this application was being made concurrently subject to whatever action was taken in connection with the Declaration of Intention?

By Mr. THOMPSON. We have an Exhibit here asking that it be considered concurrently, before that, several weeks prior to the above hearing.

By Mr. JACKSON. The only point is that this hearing was on an application for a license, and it was understood at this hearing that a Declaration of Intention was being filed, and whether or not anything was to be finally done with the application, would depend on the outcome of the proceeding on the Declaration. Did you so understand that?

By the WITNESS. I would have to study that over, to answer that question. I don't know about that.

By Mr. JACKSON:

Q. Major Trippe, do you claim that this stenographic report of the hearing you held at Radford, Plaintiff's Exhibit 101, is incorrect in any particular?

By Mr. JACKSON:

Q. Major Trippe, do you have any independent recollection of anything that occurred at the hearing that is not included in Plaintiff's Exhibit 101—the stenographic report of the hearing?

A. No, sir.

Q. So far as you know, that is complete and accurate?

A. So far as I know, it is.

946 By Mr. JACKSON:

Q. I direct your attention to Exhibit 98, which is a communication bearing date—it appears to be a letter dated April 12, 1927, a report signed by Brigadier-General Deakyne, as Acting Chief of Engineers, and following that is your report dated December 22, 1926, upon the application for license, isn't it?

A. Yes, sir.

Q. And that has attached to it an index of a first endorsement by Colonel Kutz, dated January 13th, 1927?

A. Yes, sir.

947 Q. I show you this Exhibit No. 508, so marked for the defense for identification, and ask you whether or not that first communication, signed by Acting Chief of Engineers is not the fourth endorsement on the same series of reports, dated February 7, 1927, and whether or not the fifth endorsement is not a further report by you on the same series and the sixth endorsement a further report by Colonel Kutz, your Division Engineer?

A. It appears to be; yes, sir.

Q. These defendant's exhibits, marked 508 for identification, consist of four endorsements, which are in the original condition of these reports, attached to your report with Colonel Kutz's first endorsement, which now appears in Plaintiff's Exhibit 98. Is that a fact?

A. This letter of April 12th, which is apparently an original letter—the fourth endorsement is dated previous to that.

Q. It would necessarily be previous to that, of course. In any series of reports leading up to a final report or final action by the Chief, all of them would take date prior to the final report of the Chief, wouldn't they?

A. The second endorsement—do you want that?

Q. No; all we have is—we don't have the second and third endorsements, but we do have, beginning with the fourth endorsement, February 7th, 1927.

A. There is something missing there.

By Mr. JACKSON:

Q. Major Trippe, when the Chief of Engineers directs that an investigation be made and it is sent to the District Engineer, doesn't it ordinarily run through the Division Engineer for his endorsement and comment?

A. Yes, sir.

Q. And then it goes back to the Chief of Engineers?

A. Yes, sir; it goes back to the Chief of Engineers.

948 Q. And then the Chief of Engineers may send it back to the Division Engineer for some other questions?

A. Yes, sir.

Q. And he would then make a further investigation, or rather endorsement, upon the accumulated series of papers?

A. Yes, sir.

Q. And then the Division Engineer would make another endorsement to you, if you happened to be the District Engineer?

A. Yes, sir.

Q. And then you might make a further report and send it to the Division Engineer?

A. Yes, sir.

Q. And then he would make another endorsement?

A. Yes, sir.

Q. And then it would go back again to the Chief?

A. Yes, sir.

Q. And that, under the practice of the War Department, would be the complete investigation of that particular project or on the question at that particular time?

A. Yes, sir.

Q. It would all be part of the investigation?

A. Yes, sir.

Q. And the Chief, under the assumed condition of sending it back, would not make a final report for the War Department until all the papers had been returned to him for his final consideration, with such further information as he requested?

A. Yes, sir.

By the Court. What does the witness say?

By the Witness. I don't know, sir.

By the Court. What are the papers handed to you?

By the Witness. Endorsement 4 is an endorsement purported to be signed by Brigadier General Herbert Deakyne.

By the Court: What does the endorsement show?

949 A. The fourth endorsement is to the District Engineers at Huntington, requesting information as follows: "1. With reference to paragraph 26, special condition No. 4, recommended to be included in the license, information is requested as follows:

(a) Minimum continuous flow required at lock No. 2 and at applicant's dam to provide navigation in the Kanawha River with the dams in their present condition.

(b) Same if the dams are reconstructed by the United States and the applicant to provide for power development as well as navigation on the Kanawha River. The applicant estimates that at the proposed dam a continuous discharge of 400 acre feet per day, or an irregular flow amounting to 4,200 acre feet per week, will be ample under these conditions.

(c) Any information that has been obtained to date regarding the fluctuation of flow in the New River due to the operation of the applicant's existing dam."

By the COURT. I didn't want the subject matter of the report. I just wanted to know if the endorsement was a formal endorsement passing it along, or whether or not it contained other data, and what effect the endorsement was. You want to know if these endorsements, or the matter brought out by the endorsements was developed with the other reports?

By Mr. JACKSON. Yes, sir. The infirmity of Mr. Thompson's statement is that he is offering a final report of the Chief and the report of the District Engineer on the preliminary investigation and information of his Superior Officer, the Division Engineer. He says that it is complete. It may be that the Chief Engineer and the District Engineer made a further report, and the Division Engineer made endorsements. I don't mean by endorsements—I am not being technical about it—I do not mean mere forwarding endorsements, but he makes comments in the matter, and these come back with other things to the Chief before he made his report, April 12th, 1927, which the Government offers, and I was trying to tie this into the report.

By the WITNESS. Apparently the fourth endorsement to me at Huntington, West Virginia, came to me and I made report on it by the fifth endorsement, February 23rd, 1927, and sent it to the Chief, through the Division Engineer.

By Mr. JACKSON:

Q. And he made endorsement with comments?

A. He made an endorsement——

By the COURT (interrupting):

Q. Do you recall that the matter came back to you for further data?

A. Yes, sir.

Q. Does this seem to be the endorsements to which it was done?

950 A. Yes, sir.

By Mr. THOMPSON:

Q. Do I understand that these papers have to do with the investigation for the application for license upon which you were asked to report?

A. Yes, sir; they were passed on to me in a report, which went to the Division Engineer and then to the Chief, and then apparently there are one or two endorsements left out, and it came back with the fourth endorsement and I answered that with the fifth and the Division Engineer with the sixth to the Chief.

By Mr. **Jackson**:

Q. In connection with your testimony as to the observation of certain waves on New River—you said that these waves were nothing like those which would, or could, occur at the Radford project. I suppose you meant to say that they were nothing like those which you think could be produced by some method of operation of the Radford project?

A. The statements made at the public hearings by representatives of the Appalachian Electric Power Company led me to believe that that plant would be operated as a peak carrier, with an installation which will permit a discharge to somewhere probably 9,000 second-feet, and the wave would certainly be much larger than the ones we have.

Q. You said the waves you observed were smaller than those that could be produced by certain methods of operation at the Radford plant?

A. Yes, sir.

Q. And you don't mean to testify that the waves which would necessarily be produced by any operation of the Radford plant would be of the order of such waves that you observed—would be nothing like that?

A. I mean exactly that; yes, sir. The project that they submitted to me had the explanation which would require the use of somewhere between eight and nine thousand cubic feet per second to operate and naturally they would not install that, if they were not to use it.

951 Q. Why would it require that much to operate it?

A. Why would it require that much to operate it?

Q. Yes?

A. Because you cannot develop full power of the plant without using that much water.

Q. Do you have to use all the capacity of a hydro plant at all times?

A. No, sir; that is the point exactly.

Q. Of course, you don't personally know how the defendant is going to operate this plant, do you? They have never told you.

A. They made the statement at the hearing that I held that I spoke of yesterday.

Q. What hearing, and who made the statement?

A. I would like to have those papers. It was at the public hearing held by me [papers are handed to witness].

Q. Is it in evidence?

A. No, sir. You asked me a question and I am trying to answer it. At a public hearing held [witness refers to papers] in Roanoke, Virginia, January 13th, 1925, in the matter of the application of the Central Power Company for a preliminary permit under the Federal Power Act, to construct dams and power dams across New River and Reddies River in northwestern North Carolina and southwestern Virginia, as described in the application before H. M. Trippe, Major Corps of Engineers, U. S. Army, District Engineers. I held the hearing at that time.

By Mr. THOMPSON:

Q. Where?

A. At Roanoke, Virginia. Mr. Buck of the Applachian Electric Power Company was present at the hearing.

Q. Who was he?

A. Mr. Buck was engineer for the Appalachian Electric Power Company. In aswer to Mr. Thorp, who was interrogating Mr. Buck, we have the following: "By Mr. Thorp: I did not intend that to be a question. I will ask you—you now are starting up 952 and shutting down the boilers and engines at different times, depending upon the river flow; the river comes up and you take more load on your Hydro plant—if enabled to set a base load on your steam plant, which you would not have to vary, then you could more economically generate than you could by switching from high to low." To which Mr. Buck gave reply: "Yes, although at present our operating height is very high, eighty percent; we do that by carrying our peaks on water power." That was the testimony by Mr. Buck.

By Mr. JACKSON:

Q. They were not carrying that peak on the Radford project then?

A. No, sir.

Q. You don't mean to testify that the Radford project cannot be operated without producing waves of a magnitude such that those you have observed would have no relation to them. You don't deny the physical possibility of operating the Radford project so as to say that the waves will not be of a magnitude having no relation to those which you observed?

A. Not at all; no, sir.

Q. You spoke about those observations or experiments which were being made with reference to waves of existing power plants in New River, while you were District Engineer at Huntington. Had those observations or experiments been completed, when you left the Huntington District?

A. That series; yes, sir. I would not attempt to take them in the winter. We took them up as late as we could in the fall.

Q. You stated, in response to a hypothetical question, that if the flow of New River were entirely cut off at Radford it would impair navigation conditions on the Kanawha River?

A. Yes, sir.

953 Q. How long did you assume that the flow at Radford would be cut off?

A. I did not make any assumption.

Q. Suppose it were cut off for fifteen minutes, what would the result be?

A. Very small.

Q. You would not have any, would you?

A. It would not be noticeable; no, sir.

Q. When you made this answer, you did not have in mind any period of time that you assumed the flow at Radford would be totally cut off, did you?

A. I assumed it would be for an appreciable time; yes, sir.

Q. You assumed, didn't you, that it would be long enough, so that under low-water conditions, there would not be water enough in the Kanawha River to maintain the pools?

A. Even though it might interfere with navigation, if it did maintain the small pools.

Q. Can you give me any better statement of how long you considered the water being cut off at Radford, when you answered the question?

A. I considered an appreciable length of time.

Q. What would you regard as an appreciable length of time?

A. I don't believe I would care to make a statement. One minute would make a very slight effect, and one hour a larger effect.

Q. Is it your testimony that, if it was cut off one minute, it would have any effect on navigation at Kanawha River?

A. Not any appreciable effect; no, sir.

Q. Would it produce any effect that you could notice on the Kanawha?

A. No, sir.

Q. Would one hour produce any effect that you could notice?

954 A. It might be made by a recording gauge—it might not; it depends on the flow of the river at the time.

Q. You cannot say whether or not the difference could be detected by the recording gauge, could you?

A. You ask so many things. You did not give me the flow of the river.

Q. I am giving you everything you had when you answered the question.

A. The flow would be absolutely cut off.

Q. You made no limitations before, as I understand it?

A. I thought that was implied in the question—that the flow was to be absolutely cut off.

Q. That the flow was to be cut off absolutely for one hour?

A. I don't know that there was any definite time.

Q. The question that I ask you now has in it more information that you had when you answered the question before.

A. It will have an effect; yes, sir.

Q. And you think you will be able to measure that on the Kanawha River?

A. I am not sure I could. I answered that I conducted experiments with waves; so I take it, it would have—it would have some effect.

Q. And you did not arrive at any satisfactory conclusion?

A. No definite conclusion, except they did persist—the waves.

Q. What physical conditions on the Kanawha River did you assume, in answering that?

A. What do you mean?

Q. What kind of navigation channel—what navigation did you consider to be existing on the Kanawha River when you answered the question on direct examination?

A. I assumed commercial navigation.

955 Q. Did you assume slack water navigation?

A. Yes, sir.

Q. And what kind of dams did you assume to be in place?

A. The kind that are there at present.

Q. And that includes the two dams—London and Marmet?

A. Yes, sir.

Q. And it includes six old dams being replaced?

A. Yes, sir.

Q. And it was on the basis of that assumption that you answered the question?

A. Yes, sir.

Q. That is all.

Q. Colonel Trippe, at page 1924 and 1925 of the record you were asked "Have you ever been up New River?" and you answered "Yes, sir," and then proceeded to say "On two trips up to the mouth of the Wilson." I want to ask whether you made those trips up New River by boat?

A. No, sir.

Redirect examination by Mr. Thompson:

Q. Colonel Trippe, have you ever been to the site of the Radford dam?

A. Yes, sir.

Q. How many times?

A. At least three times.

(Exhibit 130, being letter dated July 1, 1927, from O. C. Merrill, Executive Secretary of the Federal Power Commission, to Curtis, Mallet-Prevost, Colt & Mosle, together with form of major license tendered Appalachian Electric Power Co., and exhibit 131, being letter dated May 5, 1931, from George Otis Smith to Appalachian Electric Power Co., % Curtis, Mallet-Prevost, Colt & Mosle, together with form of major license tendered defendant at that time, were offered in evidence.)

956 **EDWIN W. KRAMER**

Direct examination by Mr. McCLERNAN:

Q. What is your name?

A. Edwin W. Kramer.

Q. And what is your residence and occupation?

A. My residence is San Francisco. I am a Civil Engineer.

Q. What schooling did you have as an engineer, Mr. Kramer?

A. I went to Cornell University from 1902 to 1905 and received the degree of Civil Engineer.

Q. What was your engineering experience prior to the time you became employed by the Government?

A. Immediately after leaving Cornell I was employed on the New York State Barge Canal for six months. From that time I went to the employ of the Army at New London, Connecticut. I was there for two years building small steam plants and water plants and things of that nature. After that I entered the employ, in 1907, of the United States Forest Service.

Q. What experience in engineering have you had in the Forest Service?

A. I was with the United States Forest Service from 1908 until June 30th, 1936. In 1908 I reported on the safety of the Lake Como Dam of Bitter Root Valley Irrigation Company in Montana. I reported on the application of the Skagit River Power Company in Washington for a hydro project, capacity 300,000 horsepower. In 1909, I established a number of stream gauging stations in Montana and northern Idaho and made stream measurements in cooperation with the United States Geological Survey. In 1913 I reported on the application of the Montana Power Company for the Hebgen Reservoir at the head of the Madison River in Montana and a system of power plants on the Madison and Missouri Rivers with a total capacity of over 200,000 horsepower.

957 In 1915 I reported on application for power projects in Montana, Idaho and Washington, including Canyon Project on Clarke Fork, Columbia River, 118,000 horsepower, and Thompson Falls Project of Montana Power Company on the same stream in Montana, 40,000 horsepower.

In 1918 I prepared a description and estimate of all the waterpower in Montana which was published in the Electrical World.

In 1919 I reported on the application of the City of Seattle for a complete development of the Skagit River in Washington, something in the neighborhood of 300,000 horsepower.

In 1920 I was in California reporting on applications to the Federal Power Commission. I was employed by the Forest Service but the Forest Service was the field representative of the Federal Power Commission.

In 1921 I reported on the project of Nevada irrigation district on the Yuba River in California at a cost of $2,800,000.

In 1923 I reported on the application of Merced Irrigation District, a project of five and one-half million dollars.

In 1924 and 1925 I reported on application of the southern California Edison Company, Pacific Gas & Electric Company, and Southern Sierras Power Company in California, a total of over 500,000 horsepower. In every case it was necessary to make a complete study of the water resources involved, the power market and the economics of the situation.

In 1928 I represented the Federal Power Commission on the Federal State Board, appointed by President Hoover and Governor Young of California, to study the Central Valley Project, estimated at $165,000,000. Prior to the failure of the San Francisco dam in California in 1928, the Federal Government was almost the only authority passing on the safety of dams to be constructed or under construction on Government land. I had to analyze the stresses and inspect the construction of a
958 number of the largest dams in the world, including the Exchequer dam on the Merced River, 320 feet high, the Salt Springs dam on the Moklumne River, 332 feet high, the Pocoima and San Gabriel No. 1 Dam of the Los Angeles County Flood Control District, 372 and 381 feet high, respectively. I also passed on the plans of the Canyon Diablo Dam in the City of Seattle, which I believe is the highest dam in the world, depending entirely on arch action for its stability. In many cases it was found necessary to require changes in plans.

I was regional Engineer for the Forest Service in San Francisco for the California Region of the Forest Service until June 30th, 1936. Since that I am now Regional Director for the Western Region of the Federal Power Commission, including the Pacific Coast States and the adjoining states on the East.

Q. Where were you located in 1925, Mr. Kramer?

A. San Francisco.

Q. Will you tell us briefly what hydroelectric plants are and how they operate?

A. Hydroelectric plants are plants constructed on streams to convert the energy in the water into mechanical energy through their penstocks and turbines and then into electrical energy by

means of their generators. They may be constructed with a capacity equal to the dependable flow of the stream or they may be constructed to a greater capacity, for instance, the capacity necessary to use the average flow of the stream, or they may be constructed to a capacity to use a considerably larger flow. In the first case, where they would be constructed to use only the dependable flow, they may have small reservoirs which are capable of varying the flow throughout the day. Those reservoirs are ordinarily spoken of as ponds. These ponds may have sufficient capacity to vary the flow sufficiently to allow the plant to take care of the load on the system to which they are connected equivalent to the load factor on the system. The ponds may be larger
959 so that these plants can take just the peak off of the load on the system.

Q. What do you mean by a peak load?

A. Could I finish answering your question? On the streams where the plants are constructed to use the average flow, it is necessary for them to have larger reservoirs to save the water during the months of high flow for use during the months of low flow. They also may be operated to take care of the peaks on the system if the capacity of the turbines and generators is sufficient to use considerably more than the average flow.

Q. What do you mean by a peak load that you mentioned?

A. On the usual large system the lowest output of power may occur about five o'clock in the morning. At about seven o'clock the load begins to go up, due to people going to work and using more streetcars and for other reasons. At eight o'clock when more factories go on, the load goes up still further, approaching its maximum. The maximum will frequently occur about eleven o'clock. There will be some falling off between eleven and twelve, due to the noon hour, and in the afternoon there will be a second peak, probably not as high as the eleven A. M. peak or the peak occuring between eleven and twelve. The load will stay up fairly well until sometime after four o'clock, and then fall off until around six o'clock. When the lights go on in the evening there will be a third peak occurring probably at seven or seven-thirty and then the load will gradually go down. During the night it may be only three-fifths of what the peak was in the daytime.

Q. How are such loads usually carried by power plants such as we have in this part of the country? Perhaps I should say power systems instead of power plants.

Mr. Jackson. I interpose the objection that the witness has shown no qualifications to express an opinion as to how systems in this part of the country carry a peak load. His experience has only been on the Pacific Coast.

The Court. He may answer it.

Mr. Jackson. I note an exception.

A. In this part of the country most of the large power systems have both steam and hydro plants. The hydro plants usually are less than half the capacity of the total installation on the system.

In times of high flow when there is lots of water available, 960 it is most economical to get as much power as you can out of the hydro plants and carry the varying load on the steam plants. In times of low flow, in order to have sufficient capacity to carry their peaks, it is most economical to run the hydro plants on the varying load if there is sufficient installation and water available to carry the peak and to run the steam plants on the uniform base load as near as they can do it.

Q. Does the operation of a hydroelectric plant, in the manner you have described, to carry peak loads have any effect on the flow of the stream below the plant?

A. It causes the flow to vary throughout the day and also throughout the week if the plant is shut down on Saturdays and Sundays.

Q. Does that effect continue downstream?

A. It does on certain streams.

Q. We shall have occasion to talk about these effects, I think, Mr. Kramer, in rather technical language. Will you tell us what is meant by the crest of the wave and trough of the wave caused by the hydro plant operation?

A. As water is released from a hydroelectric plant in varying degrees—I can best describe that by selecting some point below the plant. For instance, we will say, ten miles below the plant. As the water passes that point it will rise and fall throughout the day. At some time in the day the water will be highest. At some time in the day it will be lowest. The rise and fall can be measured by a gauge. The gauge will give the rise and fall in feet. The highest reading on the gauge could be called the crest of the wave and the lowest reading on the gauge could be called the trough of the wave. The difference between the two could be called the amplitude of the wave expressed in feet. However, in studying waves better conclusions can be drawn in regard to them if these gauge heights are converted into stream flows, in which case the stream flow equivalent to the highest gauge reading would be the crest flow or the crest of the wave and, likewise, the stream flow corresponding to the lowest reading would be the trough of the wave. The amplitude then would be the difference between 961 the two stream flows and would be expressed in cubic feet per second and the flow in cubic feet per second. There is also another fact to consider and that is the average flow that occurs throughout the wave cycle. The amplitude of the crest of the wave, expressed in second feet or cubic feet per second, would be the difference between the average flow and the maximum flow. The amplitude of the trough would be the difference between the minimum flow and the average flow.

Q. What is meant by the period of a wave, Mr. Kramer, and the period of the crest and the period of the trough?

A. The period of the wave would be the time that the complete cycle of the wave occupied in passing a given point. Ordinarily in the waves that we are talking about it would be 24 hours or some time nearly 24 hours. The period of the crest would be the length of time that the flow is above the average flow. The period of the trough would be the length of time that the flow was below the average flow.

Q. Do you have any diagram or chart that would illustrate the explanation you have made?

A. I have.

(This chart was marked "Government Exhibit No. 132 for identification.")

Q. Mr. Kramer, I call your attention to the chart which is marked plate [illegible] diagram showing change in wave as it travels downstream, and which the reporter has marked for identification Government Exhibit No. 132. Is that the chart or diagram that you mentioned?

A. It is.

Q. What is the significance, Mr. Kramer, of the vertical lines that I see going all the way across the exhibit?

A. The vertical line is one hour.

Q. That is, the spaces between each pair of lines represent the lapse of time of an hour?

A. One hour.

Q. I notice a number of areas covered in blue and green on the exhibit. What do they indicate?

962 A. May I explain the exhibit just a little?

Mr. JACKSON. May I ask is this an exhibit to be offered in evidence or is it one that has been produced merely for illustrative purposes?

Mr. McCLERNAN. It is merely illustrative. We propose to have the testimony constitute the proof.

Mr. JACKSON. The point I am getting at, this exhibit is not intended to exhibit any condition upon any stream?

Mr. McCLERNAN. No; it is purely diagrammatic.

Mr. JACKSON. It is purely a hypothetical chart?

Mr. McCLERNAN. I don't think I would call it that but it is a diagrammatic representation of the phenomena.

Mr. JACKSON. The point is if it is supposed to illustrate the condition on any stream anywhere, I should like to know that.

Mr. McClernan. No; it doesn't illustrate any actual wave at any place.

Mr. Jackson. It doesn't represent any actual wave anywhere whatever?

Mr. McClernan. No.

The period between each two vertical lines represents one hour. The stream flows are represented by the height of these lines. For instance, the line at the top of the first square represents a stream flow of 9,000 cubic feet per second. The lower two squares are intended to represent a wave as it is released from a power plant. It is assumed that the flow will be increased from zero, which is represented by the bottom line of the entire diagram, to 9,000 second-feet which is represented by the top line of the first blue square to the left and also by the 9,000 second-feet on the second square which is at the same distance from the bottom of the diagram. Under the assumptions that this was drawn, the flow was allowed to continue at the rate of 9,000 cubic feet per second for six and one-third hours. The water was then completely shut off and kept shut off for seventeen and two-thirds hours and then increased again to 9,000 second-feet which was continued for six and one-third hours. I have one more thing here. The average flow was assumed to be 2,000 cubic feet of water per second which is represented by the second line from the bottom on which is written "Average flow 2,000 c. f. s." The amplitude of this wave would be 9,000 cubic feet per second which is the difference between zero and 9,000 cubic feet. The amplitude of the crest would be 7,000 cubic feet per second which is the difference between the average flow of 2,000 cubic feet and the maximum flow of 9,000 cubic feet. The amplitude of the trough would be the difference between zero and 2,000 cubic feet per second or 2,000 cubic feet per second. The period of the crest would be six and one-third hours, the period of the trough would be seventeen and two-thirds hours and the period of the wave twenty-four hours. Shall I go ahead with the explanation or do you want to ask me another question?

By Mr. McClernan:

Q. Mr. Kramer, you have been talking about the two
963 blue squares in the lowermost position of the chart. Will
you pass now to the colored areas next above them and
explain what they mean?

A. The second diagram from the bottom of the chart shows a heavy black line at the lower portion. This represents the water that has run into the stream below the point where the waves were generated. It is assumed here that this point downstream at a time ten hours later 1,000 cubic feet of water per second has flowed into the stream. The diagram is assuming the change in the wave that has occurred in that distance. I may say, in general, this is the way that waves below power plants behave, in different degrees, of course, due to the different characteristics of the stream, and the distance the water will flow in the time I have assumed, the difference in amplitude and difference in period.

The diagram, I think, in a general way shows how the waves behave as they continue downstream. At this point, ten hours below, the amplitude, at both the crest and the trough has remained the same.

May I say something else here that might be of interest? The waves we are studying here travel in the neighborhood of from three, to five, or six, or eight miles per hour, so that if this represented twenty-four hours [indicating]——[interrupted].

By Mr. JACKSON. I understand this is merely a technical description of wave action, and it isn't any particular wave we are studying. The witness may say for the purpose of this chart the explanation has assumed a hypothesis, but I don't want this to develop into any particular wave or any particular river.

By the COURT. I don't think he has done that yet.

A. (Continuing.) May I modify that and say that waves below power plant have speeds of this order. If we assume this wave just to get some idea of how fast it travels, travels at the rate of three miles per hour, in twenty-four hours it would have traveled seventy-two miles, and the length of the wave from trough to trough, or crest to crest, would be seventy-two miles. If you were standing on the banks of the stream, as on many streams, the rise and fall of the wave would be very gradual, probably imperceptible. It could, however, be measured by a staff gage or automatic gage. The rise and fall, however, would be a matter of feet, whereas the length of the wave is a matter of miles.

964 The green diagram or the green area in the second diagram from the bottom preceding the wave, the waves are traveling from right to left. The green area represents water that has preceded the crest of the wave slightly, and is beginning to get into the trough, also the green area following the square is lagging behind the crest and is beginning to fall back into the trough.

The amplitude, this far downstream—this ten hours below—is as much as it was when the wave started, the amplitude of the trough being 2,000 second-feet and the amplitude of the crest being ,000 second-feet.

The third diagram from the bottom represents the same wave at a time fourteen hours later than the second one, or twenty-four hours later than the first one.

It is assumed here that the stream flow that has run into the stream below the point where the waves were generated has increased to 4,000 cubic feet per second. This is shown by the heavy black line at the bottom of the third figure from the bottom.

The amplitude of the entire wave at this point has been assumed to have decreased to 4,500 cubic feet per second, the amplitude of the crest having decreased to 2,500 cubic feet per second. The amplitude of the trough, however, having remained the same.

On this assumption that is attributed to the fact that the period of the trough from start, or to start out with, was 17⅔ hours, whereas the period of the crest was only 6⅔ hours indicating the shutting off the water for a long time has caused the amplitude of the trough to persist at 100% whereas the short time the large flow was turned on has caused the crest to diminish from 7,000 cubic feet per second to 2,500 cubic feet per second.

The fourth diagram from the bottom is sixteen hours later than
the third one, or about forty hours later than the time the waves
were generated. It is assumed here that the wave has begun to
flatten out for the purpose of illustrating how waves flatten
965 out. I might say the area in red on each one of the diagrams
represents water that has—not water—but the change in
the area of the wave, the red area having left its position in the
traveling form of the wave and gone to the area shown in green.
That is true of each one of the diagrams.

It is assumed in the top diagram that the stream flow tributary below the wave has increased to 6,000 cubic feet per second. The amplitude of the wave is 3,500 second-feet under this assumption. The amplitude of the crest has decreased to 1,500 second-feet. The amplitude of the trough has decreased from 2,000 second-feet to 1,500. The amplitude of the crest and trough are now the same, however, the amplitude of the crest is one-sixth of what it was to start with. The amplitude of the trough is three fourths of what it was to start with, or 75%, that is due to the fact under the assumptions I have here and which I believe is largely true of all power waves on all streams, the longer the period of either the crest or trough the farther the wave will persist down stream, and the greater the degree will be of the persistence.

Q. Mr. Kramer, in your opinion is this Exhibit #132 a correct diagram'ic representation of the way the waves we have been discussing behave as they travel downstream?

A. It is the general way. It was necessary to make assumptions which might be different on different streams, but I think that in a general way the waves will follow the method I have shown on the diagram.

(Exhibit 132 offered in evidence.)

Q. What are the factors in the generation of waves of this sort that affect their persistence downstream?

A. I think the most important factor is the period of the trough and period of the crest, the longer the period the further the wave will persist downstream; this is ordinarily understood that the longer you shut the water off the farther downstream the effect will be noted, and the greater the degree and the longer you turn the larger flow on and keep it turned on, the farther its effect will be noted, and the greater the degree.

966 Q. Now, is the amplitude of the wave as important as the period?

A. I don't regard the amplitude as important as the period. It is, however, an important factor in the persistence of waves. The greater the amplitude of the trough or crest the greater the persistence of the trough and crest would be on the stream, other conditions being constant.

Q. What do you call the process of smoothing out of these waves as they go downstream?

A. I usually refer to it as dampening out.

Q. Is that term in common use?

A. I think so.

Q. What are the factors that cause the wave to be dampened out?

A. I regard the most important factor as any condition along the stream that will require the water to rise and fall the most, for a given change in stream flow. I think the reason of this is that for a certain rise in the flow the water along the front of the wave, that is the surface of the water in front of the wave, will be steeper and the slope of the water back of the wave flatten than the grade of the stream; the steep front will cause the wave to travel, the crest of the wave to travel, more rapidly and the flat back slope of the wave will cause the water to travel, more slowly, the water in the back of the wave lagging back to the trough.

Q. Were there any other factors you wanted to mention?

A. The factors on a stream.

Q. Any factors, to be particular, what characteristics of a stream bed affect the dampening of a wave?

A. Well a narrow type stream or a narrow stream, the water going through a narrow stream will rise or fall more for a given change in stream flow than it will on a wide, shallow stream;

967 therefore, for the same slope the wave would be more persistent on the wide, shallow stream than it would on the narrow, deeper stream for the same change in stream flow, and for the same average stream flow. The grade of the stream, I regard next in importance. It is my opinion that for grades with a fall of less than ten feet per mile the streams with slope of less

than ten feet a mile the difference is so little that factor is not as important as the width of the stream.

Other important characteristics are the slope of the banks, if they are nearly straight up and down for the height of the wave rises and falls, the banks will have little effect on the waves; in other words, the banks will not cause a dampening out of the waves; if, however, the banks are sloping for the distance that the water rises and falls, the water will spread out more over this greater area, the water being taken out of the crest to some extent and returned to the trough as the trough passes the point we are considering.

Q. Did you ever make any experiments in order to determine the persistence of power plant waves, such as these we have been discussing?

A. I have observed waves created by power plants, at my request.

Q. You mean some waves created by ordinary operation and others created intentionally?

A. Yes, sir; by unusual operation.

Q. Where did you do that?

A. The first case was on the Pit and Sacramento Rivers in California, in 1925.

Q. Any other instances?

A. Two other instances. On the Klamath River in California, 1927 and 1935. I have also studied the wave action on streams in general, but not to the extent they might be called experiments.

Q. Did you tell us where the Pit and Sacramento Rivers are?

968 A. In California.

Q. Don't the head waters lie in Oregon?

A. No; practically all the Pit and Sacramento Rivers are in California.

Q. Will you describe the method of making your observation on the Pit and Sacramento Rivers?

By Mr. Jackson. I object to that question. We are certainly not going to try, I assume, in this case the question of the conditions of the Pit and Sacramento Rivers, and it is improper and incompetent for this witness to testify as to that.

By the Court. Can't he describe conditions pertaining to this? [Question read.] I see no objection to describing the method.

By Mr. Jackson. How he goes about making observations of power waves on any river? I cannot help but feel a question asking for observations on the Pit and Sacramento Rivers must be designed to bring out the nature and result of experiments on those rivers.

By the Court. When it gets to that stage I will stop it.

By Mr. **Jackson**. I thought it was at that stage. May I have my exception noted?

By the **Court**. Yes, sir.

A. Pit #3 power plant of the Pacific Gas and Electric Company is located on the Pit River. I will have to get my data on that.

By Mr. **Jackson**. I suggest the method is not dependent on the location.

By Mr. **McClernan**. As I understand the witness is telling us where these various points are he made those observations.

By the **Court**. He is going to describe how he goes about making these tests.

By Mr. **Jackson**. I can't see it has any pertinency in this case unless and attempt to prove something observed that depended on the Pit and Sacramento Rivers.

By the **Court**. It might be illuminating to me to know how he goes about making such tests. It might have a good deal of effect on the importance I would attach to it.

By Mr. **Jackson**. I wonder if I have made my position clear? What I have in mind is this: It is often argued when a technical engineering question is involved before a Court, involving a particular river, or involving the valuation of a public utility, it would cast some light upon the question to find out the value of some other utility, or to find out what conditions were found to exist on some other river, but so far as I know it has been the universal determination of the Courts that that cannot be offered by an expert as part of his direct examination, and if admissible and competent for any purpose, it must be open to the adversary to explore what the conditions were on the other river or utility.

By the **Court**. He was asked if he ever made experiments along the lines of the chart and diagram he exhibited, and he said yes, and now he is asked to tell how he did it.

By Mr. **Jackson**. If I made myself clear I don't want to argue further about it.

A. Pit #3 power plant of the Pacific Gas and Electric Company is located on the Pit River at a point 53 miles above the junction with the Sacramento River. There is a reservoir a short distance above the power plant. We requested the power plant to vary the flow. At a point 15 miles below the power house, there is a regular gaging station of the U. S. Geological Survey which is called Big Bend; at a point 38 miles still further downstream is located the gaging station called Ydalpom; at a point 75 miles still further downstream is a gaging station called the Red Bluff gage. The total distance from the power house to the Red Bluff gage is 128 miles. The flow is observed at the power house by reading venturi meters, and the flow was also measured in the stream opposite the power house, the water that did not go through the turbines was measured by automatic gage. The flow was measured at each of the gaging stations I mentioned, and those flows converted into stream flows all platted on the same chart.

Q. You say you charted the results of your observations?

A. Yes, sir.

Q. Did you mean the size of the waves you used for the purpose of your observations there?

By Mr. JACKSON. I would like to show the same objection to that question.

By the COURT. Objection overruled.

By Mr. JACKSON. Exception noted.

A. The average flow at the Pit 3 power house was about 2,000 second-feet during the period of the experiment. The experiment was carried on from August 7th to August 12th,
969 1925, inclusive. On some days the flow was reduced 400
second-feet and this reduced flow maintained steadily for about six hours. This was the usual procedure. For the rest of the twenty-four hours or for eighteen hours the flow that had been stored was released and was added to the natural flow of the stream, causing waves with a trough period of about six hours, and a crest period of about eighteen hours. Some days the amplitude of the wave would be 400 second-feet. One day it was 600 second-feet, and one day 700 second-feet, but the periods were the same, and the average flow of the stream was about the same; the whole week it increased slightly from 1,900 second-feet, at the beginning of the week to about 2,100 second-feet at the end of the week. That is the normal flow.

By Mr. McCLERNAN. Now, I propose to ask the witness for the result of his experiments, and I understand we will have a discussion of the law on that.

By the COURT. Not unless you can show me where it is permissible. [Argument omitted.] I don't believe I can allow you to do that.

By Mr. McCLERNAN. Exception.

Q. Are you familiar with the New and Kanawha Rivers here in North Carolina, Virginia, and West Virginia?

A. I am.

Q. Did you examine them personally?

A. I did.

By the COURT:

Q. Do you know the fall in the New River for seventy-two or eighty miles below Radford?

A. Yes, sir.

Q. Do you know the similar fall in the Sacramento River?

970 A. Yes, sir.

Q. Do you know the average width of the New River from Radford down to Hinton?

A. I have seen the river in a number of places and measured the width of each of the bridges, but I don't think anyone would know the average width.

Q. Do you know the narrowest width of the river between Radford and Hinton?

A. I think the Narrows would probably be.

Q. Do you know what the width is there?

A. I have a picture and estimated width, I never measured it; no, sir.

Q. Do you know the widest place on New River between those points?

A. No, sir.

Q. Do you know the same data on the Sacramento River?

A. No, sir. I have measured the width of it at a number of places, but I could not tell you the average.

Q. You are speaking of the general characteristics of the stream?

A. Yes, sir.

Q. Not with any actual similarity of measurements or topographical features of the stream?

A. I think by looking over the streams carefully and getting the average fall and steepness of the banks and flows you are studying, that study of one stream will be indicative to a large extent of what will happen in another stream. I have not studied the streams to the extent, however, you question me.

Q. I believe you said also Mr. Kramer you conducted certain observations on the Klamath River?

A. Yes, sir.

Q. What was the method of making your observations there?

By Mr. Jackson. May we note our objection to that question, and I understand your Honor overruled it?

By the Court. Yes, sir.

By Mr. Jackson. And may our exception be noted?

By the Court. Yes. It is similar to the question I allowed him to answer.

A. There is a large reservoir on the Klamath River, above what is called the Copco Power Plant. The distance from the

971 Copco Power Plant to the ocean is 202 miles. Immediately below the Copco Power Plant on the Klamath River there is an automatic gage maintained by the Geological Survey, and another one at a point called Seiad; a distance of 64 miles below. It

is a staff gage. I made two experiments on the river, the first time with a staff gage and the second time an automatic gage. At a point 69 miles below Seiad is a point called Somes Bar. In my reports to the Federal Power Commission this was called Red Rock Island gage, Somes Bar and Red Rock Island being the same. At a point 65 miles below Somes Bar is a gage called Requa gage. It is about 4 or 5 miles from Requa to the ocean. The original operation of the Copco Power plant used to carry peak loads. Water is reduced very much on Saturday and Sunday, but the wave cycles for the remaining five days of the week are fairly uniform.

Q. Where did you observe the waves?

A. We observed the waves at each of the gaging stations I have mentioned, Copco gage, Somes Bar, Seiad and Requa gages, the lower gage being 198 miles below the point where the waves were generated.

Q. What size were the waves?

A. The ordinary procedure, other than Saturday and Sunday. This is normal operation of the plant and made no unusual operation at our request. About six o'clock in the morning the stream flow was increased from 700 second-feet to 2,200 second-feet. It was then increased farther throughout the day to 3,200 second-feet. I am describing one particular wave that was created on November 4, 1935 of the Copco plant. They have varied a little bit. One time during the day the wave reached a flow of 3,200 second-feet. At about eleven o'clock at night the flow was reduced, the flow had decreased during the day up to eleven o'clock at night, it had gradually decreased to 2,400 second-feet. It was then decreased to 500 second-feet, which flow continued until six o'clock the following morning.

972 Q. Did you give us the dates you made those observations?

A. The first observation was made on the Klamath River from February 12th to February 17, 1927. The second ones were made from November 2, to November 7, 1935.

Q. Was there any difference in the method of making your observations between the ones you made in 1927 and 1935?

A. The ones we made in 1927 went down only to the Somes Bar, the gage there, a distance of only 133 miles, whereas the ones in 1935 went down to the Requa gage, a distance of 198 miles.

Q. Did you communicate to the Federal Power Commission any results of your observations made on the Pit River in 1925?

A. They were reported to the Federal Power Commission within a few days after they were made and worked up.

Q. Did you report to them your observations made in your report on the Klamath River?

A. I did.

By Mr. McClernan. If your Honor please, for the purpose of the record, I now offer to prove by this witness the results of his observation made on the Klamath River, particularly with reference to the distances of the persistent down stream of the power waves observed.

By Mr. Jackson. We object.

By the Court. Do you want to introduce evidence contained on that diagram, or chart, showing the actual results of those experiments on those rivers?

By Mr. McClernan. Yes, sir.

By the Court. I sustain the objection.

By Mr. McClernan. We desire to except.

By the Court. Of course, you will understand, Mr. McClernan, that I am ruling out now evidence of specific experiments or happenings on these other streams. I am not undertaking to rule that this witness is not an expert on this subject, and cannot testify from his experience what can happen on those rivers. You understand that?

By Mr. McClernan. I understand that.

By Mr. Jackson. If your Honor please, Mr. McClernan wants to use certain blueprints at this stage which we have not fully checked. We have no doubt they are accurate, and we would like to stipulate we concede their authenticity subject to our right to check them and call his attention and the Court's attention to any errors, if there be any. In that way we will not delay Mr. McClernan.

By Mr. McClernan. They are the same as the blueprints that were identified by Mr. Derzulaitis.

By Mr. Jackson. They are only in part the same. They are only a part of those covered by Mr. Derzulaities' identification, but we are willing that they shall be used, subject to our finding any errors.

I am told that some of these blueprints you have produced, or at least the original tracings to be offered in evidence, have some pencil notes on them. It is understood that our stipulation does not extend to those pencil notes on them, and they are not offered for that purpose.

By Mr. McClernan. That is satisfactory.

Q. Mr. Kramer, I have here Government Exhibit 133, which is a blueprint entitled "Discharge, hydrograph wave study of New River, at Allisonia, Virginia, and which is dated in the lower left-hand corner, March 1930," and appears to run from March 11, 1930, to March 31, 1930.

By Mr. McClernan:

Q. Mr. Kramer, do you recognize it?

A. I do.

Q. I have here Government Exhibit marked for identification 134, which is a blueprint entitled: "Discharge, hydrograph wave study of New River at Eggleston, Virginia, March 11 to 31, 1930," which is dated in the lower left-hand corner, March 1930, and appears to run to March 31, 1930. Do you recognize that?

A. I do.

Q. I have here Government Exhibit No. 135, which is a blueprint entitled: "Discharge hydrograph wave study of New River at Glen Lyn, Virginia, March 12 to March 31, 1930." Do you recognize that?

A. I do.

973 Q. I have here Government Exhibit No. 136, which is a blue print entitled: "Discharge hydrograph wave study of New River, at Hinton, West Virginia," which is dated in the lower left-hand corner March 1930, and appears to cover from March 13, 1930, to March 31, 1930. Do you recognize that?

A. I do.

Q. I have here Government Exhibit No. 137, which is a blue print entitled: "Discharge hydrograph wave study New River at Caperton, West Virginia," which is dated in the lower left-hand corner March 1930, and appears to cover from March 12 to April 3, 1930. Do you recognize that?

A. I do.

Q. I call your attention to Government Exhibit 138, which is a blue print entitled: "Discharge hydrograph wave study New River at Damsite "A" near Radford, Virginia," which is dated in the lower left-hand corner March 1930, and appears to cover a period from March 11 to March 31. Do you recognize that?

A. I do.

Q. I call your attention to Government Exhibit 139, which is a blue print entitled: "Discharge hydrograph wave study of Kanawha River, at Kanawha Falls, West Virginia," which is dated in the lower left-hand corner March 1930, and appears to cover a period from March 12 to April 1, 1930. Do you recognize that?

A. I do.

Q. I call your attention to Government Exhibit No. 140, which is a blue print entitled: "Discharge hydrograph wave study of New River, at Ivanhoe, Virginia," which is dated in the lower left-hand corner March 1930, and appears to cover a period from March 12, 1930, to March 31, 1930, and possibly an hour into April 1, 1930. Do you recognize that?

A. I do.

974 Q. I call your attention to Government Exhibit No. 141, which is a blue print entitled "Discharge hydrograph wave study of Kanawha River, Lock No. 2, at Montgomery," which is dated in the lower left-hand corner March 1930, and appears to cover a period March 14 to March 31, and extending some distance into April 1, 1930. Do you recognize that?

A. I do.

(Exhibits 133, 134, 135, 136, 137, 138, 139, 140, and 141 offered in evidence.)

By Mr. McClernan:

Q. I notice that these exhibits are entitled: "Discharge hydrographs." Is there any particular reason from an engineering standpoint why the graphs should be made in terms of discharge rather than in terms of gauge heights?

A. Those hydrographs were made up at gauging stations along New and the upper end of Kanawha River, from gauge readings and rating curves that had been made by the U. S. Geological Survey. They were made under the supervision of Mr. Derzulaitis. The reason that they show stream flow in cubic feet per second instead of showing changes in gauge height along the river, is to show changes in the wave as it goes downstream. You can observe changes in the wave as it travels downstream, much better if you study it in streamflow rather than if you study it in gauge heights for the reason that when water passes a narrow section the water will rise and fall more for a certain change in flow than it will rise and fall when it passes a wide section. When you are attempting to study a wave by changes in gauge heights you may get a larger change in gauge reading in any stream, way downstream than you would at some intervening point along the stream, whereas the change in stream flow, or in other words, the amplitude of the wave expressed in stream flow usually is fairly continuous without any abrupt change. That is rather hard to understand.

Q. As a practical matter, what is the process of converting gauge height reading into stream-flow figure that the U. S. Geological Survey uses or rather when the U. S. Geological Survey establishes a gauging station on a stream?

975 A. The first step is to establish a gauge to record the height of water as it passes the station. They will then make discharge measurement with current meters at the same place by actually measuring the velocity of the water across the stream at a number of points and the depth of the water at the same time by measuring the depth and the velocity at each point they can compute the stream flow. They do that for various elevations of water on the gauge. When they have finished this they plat these points on a sheet of paper and draw a smooth curve as near as they

can through the points. Then by referring to the coordinates on the side of the paper for certain gauge readings they can tell with reasonable certainty there was a certain stream flow.

Q. You said you recognized all of these exhibits. Have you made use of them for any purposes?

A. I have used them first to compare them with computations I have made or with similar charts I have made myself at most of these points, not all of them, but I have made similar charts at Ivanhoe, Radford, Eggleston, Caperton, and Kanawha Falls, but not for as long a period. I picked out five or six days instead of continuing the chart for a whole month. The charts that I computed are almost identical with these. There was not enough difference, I don't believe, to be of any importance.

Q. From your study of these Exhibits, 133 to 141 inclusive, you were able to come to any conclusion concerning the wave effect which the exhibits show, if any, and the manner and distance which they traveled downstream?

A. May I describe the waters. Do you want me to answer the question that way?

Q. Answer it any way you think is correct.

A. These lines that go up and down on the exhibit show the flow in cubic feet, per second, at the various points.

By Mr. Jackson:

Q. Would you mind indicating the number of the exhibit you are pointing to, Mr. Kramer.

976 A. I was talking about all of them, but I will designate them hereafter.

By Mr. McClernan:

Q. Go ahead with your answer.

A. On all the charts, the figures at the left show stream flow in cubic feet per second. On this particular chart, Exhibit 140, which shows variations in stream flow at Ivanhoe, the lowest left-hand figure is one thousand cubic feet per second. The interval between each number is one thousand cubic feet, this is one thousand, two thousand, three thousand, on up to thirteen thousand. The numbers along the bottom of the exhibits are the dates, the first date on Exhibit 140 being March 12, and the dates are on there continuously up to and including March 31st. The end of each day is shown by the heavy line near the bottom of the curve, for instance, on March 14th, on Exhibit 140, the beginning of March 14th is indicated by a heavy line about two inches long, cutting across the curve. The end of March 14th is indicated by a similar line, about two inches long, cutting across the curve.

Noon for the day is ordinarily indicated by a dotted line. The very smallest intervals, in a horizontal direction, are one ur each.

By the WITNESS. I will now take up Government's Exhibit umber 140. This (indicating on chart) indicates the change in ream flow at Ivanhoe, Virginia, which is about 2½ miles below e Buck power plant. The Byllesby and Buck power plants e located on New River, the Byllsby power plant being the oper one of the two, and is located a few miles above the Buck ower plant. The Byllesby power plant has some pondage, hich is a term used for storage when used to regulate the flow om hour to hour and not from month to month, and I think the ndage capacity is 1,200 acre-feet, but the Buck power plant s a smaller pondage of 200 acre-feet. By means of these reservoirs and letting the water through the turbines and 7 also through the gates, they are able to get a varying stream flow as indicated on this chart, the point of measure-ent being only a few miles below the lower plant. This is fairly presentative of the flow immediately below the lower plant. here might be some small change, but not significant.

By Mr. McCLERNAN:

Q. What is the vertical scale there?

A. The vertical scale is 500 cubic feet per second for an inch. very small line in the vertical direction represents 50 cubic feet r second. That scale has been used on all of these Exhibits, both r the days and hours and change in flow in cubic feet per second. I would like to describe first—I have numbered these waves, be-nning with the wave on March 12, 1930, at the Ivanhoe plant, d making that Wave Number 1, and so on, numbering the waves, to and including the wave at 18.

By Mr. JACKSON:

Q. What is the date of Number 18?

A. At Ivanhoe, the peak of wave 18 occurred at eight o'clock at ght—that afternoon—in the evening of March 27th.

Q. Are those numbers that you put on the chart?

A. I put those numbers on myself in red on the chart—on the art those red numbers, numbering the waves.

By the WITNESS. The capacity of the pondage at the two plants s not sufficient to create waves at the crest for very long periods. other words, the reservoir would be emptied in a very short ne, if they attempted to create waves over long periods. For tance, waves with the amplitude as wave Number Four created Ivanhoe, March 15th, at its maximum reading was 6,052 feet; minimum reading for trough was 300 second-feet, approximately. The amplitude of that wave (referring to papers) was about 5,900 cubic feet per second. The change in stream flow was 5,900 cubic feet per second. The period——

By Mr. McCLERNAN. Stand back a little so that the Court can see the charts.

978 By the WITNESS. I will have to get close to them to see them myself. The period of the crest of that wave was about eight hours and the period of the trough was about sixteen hours.

By Mr. JACKSON:

Q. Which number is that?

A. It is wave No. 4. That type of wave had a greater amplitude of crest than most of the waves they produced. That is a type of wave with the trough and crest somewhat in the same proportion. The reason I refer to that wave particularly is for that reason. It was as persistent as any other wave I have to describe. Wave No. 13, while the flow varied from twelve thousand one hundred and fifty second feet to about two hundred fifty second feet——

By Mr. JACKSON (interrupting):

Q. What is the date of that wave?

A. March 24th, as shown on the chart; the time at the maximum flow, at the time the maximum flow was realized was only about one hour. The wave, itself, that is measured at the time at the point on the chart where the average flow of the cycle would be, was approximately two hours.

I would like to describe now that wave No. 4, as it showed at Lock No. 2—that is on Kanawha River a few miles below Kanawha Falls.

By Mr. JACKSON:

Q. Give the date of wave No. 4—when it was initiated.

A. March 15, 1930. I have traced these waves from point to point of use of all of these diagrams [indicating]. It would not be possible—it might be possible, but it would not be as certain of the wave, if you tried to take this chart, Exhibit No. 140, and then have gone immediately to Exhibit No. 141, but, with the use of the other exhibits, it is possible to identify the wave absolutely as it proceeds down. However, there is another point that enables you to identify the wave.

On March 19, as shown on Exhibit 140, you will note a number of lines up and down, between, as I have shown on chart wave 8 and wave 9. That same condition can be observed on
979 Exhibit 141 as occurring on March 18, although the small lines have smoothed down into a smoothed curve.

Q. What wave do you refer to as being observed March 18th, on Exhibit 141?

A. I am talking about Wave No. 8 now.

Q. Wave No. 8?

A. Yes, sir; I changed to Wave No. 8.

Q. What is the date of Wave No. 8?

A. March 19th, at Ivanhoe, March 19th and 20th.

Q. You say that you observed Lock No. 2 on March 18th.

A. (Witness refers to charts.) I guess I am wrong about that; this is March—between March 21st and 22nd.

Q. March 21st and 22nd?

A. Yes, sir. Referring back to Wave No. 4, the crest of that wave at Ivanhoe was about 6,124 second-feet. This may be different slightly from the figures on the chart. They are figures that I computed independently from the hydrograph and the gauges filed by Mr. Derzulaitis and Mr. Kessler here before these exhibits were filed. I think they are in substantial agreement. The flow at the crest was 6,124 second-feet; the flow at trough was 258 second-feet; the amplitude of the wave was 5,866 second-feet. The average flow——

By Mr. JACKSON (interrupting):

Was that 5,866 second-feet?

A. Yes, sir; the average flow for the wave was 2,366 second-feet; the amplitude of the crest was 3,758 second-feet; and the amplitude of the trough was 2,108 second-feet.

By Mr. JACKSON:

Q. I didn't get your statement as to the figure for the trough—2 and some feet.

A. The amplitude of the trough was 2,108 feet—second-feet.

Q. No; the second figure—your said the crest of the wave was 6,124, at Ivanhoe and the trough of the wave at Ivanhoe, didn't you?

A. Yes, sir; the trough is 258 second-feet. I will now 980 give the periods more accurately than I would be able to read it here, because the charts that I prepared are much longer to the vertical scale. The period of crest was six hours; the period of trough was seventeen hours. That wave took fifty-two and a half hours to travel to Lock No. 2.

Q. It would take how many?

A. It would take fifty-two and a half hours.

Q. That is from Ivanhoe or from the plant?

A. From Ivanhoe. We have No. 4 on Exhibit 141, as shown to the crest on the afternoon of March 17th. The trough of the wave occurred about noon on March 17th, and the crest roughly about six o'clock that afternoon. These figures that we have in regard to the time of travel might not agree exactly when I read them here, because it is difficult to read them within an hour on this blue print.

At Lock No. 2, the crest of the wave read 14,200 second-feet; the trough of the wave read 12,150 second-feet, making an amplitude of the wave 2,050 second-feet.

I might say that Ivanhoe is located 192 miles above the mouth of New River, and this plant here is located—I mean this Lock No. 2, is located thirteen miles below the mouth of New River, making the whole distance two hundred and five or two hundred and six miles.

By Mr. **Jackson**:

Q. I don't understand that. I thought you said Lock No. 2 was one hundred and ninety-two—Oh, I beg your pardon, you said Ivanhoe—above the mouth of New River. I beg your pardon.

A. Yes, sir; the whole distance is about two hundred and five miles. I should state here also that the Radford Plant is located forty-six miles below Ivanhoe.

The amplitude of the crest of the wave at Lock No. 2 was 1,322 second-feet. The amplitude of the trough was 728 feet.

By Mr. **McClernan**:

Q. Didn't you give us figures on that already?

A. No, sir; not about Lock No. 2. I gave the amplitude 981 of the wave, but not of the crest of the trough. The amplitude of the wave was thirty-five percent of the amplitude at Ivanhoe, a point forty-six miles above Radford. The amplitude of the trough—no; I will read the crest first—the amplitude of the crest was also thirty-five percent of the amplitude of the wave at Ivanhoe. The amplitude of the wave; yes—I read that.

The amplitude of the trough was thirty-four percent of the amplitude at Ivanhoe. This wave was also observed at Radford, as shown by Exhibit 138. The percentages applied back to Radford instead of at Ivanhoe are for the wave which is forty-two percent; for the crest, forty-five percent, and for the trough—no; I am reading wrong, I beg your pardon. I have only the amplitude for the wave at Radford and not the crest and the trough. I would like to withdraw the last figure I put in.

By the **Court**:

Q. What was that?

A. Forty-two percent.

Q. Forty-two percent of the amplitude at Ivanhoe?

A. At Radford; the amplitude at Lock No. 2 was forty-two percent of the amplitude at Radford, or thirty-five percent of the ampltiude at Ivanhoe. The wave had decreased some going from Ivanhoe to Radford.

By Mr. **Jackson**:

Q. You said thirty-five.

A. I said thirty-five, that is right; yes, sir. I would like to have this exhibit placed on the pedestal. [The exhibit is arranged.] Exhibit No. 138 shows variations of stream flow at what is called Damsite A, at Radford, Virginia.

Q. Exhibit No. 138?

A. Yes, sir.

By the **Court**:

Q. That is the site of the proposed dam, is it?

A. I think it is approximately the site of the proposed dam; yes, sir.

By Mr. **McClernan**:

Q. But not the same dam involved in this suit?

982 A. That is within a few miles of it, and practically the same site so far as this study is concerned. Wave 4 reached Radford Damsite A about—the peak, from about midnight between March 15th and March 16th, the trough—in this case I am describing the trough that precedes the wave—it reached there about 5 P. M., March 15th.

By Mr. **Jackson**:

Q. Change your trough time and see if you have made a mistake in reading that chart. It is hard to read, it is so dim.

A. [Witness examines chart.] About 7:00 P. M., or 8:00 P. M., March, 15th.

Q. Yes, sir.

A. Yes, sir; did I state that.

Q. You said midnight.

A. No; I said the crest was midnight.

Q. I beg your pardon.

A. March 15th and 16th.

Q. And this should be 7:00 or 8:00 P. M., for the trough that preceded the crest?

A. Yes, sir; the maximum stream flow at Radford was 6,450 second-feet and the minimum flow 1,550 second-feet.

Q. The maximum was what?

A. The maximum was 6,450 second-feet, giving an amplitude of 4,900 second-feet. You can observe by the chart the mean flow was 3,170 second-feet of the cycle of the wave.

Q. Does that appear on the chart?

A. No; it does not. That is computed, and as I stated, I am reading the figures that I computed from the gauge heights and hydrographs, as they were exhibits from which these are platted under the direction of Mr. Derzulaitis, and the figures may be slightly different, because in interpreting gauge heights from rating curves, it is easy to make an error of a hundred second-feet in some cases.

The period of the crest was nine hours, and the period of the trough fifteen hours; but the length of time that the high
983 flow of 6,450 second-feet occurred was very short. As shown by the chart, it was for some time less than one hour, and even that—a crest of that short duration, the percentages that I have stated, obtained.

By Mr. McClernan:

Q. Now, Mr. Kramer, are you familiar with the plans of the proposed Radford project which were filed by the defendant with the Federal Power Commission in 1930 or 1931 and which are in evidence here somewhere? Have you examined them?

A. Yes; I have.

Q. I hand you Government Exhibit 90–A. Are those the plans to which you referred?

A. Yes; they are.

Q. It is admitted in the answer to the bill of complaint that the dam proposed to be erected will have 100,000 acre-feet of utilizable storage with a draw-down of 27 feet and that its turbines will have a capacity of 9,000 cubic feet per second. There has been evidence here to the effect that the average flow of the river at the Radford dam site over a 28-year period was 3,211 cubic feet per second. Upon the basis of that information and the blueprints, Exhibits 133 to 141, which you have been discussing, can you tell us what differences, if any, there will be between waves which could be created by the operation of the Radford project and the waves which were created by the operation of the Buck and Byllesby dams in 1930?

A. The capacity of the reservoir with 27,000 acre-feet storage——

Q. 100,000 acre-feet storage?

A. 100,000 acre-feet storage with a 27-foot draw-down——

By the Court:

Q. What do you mean by a 27-foot draw-down? That is the water in the reservoir can be lowered that much in the operation of the plant?

A. It can be lowered 27 feet and make available 100,000 acre-feet storage.

984 By Mr. McClernan:

Q. Can you explain that to the court a little more explicitly?

A. The reservoir has an area of somewhere around 4,600 acres. By drawing the water down 27 feet they can make available for use 100,000 acre-feet of water through their power plant.

By the COURT:

Q. Supposing the reservoir is filled to the height of the dam, then by drawing it down 27 feet they will have used or had the use of 100,000 acre-feet of water?

A. That is right.

Q. Why do you use a figure of 27 feet draw-down?

A. That figure is the answer of the defendant as an agreed figure. In other words, if they drew down 27 feet they would get 100,000 acre-feet of storage. It was also used at a hearing in Virginia before the Corporation Commission, given to that Commission by Col. Scheidenhelm as the draw-down on the reservoir.

Q. (The question was read as follows: It is admitted in the answer to the bill of complaint that the dam proposed to be erected will have 100,000 acre-feet of utilizable storage with a draw-down of 27 feet and that its turbines will have a capacity of 9,000 cubic feet per second. There has been in evidence here to the effect that the average flow of the river at the Radford dam site over a 28-year period was 3,211 cubic feet per second. Upon the basis of that information and the blue prints, Exhibits 133 to 141, which you have been discussing, can you tell us what differences, if any, there will be between waves which could be created by the operation of the Radford project and the waves which were created by the operation of the Buck and Byllesby dams in 1930?)

A. It would be possible, in order to take the peak off the load of the Appalachian Electric Power Company to shut down the plant Friday night and start it Monday morning about seven o'clock, shutting down probably at ten o'clock Friday night, letting no flow go out for a period of about 57 hours. It was not possible to do that at the Buck and Byllesby plants because the
reservoirs were not great enough to cut off the flow very
985 long. The flow that was occurring there was such that
it would fill the reservoirs up in such less time than that,
probably a matter of four or five hours if the water was shut off completely. The Radford plant would be capable of releasing and using 9,000 cubic feet of water per second and letting that out for a period long enough to take care of their peaks, so instead of the crest of the wave, as shown at Ivanhoe, the very point of the crest, only lasting for an hour or so, the 9,000 second-feet flow would last for some ten or eleven hours. The waves of that type would be much more persistent downstream, both in magnitude and in distance.

By Mr. McClernan:

Q. You have testified concerning the importance of the period of the trough and period of the crest of the wave. Would that feature enter into the difference between the Radford waves you have been discussing and the Buck and Byllesby waves?

A. It would; yes.

Q. In what way?

A. The way I have just explained, that the period of the trough over a week end could be from probably ten or eleven P. M., Friday, until seven A. M., Monday, instead of some eight or eleven hours as shown on these charts.

Q. And would that difference affect the distance to which the effects would persist downstream?

A. It would.

Q. In what way?

A. The wave would persist to a much greater distance and to a much greater degree.

Q. You have just said, Mr. Kramer, I believe, that the Radford reservoir, if constructed according to plans, could shut off the entire flow of the river for a period of some 57 hours. Do you mean that that would be true at any time of the year?

A. Yes. Of course, you could shut it off for longer period, but I was describing the possible method of operating it as a pond.

In addition to that, they could store water from months of
986 high flow to months of low flow, but I was describing the
daily and weekly waves that might be created.

Q. What I was getting at, would it be possible in periods of very high flow of the stream to shut it off for that long?

A. I have to assume some flow. It could be shut off, if it was empty, until it was full. That would be for 100,000 acre feet the equivalent of about 1,660 second-feet flow per month, so it could be shut down in that proportion to fill it up.

Q. You have mentioned the load which the Appalachian electric Power Company system carries. Do you know the nature of that load?

A. I do.

Q. Where did you get your information?

A. I got it from the data filed with the Federal Power Commission in the National Power Survey recently conducted by the Commission, filed by the Appalachian Electric Power Company.

Q. You say recently. When was that?

A. Well, for the last several years, particularly in 1935.

Q. Have you depicted that load curve in any manner, or any diagram or chart?

A. I have for three days.

(Exhibit 142 offered in evidence.)

By Mr. **McClernan**:

Q. I call your attention to Government Exhibit 142 which is entitled "System Load Curve, Appalachian Electric Power Company and American Gas & Electric Company," and bears dates—week-day, October 28th, 1935, Saturday, November 2nd, 1935, and Sunday, November 3rd, 1935. Is that the diagram, or chart, to which you referred?

A. It is.

Q. Does it correctly represent the information which you found in this report made by the Appalachian Electric Power Company?

A. It does.

Q. Mr. Kramer, will you explain briefly what the various 987 figures and lines on the chart mean?

A. The chart is intended to show the load on the entire system of the Appalachian Electric Power Company. The numbers on the left of the chart show the load in kilowatts. The figures at the bottom of the chart show the hours of the day, beginning at midnight on one and ending at midnight the following day.

By Mr. **Jackson**:

Q. Your heading confuses me in view of your statement. It says "Appalachian Electric Power Company and American Gas & Electric Company." Is that the same thing as you have used it in your chart?

A. It is given as it was filed with the Commission but it would be more correct to leave the American Gas & Electric Company out of it because it is a part of the system operated by the Appalachian Electric Power Company.

Q. You have attempted to take only that part of the American Gas & Electric Company system which is operated by the Appalachian Electric Power Company?

A. I took it as it was given in the file.

Q. You understood it to be only figures for the Appalachian Electric Power Company?

A. I verified it by other figures that were in the same document.

Q. I wanted to be sure what it purported to show?

A. This indicates that about 5 A. M. on October 28, 1935, the load on the system was 115,000 kilowatts. It increased a little after 9 A. M. to 260,000 kilowatts with an overall peak of 271,000 kilowatts occurring between 10 and 11 A. M. There was a trough or depression in the curve about 5 P. M. in the afternoon, decreasing to about 210,000 kilowatts and the load went up about 6 P. M. to 240,000 kilowatts. From 10 P. M. at 200,000 kilowatts it decreased and was less than that for the remainder of the day.

On Saturday, November 2nd, 1935, at no time during the day did the load exceed 190,000 kilowatts. On Sunday, November 3rd, 1935, at no time during the day did the load exceed 140,000 kilowatts.

By Mr. **Jackson**:

Q. You misread the last one.

988 A. I should say about 170,000 kilowatts.

By Mr. **McClernan**:

Q. Mr. Kramer, why did you select those particular dates?

A. They were the dates filed as representative of 1935, weekdays and Saturdays and Sundays.

Q. They were selected by the Appalachian Electric Power Company and not by you; is that right?

A. That is right.

989

AVOWAL

Mr. **McClernan**. Your Honor will recall there was some discussion yesterday concerning the observations made by Mr. Kramer on the Pitt, Sacramento and Klamath Rivers. I am not satisfied with the record I made and, for the sake of the record, I would like to make some offers of proof.

The **Court**. Dictate into the record what you propose to do.

Mr. **McClernan**. The Government now offers to prove by the witness on the stand that as a result of his observations on the Pitt and Sacramento Rivers in 1925, he found that waves created at the Pitt-3 Power plant, already mentioned in the witness' testimony, persisted below the point of generation to a substantial degree for a distance of 128 miles, namely to the Red Bluff Gage, and further offers to prove by the same witness that while the Pitt and Sacramento Rivers are not in every respect comparable to the New and Kanawha Rivers, there are substantial stretches in the Pitt and Sacramento Rivers that are substantially comparable to like substantial stretches in the New and Kanawha Rivers and sufficiently so to enable an experienced hydraulic engineer to form a reliable opinion from observations such as were made by this witness on the Pitt and Sacramento concerning what would be the distance and degree of persistence of similar waves on the New and Kanawha Rivers.

Mr. **Jackson**. We object, of course, to the offer of proof.

The **Court**. The court will permit the witness, out of his experience and observations, to express his opinion as to conditions that exist in New River and the Kanawha as to what are referred to here as the waves, but I do not think it permissible that

990 the actual data relating to the other rivers should be introduced as evidence of what will occur on the New River

unless very accurate and close comparison is shown between the topographical features of the New River with the others.

Mr. McClernan. I understand the record may show our exception.

The Court. So far as your offer is to develop the opinion of this witness as to what will happen on the New River, the court will permit that to be done, but that is not to be proven by actual data as to what did occur on the other rivers.

Mr. McClernan. I understood your Honor's views but I would like to get these in the record. The Government offers to prove by the witness on the stand that as a result of his observations on the Klamath River in 1927, he found that the waves created at the Copoco Power Plant, located on the Klamath River about 198 miles above its mouth, already mentioned in the witness' testimony, persisted below the point of generation to a substantial degree, for a distance of 133 miles, namely to the Somes Bar Gage, and further offers to prove by the same witness that while the Klamath River is not in every respect comparable to the New and Kanawha Rivers, there are substantial stretches in the Klamath River that are substantially comparable to like substantial stretches in the New and Kanawha Rivers and sufficiently so to enable a hydraulic engineer to form a reliable opinion from observations such as were made by this witness on the Klamath River concerning what would be the distance and degree of persistence of similar waves on the New and Kanawha Rivers.

Mr. Jackson. We object to the offer of proof as an offer to prove incompetent, irrelevant and immaterial evidence and an attempt to bring in collateral issues.

991. The Court. The comment which the court made a few moments ago in regard to the previous offer will stand as to this one.

Mr. McClernan. And the record will show our exception. The Government now offers to prove by the witness on the stand that as the result of his observations on the Klamath River in 1935, he found that the waves created at the Copco Power Plant located on the Klamath River about 198 miles above its mouth, already mentioned in the witness' testimony, persisted below the point of generation to a substantial degree for a distance of 198 miles, namely to the Requa Gage and further offers to prove by the same witness that while the Klamath River is not in every respect comparable to the New and Kanawha Rivers, there are substantial stretches in the Klamath River that are substantially comparable to like substantial stretches in the New and Kanawha Rivers and sufficiently so as to enable a hydraulic engineer to form a reliable opinion from observations such as were made by this witness on the Klamath River concerning what would be the distance and degree of persistence of similar waves on the New and Kanawha Rivers.

Mr. JACKSON. The same objection.

The COURT. The ruling of the court is the same as in regard to the previous offers.

Mr. McCLERNAN. And may the record show our exception?

By Mr. McCLERNAN:

Q. Mr. Kramer, you recall yesterday we were talking about the extent to which the Radford dam, as proposed to be constructed, could shut off the entire flow of the river at that point, and my recollection is that you said that at any time the dam could shut off the entire flow of the river for as long as a month. Do you wish to make any correction in that statement? 992

A. Yes. If I made that statement, it is not correct. It could not shut the river off for a month in times of high flow. In times of low flow it could shut the river off completely for a month if the reservoir was drawn down the 27 feet at the beginning of the month. For instance, if the stream flow was 1600 second-feet for the mouth and the reservoir was drawn down 27 feet, they could shut the water off completely for one month, because that is about the capacity of the reservoir for the 27-foot draw-down, expressed in second-feet months instead of second-feet.

Q. I believe at the time of adjournment we were discussing Government Exhibit No. 142, and you were about to compare the loads as shown for the Sunday with the loads as shown for a weekday?

A. Yes.

Q. Will you state briefly what the difference is between the weekday load and the Saturday and Sunday load?

A. The weekday load from 7 A. M. to 10 P. M. is above 200,000 kilowatts. From 10 P. M. to midnight and from midnight to 7 A. M. it is below 200,000 kilowatts. For all times on Saturdays and Sundays it is below 200,000 kilowatts.

Q. Are you familiar with the installation, both steam and hydro, of the Appalachian Electric Power Company?

A. I am.

Q. What is the steam installation?

A. 340,000 kilowatts approximately.

Q. And the hydro installation?

A. 74,000 approximately.

Q. Do you wish to refresh your memory on that last figure?

A. No; that is the correct figure.

Q. Does that include the London and Marmet plants?

A. Yes; that includes the London and Marmet plants.

993 Q. Would the hydro capacity in all of these plants be available in times of low flow in the stream?

A. It would not.

Q. Why is that?

A. The ability of the plants to use water is greater than the amount of water available in times of low flow. The plants do not have large storage capacities such as the Radford plant, so that they could use a little more than the low flow. The Buck and Byllesby plants and the London pool have a small capacity so that they will be able to carry some of the peak, but not anywhere near as much in proportion to the capacity as could be carried by the proposed Radford plant.

Q. From these facts concerning the type of load which you have explained to us, and the comparative steam and hydro installations, can you draw any conclusion as to what will be the most economical method of operating the steam and hydro plants?

A. It will be most economical in times of low flow to carry the peaks at the Radford plant, as much of the peak as possible, and to carry the base load, as much as possible, on the steam plants. In times of high flow the reverse would be true. The Radford plant would generate as many kilowatts as it could with the water available and the peak loads which would be smaller would be carried on the steam plants.

Q. Do your conclusions agree with the plans which the company has filed in connection with its application for a license and subsequently?

Mr. Jackson. I object to that question. If the plans are in evidence before the court, they will speak for themselves and the conclusions can be compared. If they are not, I think they should be.

Mr. McClernan. The question is probably inaptly phrased, but insofar as Mr. Jackson's objection is concerned, I submit the interpretation of the plans is a matter for an expert.

The Court. I think that is true. Are the plans before the court?

Mr. McClernan. Yes.

Mr. Jackson. Are there any operating plans before the court, Mr. McClernan?

The Court. What I meant by the plans was the blue print drawings relating to the structure and whether or not the witness has examined them and knows what is proposed to be done there.

Mr. McClernan. My recollection it was developed yesterday that he had examined them but we can go over it again very quickly.

The Court. I think that is the subject of expert testimony.

Mr. Jackson. The basis of my objection is not that the witness doesn't know what the physical structures are, but the question calls for a statement as to whether the opinion expressed by the witness as to a possible method of operation of this system coincides with the plans filed by the defendant and there are no operating plans filed by the defendant, and it is manifestly improper.

The COURT. Mr. McClernan says he thought possibly the question was inaptly phrased, but you can ask him again. What is it you want to develop?

By Mr. McCLERNAN:

Q. Mr. Kramer, I show you Government Exhibit No. 90-A which purports to contain, among other exhibits, certain plans for the construction of the proposed Radford dam, dated upon various dates. Have you examined that exhibit?

A. Yes; I have.

994 Q. From the plans for construction of the dam, which are contained in the exhibit, are you able to draw any conclusions concerning the manner in which the plant will be operated?

Mr. JACKSON. I object to that question because it appears on the face of Exhibit No. 90-A that there is nothing as to how it would be operated. If the question was changed to read as to how it could be operated, how the physical structures shown on Exhibit 90-A could be operated, I have no objection to it, but there is nothing in Exhibit 90-A as a basis for a question as to how it would be operated.

The COURT. I expect you are right about that. It might not be operated at all, as far as that is concerned.

Mr. JACKSON. Or it might be operated in a variety of ways. I think you had better phrase your question to ask how it could be operated.

By Mr. McCLERNAN:

Q. Mr. Kramer, from your examination of that exhibit, particularly the plans for construction of the dam, are you able to draw any conclusions concerning the manner in which the plant will be operated if it were operated to the best economical advantage of the defendant?

Mr. JACKSON. I object to that because I think it should still read how it could be operated.

The COURT. I think that question is proper.

Mr. JACKSON. Exception noted.

A. It is necessary to also consider the defendant's answer and this load curve and other data to draw that conclusion.

By Mr. McCLERNAN:

Q. Upon the basis of the construction plans contained in Exhibit 90-A and the information concerning the load which you have given us and the admissions in the defendant's answer concerning the utilizable storage in the pool and the hydraulic capacity of the turbines, are you able to draw any conclusions concerning the manner in which the plant would be operated if it were operated to the best economical advantage of the defendant?

Mr. JACKSON. May the record show our same objection to the repetition of the question, the ruling and the exception?

The COURT. Yes.

A. It is my opinion that it would be most economical to operate the plant in times of low flow to carry peak loads up to the extent of its capacity with the varying stream flow. I have this opinion for the reason that the plant can use 9,000 cubic feet of water per second which is only available less than 4 percent of the time. It would, therefore, be uneconomical to have that installation and only use it to its full capacity 4 percent of the time.

By Mr. MCCLERNAN:

Q. How can it be used for a greater percent of the time?

A. By operating it as a peak plant.

Q. By means of——

A. Storing water over night, using it in the daytime, storing water over Saturdays and Sundays when the load is low and using it throughout the remainder of the week in the daytime when the load is high.

995 By the COURT:

Q. What is the generating capacity of that plant?

A. About 70,000 kilowatts.

By Mr. MCCLERNAN:

Q. Mr. Kramer, as a matter of figures, what is the relation between a kilowatt and a horsepower?

Mr. JACKSON. That is, of course, dependent upon water as to what the capacity of the plant is.

The COURT. What I meant was its maximum capacity or rather what power would be developed at that plant by the use of the 9,000 cubic feet per second.

A. About 70,000 kilowatts—possibly a little more if the efficiency is a little higher than the efficiency I used, but that answer is approximately correct.

By Mr. CLERNAN:

Q. What would that be in terms of horsepower, Mr. Kramer?

A. I would have to figure it out. It is somewhere around 100,000 horsepower.

Q. Do you know the relationship between a kilowatt and a horsepower?

A. A kilowatt is about three-fourths of a horsepower. No; I said that wrong. A horsepower is about three-fourths of a kilowatt.

Q. What is a kilowatt hour?

A. A kilowatt hour is the energy that a kilowatt will generate if operating for one hour.

Q. Referring again to steam installations, is there any particular reason why a steam plant could not be operated as well to carry a varying load as to carrying a uniform load?

A. An efficient steam plant can turn out kilowatts cheaper operating on a base load than it can on a varying load.

Q. Why?

A. It takes a certain number of B. t. u.'s or, you might say, pounds of coal or barrels of oil or a thousand cubic feet of gas—whatever you are using for fuel—to keep the boilers and steam turbines warmed up. In addition to that, it takes a certain number of pounds of coal to generate each kilowatt hour that the plant turns out. The more kilowatt hours you turn out, the less amount of coal you will use per kilowatt hour or whatever other kind of fuel you may be using.

996 By Mr. McClernan:

Q. Assuming that construction and that stream flow, would the defendant, as a matter of meeting its load curve, find it necessary to provide any additional installation?

A. I will have to explain that answer. You had an assumption there of a flow of 2,000 second-feet?

Q. Yes; and that the plant was using only that flow?

A. With a flow of 2,000 second-feet, if the plant uses that flow uniformly, it can only generate about 15,000 kilowatts. If it stored water over Saturday and Sunday and operated on the peak of that load curve shown for the weekday, October 28th, it could carry 62,000 kilowatts. It would take the top 62,000 kilowatts off the load curve. The peak there shows 271,000 kilowatts. That would mean there would be 209,000 kilowatts to be carried by other plants whereas if the plant only generated 15,000 kilowatts, it would mean 256,000 kilowatts would have to be provided for elsewhere. This is true during the period that a flow of 2,000 second-feet of water was flowing. There are years when this amount of water is not flowing for a number of months. These years occur, or have occurred in about the last twenty-year period, a little over half the time; that is, in the last twenty year period there are probably eleven years that by drawing down the storage in the reservoir they could not have provided 2,000 second-feet of water. They would have emptied the reservoir before the end of the dry period. That would mean that they would have to have a steam plant, if they operated the plant as I am describing it to carry this 62,000 kilo-

997 watts of the load for a short period, approximately one year out of two. This could be done by an inefficient steam plant that had become somewhat obsolete for the reason that it would be operated a very short time, approximately every other year, whereas if they operated the plant on a base load, carrying only 15,000 kilowatts with the 2,000 second-feet, it would not be economical to run such an inefficient steam plant. It would be necessary or it would be more economical to build a new efficient steam plant, so that explanation, I think, gives the answer that it would save them from providing new, more efficient, installation.

Q. If the Radford plant were operated to carry peak loads as you have described, what would be the result upon the stream flow below the dam?

A. In times of low flow the streams would vary from zero or from nearly zero to 9,000 cubic feet of water per second. If the water was shut off over Saturday and Sunday as I have described, it is my opinion that this shut-off, in other words, reduction from the average flow, would be 75 percent effective at the mouth of the Kanawha River, about 85 percent effective at the Kanawha Falls which is approximately at the head of navigation on the Kanawha River. It is my opinion that the depths along New River would be reduced below what they would have been had the river run at its normal flow for an amount varying from about $\frac{9}{10}$ of a foot at Kanawha Falls to 1.7 feet at Eggleston. It is my opinion that the total variation in depth, that is between the lowest depth and the highest depth as the waves pass, would vary from about 2 feet at Kanawha Falls to about 4 feet at Eggleston.

Q. Mr. Kramer, assuming a flow of 2,000 cubic feet per second at the Radford dam site and the dam constructed as has been discussed and that this flow is entirely cut off for a period
998 of 57 hours, to what extent, in your opinion, would this reduction in volume of flow persist to the mouth of the Kanawha River?

A. I answered that in the last question, 75 percent.

Q. Did you say to the mouth of the Kanawha River?

A. Yes.

Q. What would that be in terms of second feet?

A. 1,500 second-feet.

Q. If such a flow, or a flow of 1,500 second-feet, were cut off in such a manner for a period of a week, to what extent would the reduction in volume of flow persist to the mouth of the Kanawha?

A. The longer it is shut off, the more nearly it approaches 100 percent reduction. I don't believe it would quite be 100 percent, but it would approach it so closely that I wouldn't like to estimate the difference between what would happen and a 100 percent reduction.

By Mr. Jackson:

Q. You spoke of a figure of 1,500 second-feet. I didn't understand what that was?

A. That is 75 percent of 2,000 second-feet. We were assuming an average flow of 2,000 second-feet at Ivanhoe and a reduction of 75 percent.

Q. All your answers at this point were on a flow of 2,000 second-feet?

A. That is correct.

By the Court:

Q. I don't believe I understand the effect of that answer, exactly what is meant. Can you explain it a little bit more? If you cut the flow of 2,000 second-feet off for 57 hours, no part of that flow goes down the river, does it?

A. I think there would be part of it going down the river. I don't think there would be 100 percent reduction.

Q. Where would the 25 percent come from that would go down?

999 A. At the lower end of the wave the water would lag behind the crest and that water would stop along the stream in pools and would gradually run down. That is a distance of two hundred some odd miles. It would take that length of time to dry the stream out or the upper part of it out.

Q. You mean it would be reflected in its effect to the extent of 75 percent down below?

A. Yes, sir.

By Mr. McClernan:

Q. Mr. Kramer, during your investigation of these matters, did you examine the application for a license which was filed by the defendant with the Federal Power Commission?

A. Yes; I did.

A. Aren't you referring to the one you have just shown me?

By Mr. McClernan:

Q. I show you exhibit 90-A which merely holds the plans. Didn't you examine the original application for license which was filed with the Federal Power Commission?

A. Yes.

By Mr. McClernan:

Q. Do you recall a statement in the application for a license, Mr. Kramer, which is here as Exhibit No. 90, to the effect that all power generated can be utilized as soon as available?

A. No; I don't think I can.

Q. I show you Government Exhibit No. 90 and call your attention to page No. 4, the last sentence in paragraph numbered 4, which reads: "All power generated can be utilized as soon as available." Are you able to refresh your memory from this exhibit and say that you can now recall seeing that statement in the application for license?

A. Yes; I have seen it before.

Q. If this statement is correct, does that have any bearing upon the nature of the load which the Appalachian Electric Power Company would have?

1000 A. I think that means that they have a market for that power at the present time, probably by retiring some of their old steam plants. I dont' think it tells anything about how the plant is going to be operated.

Cross-examination by Mr. JACKSON:

XQ. Mr. Kramer, I suppose that you will agree that the Radford project, if constructed in accordance with the plans shown on Exhibit #90–a can be operated in a great variety of ways?

A. That is correct.

XQ. And that the physical possibilities range from continuous operation on what might be called the natural flow up to a wide variation in degrees of peak load operation?

A. That is correct.

XQ. And when you undertake to say that a certain method of peak load operation would, in your opinion, be the most profitable method of operation, you do not want the Court to understand you as testifying that that would be the only practicable method of operation, do you?

A. Yes; I do.

XQ. You don't want the Court to understand that would be the only practicable method of operation from the physical point of view?

A. If you substitute possible for practicable, I would say no.

XQ. Nothing impracticable from a physical or operating view, leaving aside the question of economy in operating this project on any variation of peak load?

A. The word practicable means you take into consideration
1001 the economy of the situation.

XQ. I am asking you to express an opinion, if you can, from an operating standpoint solely?

A. It is entirely possible to operate it in many ways solely from an operating standpoint.

XQ. Solely from that standpoint no difficulty whatever?

A. No, sir.

XQ. And in your study of this problem did you observe the Federal Power Commission twice tendered a license to this defendant upon the plans shown in Exhibit #90–a, and application shown on Exhibit #90?

A. I am not familiar with what the Federal Power Commission did. I hav[illegible]understanding that is the case, but I am not sure of that.

X Q. Did you also observe in the study you made of this question that the chief of engineers had approved the plans for the construction of this project, which plans are shown on Exhibit #90-a?

A. My understanding of that was (interrupted).

X Q. I just asked for your observation.

A. My understanding of that was the final approval had to be with the Federal Power Commission, and before the Federal Power Commission makes approval it is necessary for the Army to approve it insofar as certain conditions they are concerned with obtain.

By the COURT. Mr. Jackson asked if you didn't know or understand the chief of engineers had approved it, insofar as his branch was concerned?

A. Yes, sir.

X Q. In your work with the Federal Power Commission, did you learn whether it was the practice of that Commission in
examining an application for a license and the plans for
1002 a project to consider in giving its approval whether the
plan was economically practicable?

A. It is their custom to do that.

X Q. And didn't you understand according to their interpretation of the Federal Water Power Act and the regulations they promulgated in examining applications for licenses they undertook to investigate, and to determine, whether the project would provide for the greatest practical use of the water resources involved, from the standpoint of the public interest?

A. Yes, sir.

X Q. And was it not their view and rule as you have discovered it, in working for that Commission, to require that the installations in licensed projects should be adequate to utilize the available water to the greatest possible advantage?

A. Yes, sir.

X Q. And in carrying out that rule and regulation has it not been the practice, under the regulations of the Commission, to study the nature of the installation proposed by an applicant?

A. It has.

X Q. From your work with the Commission are you able to say whether in examining these projects one of the matters required to be considered was the possible relation of the type of the project to the asserted right of recapture?

A. Yes, sir, they consider that.

X Q. In the course of your direct testimony, Mr. Kramer, you
said that 9,000 second-feet flow would be available at the
1003 dam site only 4% of the time, did you not?

A. Yes, sir.

X Q. Were you referring to natural flow?

A. I was.

X Q. Would you regard an installation which provided only for the utilization of the natural flow practical and economical installation?

A. In some cases it would be.

X Q. Well, where you have a natural flow of 9,000 second-feet for a certain period of time, does not that mean that there is a large period of time when the flow varies somewhere between 9,000 second-feet and low water flow?

A. It does.

X Q. And isn't it a fact that during that period of time you could utilize varying volumes of water with your installation even without peaking?

A. You mean without drawing down from storage?

X Q. Yes.

A. Yes, sir. I would like to have that question read. (Question read.) That is right.

X Q. And without drawing down storage?

A. Yes, sir.

X Q. And if you chose to draw-down the storage you could use even a larger quantity of water without peaking and utilize even a larger part of your installation?

A. That is correct.

X Q. And if you used peak operations you could utilize all of your capacity for varying parts of the day during that period of time when the natural flow of the stream was between your 9,000 second-feet and low-water flow?

1004 A. That is correct.

X Q. And would there not be a very large percentage of the time between the prevalence of flows of 9,000 second-feet or better, and low-water flow, when the flow would be very substantially above low water?

A. You would have to define low water before I could answer that.

X Q. You have testified here about low water. What do you understand by it?

A. I was thinking of 2,000 second-feet and less.

X Q. Well wouldn't there be a very large part of the time between the conditions when there would be a flow of 9,000 second-feet and 2,000 second-feet when the flow would be substantially larger than 2,000 second-feet?

A. 2,000 second-feet is available 60% of the time.

X Q. Isn't more than 2,000 second-feet available more than 60% of the time?

A. No; less than 2,000 feet would be available more than 60% of the time.

X Q. Is that with storage?

A. Natural stream flow.

X Q. With storage is more than 2,000 second-feet for more than 60% of the time?

By the **Court**:

Q. I think I am confused by the answers to the last few questions. I understood you to say first that observing the stream flow along that river showed that there was as much as 2,000 second-feet available 60% of the time, in the natural flow of the river?

A. Yes, sir.

Q. Then I understood you to say in answer to the next question that less than 2,000 second-feet was available 60% of the time?

A. Is available more than 60% of the time. If you take
1005 a low enough stream flow it would be available 100%. As
you increase the figure the percentage that flow would be available decreases. When it gets up to 9,000 second-feet it is available less than 4% of the time.

By Mr. **Jackson**:

X Q. If you utilized the storage to the best advantage for providing a flow of 2,000 second-feet, over what period of time could you provide such a flow?

A. I don't remember that figure.

X Q. Did you work it out?

A. I studied it; yes, sir. I haven't the notes here on that.

X Q. Can't you say from your own knowledge of the problem and the study you have given it, it would be more than 90% of the time?

A. I would not like to answer that.

X Q. Now you have based a lot of your testimony on the question of what you would say to be the relation between the hydraulic capacity of this installation and the period of time during which a natural flow would be available at the dam site equivalent to that hydraulic installation, haven't you, 9,000 second-feet; am I right?

A. I have based some of it.

X Q. Mr. Kramer, did you ever know the Federal Power Commission to approve an application for the construction of a power project with an impounding reservoir, that did not have an installed capacity larger than the low water natural flow of the stream?

A. I wouldn't say I did not. The physical conditions at the dam site would be taken into consideration and it might not be any possible to do any impounding, in which case they would approve it.

X Q. Of course there wouldn't be a reservoir there?

A. I will have to have the question again.

X Q. I won't pursue it further. As the Court suggested it probably is somewhat irrelevant. Do you know whether the defendant is relying upon a 9,000 second-foot flow at all times for peak carrying purposes?

1006 A. I would assume they were certainly not relying on 9,000 second-feet of water being available at all times. I have more confidence in their consulting engineer than to think he would give such advice.

X Q. For peak carrying purposes I said.

A. The same answer applies.

X Q. Mr. Kramer, do you know what is meant by a subpeak?

A. I don't thing I could define that.

X Q. What is the term, if you know, applied to a power plant which carries a load up near the top of the load curve, but does not carry the peak?

A. I know what you are talking about, but I don't think I ever heard any special term applied to it.

X Q. Would you consider the term "subpeak" was sufficient to indicate that condition?

A. I think I understand what you are talking about.

X Q. Do you understand that I mean a plant which carries part of the load, which is on the upper part of the load curve, above the base, but not the extreme peaks of that load; do you understand that is what I mean?

A. I do.

X Q. Would it be feasible or physically possible to operate the Radford plant as a subpeak load carrier?

A. It would be physically possible.

X Q. And would it be possible to utilize plants like Buck and Byllesby, London, and Reusens to carry the extreme peak?

A. It would be physically possible, but it would not be practical.

X Q. Why wouldn't it be?

A. Because in times of low flow there is not enough water to generate the kilowatts in what you call the subpeak position 1007 on the load. There would not be enough water to generate enough kilowatts to allow the Radford plant to carry nearly as much of the load represented in kilowatts as it would be if it carried the very peak of the load. As I stated before, by carrying the very peak of the load on the day I have shown, with 2,000 second-feet, the plant could be responsible for 62,000 kilowatts. Now, as you lower the plant on that load curve the less number of kilowatts it can be responsible for, and you lose the benefit of that additional installation.

XQ. It would operate over a longer period of the day, wouldn't it?

A. It would operate over a longer period of the day, but would not carry as large a proportion of the load, and the other plants are not suitable, you would lose some of the benefits in the other plants, because they do not have as much storage. They are more designed to work on the subpeak load than Radford and Radford is more designed to carry the peak of the load.

XQ. How do you know what the defendant designed for the Radford plant?

A. I can only judge by the plans and statements in defendant's answer and statements made by Col. Scheidenhelm before the Corporation Commission for the State of Virginia, when they applied for license to build the Radford plant, and judging from that information I would say it was their intention to operate it carrying the peak of the load.

XQ. Did you ever operate a large electric power system?

A. No, sir.

XQ. And you are now testifying as I understand it how you think this load curve you have shown on your Exhibit #142 should be apportioned among generating plants?

A. Yes, sir.

XQ. The peak of the load curve on Exhibit #142 was, of course, carried by the system of the Appalachian Electric Power Company in 1935?

A. Yes, sir.

1008 XQ. And of course no part of it was carried by the Radford project?

A. No, sir.

XQ. And you don't know how that peak was distributed among the generating plants of the Appalachian Electric Power Company on October 28, 1935, do you?

A. I have information that would tell me how the kilowatts were generated by the various plants throughout the system for various months in 1935.

XQ. For that date do you know?

A. No, sir.

XQ. And of course you don't know how the peak of the Appalachian Electric Power Company system will be distributed among generating plants in the future, with or without the Radford project?

A. I do not.

XQ. And do you know whether Buck and Byllesby plants are now operated as peak-load carriers?

A. They are.

XQ. Do you know whether or not the Appalachian Electric Power Company system is interconnected with other power company systems?

A. It is.

XQ. Do you know whether or not those power systems exchange power for peak-load purposes?

A. They have an exchange agreement which allows one company to buy power at a small sum when the other company wants to sell it and the first company wants to buy it. There is an exchange of power for peak purposes.

By the COURT:

Q. Are you familiar with the Marmet and London Dams?

A. Yes, sir.

1009 Q. What is the capacity of each of them?

A. Approximately 15,000 kilowatts when they have sufficient stream flow to generate them.

Q. Following a discharge of how many cubic feet of water?

A. I am not sure of that figure. I think it is—perhaps I had better not give it.

Q. Those dams are much lower than this proposed dam at Radford, are they not?

A. They have 24 feet head approximately each. The London plant has a pool providing a small amount of pondage, the use of which, however, is under control of the U. S. engineers and the Federal Power Commission.

Q. What I was getting at, I am not enough electrician to know whether the differences Mr. Jackson referred to, the London and Marmet dams, and nature of the plant and height of the dam, the head I believe you say, indicates that, a difference in the practical use of the different plants?

A. Would you like me to explain or compare the London and Marmet dams with the Radford?

Q. If it isn't too lengthy, yes.

A. Well, the London pool, if drawn down at the rate of 3/10 of a foot an hour provides a flow of 3,000 second-feet. I think in times of low flow that would enable the two plants to generate together 15,000 kilowatts. That would not vary the load enough throughout the day, or the twenty-four hours, to make it advisable to carry the peak of that load. The amount of water, the relation of the average amount of water, that would be available to the amount of water they could use on a peak, expressed in percentage, is not very high; whereas, the same thing expressed at Radford would allow them to take a very large amount off
1010 of that peak, because the Radford reservoir is much larger.

They could by drawing it down two feet over the week and storing it up over Sunday, when the flow was 2,000 second-feet, keep it even, and lose very little head, and in my opinion the most efficient way to operate.

Q. I mean the London and Marmet, are they better adapted for carrying base loads than the Radford dam, or which of the plants would you say could be most practically used to carry a peak load?

A. As I stated the reservoir or pond, they are not allowed to lower the Marmet pool, that has to be maintained at a certain elevation on account of navigation, but they can under restriction lower the London pool three feet, which allows it to use 2,500 acre-feet of storage. Now 2,500 acre-feet of storage in proportion to the stream flow at London and Marmet is very small. The 100,000 acre-feet of storage at Radford in proportion to the stream flow is very great, and it follows that Radford would operate on the peak load more successfully than London and Marmet, although they could carry the subpeak load very nicely.

By Mr. Jackson:

X Q. You have just told the Court that the London and Marmet combined would produce 15,000 kilowatts; is that right?

A. I said the capacity was 15,000 each but in times of low flow I think with approximately 2,500 second-feet flowing into the London pool and by using the small pondage at the London pool, they together could carry about 15,000 kilowatts; that is lowering the reservoir at the rate of 3/10 foot per hour. They possibly might lower it more rapidly and in that case the peak they would carry would be only for a few hours, and if they were going to operate on subpeak it would be a longer period.

X Q. And if on extreme peak that short period would fit in?

A. I don't think so.

X Q. You don't know how it has been operated?

1011 A. Yes, I do; I have studied the draw-down in that reservoir every day since it has been put in there. The maximum drawdown has not exceeded 3/10 foot per hour except once when it went to 4/10.

X Q. It has been operated on a peak-load basis?

A. It is an what I would call probably subpeak.

X Q. Both the London and Marmet dams have been operated on some form of peak-load basis?

A. Yes, sir.

X Q. You just said I think that your estimate of the low water flow at London and Marmet was about 2,500 second-feet, is that right?

A. Not extreme low water. I selected that to illustrate my point.

XQ. Tell me the extreme low water?

A. I am not prepared to answer that. That has been put in evidence by a witness more competent than I am. I think his evidence will show somewhere around 1,000 second-feet, but the record will make that clear.

XQ. Now will you tell the Court what is the hydraulic capacity of the installed installation of the London power plant, maximum hydraulic capacity?

A. 15,000 kilowatts.

XQ. That isn't hydraulic capacity is it?

A. You mean in cubic feet per second?

XQ. Yes; how many cubic feet per second.

A. The Court asked that and I stated I hesitated to answer because I wasn't sure of the figures.

XQ. Didn't you study those this problem?

A. I don't remember the figures.

By Mr. JACKSON:

Q. To refresh your recollection, don't you know it to be a fact that the hydraulic capacity of the installation at the 1012 London Dam is 9,000 second-feet?

A. That was the figure I had in mind, but I was not sure of it.

Q. Just the same as at Radford?

A. Yes, sir.

Q. Nine times the low water flow if I am right in my recollection of the figures. Will you tell me what is the hydraulic capacity of the installation at the Marmet Government Dam?

A. I assume it is the same since they have the same head and the same installation.

Q. And in your study did you examine the plans for the Winfield Dam and the power plant downstream?

A. I cannot give you the hydraulic capacity there because the dam is not completed. I have studied it, but I do not recollect that I was informed of the installation and the head there, but I did take that into consideration in forming the answers I have given here to certain extent.

Q. Don't you recall that the hydraulic capacity and the installation at Winfield is even larger than at London and Marmet?

A. I would not like to answer that in a certain way. My recollection is they were somewhat the same.

By Mr. JACKSON:

Q. Mr. Kramer, you stated before recess, in answer to one question that you were familiar with the fact that the Appalachian Electric Power Company system had interconnecting connections, or exchange of power. Is that right?

A. Yes, sir.

Q. Do you know whether one of those interconnections extend southward?

A. I don't know whether it is southeast or southwest or straight south.

1013 Q. I would think, although I am not sure my geography is perfect, that it might be a little bit southwest. I thought with your study of the problem you could state it definitely.

A. Yes.

Q. Don't you know it to be a fact that the Appalachian Electric Power Company system has interconnections, among others, with the Tennessee Electric Power Company, the Alabama Power Company and the Georgia Power Company?

A. No, sir.

Q. You are not familiar with that fact?

A. No, sir.

Q. That they are connected so that they can exchange power?

A. No, sir; they are not directly connected.

Q. But they do exchange power?

A. The reports I have studied only give the amount of power and the name of the company that gets that power, but beyond that, or if there was a third connection, I would not have any information regarding it.

Q. Do you know whether or not the Tennessee Electric Power Company, the Alabama Power Company, and the Georgia Power Company has large hydroelectric installations?

A. They have; yes, sir.

Q. And don't you know also that the periods of high and low flow for the hydroelectric plants of the Alabama Power Company and the Georgia Power Company vary from the periods of high and low flow of the hydroelectric plants of the Appalachian Electric Power Company?

A. I have never studied the flow of those streams.

Q. You are not familiar with that?

A. No, sir.

1014 Q. "If they do vary, and if there is a method of interchanging power between those companies, would that have any relation to the problem of carrying peak load"? That refers to the Tennessee Electric Power Company.

A. That was taken into consideration in my answers to the questions by the plaintiff's attorney.

Q. I thought a moment ago you told me you did not know that they had any interchange with the Tennessee Electric Power Company, the Alabama Power Company, and the Georgia Power Company.

A. I also told you——

Q. (Interrupting.) Did you tell me that?

A. What was the question?

Q. Didn't you tell me a few minutes ago that you did not know whether the Appalachian Electric Power Company had any interconnection or exchange of power with the Tennessee Electric Power Company, the Alabama Power Company, and the Georgia Power Company?

A. I told you there was no direct connection.

Q. Didn't you tell me a few minutes ago that you did not know what were the conditions of the flow on the stream where the hydroelectric plant of the Alabama, Tennessee, and Georgia Power Companies are located?

A. Yes, sir.

Q. And you say you took that into consideration when you were answering questions of counsel for the Government on your direct examination?

A. I took into consideration the amount of power bought and sold by the Appalachian Electric Power Company each month.

Q. Did you have any information as to whether that was the total amount of power which the Appalachian Electric Power Company could obtain under its interchange arrangement?

1015 A. No, I did not.

Q. And did you have any knowledge as to what amount of interchange power it would be able to obtain next year, or the year after?

A. I did not.

Q. Now you testified on your direct examination that the Appaachian Electric Power Company had 74,000 kilowatts of installed hydroelectric capacity. Is that right?

A. I said approximately.

Q. You said approximately?

A. Yes, sir.

Q. Did you take into consideration the Winfield Development?

A. No; I did not.

Q. Do you know whether or not that power has been licensed to he Appalachian Electric Power Company?

A. I understand that it is.

Q. Do you know what amount of power will be available at the Winfield Dam?

A. Not exactly. I assume it is somewhat the same as at the ther two.

Q. Would you be surprised to know it is substantially larger?

A. It depends on what you mean by "substantially larger." It ould be some larger, because it is further down the stream.

Q. 30 or 40 percent larger perhaps?

A. Not in low flow times, in my opinion.

Q. Is the head the same at the Winfield Dam as at the London and Marmet?

A. It is my understanding it is very nearly the same.

Q. At least in your consideration you assumed it to be substantially the same?

A. It is not constructed but I was talking about the present condition.

1016 Q. Do you have any information that would lead you to think it would not be constructed before the Radford Dam can be constructed?

A. No, sir.

By Mr. Jackson:

Q. Mr. Kramer, you have been testifying generally as to the affect of what you have termed the wave below an hydroelectric plant. Would any reservoir down stream from such an hydroelectric plant have an effect on wave release by that plant?

A. It might or it might not have.

Q. That is, in your view, would it be immaterial whether there was a reservoir below an hydroelectric plant, so far as considering the behavior of the waves released by that plant if the reservoir were full?

A. As the wave came down there would be a minor effect but not to a sufficient extent to make a material difference, if the reservoir was not full and would operate to smooth out, why it might have an effect.

Q. It might have a very substantial effect if the reservoir were not full?

A. I would have to know the capacity of the reservoir you have under consideration and how much storage there was available when the waves struck it.

Q. Would you expect to find a flood control reservoir downstream full during a period of low water?

A. I don't think I have enough data to answer your question.

Q. Mr. Kramer, just as an engineer, don't you know that a purely flood control reservoir would not be maintained full during a period of low water so that it would have no capacity to absorb a flood after it came?

1017 A. Well, it might be that sufficient studies have been made in the stream flow to hold that head up during a low period, and draw the reservoir down some time between the time the low period occurred and the flood expected, so that they could have storage for the flood dam. Only a storage reservoir, without anything else, I think, your assumption is correct.

Q. You never knew of a flood-control reservoir that was maintained full during the low-water period, did you?

A. I know plans for them to maintain them full during very low season, but not purely flood control.

Q. I asked you regarding purely flood-control reservoirs.

A. No.

Q. Is it your idea that a flood-control reservoir should be emptied during low water and available to take the peak off the flood when it comes? Is that your idea?

A. A long period between low water and the expected flood season, or rather most all flood-control reservoirs I am familiar with had some other function such as supplying water for irrigation, supplying water for power, and I think if I answer your question, did I ever know of a flood-control reservoir that was purely operated for flood control, I would have a hard time thinking where there was one that I was familiar with.

Q. Did you ever hear of the Miami Conservancy District?

A. Yes, sir.

Q. However most of your experience has been out in the West, hasn't it?

A. And northwest.

Q. And is that country such that you have arid or dry periods and then certain definite seasons of the year when there is rain and melting of snow?

A. Yes, sir.

1018 Q. Did you examine what was the regularity of floods on the New River, when you studied this problem?

A. I did not make a very careful study of the flood situation there. I directed my attention more to the low-water condition.

Q. Did you not in your studies notice that the flood in New River may occur any month in the year?

A. I do not think I noticed any major floods in the low-flow season, which would be August, September, and October.

Q. Then is it your testimony that as a result of your study you will not say that there are no floods on New River or rather that they do not occur during the months of July, August, and September.

A. I do not think any major floods and I do not think that problem enters into my study.

Q. Did you notice in your study that the largest flood that ever occurred on New River, was on September 14, 1878?

A. No, sir.

Q. Did you know that the second largest flood was July 16, 1916?

A. No; I did not. I made no study of the flood-water conditions. I did study the low-water conditions, the years they occurred and the length when the low-flow periods occurred, and I also noted the fact that very often in these low-flow periods that there were periods of higher flow when the reservoir could have been filled up, but when the Major floods occurred, I did not give any special consideration to it.

Q. Did you give any consideration to reservoirs at all?

A. Other than the Radford reservoir?

Q. Yes.

A. Only the ones that are now constructed.

Q. You mean what?

A. I mean the small reservoirs at Hawks Nest Plant, at 1019 Glen Feris plant, and at the London plant, and the ones above at Buck and Billesby, and the very much smaller ones above there.

Q. Yet, assuming that there should be constructed a reservoir downstream from the Radford project, with a storage capacity of 235,000 acre feet, would that have any effect upon any waves that might be produced by the proposed plant of the defendant at Radford?

A. Certainly it could.

Q. It is conceded in the complaint that the Government is going forward with the construction of a reservoir at a site known as Bluestone on the New River, and it appears from the Government Exhibit No. 120, that this reservoir will have a storage capacity for that part devoted to flood-control purposes of approximately 235,000 acre-feet. If that project is constructed and placed in operation, what, if any, bearing will it have upon the question of the possibility or effect of any wave produced by the defendant's proposed plant at Radford, persisting downstream below Bluestone?

By the COURT. I understood him to say he was familiar with the Bluestone project. Is that right?

A. No, sir; not the details.

By Mr. JACKSON:

Q. Let me ask this question. Is is necessary for you to know anything more than the project provides 235,000 acre-feet of storage for purely flood control?

A. It is necessary to have more information, in regard to the degree and the effect. The fact that such a body of water would be there at all would have some effect on the speed of the waves, even if the reservoir was full.

By Mr. JACKSON:

Q. In answering that question, Mr. Kramer, you might, if you want to, look at Government Exhibit 120, which shows a profile of the Bluestone Project and the Radford Project.

A. I know there is a Bluestone project contemplated, but 1020 whether they will ever get money enough to build it, or not, I don't know. I know where it is going to be, how big the dam is going to be, how much storage capacity they will have, but how they operate that dam, I don't know, I never have studied it.

Q. Can you look at Exhibit 120, and tell me if there is shown a utilizable capacity of flood control of 235,000 acre-feet?

A. I could not examine it in a hurry and tell you very much about it.

Q. Mr. Kramer—first, I will have marked for identification a document known as House Document No. 91, of the 74th Congress, entitled Kanawha River, West Virginia, Virginia, and North Carolina, as defendant's Exhibit No. 512, for identification. Mr. Kramer, I direct your attention to this statement in Defendant's Exhibit No. 512, for identification, on page 94, which appears in the supplemental report of the Division Engineer to the Chief of Engineers, on Bluestone Reservoir project, dated November 21st, 1934, reading as follows: (Reading:)

"The dam in this case would also be constructed to elevation 1520, providing the same gross capacity as the flood-control project (625,600 acre-feet). Of this total capacity, 235,500 acre-feet (representing about one inch of run-off from the water-shed above the site) in the top 30 feet of the reservoir would be reserved for flood control, leaving a gross capacity of 390,100 acre-feet available for power purposes."

Assuming that this Bluestone project should be completed so as to provide that 235,500 acre-feet, included in the description I have read to you from the official report, Defendant's Exhibit 512, for identification, what, in your opinion, would be the effect upon any power waves produced by the Radford plant?

By Mr. Jackson:

Q. Will you read the question? (The question is read.)

A. I have no assurance that that describes the operation of that reservoir. That is just a recommendation that the reservoir be built in a certain way. As to whether or not it is followed, is something I am not sure of.

1021 Q. I did not ask you to testify to that. I asked you, assuming that that would be followed, what effect it would have on the Radford project?

By the Witness. If the project is operated as described and the waves came when the reservoir was drawn down, it would smooth the waves out.

By Mr. Jackson:

Q. Isn't it a fact that, if the Bluestone project be constructed and operated so as to maintain this 30-foot on the upper part of the storage reservoir, amounting to 235,500 acre-feet capacity, empty for utilization for flood control purposes during low water flows, the condition of the flow of the stream below Bluestone would depend solely on the plant at Bluestone?

A. My opinion would be that it would largely depend on the water released from the Bluestone reservoir, except in times of flood.

By Mr. JACKSON:

Q. In low water periods, it would depend wholly on the Bluestone operation?

A. It could depend entirely on the operation at Bluestone.

Q. Assuming low water and the maintenance of the upper or flood reservoir, with the reservoir empty to take care of floods, in what respect could the conditions of flow below Bluestone depend on any other thing other than the operations of Bluestone, I mean, immediately below Bluestone?

By the WITNESS. In times of low flow, it would depend on the water released from Bluestone, assuming they followed that plan that you have outlined. May I add that, in times of flood, where there is a power plant, it is an awful temptation to fill the reservoir up, in times of low flood.

Q. Yes, sir.

A. (Continuing.) To get the full head of the plant.

By Mr. JACKSON:

Q. You think that the Government would be likely to
1022 overreach into the part that should be reserved for flood control, in order to develop power?

A. I don't know whether they would or not.

By Mr. JACKSON:

Q. What is the proposed capacity of the power installation under the Government's project at Bluestone?

A. I don't know.

Q. Don't you know it is in excess of 10,000 second-feet?

A. No, sir.

Q. Assuming, as you suggest, that the Bluestone reservoir is purely a power development, wouldn't the condition of any stream below Bluestone depend on the method of operation of the Bluestone power plant?

A. Not necessarily; the power waves might come from above when the reservoir was full.

Q. At low-water time?

A. Yes, sir.

Q. You think, if the plant at Bluestone is operated purely as a power project, that the reservoir would be kept full during low water?

A. Not full, but full sometimes during the day.

Q. You think that there would be no more drawdown on a reservoir the size of Bluestone than pondage that could be built by low water flow during the flood hours of the day?

A. That might be the way to operate it most efficiently.

Q. That is your best judgment, is it?

A. From a power standpoint.

Q. It is your judgment that, in the construction of a reservoir the size of Bluestone, which is twice the size of the Radford project, that probably the proper way to operate it as a power project would be to have the reservoir full?

A. Not at all times.

Q. During low water?

1023 A. At the beginning of low-water period, it would; yes, sir.

Q. Would there be any difference from the Radford project in that respect?

A. I don't understand you.

Q. Would the proper method of operation of Bluestone be different from the proper method at the Radford project, as a power project?

A. You mean carrying peak loads?

Q. You are telling us how it should be done. I asked whether or not, in your opinion, the proper method at Bluestone, as a power project, would be different from the proper operation of the plant at Radford, as a power project?

A. Your question is too indefinite.

Q. You cannot answer that?

A. No, sir.

Q. But I do want to get this clear—you think that Bluestone, operated as a power project, that the proper method of operation would be no draw-down of the pool or reservoir?

A. No, sir, I did not say that. I said there might be times when the reservoir would be full during low-flow periods.

Q. What period during the low-flow period would the reservoir be full?

A. At the beginning of the low-flow period.

Q. One question about your exhibit 142—the load curve. I ask this merely for the purpose of information, Mr. Kramer: Can you tell us or identify for us records from which you made that curve? This is what I want you tell us, first: the date of the sheet or whatever it may have been, or report?

A. It is a 1935 report for the first ten months of 1935.

Q. It is a report of the defendant filed with the Federal Power Commission, is it?

1024 A. Yes, sir.

Q. And that is for the first ten months of 1935?

A. Yes, sir.

Q. And why did you choose particularly this, as shown on exhibit 142?

A. There was only one week; the data is given for only one week, and I decided on Saturday, Sunday, and Monday of the week. Monday is fairly representative of the other five week days.

Q. The data that you had from it—you had this top load curve from which you got the information for a single week?

A. For one week, yes, sir.

Q. Is there anything—anything to tell whether or not that curve is typical of what will be the load of the Appalachian Electric Power Company two or three years from now?

A. No exact way. Engineers have to make estimates with the information they have, by using all available information and make a reasonable estimate, but, of course, their estimates are not always correct.

Q. On your direct examination, you expressed an opinion that, if the flow at Radford were totally cut off for a period of 57 hours, 75 percent of the effect would be transmitted to the mouth of the Kanawha River, assuming a flow of 2,000 second-feet average per day out of the Radford plant. Have I stated that correctly?

A. I think so.

Q. Now, as the basis for that opinion, what was the shape of the curve or the wave, rather, which you assumed at Radford?

A. It was a wave that would take the peak off the load, as shown by this exhibit.

Q. Can you describe it briefly but sufficiently so that we can tell the form of it?

1025 A. The flow from about eight o'clock, we will say, on Friday, would be in the neighborhood of 9,000 cubic-feet per second, until about 4.30 in the afternoon; then it would gradually decrease until the flow reduced to zero at ten o'clock Friday night; it would go up again at seven o'clock Monday morning. I think that is approximately the type of wave I was considering.

Q. Is that, in your opinion, consistent with the hypothesis of the water being shut off completely for 57 hours?

A. Yes, sir.

Q. When was the water shut off to become complete?

A. Ten o'clock Friday night until seven o'clock Monday morning.

Q. What conditions did you assume on New and Kanawha Rivers, in making your estimate, or expressing that opinion?

A. I considered low-flow period on both streams.

Q. What stream flow did you assume below the dam?

A. Below the dam?

Q. Yes?

A. The stream flow gradually increasing below the dam. I think the figure I used was 2,500 second-feet at Kanawha Falls?

Q. That is in addition to the wave?

A. No, sir; the average flow, if no interference with the wave.

Q. Can you tell me what flow you assumed coming into the river below the dam?

A. That would be 500 second-feet between Radford and Kanawha Falls, but about that—my opinion is based on flows in that neighborhood. There could be some more or some less than that, but the change would not be material for a variation of 10 or 15 per cent above or below that.

1026 Q. Do you know what proportion of the time the condition of the incoming flow of 5,000 second-feet below Radford, is obtained?

A. No, sir; I could not give you that figure.

Q. I should have said 500 second-feet.

A. I am not able to give you that figure.

Q. Don't you know the period during which that condition would prevail would be so short as to be negligible?

A. I don't think so; it would be short, but not so short as to be negligible.

Q. Tell me how short it would be.

A. I cannot give you an exact figure.

Q. Give us your best estimate.

A. I would not care to make an estimate.

Q. What conditions did you assume further on the New and Kanawha Rivers—what inflow did you assume below Kanawha Falls?

A. I did not go into that. It was not necessary to go into that, because the shut-off effective at Kanawha Falls would have some effect, regardless of the flow below for a two-day period.

Q. State whether or not it was necessary for you to make any assumption or have any information as to the inflow below Kanawha Falls?

A. No, sir; I had information, but I did not go into the assumption.

Q. You did not consider it?

A. No, sir.

Q. What conditions of the reservoirs did you assume on the Kanawha when you answered that question?

A. I assumed the reservoirs on the Kanaw*ah* to be full.

Q. You assumed them to be full?

A. Yes, sir.

1027 Q. Do you know whether or not there is a pondage at London?

A. Yes, sir.

Q. Do you know the purpose of the London Pondage?

A. Yes, sir.

Q. Isn't it to absorb both natural and artificial fluctuations?

A. Under the regulations of the Government, they may so regulate it.

Q. Didn't you find that the report of the engineers so stated?

A. I didn't see anything that led me to believe they would keep the London pool down to take care of operations above.

Q. Do you so testify—that the official reports of the London project do not show that it provides a three-foot pondage for the purpose of equalizing natural and artificial fluctuations?

A: I did not state artificial.

Q. If you want to testify to that, it is all right. Do you?

A. Yes; I don't know whether that is a requirement—that they are required, if it is.

Q. You don't know that it was not?

A. No, sir.

Q. Do you wish to testify that it was not?

A. No, sir; I assumed it was full.

Q. I did not ask you that. You have discussed your view on that enough. What did you assume about the condition of the pond at the Electro-Metallurgical plant?

A. I assumed it as being full.

Q. Which pond?

A. Well, I assumed both of them—Hawks Nest and Glen Ferris.

Q. Did you consider them?

A. Yes, sir.

Q. For what reason did you assume they were full?

A. I had no reason to know that they were not full.

1028 Q. And you had no reason to know that they would be?

A. That is correct.

Q. You also assumed the London reservoir to be full?

A. Yes, sir.

Q. And you had no reason to know it would be?

A. No, sir.

By the Court. What plant is it that has an outlet from the dam that runs through a tunnel?

A. That is Hawks Nest.

By Mr. Jackson:

Q. There is another plant of the same company at Kanawha Falls.

By the Court. What I refer to is the tunnel opening on the right bank of the river.

A. The long tunnel?

By the Court. I don't whether it is long, or how long it is.

By the Witness. That is the Electro-Metallurgical Company's.

Q. Mr. Kramer, I would like to ask you a few questions about your testimony in regard to the experiments which were conducted at the Buck and Billsby plants on New River, in March 1930. In your direct testimony, you said that you had made some computations of your own, in addition to the charts and graphs offered in evidence as Government's exhibits No. 133 to 141, inclusive. Briefly tell the nature of your computations.

A. Yes, sir; most of my study was based on the report made by the Huntington office of the United States Engineers. In that report, the amount of water in the wave; the period of the wave, and the amplitude of the wave, both above and below the crest, was all given. I checked some of those, but nearly all the information I worked up myself was just to check that against the information in that report.

Q. There was a report by the District Engineer, was there?

1029 A. It was a report made in the Huntington office of the United States Engineers. I don't know if it ever went out of the office.

Q. Was it, can you tell me whether or not it was a report addressed to the Chief of Engineers?

A. I don't think it was; no, sir.

Q. I hand you a book here, which is entitled "Preliminary Report of Power Waves on New and Kanawha Rivers, Engineer's Office, Huntington, West Virginia, February 29th, 1932," and ask you whether or not that is the report you refer to?

A. I think that is part of it—part of it is, I think. I think there is more in this report than in the report I had. The first part of this, I don't believe was in the report I had.

Q. You think that everything is in the book I have handed you that was in the report you covered, or examined?

A. I am not sure about that. It has the general appearance.

Q. I will ask you to examine it off the stand, and state whether or not it is. Did you examine any other official report dealing with these experiments, than the one you have referred to?

A. No, sir; I did not.

Q. You did not?

A. No, sir; except the original hydrographs.

Q. I mean in addition to the hydrographs. I meant reports. I conceived those records to be in the experiment. Did your computations extend or include computations of stream flows upon the basis of the reported gauge heights during these experiments?

A. Did I include gauge heights?

Q. No; did you make computations of stream flow from the records of the gauge heights—of the recording gauges?

A. I did, on some of them.

1030 Q. Tell me briefly how you developed this stream flow?

A. By rating tables and rating curves.

Q. You took a rating table or rating curve, which was supplied to you to be applicable to the particular gauging station, and used them, in conjunction with the record of the automatic gauge, to compute the flow?

A. Yes, sir.

Q. In connection with that work, did you have, or develop a stage chart for the readings at some or all of the gauging stations?

A. There was one that accompanied this report, that is not in the report.

Q. Did you use that?

A. Yes, sir.

Q. Have you a copy of it?

A. Not here.

Q. Will you supply a copy for us?

A. I think I can get one.

By Mr. McClernan. What did you say?

By the Witness. I think I have a blue print here.

By Mr. Jackson:

Q. Did you make any computation in particular about Lock No. 2, as affecting—in regard to the readings at Lock No. 2?

A. I did not; you mean as to how reliable they are?

Q. No; you said you made certain computations of stream flow in connection with certain rating curves, or tables, and records of the gauge heights, and I am asking you whether or not, among the work you did, was some of it in relation to the records at Lock No. 2?

A. Lock 2 was worked up in a report I had.

Q. It was worked up in a report that you had?

A. Yes, sir.

Q. So you had before you a stage chart for Lock No. 2?

A. Yes, sir.

1031 Q. Tell me, what was the rate of change in stage through Lock No. 2 by the waves produced by—during the experiments, as measured at the upper gauge at Lock 2—for instance, wave No. 4, the one you testified about.

A. The rate of change?

Q. In stage?

A. I could tell you if I had the blue print that I referred to.

Q. Haven't you the blue print with you?

A. No; it is not here.

Q. I produce here a chart which I will ask to have marked as Defendant's Exhibit 513, for identification. I show you a chart marked Defendant's Exhibit 513 for identification, and ask if you ever saw a copy of that chart before [handing to witness].

(Exhibit 513 marked for identification.)

A. No; the chart I saw was different from this. It had the hours on it. This only has the days divided into twelve hours periods.

Q. From that chart, can you, as an engineer, read the rate of change in stage at Lock 2?

A. [Witness examines chart.] Lock 2?

Q. The rate of change of stage in feet at Lock 2—feet per hour?

A. I cannot give it in feet per hour.

Q. At Lock 2?

A. It is different for different waves. You will have to ask for a particular wave.

Q. Tell me for wave No. 4. That is the one you testified about.

A. I can give the reduction in six hours, but not per hour.

Q. Can you read that as an engineer—read that rate per hour in the exhibit?

1032 A. This exhibit is prepared very roughly. It does not show the tenths of a foot. It gives 21 and 22 feet; there are no intervals between that—six A. M. and midnight. I have a much more accurate one than that, or have access to it.

Q. But you do not have it with you here?

A. No, sir.

Q. Isn't it possible for you to say from inspection of Exhibit 513, for identification, that the rate of change in stage—the change of stage in feet per hour, is such that it will not exceed a rate of change of more than two or three inches per hour at Lock 2?

A. You mean in wave 4, it does not exceed that?

Q. Yes?

A. It looks like the maximum rate of change in six hours is .4 of a foot.

Q. That would be approximately what per hour?

A. Two-thirds of a tenth.

Q. Would be how much in inches?

A. [Witness figures.] .8 of an inch.

Q. And from an inspection of that chart, can you say that there was no other waves shown at Lock 2, which would have a materially different rate of increase in stage in feet.

A. Wave 8, as you have marked here, and 7, and 6, are all steeper.

Q. Can you say that they would not be materially steeper—do you think they would be—I want you to find the rate of change in the steepest wave that you can pick out on the chart?

A. It looks like, from a casual inspection, that wave 10 is steepest.

Q. You say the rate of change would be .8 of an inch an hour for No. 4. Can you say whether or not it would be as much as an inch and a half in wave 10?

1033 A. It looks like this is .10 of an inch an hour; .6 in the——

Q. Now——

A. (Interrupting.) No, these are 12 hour periods. It is less than that.

Q. It is less than the figures you gave for both of them?

A. Yes, sir.

Q. Tell me, Mr. Kramer, what was the total rise in stage, measured in inches, produced by the wave you selected as the steepest, appearing on the chart?

A. Assuming this is correct——

Q. (Interrupting.) At Lock 2.

A. I don't know that this agrees with the chart I have.

Q. If you find it is in error, will you let us know. We will do the best we can.

A. What is the question?

Q. Tell me the total rise in stage, measured in inches, produced by the steepest wave that you can find on Defendant's Exhibit 513, for identification, at Lock 2?

A. You mean the maximum rise?

Q. Yes, sir; the maximum rise, produced by any wave that you can select in that chart, measured in inches?

A. .9 of a foot.

Q. And what one are you pointing to?

A. The difference between the crest and the trough of wave 10 and 11. That is .9.

Q. You are measuring from the line marked at 10 of the trough ahead and with the wave marked 10 to the trough ahead of that wave?

A. Yes, sir.

By Mr. McClernan:

Q. Can you tell us some other way to get the direction of the head?

1034 By the Witness. That is the crest of the wave and the trough following it, as I have drawn it on my exhibit.

Q. Do you know whether or not any of that drop was due to a change of the average stream flow?

A. I don't know. Some of the change may have been due to that.

Q. Yes, some of the change may have been due to that. How much is wave 10 above the trough ahead of it on the gauge at Lock 2?

A. 0.7 of a foot.

Q. That would be something less than 7 inches—something less than 9 inches, I mean?

A. Yes, sir.

Q. At the time this wave got to Lock 2, I understand it was 72 miles long?

A. No, sir; I didn't say that.

Q. Look at Exhibit 513, for identification, and tell me if you did not make a mistake giving the total rise in stage for wave 10, above the trough preceding it in point of time, and whether or not the total rise in stage is not 0.4 of a foot—about 0.4 of a foot?

A. The total might might be 0.5 of a foot; it is apparently more than .4 of a foot. This chart is not very accurate.

Q. Your best judgment is that it is between 0.4 and 0.5 of a foot?

A. I say at least 0.5 of a foot.

Q. Do you say that it is more?

A. I think 0.5 of a foot is about as near as I can get it.

Q. Did you find, or do you find that any of these figures are wrong, or if you do, please let us know. You testified that the storage capacity of the Billsby dam is 1,200 acre feet and Buck 200 acre feet. Where did you get that information?

1035 A. Figures in the report to the Federal Power Commission.

Q. The report of the defendant—you took it from that?

A. Yes, sir.

Q. Do you remember what period of time that report covered?

A. That report was for 1933.

Q. Are you sure that was not a report of second-feet days rather than acre-feet?

A. My recollection is that it was acre-feet.

Q. You assumed it was acre-feet, and that is how you got the figures?

A. No, my figures didn't depend on it. You mean the figures for the waves?

Q. No, sir; for the storage capacities.

A. The figures I gave was assuming that that was acre-feet.

Q. I want to ask you a further question or two about these experiments. Am I right in understanding that, when these experiments were made, in March 1930, the streambed below the dams, prior to the release of a wave, was substantially dry?

A. No, they were not.

Q. How much was there?

A. There was about 300 second-feet at Ivanhoe, which is 2½ miles below the Buck plant.

Q. There would be no more below the plant than at Ivanhoe?

A. No, sir.

Q. You said that, as to wave 4, the trough was 258 second-feet?

A. Yes, sir; there is a slight difference between my computation and the computation made under the direction of Mr. Derzulaitis for that particular wave.

Q. On your assumption that the power plant—the proposed power plant at Radford, were completely shut down, and then a large quantity of water immediately released, wouldn't the stream-bed below the dam be substantially dry? 1036

A. No, sir; I don't think so.

Q. How much flow do you think there would be?

A. I assume a shut-down would be practically zero. As I understood, there might be some release of 100 second-feet. My computations would not be affected by that difference.

Q. I didn't ask you that. In an event, did you assume that, under your hypothesis, the stream-bed below Radford—below the Radford plant would be—the stream flow below the Radford plant would be reduced to an order of magnitude of something like 100 second-feet?

A. Yes, sir.

Q. When the wave was released?

A. Yes, sir.

Q. When you gave your evidence as to wave No. 4, didn't you testify that the trough of the wave at the Radford dam site was 1,550 second-feet?

A. (Witness refers to papers.) Yes.

Q. So that your wave 4 is a wave with a trough of 1,550 second-feet, compared with a wave under your assumed conditions having a trough at the dam site of approximately 100 second feet. Is that true?

A. Substantially; yes, sir.

Q. When these experiments were made, Locks 2, 3, 4, and 5, or dams, 2, 3, 4, and 5, on the Kanawha were in place weren't they?

A. They were still in existence and being used.

Q. And each of these dams has now been removed. Is that true?

A. I think Lock 6 is still there and I think all of them above have been removed.

Q. I referred to 2, 3, 4 and 5, and if I am wrong, you correct me.

1037 A. (No answer from witness.)

Q. Referring back to the condition of the stream-bed, is it a fact that a waive dampens out more rapidly on a substantially empty stream-bed, than where there is a substantial base flow?

A. No, I don't think so.

Q. You spoke of some flow computation by Mr. Derzulaitis, I believe it is. I understood that you had checked those?

A. Not all of them. I checked some of them.

Q. Did you satisfy yourself that your computations and Mr. Derzulaitis' were in substantial accord?

A. Yes, sir.

Q. You did not find any serious errors?

A. No, sir; if I found any, they were minor; there were minor discrepancies, as I pointed out.

Q. Mr. Kramer, this morning I showed you a copy of the report of the United States District Engineer office at Huntington with reference to these experiments and asked you whether you could say that that was a copy of the same report which you said you had considered or examined in your studies. Can you now tell me whether that is?

A. It has the same date as the report that I studied and appears to be the same report. There are a number of pages in it and it would take quite awhile to check it carefully, but, as far as I can tell, it is the same report.

Q. Referring a moment to Exhibit 142, in your direct testimony you stated that those days were selected by the defendant. Is it not a fact that within the last month the Federal Power Commission requested the Appalachian Electric Power Company to furnish the data for those specific days without inquiring whether they were typical or without disclosing the purpose for which they were desired?

1038 A. I didn't understand that to be the case.

Q. Did you see a copy of the letter requesting the information?

A. No, I did not.

By Mr. Jackson:

Q. Mr. Kramer, I want to ask you a few questions about your chart which you have introduced as Exhibit 132. Am I right in understanding that you assumed an average flow of 2,000 second-feet for one day and utilized that average flow on a peak basis in developing the diagram shown on Exhibit 132?

A. Yes.

Q. That is, you start out in the lower figures on the chart with an assumed average flow of 2,000 second-feet for 24 hours at the power plant or out of the power plant?

A. Yes.

Q. And peak that?

A. Yes.

Q. And then this same 2,000 second feet is still being peaked in the second diagram from the bottom on top of a base flow which has entered the stream below?

A. Yes.

Q. And again on the third and fourth diagrams this same 2,000 second-feet is still being peaked on top of certain base flows which you have assumed to be augmented to the extent shown on your chart?

A. Yes.

Q. As I understand it, this was a hypothetical process and you could have used 3,000 average flow or 4,000 for purposes of illustrating the peaking of the quantity and you merely assumed the 2,000 second-feet?

A. There is nothing about that that is supposed to be very accurate. It is just to give a picture of the way a wave might pass down the stream in order to show what the amplitude
1039 of the wave is, what the amplitude of the crest is and what the amplitude of the trough is and what the period is.

Q. I merely want to get at the basis of it and to understand it. With a 2,000 second-feet flow for a day which you had peaked—it might have been any other figure, but you did choose 2,000 second-feet?

A. Yes.

Q. Will you look at the wave in the lower diagram on your chart, Exhibit 132, and tell me how many second-feet days there are in each of those waves?

A. Supposed to be 4,800. No, 2,000 second-feet days in the lower one.

Q. Will you look at the lower one a little more closely and see whether or not your wave does not contain 2,370 second-feet days?

A. I had a flow of 9,000 second-feet there for six and one-third hours. I think probably that period should have been 5⅔ instead of 6⅓. I have a period there for the crest of 6⅓ hours and it should have been 5⅔.

Q. 5⅓ it would be, wouldn't it?

A. 5⅓. That is right.

Q. But you have actually shown in your two waves on the bottom diagram of Exhibit 132 a volume of water which would be in excess of the total amount of water for 24 hours at 2,000 second-feet flow, haven't you?

A. Yes.

Q. And if you were going to make your average flow line conform on the diagrams on the bottom of the chart with the actual size of your waves, you would have to raise the average flow line, wouldn't you?

A. No, I would just shorten the period from 6⅓ hours to 5⅓ hours and the picture would almost remain the same as it is now.

1040 Q. Then you would be reducing your wave to conform with the 2,000 second-feet flow?

A. That is right.

Q. But if you wanted to conform the average flow line with the size of the wave you have actually shown on the bottom of your chart, you would have to raise this average flow line, wouldn't you?

A. Well, that wouldn't be the way to change it. It would be nearer like the picture there—just shorten this line about an eighth of an inch or something like that.

Q. Would you then decrease the size?

A. Decrease the period, decrease the period of the crest and increase the period of the trough about one hour, I guess.

Q. And by about 20 percent?

A. No.

Q. You would increase a duration of 5⅓ hours by one hour?

A. Yes.

Q. Which would be nearly 20 percent?

A. Yes.

Q. Isn't it a fact that on the second diagram from the bottom of your Exhibit 132 you show again a wave which has a volume equivalent to 9,000 second-feet flowing for 6⅓ hours?

A. That is correct. That same correction would apply to all three of them.

Q. If you corrected that you would increase the amount of water which would be in these green areas?

A. No; I don't think so. It would just increase the top horizontal section.

Q. It would increase what?

A. Decrease the top section of the wave across the top.

Q. That is, it would make it narrower?

1041 A. One of those spaces narrower.

Q. And when you come down, you will notice, Mr. Kramer, that to the righthand of those waves on the diagram second from the bottom as you face the chart, there is an area following the wave—I undertsand that is following, isn't it?

A. Yes, that is right.

Q. Colored dark geen; is that right?

A. Yes.

Q. That represents water in the wave that has begun to dampen out?

A. Yes.

Q. And if you decrease the width of your wave, you would at the same time move the lefthand boundary of that green area representing the water which has dampened out of the wave?

A. Yes; move it to the left one space and leave it about the same area but move it to the left one space.

Q. If you moved it to the left one space, it would increase the area, wouldn't it?

A. It would leave the blank space in the middle one space longer.

Q. What space in the middle?

A. The blank space showing the amplitude of the trough. The amplitude of the trough would be one hour more and the amplitude of the crest would be one hour less.

By Mr. McClernan:

Q. You mean period?

A. Yes, period.

By Mr. Jackson:

Q. Direct your attention for a moment to the third diagram from the bottom of your chart, Exhibit 132. If that, in fact, represented a wave corresponding to the peaking of 2,000 second-feet flow per day, as it does not, you would again narrow the 1042 width of that wave, the square part of that wave, in the diagram, wouldn't you?

A. Yes, one space.

Q. So that would result in moving the line at the back of the wave which bounds, on the upper part, the red area and in the lower part marked by the division between the dark green and light green areas, one space to the left on the chart as you face it?

A. It would be one space more between the two red areas.

Q. That is right, and that line that not only bounds the red area but divides the two green areas would be moved one space to the left, wouldn't it?

A. Yes.

Q. And the result of that would be that the dark green area would be larger, wouldn't it?

A. Well, it is a diagrammatic affair. The picture would probably be just the same as it is now.

Q. It wouldn't make any difference to you then whether you were peaking the wave on one volume or another?

A. It would if I were attempting to show an accurate condition at some particular place, but just to show what the amplitude and the trough and the back slope of a wave, that doesn't represent a wave at any particular point. It is just intended as a diagram to show what the amplitude, the crest, the trough, and the period of the waves are. It is not intended to show any particular wave.

Q. I understand that, of course, but if you had put in the actual amount of water used, 2,370 second-feet, it would somewhat raise that average flow line, wouldn't it, in the diagram if you were putting that on diagrammatically?

A. If I had changed it that way, it would, yes.

1043 Q. And that would result in a change in your measurements from that line of amplitude, wouldn't it, as measured from that line on the diagram?

A. Yes.

Q. I understand this is only diagrammatic, but I want to make an inquiry because I was a little misled by something about it. I direct your attention again to the third diagram from the bottom of that chart. Am I right in understanding that if that diagram were made accurately the red area should be equal to the sum of the dark green area following the wave and the dark green area on the face of the wave?

A. I would say that the green area should be larger than the red area for the reason that the water doesn't travel quite as fast in back of the wave.

Q. The point I am getting at is that the red area is intended to indicate the area of the wave as it originated?

A. Yes.

Q. Which at the point shown by the third diagram on Exhibit 132 has disappeared or dampened out into the water that has gone ahead, if that is the right way, on the face of the wave and fallen behind at the back of the wave; is that right?

A. It is more of a change of the cross-section of the moving wave than it is of a change in the water, the position of the water. The wave moves faster than the water.

Q. Moves faster than what water?

A. Than the water in the stream, than the average velocity of the water in the stream.

Q. I understand that, but I am talking now only about the wave which you show on top of your base flow. You understand that, don't you?

1044 A. Yes.

Q. And I am asking you whether you have not sought to show diagrammatically that the area of the wave colored red in the third diagram—the water that was in that area—has now, as a result of the change in the shape of the wave, taken its place in the dark green areas immediately preceding and following the light green section of the wave?

A. Not with any accuracy.

Q. I didn't intend any accuracy, but that is the purpose of the coloring?

A. You mean that the green area is supposed to be equal to the red area?

Q. I haven't asked you that yet. As you testified on direct, the red part of the diagram, the third diagram from the bottom of the sheet, was intended to show the area of the wave as it started at the bottom which at this point had been dampened out into the area which precedes and follows the light green section of the wave as you show its shape in the third diagram; is that right?

A. Yes.

Q. Now, if one wanted to be accurate in giving a diagrammatic representation of this wave action and this wave form, the red area shown in that wave would have to be equal to the sum of the dark green area preceding the light green area on the face of the wave and the dark green area following the light green area at the tail of the wave?

A. It should exceed it.

Q. Can you not say from an inspection, as you have had the diagram prepared, the red area is, in fact, over twice as great as the sum of the two dark green areas?

A. I wouldn't say that without actually measuring the areas.

Q. You can see it is a great deal larger?

1045 A. Sometimes a diagram of that kind is deceiving unless you actually measure the areas; however, I will say that there was no attempt to prepare that diagram with that accuracy. It was more for the purpose of showing that the back slope of the wave is flat and the front slope steep, and that the water is dragged out of the crest towards the back of the wave. Nothing further was intended than that, and to show the definitions contained on there.

Q. I am not raising any question as to what you were trying to show. I am trying to find out whether or not it can be readily and fairly interpreted. You would not be willing to testify that the red area is not more than twice as great as the two dark green areas on that diagram, would you?

A. It is not more than twice as great?

Q. Yes, as the sum of the two dark green areas?

A. I would say it was nearly equal to the sum of the two dark green areas.

Q. That is your best judgment as an engineer?

A. Yes, my best judgment by looking at it.

Q. We have measured that and you might be surprised to know it is over twice as great. Now, referring to the top diagram on Exhibit 132, as I understand it, you there show a situation where the two waves have caught up with each other. Would that be the right way to say it?

A. No; the crest of the waves are about the same distance apart as they were to start with.

Q. I mean by that the front of the following wave has caught up with the tail, as it were, of the first wave; is that right?

A. That is correct. The water has lagged from the crest of the preceding wave back until the crest of the wave back of it has caught up with it.

1046 Q. The steep part of the following wave travels more rapidly than the shallower part of the tail of the preceding wave; is that so?

A. The water does, yes; in the wave.

Q. And that results in the following wave catching up with the back or end of the preceding one?

A. I would rather express it the other way and say that the water in the tail of the preceding wave lags back.

Q. I' any event, they come together?

A. Yes.

Q. Mr. Kramer, on this diagram you have assumed a condition where you have no flow and instantaneous release of 9,000 second-feet continuing at that uniform rate for either 5⅓ or 6⅓ hours, depending on how you correct your chart, and then being abruptly terminated to nothing; is that right?

A. That is right.

Q. Does that ever happen?

A. Ordinarily the increase in flow would be over a longer period. There would be undulations in the top of the wave and the end of the wave would not be cut off as abruptly. It would be cut off less abruptly. It wouldn't be regular like that.

Q. Assume that you are going to release this volume of water, Mr. Kramer, and that you started out and gradually increased from nothing until 9,000 second-feet over a period of, say, two or three hours, remained at 9,000 second-feet for half an hour or an hour and then you cut down to 3,000 second-feet gradually for two or three hours and then after an hour increased for two or three hours up to, say, five or six thousand second-feet, and then drop off to zero gradually, would the form of the resulting wave look anything like these square boxes on the bottom of diagram 132?

A. It would look something like them, not identical by any means.

1047 Q. They would be very different, wouldn't they?

A. The outline would be regular. There would be a sloping face upstream.

Q. They would be spread out in a gradual line, wouldn't they, a gradually undulating curve?

A. More of a gradual curve than this is; yes.

Q. You testified that you had some estimate that under certain conditions a wave released at Radford would persist to the extent of 75 percent to the mouth of the Kanawha River and, I believe, 85 percent to Kanawha Falls. Will you tell me whether those figures were derived by computations or whether they are based upon your judgment?

A. They are based upon my judgment.

Q. You also testified that from your study of these exhibits 133 to 141, inclusive, you had made some estimate of the percentage of the waves which persisted at Kanawha Falls, did you not?

A. Yes; I think so.

Q. That is the percentage of the amplitude at the Radford dam site "A" which persisted at Kanawha Falls?

A. That is correct.

Q. And at Glen Lyn?

A. I didn't say that I had at Glen Lyn.

Q. There were two places. One was Lock No. 2 and the other Kanawha Falls?

A. No.

Q. Can you give me these two figures from your notes? Do you know the two places about which you testified?

A. Lock No. 2 and Ivanhoe and Kanawha Falls, I think, were the figures that I read.

Q. Didn't you give figures for two places in percentages of the amplitude which you found at Radford dam site A?

1048 A. I only remember giving the one for Kanawha Falls.

Q. What percentage figure did you give for Kanawha Falls?

A. Wave No. 4 I think I was reading about. The amplitude of the wave was 44 percent of the amplitude at Ivanhoe.

Q. Did you give a figure of 54 percent?

A. I gave a figure of 53 percent of the amplitude of the wave at Radford. The wave at Kanawha Falls was 53 percent of the amplitude of the wave at Radford, the same wave.

Q. Wave 4?

A. Yes.

Q. As I read your testimony at page 2103 of the record, Mr. Kramer, you say that the amplitude of the wave for Lock 2 applying to Radford is 54 percent?

A. I may have read Lock 2. I am reading the wrong figure. May I read those figures again?

Q. Yes; you can read the figures if you want to. Tell what it is.

A. The amplitude of wave No. 4 at Kanawha Falls is 45 percent of the amplitude of the same wave at Ivanhoe.

Q. I don't think you mentioned Kanawha Falls at all yesterday in your transcript. It is only at Lock 2?

A. At Lock No. 2 it was 35 percent of the amplitude of the wave at Ivanhoe.

Q. And what did you say was the amplitude of the wave at Lock 2 in terms of Radford dam site A?

A. 42 percent.

Q. If the record on page 2103 shows 54 percent, that is an rror, is it?

A. The 54 percent applies to the Kanawha Falls. The wave at Kanawha Falls was 54 percent of the wave at Ivanhoe.

1049 Q. The one for Lock 2 is 42 percent according to your computations?

A. That is right.

Q. I suggest that you read page 2103 of the record and get that traightened out. There appears to be an error there. It appears to read that the amplitude of the wave, according to your estimate, at Lock 2 was 54 percent of what you found it to be at Dam Site A and that was the way I understood your testimony yesterday. Will you give the amplitude of the wave at Kanawha Falls as you letermined it to be?

A. The amplitude of wave No. 4 at Kanawah Falls was 45 percent of the amplitude of the same wave at Ivanhoe.

Q. I am asking you not for percentages but what you found the mplitude of the wave at Kanawha Falls, wave 4, to be in second feet?

A. 2,650 second-feet.

X Q. Mr. Kramer, I understood you to testify yesterday that in your opinion the greater the period of the wave the greater the persistence of the wave down stream.

A. The longer the period.

X Q. I understood the longer the duration of the wave the onger would be its persistence down stream?

A. Yes, sir; other things being equal.

X Q. And then I understood you to say the longer the period r duration of the trough the longer the wave would persist downtream?

A. The longer the effect of the trough would persist.

X Q. Of course operating on a daily cycle of twenty-four hours hose two principles meet themselves coming back, so far as daily ycle is concerned?

X Q. Do you understand the question?

A. No; I don't.

X Q. Well, when you are operating a wave on a cycle of twenty-four hours, do not those two principles work in opposite 1050 directions; that is to say, every time that you lengthen the duration of the wave you necessarily shorten the duration or periodicity of the trough, do you not?

A. Yes, sir.

1050a Re-direct examination by Mr. **McClernan**:

Q. Mr. Kramer, I believe counsel asked you on cross-examination whether it was your understanding that the plans for the construction of this dam at Radford had been approved by the Chief of Engineers. Was it your understanding that approval was unconditional?

A. It was my understanding there were conditions attached to it.

Q. Were any of those conditions the operation of the project under a license?

By Mr. **Jackson**. If he knows.

Q. If you know?

A. I don't remember the conditions very accurately. I remember there were conditions. I would have to make an assumption to answer the question.

Q. I think counsel also asked you whether the Federal Power Commission had made a request in the last month for a certain load data. Did the company furnish that load data which was requested?

A. I know of no request during the last month. This data I saw has been filed at the Federal Power Commission for sometime, since around the first of the year, I would say the first of January; however, I am not sure of that. The reason I think that, the last month included in it was October, 1935. If they had furnished it after the end of 1935 I assume they would have included the other two months.

By Mr. **Jackson**. Not if they asked for specific dates?

A. No, sir.

Q. So far as you know, the last request counsel mentioned was not complied with by the company?

A. It was not. I know I saw these reports about the first of May in the files of the Commission.

By Mr. **Jackson**. Will you read the answer. (Last answer read.)

A. I didn't intend to say it did not. I don't know anything about that.

Q. You don't know about that?

A. No, sir.

Q. I believe also counsel asked you if it was not possible, physically possible, to use varying quantities of water, less than 9000 second-feet, in the operation of the Radford dam, constructed as proposed, would that be an economical use?

A. It might be.

Q. In what way?

A. Why by operating the plant on peak loads.

Q. I don't think you understand me. My recollection of the cross-examination was to the effect there might be a continuing use of different quantities of water, substantially less than 9000 second feet, in the operation of the Radford plant. My question to you now is, whether that is the most efficient or economical use at the Radford project or operation?

A. You mean at a uniform load?

By Mr. **Jackson**. I object to that, because not in accord with the testimony on cross. It makes an erroneous assumption, I did not put the form of question you are now putting to the witness.

By Mr. **McClernan**. I believe it is true the form is not the same.

By Mr. **Jackson**. Neither are the facts or assumptions.

By the **Court**. What I understand you are asking the witness is: This witness has testified the plant might be operated, and the use and flow of water considerably less than 9,000 feet; varying downward, say 7,000, 6,000, 5,000, or 4,000. You want to know if it would be economical to operate the plant in that manner?

By Mr. **McClernan**. Yes, sir.

By the **Court**. He means a plant adapted to economical, advantageous use, at figures of flow less than 9,000 cubic feet?

A. Not unless it is operated as a peak plant, at a varying load.

Q. My recollection on this is not clear, but I believe something was said about the fact that these waves and their effect in fluctuating streams below would be serious only in times of low flow in streams, is that true?

A. The waves would be——(Interrupted.)

By Mr. **Jackson**. I object to the form of the question, so far as it calls on the witness to state if the effect would be serious. I think that is a conclusion he ought not to draw. If he wants to ask what effects would exist at varying flows I have no objection.

By Mr. **McClernan**. I will substitute "substantial" instead of "serious."

By the **Court**. Go ahead.

By Mr. **Jackson**. Exception.

A. The waves would persist downstream, if the plant was operating on a varying load, whether the water was low or at some medium stage. There would be less reason for varying the load when there was a high-stream flow because the plant would want to develop all the kilowatts they could, and at a flow of 9,000 feet per second the most economical way to run the plant would be to run it with the 9,000 second feet all the time, as long as that water was there, assuming the reservoir to be full.

By the COURT. Is that what you were getting at?

By Mr. McCLERNAN. No, sir; but I will bring it out later.

Q. I believe you testified also that the Radford plant could be used to carry what counsel has termed the sub-peak load. Now I will ask you if a dam can be used as economically for carrying that kind of load as for carrying the real peak load?

A. Not in times of low flow, not in the neighborhood of 2,000 second-feet.

Q. I think you said also that the London and Marmet plants and the Buck and Byllesby plants have actually been used to some extent to carry peak loads?

A. Yes, sir.

Q. Can those plants be used as advantageously for that purpose as the Radford plant could be?

A. Not to carry peak loads, on the lower load. The stream flow is almost as much at Buck and Byllesby as at Radford. It is greater at Radford, but the storage at Buck and Byllesby is much smaller in proportion to the stream flow at the point they are located than the storage is to the stream flow at Radford. Radford having 100,000 acre feet capacity and Buck and Byllesby plants having only, as I recollect, 1,400 acre-feet capacity together.

Q. How about the London and Marmet?

A. The same thing is true at London. The average flow of the Kanawha River at London is very much greater than the average flow of the New River at Radford. The flow available for 60% of the time at London is much greater than the flow available for 60% of the time in Radford; however, the storage they are allowed to draw-down in London is in the neighborhood of 2,500 acre-feet, whereas the storage they can draw-down at Radford is 100,000 acre-feet.

Q. You know whether there is any reservoir on the New and Kanawha Rivers at present used only for flood control purposes?

A. I know that there is none.

Q. I think you were questioned concerning your testimony about the hydro installation of the Appalachian Electric Power Company, and what you have told me on direct examination, that it came to some 74,000 kilowatts; is that correct?

A. I think I stated that using 9,000 second-feet flow, the capacity would be 70,000 kilowatts.

Q. I am talking about the total hydro installation, not the Radford project?

A. Yes, the total hydro installation for the Appalachian Electric Power Company, about 74,000 kilowatts.

Q. In giving that figure, you did not include, as I understand you, the power potentially available at the Winfield Dam?

A. I did not.

Q. Was that because the Winfield dam is not completed?

A. Yes, sir; it is not completed.

Q. And so far as you know it may never be completed?

A. So far as I know for certain it may never be completed.

Q. You knew of at least one other large power project that is well along toward completion, but which may not be completed?

A. That is correct.

Q. On cross-examination, counsel undertook to have you correct some figures you had given, concerning the persistence of these Buck and Byllesby waves, and I think those corrections were satisfactorily made, but I believe you made another error in correcting them. I think you said wave #4 at Kanawha Falls was 54% of that wave at Ivanhoe. Did you intend that, or did you intend 54% of the wave at Radford dam site?

A. The amplitude of the wave at Kanawha Falls was 45% of the amplitude of the wave at Ivanhoe and 54% of the wave at Radford.

Q. Mr. Kramer I understand that at Mr. Jackson's request you have produced a blue print which you all discussed?

A. I have.

By Mr. McClernan. I don't remember the occasion for calling for the production of this blue print.

By Mr. Jackson. Is that the stage chart I asked you about?

A. This is the stage chart he asked me to produce.

By Mr. Jackson. I asked Mr. Kramer some questions about a stage chart marked Defendant's Exhibit #513 for identification, and as I understand Mr. Kramer is producing his own stage chart corresponding to Defendant's Exhibit #513 for identification.

Q. Is that the situation?

A. Yes, sir.

By the Court. One chart Mr. Kramer was examined about he said it was difficult to make estimates of figures, and he stated he had another chart, is that the one?

A. That is correct.

By Mr. McClernan. Let the record show at the request of counsel for defense Mr. Kramer has produced Government's Exhibit #143, which is entitled on its face, "New-Kanawha Rivers power waves period of March 11 to April 3, 1930, inclusive", and that I now offer it in evidence. Any objection?

By Mr. **Jackson.** I have no objection to your statement. I didn't ask him to produce it. I asked for the data and if he was dissatisfied with it to check it with his chart.

(Note: Chart marked and filed Government's Exhibit #143.)

Q. Will you refer to that Exhibit #143 a moment?

A. Yes sir.

Q. Can you tell us briefly the difference, if any there is, between this Exhibit #143 and the similar blue print which counsel produced and asked you to use on your cross examination?

By Mr. **Jackson.** That was Defendant's Exhibit #513 for identification. My question was directed only to the gage readings at Lock #2, so that is the only difference as I understand it.

A. What wave was I referring to?

By Mr. **Jackson.** You referred first to your wave #4, the first wave I referred to and which I asked you to state the rate of rise per hour, expressed in feet, as shown by the gage, at the upper gage of Lock #2.

A. As I recollect it I was asked the rate of fall.

By Mr. **Jackson.** No; you were asked the rate of rise.

A. The rate of rise for wave #4 as shown on Defendant's Exhibit #513, which I, however, don't think was what was asked me the other time——

By Mr. **Jackson.** Yes, it is.

A. (Continuing.) occurred during a period of about three hours. The rate of fall was what I testified to.

By Mr. **Jackson.** You misunderstood. If I may I will make it clear. I asked you to state the rate of rise for your wave #4 in inches per hour on the gage as shown on the upper gage at Lock #3.

A. As shown by your exhibit?

By Mr. **Jackson.** That is all we had.

By Mr. **McClernan.** I would still like to have the question I asked answered.

By the **Court.** Mr. McClernan had this witness on redirect, but the reason I was letting you go on, I thought you were bringing him onto the blue print to answer the question.

By Mr. **Jackson.** I was trying to be helpful. I apologize for doing it.

Q. I want to know in what way the exhibit this witness produced differs from the exhibit produced by the defense?

A. I don't know it does differ with reference to accuracy. This exhibit I have shows the time in hours and the vertical scale shows the rise in tenths of the foot, whereas Defendant's Exhibit #513 has no intervals for less than one foot in a vertical direction or ½ day in the horizontal direction.

Q. Does the exhibit you have produced, Government's Exhibit #143 cover the same dates and the same places as the Defendant's Exhibit marked for identification #513?

A. It does, yes.

Q. I think in connection with a certain wave which appears on Defendant's Exhibit #513 as on the 23rd of March, you gave the total difference in stage, at first I believe you said that the difference in stage was nine-tenths of a foot, and later in some connection with that same wave, you stated the difference in stage was about five-tenths of a foot. Was that last statement a correction or were you talking about a comparison at different points?

A. Comparison at different points. In the first case I was comparing the crest of the wave with the following trough. The difference in gage there is nine-tenths of a foot, as I described it. If that difference is compared with the preceding trough it is five-tenths of a foot, slightly less than five-tenths of a foot.

By Mr. Jackson. Will you kindly have him identify the wave?

Q. That wave you have been talking about, as I understand it, appears on Defendant's Exhibit #513 as on the 23rd of March, with the troughs at the left and right of it, and appears on the same date on your Exhibit #143?

A. Yes, sir.

By Mr. Jackson. That is at Lock #2?

A. Yes, sir.

Q. Now this wave that is shown on these two exhibits we have been discussing, was that a wave of the size or intensity such as could be generated by the Radford project?

A. I will have to refer to this exhibit we were using. Will you give me the date?

Q. You mean the date of the wave you discussed?

A. It isn't necessary. That shows on the other exhibit as wave #10, and I can identify it on this exhibit as wave #10. Wave #10 had an amplitude of from 500 cubic feet per second to 11,100 cubic feet per second, the difference between the two being about 10,600 cubic feet per second.

By Mr. Jackson. That is wave #10?

A. Yes, sir.

By Mr. Jackson. And where is it?

A. At Ivanhoe, and shown on Exhibit #140 under date of March 21, at Ivanhoe. It will be observed the peak of this wave, that is the time the largest flow was let out, was only for a few minutes. The time the flow of 9,000 second-feet occurred was slightly less than three hours. The time the water was shut off, or the water was not shut off, preceding the wave, but the time the flow was less than 600 second feet preceding the wave, was slightly less than five hours. At the time the flow was less than 700 second-feet, following the wave, slightly less than seven hours. This differs from the waves that might be created at the Radford plant if operated as I have discussed here by ordinary peaking throughout the week, or shutting the flow down Friday night and letting it out Monday morning, first in respect to the short time the water is shut off between peaks in the waves shown on the chart, and created at the Buck and Byllesby plants, as compared to the time the water could be shut off at the Radford plant.

Furthermore, the time that the large flow would be let out at the Radford plant, at least flows exceeding 8,000 cubic feet per second, would be in the neighborhood of nine to ten hours, instead of less than three hours, as I described there.

There is one other point. These waves were created at Buck and Byllesby plants. They were measured as Ivanhoe, forty-six miles up-stream from the proposed Radford plant.

Re-cross examination by Mr. Jackson:

Q. Isn't it a fact that I asked you to give me the rate of change and the maximum change in stage of what you thought was the steepest and largest wave shown on Exhibit #513 of the Defendant, marked for identification, at Lock #2, and that you yourself selected wave #10 as the one for which you desired to give those figures?

A. The waves are very similar. This appeared as steep as any of them, possibly steeper than most of them.

Q. And at my request you made that selection?

A. I did.

Q. It was not one I picked out?

A. That is correct.

Q. And there are other waves on there whose duration of release at Ivanhoe was longer than the duration of release at wave #10?

A. That is correct, but the variation was not as much.

Q. Under your normal procedure do you measure the amplitude of the wave from the trough which precedes the crest or the trough which follows the crest, in point of time?

A. I think it can be done either way. If there is no change in stage in stream flow and the cycles are the same, the variations in stream flow are the same. You would get the same results. If there is a difference in the waves as they are created, and there is a change in stream flow, you would get different results.

Q. What is the normal engineering practice in measuring the waves?

A. There is no normal practice in so far as I know. The waves as I showed them on my chart, I was discussing awhile ago, I was comparing the trough that followed the wave with the preceding crest. I think if I were working independently I would adopt that method, however, the waves as reported by the Huntington office were described in the opposite manner, so I followed that in order to have somewhat the same figures in order to compare my figures with theirs.

Q. Is it fair to say the engineering practice permits either method?

A. That is correct.

Q. What is the engineering practice with a varying base flow as to which way the measurements may be made?

A. I think the most accurate way would be to take the average rise between the two troughs, the one preceding and the one following, and measure the amplitude of the crest from that.

Q. If that average was applied to this wave #10 for which you gave two amounts, nine-tenths of a foot, and somewhere between four and five-tenths would that result in averaging those figures?

A. Yes, sir; it would.

Q. You think that would be the fairest way of arriving at that measurement?

A. I think the preceding wave and the following wave, if they were the same that would be the most correct. A few other things though should be taken into consideration in the complete study of that wave; however, if it was just to determine this one point, the best way would be to average those two figures.

1051 EARLE E. TEETER

Direct examination by Mr. GATCHELL:

Q. Mr. Teeter, will you state your full name and occupation?

A. Earle E. Teeter, Huntington, West Virginia; occupation, Civil Engineer.

Q. And where do you work?

A. In Huntington, U. S. Engineer Office.

Q. And who is your immediate superior?

A. My immediate superior is W. S. Winn.

Q. How long have you been in the Huntington office?

A. Since June, 1928.

Q. And where were you prior to that time?

A. I was on the Tennessee River, and I was located at Chattanooga, Tenn.

Q. With the United States Engineers?

A. Yes, sir.

Q. Are you familiar with the records of the United States Engineers Office at Huntington, West Virginia?

A. Yes, sir.

Q. I show you Government Exhibit No. 144, being a series of maps entitled "Kanawha River Lock and Dam, Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11," and will ask you if those are records or maps obtained from the United States Engineers Office at Huntington?

A. They are official records.

Q. And what do those maps purport to show?

A. They show maps of Locks and Dams 2, to 11, on Kanawha River.

Q. And does it show on each map, at any place, the year of completion?

1052 A. The year of completion is given in the upper right hand corner of each map, for each lock and dam.

(Filed before as Exhibit Government 144.)

Q. Does your office have charge also of the Ohio River immediately above and below the mouth of Kanawha River?

A. Yes, sir.

Q. Can you tell me the dates of completion of Locks and Dams 26, 27 and 28 in Ohio River?

A. Yes, sir, I have those notes from the official records.

Lock and Dam #26 was completed in 1912.

Lock and Dam #27 was completed in 1923.

Lock and Dam #28 was completed in 1915.

Q. Can you give me the distances between those locks or the distance below the mouth of Kanawha River for those three dams?

A. Lock and Dam #26 is 13 miles below the center of the mouth of Kanawha River.

Dam #27 is 35.3 miles below the Kanawha River, or 22.5 miles from Lock #26.

Lock and Dam #28 is 45.9 miles below Kanawha River, or 10.6 miles below #27.

By Court:

Q. Where is Lock #28 with reference to the City of Huntington?

A. It is in the lower part of Huntington, and two miles below Huntington Bridge.

By Mr. **Gatchell**: Q. Can you give me the distances on the Kanawha River of the Locks shown in Exhibit 144, being maps of Locks and Dams 2, to 11, inclusive?

By Mr. GATCHELL: Q. Distances from where?

By Mr. GATCHELL: Q. State from what point you start the distance?

1053 A. I will start at the mouth of Kanawha River.

Lock #11 is 1.8 miles from the mouth.

Lock #10 is 19.2 miles.

Lock #9 is 25.4 miles.

The next is Winfield site, which is 31.1 miles.

Lock #8 is 36.2 miles from the mouth.

Lock #7 is 44.2 miles from the mouth.

Lock #6 is 54.3 miles from the mouth.

Lock #5 is 67.6 miles from the mouth.

And the New Marmet Dam is just above, 67.8 miles.

Lock #4 is 73.5 miles from the mouth.

Lock #3 is 79.7 miles from the mouth.

Then comes the New London Dam 82.8 miles from the mouth.

The last one at the river is Lock #2, 84.8 miles.

Q. I show you Government Exhibit 144, being a map of Lock and Dam #2 on the Kanawha River showing that the date of completion for that lock was 1887, and will ask you if that dam has remained at the same level that it was originally constructed?

A. No, sir; the dam is timbered crib filled, with stone. About 1925 a settlement was noticeable and by 1930 it was reported by the Charleston office, which office had charge of the operation of this river, that the crest of the dam had settled 1.1 feet lower than the original elevation.

Q. I notice on that map that the upper pool elevation is given as 597.75. Is that the correct elevation?

A. That is the elevation on the original Kanawha River Datum, which is different from the Ohio River datum.

Q. Has the Kanawha River been resurveyed to establish the correct datum?

A. The Kanawha River was resurveyed in 1930 and the old Kanawha River datum was changed to the Ohio River 1054 Datum or Sandy Hook datum, and the elevation of points recorded on the map from the new datum.

Q. How much should be added to the datum shown on these maps to get the correct Ohio datum?

A. 4.15 feet.

Q. Do you mean to add 4.15 to the elevation shown on this map and that then they will correspond with the elevation shown on the Ohio River datum?

A. That is correct. It did not change the actual elevation at any point, it just changed the recorded elevations.

Q. I show you Government Exhibit No. 110, entitled "Ohio River at Lock and Dam 24, during the months of August, 1918, through to October, 1933," it not being a continuous record but picking up particular months. Will you examine Exhibit 110, and tell me if those are the official records of the United States Engineers Office at Huntington, West Virginia?

A. All these sheets are original copies of records in the Huntington office.

Q. I notice that most of them are signed by the Lock Masters but that some of them are signed by Roland R. Castle, Assistant Engineer. Were those records obtained in the same manner as the records signed by the Lock Masters?

A. They were. Mr. Castle was in charge of the District or the lower portion of Ohio, and he signed a few of these instead of the Lock Masters.

Q. I notice also that on these signed by the Lock Masters appears the "receipt stamp, United States Engineers Office," when received, and the date, but that on these signed by the Assistant Engineer, no such receipt stamp appears. Can you explain why no receipt stamp is shown on these?

1055 A. That is merely the date received by the Huntington Office. It has nothing to do with the official status of the exhibit. I will explain it this way, Mr. Castle signed probably several sheets at once, and when the mail came to the office, they probably stamped the top sheet and passed it on, and did not go through the whole pile and stamp all of them. That would be my explanation of it.

Q. How are these records obtained in order to be placed on these sheets?

A. They are copied from the Lock Masters Log Books of the Gauge readings.

Q. Are they checked before being transmitted to the Huntington office?

A. Yes; they are checked at the Lock or at the District Office.

Q. I notice on a number of pages, particularly on the third page which covers the period October 1920, at Dam #24, the 8 a. m. readings are placed on this chart by a typewriter for the upper and lower pools, but that the middle gauge is placed on there in pencil, with the exception of three days. Can you explain the pencil figures?

A. When the dams are up two gauges are read, the upper gauge and the lower gauge. For these three days they have one reading. As to the middle gauge, that is read when the dams are down, the middle gauge is what we call the low-water gauge, and these pencil gauge figures here refer to this middle gauge?

Q. You say these pencil gauge figures here refer to this middle gauge, and would give the stage of the river above low water. In case the dam were down and in case the other two gauges were not read, and were the pencil figures placed on these charts by the lock master?

1056 A. No, sir; I would say they were placed on there in the Huntington office, because the typewritten portion of the report is from the Lock or District Office, which is the same thing.

I might add that these gauge records are used for various purposes and studies, certain hydraulic studies, and if you wanted to know the elevation of the flow above low water, someone has just inserted these pencil notes for ready reference.

Q. I notice at the bottom of pages appears zero of upper gauge (above sea level). The part of the chart to which I am now directing your attention is for the month of October 1920, and shows zero of the upper gauge 520.1. Can you tell me how you obtain the elevation of the water with the use of that zero of upper gauge?

A. The gauge reading added to the zero of gauge will give the elevation of the water.

Q. So that I would take the reading from the upper pool and add it to the zero of the upper gauge, and obtain the elevation of the water in the upper pool?

A. Yes, sir.

Q. Would I do the same thing to the lower pool?

A. Yes, sir; it would give you the elevation of the pool below the dam.

Q. I now show you Government Exhibit 111, being a series of charts for Dam #25, for several months, beginning August 1918 and ending with the month of October 1933 the months, however, not being consecutive. May I ask you if those are records from the Huntington office?

A. Yes; they are official records of the Huntington office.

Q. Can you tell from that what was happening to Dam #25 in August 1918?

A. There is only one reading and it means the dam wasn't up, and I see the notes here refer to construction of dam. The dam was not complete.

1057 By the Court:

Q. You say the dam was up?

A. Was not up.

Q. When a dam is up, what does that mean?

A. It means the dam is in a position to hold the water back during which time two gauge readings are taken, upper and the lower.

Q. How are you going to apply that term to the Roller type dam?

A. The dam will be in position on the Roller type dam.

Q. That is one thing that sounded rather funny to me, the expression that the dam is up?

A. There will be two gauge readings just the same.

By Mr. **Gatchell**:

Q. Then beginning with the fifth page of this Exhibit 111, appears a series of two readings for Dam #25. Will that show whether the dam was completed, or not?

A. The two readings mean the dam was up in position, the wickets were up when they read both the upper and lower gauges.

Q. When was dam #25 completed?

A. Dam #25 was completed in 1922.

Q. Have you given us heretofore the date of the completion of Dam #24?

A. No, sir; I just gave #26, #27, and #28.

Q. Will you give us the date of the completion of Dam #24?

A. Dam #24 was completed in 1919. Dam #25 was completed in 1922.

Q. There appears on these charts table, as in the previous tables in Exhibit 110, pencil figures for the middle gauge. Were those figures placed on there by the Lock Master?

A. No, sir; the same as the other exhibits, they were placed on there in the Huntington Office.

1058 Q. I show you Government Exhibit 112, being gauge readings at Locks Nos. 2, 3, and 4, Kanawha River, and Locks Nos. 26, 27 and 28, Ohio River, during Low Water periods of 1921, 1925, 1930 and 1932, and will ask you if those records were prepared in your office?

A. Yes, sir.

Q. Were they prepared by you or under your supervision?

A. Yes, sir.

Q. Can you tell me where you obtained the figures under the column head "Kanawha Falls, C.F. S."?

A. That is cubic feet per second, daily discharge obtained from the water Supply Papers, U. S. Geological Survey.

Q. Can you tell me what Water Supply Paper you refer to for 1921?

A. Water Supply Paper 728 at page 99.

Q. Can you tell me what Water Supply Paper you consulted for the figures, discharge Kanawha Falls, for 1925?

A. The same Water Supply Papers, 728, page 100.

Q. And for 1930?

A. The same paper at Page 66.

Q. Please look at that and state whether it is the same paper?

A. For 1930, it should be Water Supply Paper #713.

Q. At page 66?

A. Yes, sir.

Q. And for 1932?

A. That is Water Supply Paper No. 728 at Page 122.

Q. I notice on the 1921 table of gauge readings, that Dam #4 and Lock #4, has in there a statement "Dam down," between two stars. Can you tell me what that means?

A. Between the two dates starred, Dam #4 was down, open river.

1059 Q. And what dates are shown on that?

A. The dates of October 11th to 18th inclusive, 1921.

Q. Can you give me the upper pool gauge reading and normal pool of Lock #4?

A. The upper pool normal gauge reading is 14:00 on No. 4.

Q. Can you tell me when the wickets would be lowered on that lock or that dam?

A. The wickets are usually lowered when the river is rising and before the water gets high enough to run over the top of the wickets as much as one foot, in order to prevent destruction of the wickets.

Q. I notice on the 1921 gauge reading, upper pool gauge reading for Lock and Dam #2, is given as 19. Can you examine that table and tell me if that shows that that dam was leaking during that month?

A. It was leaking because the upper pool went below 19.00, which was the normal pool elevation.

Q. Can you determine from this chart the amount of the leakage?

A. You cannot from these gauge readings.

Q. Can you from the gauge readings taken above the dam determine the flow or discharge past the dam?

A. This #2 Dam has a rating curve. From the rating curve and the gauge readings you can determine amount of water past the dam.

Q. Would you determine that from the gauge above the dam or below the dam?

A. That rating curve applies to the gauge above the dam in this case.

Q. And for #3, how would you determine the discharge past the dam?

1060 A. No. 3, is also a fixed dam, but we have no rating curves for the upper gauge. We would determine the flow past the dam by reading the lower gauge.

Q. So that by reading the lower gauge, you would determine there was a certain discharge past Dam #3?

A. Yes, sir.

Q. Could you tell from that reading whether it was a discharge obtained by leakage or through lockage or in what manner the water passed the dam?

A. The lower gauge indicates the state of the river there without regard to how it comes through the dam. You could not tell the leakage through the dam.

Q. I notice that the figures for 1932 of Upper Pool gauge readings for Lock and Dam #26, is given as 16.90, whereas the gauge readings during the month of September, 1932, are in excess of 16.90. Can you explain why that happened, if you know?

A. This was September 1932, and I know that the river was low and the gauge reading does not indicate the flow because in low water times they try their best to hold the pools at normal or higher. The reason for this is to give the required depth in the upper end of the pool.

Q. Now I show you Government Exhibit 113, which is entitled "Kanawha and New Rivers, Hydrographs at Gauging Stations with Published Mean Daily Flows for July and August, 1932," and will ask you to examine that.

(Witness examines said Exhibit 113.)

Q. Was that prepared by you or under your supervision?

A. It was prepared under my direction.

Q. Can you tell me what these various lines represent on this chart?

1061 By Mr. JACKSON. Q. Are you speaking now of Exhibit 113?

By Mr. GATCHELL:

A. Yes, sir.

A. These are stage hydrographs taken from the recorded charts with the figures each day showing average daily discharge for that day.

Q. Do these hydrographs shows New River at Galax, Virginia, at Ivanhoe, Virginia, at Allisonia, Virginia, at Eggleston, Virginia, Glyn Lyn, Virginia, Greenbrier, at Alderson, West Virginia,, the Gauley River at Belva, New River at Caperton and Kanawha River at Kanawha Falls?

A. They do.

Q. Can you tell me what stations are automatic recording gauges?

A. They are all automatic recording gauges.

Q. Did you take these hydrographs from the charts of the recording gauges?

A. Yes, sir.

Q. Did you use the originals to put them on this chart?

A. The originals in this case were used, received from the U. S. Geological Survey.

Q. The figures appearing on each day right over the particular gauging station, right over the hydrograph for the particular gauging station, were obtained from what source?

A. They are the average daily flows obtained from the Water Supply Paper of the U. S. Geological Survey.

Q. Can you tell me what Water Supply Paper you obtained them from?

A. You mean this Chart #113?

Q. Yes, sir.

A. They were obtained from Water Supply Paper 728.

Q. Can you give me the page?

A. Page 90.

1062 By Mr. JACKSON:

Q. Are you giving them for the various gauges?

A. I can, if you wish me to.

A. They are continuous from page 90 to page 95.

Q. Of what paper?

By Mr. JACKSON:

A. Water Supply Paper 728.

Q. And you say pages 90 to 95?

A. Down river to Hinton-next Alderson, page 113, Caperton, page 96, Belva, page 115, Kanawha Falls, page 102.

Q. I show you Government's exhibit 114, entitled Kanawha and New Rivers, hydrographs, gauge stations, July-August, 1930, and ask you if that was prepared in your office?

A. Yes, sir.

Q. What does it purport to show?

A. It is similar to the other Exhibit—it shows stagegraphs from the recorder sheets; also mean daily discharges from the Water Supply Papers.

Q. Were these hydrographs taken from the original recording charts?

A. I cannot say for certain whether or not they are originals or prints in this case.

Q. Where were they obtained from?

A. They were obtained from the United States Geological Survey Engineers—from the official recorder sheets.

Q. The figures appearing in the columns and right over the hydrographs for each day, show what?

A. Show the mean daily discharges at the stations for a given date.

Q. And from what source were these obtained?

A. From the Water Supply papers.

Q. Give the dates——

1063 A. Exhibit 114—discharges were obtained from Water Supply papers 713, pages 59 to 66 and 77 to 80.

By Mr. JACKSON:

Q. Are you sure that is right?

A. 713.

Q. We have 698. I wondered if you had misread your notes?

A. Have you 713?

Q. I will not interrupt you now. I thought perhaps you had through inadvertence read your notes wrong.

By the COURT. Q. Are these Water supply papers for a definite period of time?

By Mr. GATCHELL. A. Yes, sir.

By the COURT:

Q. What does it say on the title page?

A. Some of these records are not published in the yearbook.

A. We have a number——

By Mr. GATCHELL:

Q. (Interrupting.) Look at plaintiff's exhibit No. 82, Water Supply Paper 713, and I ask you if page 59 gives the daily and monthly discharge in second-feet for 1930 and 1931, on New River near Galax, Virginia?

A. Yes, sir.

Q. Is that the source that you obtained the figures for chart 114?

A. Yes, sir.

Q. Do those pages continue on to page 66?

A. Yes, sir; to page 66—Kanawha Falls.

Q. And also page 77?

A. Seventy-seven is on the Greenbrier, but 80 concludes with Belva on the Gauley River.

Q. Mr. Teeter, I show you Government Exhibit 115—Kanawha and New Rivers—discharge at gauging stations; United States Engineers' Office, Huntington, West Virginia, January, 1936. Was that compiled in your office?

1064 A. Yes, sir.

Q. Under your direction and supervision?

A. Yes, sir.

Q. Can you tell me what is shown on this chart?

A. This chart shows the flow in cubic feet per second for the period July 16th to 25th, inclusive, 1930.

Q. At several gauge stations depicted thereon?

A. Yes, sir.

Q. Can you tell me from what source the hydrographs shown on this chart were obtained?

A. They were obtained from the prints or original charts by converting stages into discharges.

Q. And were those original records obtained from automatic stage recorders?

A. They were—all those stations, yes.

Q. I have just shown you three hydrographs, Exhibits 113, 114 and 115, which you say were prepared in your office. Can you tell me for what purpose those were obtained?

A. (Witness examines papers.) They were—no, sir.

Q. Were you informed at the time that you were instructed to prepare them, for what use they were to be made?

A. I was not informed, no, sir.

Q. I show you government exhibit 116, Kanawha River profile, back water studies, and ask if you recognize that chart?

A. Yes, sir.

Q. Is that a chart prepared in your office?

A. Yes, sir.

Q. Can you tell me what the lower jagged line represents, starting with Gallipolis locks and dams and extending to Kanawha Falls?

A. The lower jagged line represents river bottom on the sailing line of the river.

1065 Q. Is that a standard chart in your office?

A. Yes, sir.

Q. The next line is a fairly regular line, entitled "Low Water Flow, 1,000 C. F. S. Is that a standard chart in your office?

A. Yes, sir.

Q. The next line shows normal pool elevation of Gallipolis locks and dams, Winfield locks and dams, Marmet Locks and dams, and London locks and dams. Was that put on in your office?

A. Yes, sir.

Q. There are some figures inserted—back-water elevations, 2,000 C. F. S., elevation 538.06 at Gallipolis pool, shown before putting in the Winfield lock and dam. Were these back-water elevations computed in your office?

A. Yes, sir.

Q. How were they computed?

A. These flows were computed by ordinary back-water methods.

Q. Tell me what that method is?

A. Take the stretch of the river—divide it into sections where the channel is uniform throughout these different sections—we plot the cross-sections of the river; take the mean section, obtaining the area and hydraulic functions and by hydraulic back-water formula compute the rise from each section consecutively and get to the next dam above.

Q. What formula did you use to compute the back-water elevation?

A. By the Manning formula.

Q. Does that formula take into consideration the friction of water moving down stream?

A. It does; yes, sir.

1066 By the COURT. Q. You say "back water elevation"—is that the back water "curve" referred to frequently?

A. Yes, sir.

By Mr. GATCHELL:

Q. I notice that the figures given here are for back water elevations when the flow is two, six, and ten thousand second feet at each of the three dams on this chart,—London, Marmet—at the toe—the three dams on the chart—London, Marmet, and Winfield. Is that the normal way the river flows for an absolutely uniform flow at several places widely separated on the river?

A. This does not represent natural discharge. The problem given us was to compute back water for uniform flow, as stated here.

Q. That is, you were told to take these flows and compute back water elevations at the points indicated?

A. Yes, sir.

Q. Did you make the computations or were they made under your supervision?

A. They were made under my supervision.

Q. One further question—in these normal pools, would the back water be the same—have the same elevation as the crest of the dam?

A. The back water curve would rise as you proceed up the river, according to the flow.

Q. I show you Government Exhibit No. 117, "a" to "f," inclusive, and ask if you will examine these charts and state if they were prepared in your office. (Hands to witness?)

A. Yes, sir; they were.

Q. Under your supervision?

A. Yes, sir.

Q. Take the first chart, No. 117-a, entitled rating curves, Kanawha River, Lock 2, London dam to Lock 3, and explain to me what the top line represents?

1067 A. That highest curve there is London lower pool with Old Lock 3 in place.

Q. Was that computed prior to the construction of the London dam—was that computed, showing the curve, prior to the construction of the London dam?

A. Yes, sir; it was computed with data obtained before the London dam was constructed.

Q. Would it show the rating curve prior to that time?

A. Yes, sir; at the London site.

Q. Can you—I call your attention to a line entitled "London lower pool with Marmet in place". Can you tell me if that was computed after the London dam was built and after the Marmet dam was built?

A. It was—based on actual observation.

Q. Was the line—London lower pool—with old lock 3 in place, based on actual observation?

A. It was with a gauge at the London site.

Q. With a gauge at the London site. And did you use in that—making that curve, did you use gauges located at any other places?

A. The gauge at Lock 3 was used, but this curve is the rating curve of the river at London site.

Q. And not at old lock 3?

A. No, sir; not at old lock 3.

By Mr. JACKSON. Q. Which line?

A. The top line.

By Mr. GATCHELL. Q. I call your attention to a line entitled Lock 2, lower pool, two lines adjoining and extending across the page. Tell me at what point that rating curve would apply?

A. That is the rating curve for old lock 2 at the lower gauge.

1068 Q. Below Lock 2?

A. Yes, sir.

Q. Was it obtained from actual measurements?

A. It was obtained by the use of the rating curve for the upper gauge at Lock 2. This curve was determined by measurements.

Q. I notice that line splits that line extending almost straight from a point 816 gauge across the sheet to approximately sixteen hundred four gauge—the lower curve, however, which joins at approximately 12 gauge drops in a sharp curve to approximately four gauge. Please explain why these curves are drawn in that manner?

A. That Lock two, lower pool, represents the conditions as constructed, with number 3 dam in place. The lower curve represents the rating of the river without Lock 3 or with open river.

Q. By "open river", do you mean wickets down on No. 3?

A. Three is a fixed dam. This is a theoretical condition, as if Lock 3 was not in.

Q. That is computed solely from estimates?

A. This is drawn in from estimates. We start off with zero flow, which is obtained by the survey chart of the river. We know that point. We know the point of approximately 1000 second feet flow, the elevation—which is elevation of low water. The curve continues until it reaches No. 2, lower pool curve, at the point where No. 3 would be drowned out.

Q. The bottom rating curve on this chart is for Lock 3, lower pool, and continues up to Lock 3, open river—will you explain how that was prepared?

A. Number 3 is a fixed dam; this curve applies to lower gauge; this is above No. 4, movable dam, so it has two curves at the lower end, one applying to the condition when the dam 4 was up and the other when No. 4 dam was down.

1069 Q. How did you arrive at the zero on these rating curves?

A. You mean zero flow or the zero of the——

Q. (Interrupting.) Zero of the gauge?

A. The zero gauge is given to definite elevation. The zero flow is the beginning of the curve—represents the elevation of the water, if there were no water flowing.

Q. And can you tell me at what point on this gauge there would be—at what point on the chart would show no water was flowing. What would be the elevation for the several locations?

A. Lock 2, zero, flow, gauge 3.8.

Q. And what elevation?

A. Elevation 586.7.

Q. Lock 3.

A. Zero flow from 3—gauge 0.6; elevation 571.5.

Q. Can you give the low water flow at London dam?

A. London low water elevation is 583.5; giving gauge reading 5.5.

Q. I notice on Exhibit 116, Kanawha River profile, and notice that the elevation of the upper London lock is 596 and the lower London lock 578. Does that appear on the chart you have?

A. It does. It is stated here zero flow London 578; this is the elevation of the lower gate sill.

Q. Turning to Exhibit 117-b, entitled "rating curves Kanawha river, Lock 4 and 5, and Marmet. They were similarly prepared under your direction, were they?

A. Yes, sir.

Q. And it shows Marmet—the dotted line shows Marmet with the Winfield dam in place, and Marmet (1935 with pool 6) there is also a line described "Marmet lower pool (1935)," the rating curve for Marmet 1935, on pool 6, produced below and the 1070 elevation of Marmet lower pool 35. Can you explain why that was produced below there?

A. This 1935 is—this is above No. 6, movable dam, which is the next dam below Marmet. The low water flow on Kanawha

River is about 1,000 second feet, and is shown here pool stage. This line runs below the pool stage, meaning if the flow decreases, the pool would not stay at normal. It would go down.

Q. When would it decrease—at what time? What stage of the flow?

A. At 1,000 second feet, shown here.

Q. Or less?

A. Decreases at that; it starts decreasing at 1,000.

Q. Does that indicate anything as to the water tightness of dam 6?

A. Well, it shows that the leakage through the dam would be probably more than 1,000 second feet. There is 1,000 second feet coming in—and—the pool elevation went down.

Q. And similarly the curve for Lock No. 4 lower pool, and Lock No. 5 lower pool, dropped below the straight line, horizontal line, for Lock No. 4 normal lower pool and Lock No. 5 normal lower pool. Can you give me the explanation for that lowering of the curve?

A. That is the same way as mentioned before. These lower pools have the next lock below them movable dam, of course, and with very low flows could not be held at normal. The pool could not be held at normal.

Q. Can you tell me what rating curves on that chart were obtained by actual measurement?

A. This curve, Marmet 1935 with Pool No. 6, that is based on current meter measurements.

Q. Is there any other rating curve on that chart?

1071 A. Lock No. 4 and Lock No. 5 are based on rating curves and measurements at Kanawha Falls.

Q. And were those computations made in your office?

A. The curves were plotted in my office from gage data corresponding to the flows at Kanawha Falls.

Q. And did you prepare the gage data?

A. The gage readings were official readings from the locks.

Q. Those are similar readings to the gage readings shown you previously as Government Exhibits 110 and 111?

A. Yes.

Q. And are a part of the official files of your office?

A. Yes, sir.

Q. By using those gage readings you prepared the rating curves for Locks 4 and 5?

A. Yes.

Q. Will you turn to Exhibit 117-C, rating curves, Kanawha River, Locks 6, 7 and 8. Are those similar rating curves to those you have just explained?

A. They are.

Q. Were they prepared in your office?

A. Yes, sir.

Q. Under your supervision?

A. Yes, sir.

Q. Can you tell me the data from which you obtained the rating curve, Lock No. 8?

A. This curve was prepared by plotting gage readings for No. 8 for the flow at Kanawha Falls, increased according to the drainage area.

Q. And did you have any actual measurements for No. 8?

A. We have a few measurements at Lock No. 8 which we use to check the curve.

1072 Q. And Lock No. 6 curve, can you tell me how that was prepared?

A. That was prepared by plotting the gage reading for No. 6 corresponding to flows at Kanawha Falls, checked also against the rating curve for No. 5.

Q. And for Lock No. 7 what were your sources of data?

A. This was prepared by plotting gage readings for No. 7 corresponding to stream flow at Kanawha Falls, increased approximately proportional to the increase in drainage area.

Q. And did you check that by any measurements?

A. No. 7 was not checked by measurements.

Q. Exhibit 117-D, Kanawha River rating curves, Lock No. 9 and Winfield. Was that prepared under your supervision?

A. Yes, sir.

Q. Can you tell me the data for Lock No. 9 curve?

A. Lock No. 9, lower pool gage, was prepared by plotting gage readings, lower gage, corresponding to flows computed between Locks 8 and 9 which were based upon rating curve for Lock 8.

Q. And the rating curve for Winfield, how was that prepared?

A. Winfield site is about midway between Lock 8 and 9. The gage readings were determined by proportional distance between Locks 8 and 9 plotting those with corresponding flows computed from Lock 8 rating curve.

Q. And was that checked by any actual measurements?

A. We had measurements at Lock 8, basing the Lock 8 rating curve on those measurements.

Q. Government Exhibit 117-E, entitled rating curves Kanawha River, Locks Nos. 10 and 11—was that prepared in the same manner?

A. Prepared in the same manner as the upper locks.

Q. And can you tell me the data from which you obtained the rating curve for Lock No. 10?

1073 A. It was obtained from Kanawha Falls discharge, also from Lock 8 discharge.

Q. And was that checked by any actual measurements?

A. No, sir.

Q. And Lock No. 11—from what sources did you obtain the rating curve for Lock No. 11?

A. That is made the same way as No. 10.

Q. And was that checked by any actual measurements?

A. No, sir.

Q. And the final one of this series, 117-F, rating curves, Ohio River below Point Pleasant—was that prepared under your supervision?

A. Yes, sir.

Q. The top lines show Gallipolis dam and with the dam in place and the pool elevation. What that estimated or measured?

A. That was estimated for the site which is below the mouth of the Kanawha River.

Q. Was that checked by any actual measurements?

A. No, sir.

Q. The lower one is for Dam No. 26. Can you tell me the data from which you prepared that rating curve?

A. This lower curve is not a rating curve at Dam No. 26. It is for a point below Point Pleasant.

Q. How far below Point Pleasant?

A. At the mouth of the Kanawha River. It says here "Mile 266" which is approximately the mouth of the Kanawha River.

By Mr. Jackson:

Q. Where is the mile given on the chart?

A. This horizontal line says "Low water, Mile 266."

By Mr. Gatchell:

Q. Where is Dam No. 26 with respect to the point of measurement for that curve?

A. Approximately 13 miles below.

1074 Q. It states on there "Normal lower pool, elevation 519.5." Will you explain that line?

A. That states normal lower pool just as the preceding curve stated it. However there is no dam at this point. This pool 519.5 extends past the mouth of the Kanawha River.

Q. Then the use of the word "lower" in that designation "normal lower pool" would appear to be misleading; is that correct?

A. It is somewhat misleading. Just "normal pool" would be better.

Q. Does that normal pool extend from the mouth of the Kanawha down to Dam 26?

A. It extends from 26 past the mouth of the Kanawha to Dam 25.

By Mr. Jackson:

Q. Is that the same as the upper pool of Dam 26?

A. Correct.

My Mr. Gatchell:

Q. Dam 25 is located above the mouth of the Kanawha?

A. Yes, sir; five miles above.

Q. Would you mind turning back to No. 117–B, the second chart. I notice on Exhibit 116, Kanawha River profile, that the elevation of the lower sill at the Marmet Lock is given as 554. Is that shown on this chart, Exhibit 117–B?

A. Down at the bottom you will notice "Marmet 554.0 equals zero flow."

Q. Are the back-water elevations the same on the Kanawha River profile, Exhibit 116, as shown on this rating curve, 117–B, and the other rating curve for London and Winfield?

A. This 117–B has a curve, Marmet with Winfield dam in place, which is obtained from back-water. However it is obtained under different conditions from that exhibit you mentioned.

Q. Exhibit 116?

A. Exhibit 116.

1075 Q. Can you show me from Exhibit 117–B the elevation of the Marmet pool with the Winfield dam in place when the discharge is 2,000 second feet?

A. On this curve 2,000 second feet shows gage 12.3.

Q. And what elevation would that be?

A. That is 566.3.

Q. I notice on Exhibit 116, Kanawha River profile, the back water elevation for 2,000 second feet at the Marmet dam is shown as 566.10. Can you explain this discrepancy?

A. This back-water curve was made recently, an independent study without reference to this rating curve.

By Mr. Jackson:

Q. Do you refer to 116 when you say the back-water curve was made recently?

A. 116. For the conditions as stated, with the same flow throughout the pool, 2,000, 6,000 and 10,000, while this rating curve below Marmet represents the average flow under natural conditions. Under natural conditions the flow increases down the river so that the flow at Winfield site would be considerable more than Marmet and you would expect the rating curve to show a slightly higher reading for the same natural flow than you would for a uniform flow below that point.

By Mr. GATCHELL:

Q. That is, the water that comes in between Marmet and Winfield increases the elevation of the back water at the toe of the Marmet dam as shown on your rating curve, whereas your computations of the back-water studies shown in Exhibit 116 assume a uniform flow of exactly the same flow at both Marmet and Winfield?

A. That is correct.

Q. Then am I to understand that this does not represent a natural condition in any way?

A. It would hardly be possible to have exactly the same flow throughout a pool as long as the Winfield pool.

1076 Q. That is with reference to Exhibit 116?

A. Yes, sir.

Q. I show you Exhibit 116, Kanawha River profile, 6 and 9 foot projects. Was that prepared in your office?

A. It is from a standard chart in the Huntington office. The coloring matter was not put on in the Huntington office.

Q. It was not put on in your office?

A. It was not.

Q. Do you know the purpose for which the coloring matter was put on?

A. No.

Q. Are any other lines or figures on this chart inserted there that were not put on in your office?

A. I see it has the line sloping above normal pool and also a dash line sloping below normal pool which were not put on in the Huntington office.

Q. Do you know why those lines were put on there?

A. That study was not made in the Huntington office. I do not know.

Q. Were any other lines on there that were made outside of the Huntington office?

A. No, sir; I do not see any.

Q. Are there any figures or statements on this chart that were not put on in the Huntington office?

A. The elevations and all figures, I think, were put on in the Huntington office.

Q. The lower jagged line extending from Gallipolis dam to Kanawha Falls represents what?

A. That is the bottom of the river on the sailing line.

Q. And the line next above that, extending from Gallipolis Locks to Kanawha Falls represents what?

1077 A. That is low water profile of the river. It says "Flow of 1,000 c. f. s."

Q. There are several lines above the heavy lines marking the elevation of the several dams proposed. Do these represent flows of the stream?

A. Those upper sloping dashed lines are profiles of certain floods.

Q. And who selected the dates of those floods?

A. They are the highest flows that we have record of, platted on this chart.

Q. And were they placed on this chart especially for some purpose in this suit, do you know?

A. No; they were originally on the Huntington office chart.

By Mr. Jackson:

Q. The question was why they were placed on this chart?

A. As a record of the profiles of the high water flows.

By Mr. Gatchell:

Q. I understand that you did not prepare in your office those lines appearing on the several pool elevations, dashed lines immediately above and immediately below the normal pool elevations; is that correct?

A. Yes.

Q. Did you prepare in your office the normal pool elevation of each dam?

A. That is on the original chart.

Q. I show you Exhibit No. 119, Kanawha River and Tributaries, proposed improvements, and will you tell us if that was prepared in your office and under your supervision?

A. That was prepared in our office but not under my supervision.

Q. Was the whole map prepared in your office?

A. Except the coloring matter was not put on.

Q. The coloring matter was not put on in your office?

1078 A. No, sir. I believe the rest was. Here are a couple of projects shown at the top of the map.

Q. Shown in colors?

A. Shown in colors.

Q. And you didn't put on any colors?

A. No.

Q. And is this a standard map of this river system in use in your office?

A. Yes, sir.

Q. And from what source did you obtain the data showing where those proposed improvements were to be located?

A. They are projects proposed in the 308 Report.

Q. Of the Kanawha River system?

A. Of the Kanawha River system.

By Mr. **Jackson**:

Q. Will you give the official number of that 308 Report. I understand there are a series of 308 Reports.

A. No. 91, House Document No. 91, 74th Congress, 1st Session.

By Mr. **Gatchell**:

Q. I show you Exhibit 120 Kanawha River and Tributaries, Proposed Improvements, Profiles. Was this chart prepared in your office?

A. Yes, sir.

Q. And what does it represent?

A. That represents the low water profiles of the main streams of the Kanawha River and tributaries.

Q. Were the profiles of the proposed projects placed on this chart in your office?

A. Yes, sir.

Q. Was the coloring matter placed on there in your office?

A. No, sir.

Q. There are certain lines appearing on this chart in the middle of several of the profiles of improvements. Were those lines placed on there in your office?

1079 A. No, sir; neither those lines nor the coloring matter.

Q. Did you place on there the outline of each improvement?

A. Yes, sir.

Q. And nothing more than the outline?

A. That is right.

Q. Can you tell me from what data the profiles were prepared?

A. The profiles of these streams were prepared from all available reliable data, including United States Geological Survey charts, old surveys in Chief of Engineers reports, plans of Power Company applications and any local survey that was available.

Q. Mr. Teeter, in your statement yesterday you gave some mileages on the Ohio River. Have you found any error in mileages as given on the Ohio River?

A. There was one little error in the distance to one of the locks. I would like to make a correction. The distance to Lock No. 27 from the mouth of the Kanawha River is 35.3 miles and the distance from Lock 27 to Lock 26 is 22.5 miles.

By Mr. **Gatchell**. Q. That appears on page 2245 of the record?

By the **Court**:

Q. On yesterday you gave the distance from Lock No. 9 to the mouth of the Kanawha River as 25.4. The maps shows 25.5. I don't think it is enough to make much difference.

A. Your Honor, the mileages I gave were from the most recent survey of 1930, while those are recorded mileages on old charts.

By Mr. GATCHELL:

Q. In testifying about Exhibit No. 114 you gave reference to certain water supply papers. Do you have any corrections to make in those references?

A. A statement was given that the water supply paper was No. 713, whereas it should have been No. 698.

1080 Q. And do you have the page references in water supply paper 698?

A. They run from page 61 to page 67, also pages 75 and 79.

Q. I show you Government Exhibit No. 52, entitled "Rating curve for Kanawha River at Kanawha Falls, West Virginia," and ask you to examine that rating curve. Are you familiar with that curve?

A. This is an official rating curve made by the United States Geological Survey. It is the curve that we use in our computations or rather is the rating curve we use.

Q. It is the rating curve you use in your computations in figuring the discharge at Kanawha Falls?

A. Yes, sir.

Q. And I show you Government Exhibit No. 53, entitled "Rating curve for New River at Caperton, West Virginia," and ask you if you are familiar with that rating curve?

A. Yes, sir, this is United States Geological Survey Rating Curve for the station at Caperton, West Virginia, which we use.

Q. You use this also in making your calculations of discharge at Caperton?

A. Yes.

Q. I show you Government Exhibit No. 66, being "Rating curve for New River at Glen Lyn, Virginia, and Eggleston, Virginia, at Dam Site A near Radford, Virginia, at Allisonia, Virginia and at Ivanhoe, Virginia," and ask you if those rating curves, with the exception of the one for Dam Site A, were used in your office?

A. That is right, they were.

Q. And they were used for what purpose?

A. They were used for obtaining the discharges at these points.

1081 Q. I show you Government Exhibit No. 143, entitled "New-Kanawha River, power waves, period of March 11th to April 3rd, 1930, inclusive," and ask you if you recognize that chart?

A. Yes, sir.

Q. Did you assist in the preparation of that chart?

A. I helped make this chart, yes.

Q. And from what data did you obtain the figures to make the curves shown on this chart?

A. They were obtained from prints of the recorder charts taken from the gaging stations by the United States Geological Survey.

Q. Were those prints supplied to you by any other agency?

A. No, sir; no other agency had them. The United States Geological Survey supervised all of these stations.

Q. Did they give you the prints?

A. Yes, sir.

Q. What do these lines represent on this chart?

A. I wish to correct the previous statement. I see this includes locks on the Kanawha River which the United States Geological Survey did not supervise. They were read by the regular lock Masters at Locks No. 9, No. 7, No. 6, No. 11, No. 4, No. 5, and No. 2 on Kanawha River.

Q. Did you prepare the graphs for those several locks on the Kanawha River from the records supplied your office by the lock tenders?

A. Yes, sir.

Q. Were those staff readings?

A. Yes, sir.

Q. And what was the interval at which the staffs were read?

A. At this time they were read at intervals of one hour or shorter intervals.

1082 Q. At least one every hour?

A. One hour.

Q. During the entire period shown on this graph?

A. Yes.

Q. And were those staff readings taken by the men who took the regular staff readings for the Huntington office?

A. Yes, sir.

Q. And were they sent in to your office by those Lock Masters.

A. Yes, sir.

Q. Then, Mr. Teeter, I wonder if you have shown anything else on here that was supplied to you from any records supplied by the Geological Survey on this particular chart?

A. I see there is a station here on Elk River which is maintained by the Geological Survey and this curve was plotted from their chart.

Q. For the Elk River?

A. For the Elk River only.

Q. The other graphs were prepared from data supplied by the lock masters?

A. Yes, sir.

Q. Did you check these curves after preparation to determine if they were accurate?

A. They were checked to determine the accuracy corresponding to the official gage reading.

Q. Mr. Teeter, how long have you been engaged in work of the type which you now perform at the Huntington office?

A. I have had hydraulic studies pertaining to stream flow, backwater, and so forth, for approximately fifteen years.

Q. And in making your computations for the backwater curves, did you use a method in use in your office or some other place?

1083 A. The standard method, instruction given in engineering schools, and standard engineering text books.

Q. That was the method you used?

A. Yes, sir.

Q. Is that accepted in engineering circles?

A. It is.

Q. And in making your computations of the discharge of the New and Kanawha Rivers at various gaging stations, what method of computing those discharges did you use?

A. Discharges on New River were taken either from the publications of the Geological Survey or computed from the rating curves of those stations.

Q. And the discharges on the Kanawha River?

A. The discharges on the Kanawha River at Lock 2 from the rating curve, at Lock 5 we had a rating curve and at Locks 8 and 9 we had a rating curve, prepared from actual stream measurements.

Q. And did you apply the usual principles of computation in determining the discharge from those rating curves?

A. Yes, sir.

By Mr. Jackson:

Q. What were the locks you said you had rating curves for?

A. No. 2, No. 5 and Locks 8 and 9 together.

By the Court:

Q. I want to ask Mr. Teeter one question which I don't think is particularly pertinent. It might clear up something in my mind. In looking through those water Supply Papers yesterday, I noticed that the minimum flow recorded at Hinton, I think it is, in Water Supply Paper 698, there were certain dates—October 9th in some year, that it was something like 700 cubic feet a second. The minimum flow recorded at Glen Lyn, substantially up the stream, was something over 800 cubic feet a second. How is it possible for the minimum flow downstream to be less than the flow upstream? Under what conditions could that happen?

1084 A. It does happen during the lowest periods of flow. Evaporation, seepage, and so forth, decreases the amount of water in the river. At the same time, the inflow from side streams is practically nothing. However, this Hinton station has no rating curve. That flow given was probably estimated from some other point.

Cross-examination by Mr. Jackson:

Q. Mr. Teeter, can you refer to any simultaneous measurements on New River where it was found that the flow downstream was less than the flow upstream?

A. The measurements on New River were made by the United States Geological Survey.

Q. They weren't measurements, Mr. Teeter; they were simply estimates based upon a computed rating curve, were they not?

A. The rating curves were based upon measurements.

Q. The point I am getting at, do you know of any instance where there were simultaneous measurements made, allowing for lag in the flow, at two different points on New River and it ever was found that the flow downstream was less than the flow upstream?

A. We have the records of the Geological Survey only. I have made no measurements myself.

Q. You know of no record of the Geological Survey where the measurements at the two places on the river were simultaneously made, allowing for lag, and they found a result whereby the flow downstream was less than the flow measured upstream?

A. I cannot cite you any such measurements. I did not make them.

Q. From your familiarity with the Water Supply Papers, Mr. Teeter, can you not say that there are a number of instances 1085 where the flow, as recorded in those papers, for upstream gaging stations is so very much greater than the comparable flow recorded in those papers for the downstream station that as an engineer you know those records are in error?

A. I am not an authority on New River flow.

By Mr. Jackson:

Q. You have used in these exhibits about which you have been testifying a good many figures taken from the Water Supply Papers; is that right?

A. Yes, sir.

Q. And am I now right in understanding your testimony to be that your part in preparing those exhibits was merely to plot the results of those readings upon the charts and that you and your office do not know anything about the accuracy of the figures or vouch for them?

A. We do not vouch for the figures of the United States Geological Survey.

Q. To clear up this particular point, if I can, Mr. Teeter, I would like to show you, as an illustration, page 65 of Water Supply Paper 543 and ask you to look at the first column, the left-hand column covering October, 1921, and tell me what was the minimum flow at Eggleston at any time during that month?

A. 905 second feet.

Q. That is daily average?

A. Yes.

By Mr. Gatchell. Q. Will you give the date of that minimum flow?

By Mr. Jackson:

Q. That is October 26, 1921, is it not?

A. Yes, sir.

Q. Now, I want to show you page 99 of Water Supply Paper No. 728 and direct your attention to the first column on the left-hand side of that page giving at the top of the page the minimum average discharge at Kanawha Falls for October 1921, and ask you what the minimum discharge is as shown there?

1086 By Mr. Gatchell. Q. Do you want to correct that to say the minimum daily discharge?

By Mr. Jackson:

A. Yes; for any day.

A. The minimum daily discharge for October, 1921?

Q. Yes, at Kanawha Falls?

A. 770 second feet.

Q. Isn't it 690?

A. 690 second feet.

Q. On October 29, 1921; is that right?

A. That is right.

Q. According to the Water Supply Papers then, it appears that the minimum average daily flow at Eggleston during October, 1921, was estimated at 905 second feet and the minimum average daily flow in October 1921, at Kanawha Falls was estimated at 690 second feet?

A. Those were the same dates?

Q. No, there is a lag, but this is the minimum during the month. You would expect a lag, wouldn't you?

A. Yes.

Q. The lag is about three days there. As an engineer would you not say that any flow figures which gave a flow at Eggleston of 905 second feet minimum daily flow with a minimum daily flow at Kanawha Falls of only 690 second feet reflected some error.

A. No, sir; I wouldn't say that.

Q. Is it your judgment that the evaporation from Eggleston to Kanawha Falls would account for the diminution in flow plus the inflow between those two points?

A. It might be evaporation and seepage. I know that many rivers decrease in flow downstream.

By Mr. **Jackson**:

Q. I am talking about New River. What do you know about that?

1087 A. It is possible on New River.

Q. That is, one quarter of the Eggleston flow, in your judgment, plus all inflow would disappear between Eggleston and Kanawha Falls?

A. It could happen.

Q. Mr. Teeter, have you observed that even during these low water periods that only very occasionally the flow downstream is less than the flow upstream? Did you observe that in looking at these records?

A. That is true on New River.

Q. And did it strike you as odd that evaporation should be so much greater on one day than another during low water so that it would produce a diminution of 25 percent in the flow, plus accounting for all inflow, whereas on other days that result would not obtain?

A. You are not so certain about the lag and about the inflow, about evaporation and seepage. I think that would be possible.

Q. That is, you wish to testify that the evaporation and seepage on New River during low water periods may vary in such proportion from day to day that at times it will account for 25 percent of the flow at Eggleston, plus all inflow between Eggleston and Kanawha Falls, and at other times it will not have that effect?

A. The factors affecting discharge may vary that much.

Q. The factors we are talking about now are evaporation and seepage. Do they vary from day to day?

A. Evaporation varies according to temperature.

Q. In October is evaporation a serious factor?

A. Not particularly.

1088 Q. It would be a pretty serious factor to account for 25 percent of the flow plus inflow between Eggleston and Kanawha Falls, wouldn't it?

A. There be other subtractions from New River. I don't know.

Q. What do you think they are?

A. I don't know.

By Mr. **Jackson**:

Q. So you can't account for this diminution in the instance I called to your attention other than through evaporation?

A. It might be caused by evaporation, seepage, or other subtractions.

Q. But you just said you don't know of any other subtractions?

A. I don't know of any other but I say it might be caused by them.

Q. And where could the seepage go?

A. Seepage from the stream?

Q. Yes.

A. It goes into the bed of the stream.

Q. And does that never come out on a river like New River?

A. It comes out in time.

By the **Court**:

Q. If the water were impounded at any place between these points of observation, that might account for it, might it not?

A. It could. I know of no impounding.

Q. I was going to ask you if there was any point along there where it could have impounded?

By Mr. **Jackson**:

Q. Do you wish to testify in your opinion that the discrepancy cannot lie in mere inaccuracy of the estimates?

A. I do not vouch for the United States Geological Survey data.

1089 Q. That would be one explanation, wouldn't it?

A. Please state your question.

Q. Could not the explanation of the discrepancy lie in mere inaccuracy of the estimates made?

A. It is possible.

Mr. **Jackson**. On Exhibits 110 and 111 there are a number of pencil figures about which questions have been asked and no one appears to know why they were put there. I understand it may be stipulated with counsel for the Government that these pencil figures may be excluded from the exhibits and then we will not need to inquire any further about them.

Mr. **Gatchell**. That is correct, your Honor. The only reason I went into the pencil figures at all was to show that they were not put on by the Lock Master. The typewritten figures were put on by the Lock Master wherever the staff readings were made. The pencil figures will not be used in the later testimony.

Q. Mr. Teeter, on your direct examination your attention was directed to the figures for normal pool gage readings for Lock 4 on the first sheet of Exhibit 112, showing the gage reading for the upper pool elevation at normal pool as 14 and certain figures of gage readings for the fore part of October, showing readings somewhat in excess of 14, and then you were asked under what condition the wickets would be lowered. I think you said they would be lowered before the flow overtopped the wickets by a foot; is that right?

A. Yes, sir.

Q. And then your attention was directed to readings for Dam #4 on page one of Exhibit #112 showing the dam was down from October 11 to October 18, 1921, is that right?

A. Yes, sir.

Q. Did you mean to imply that the dam was lowered because of high water?

A. No, sir. I didn't say that.

Q. I know you didn't say it, but I could not understand the purpose of your testimony otherwise. There is nothing on Exhibit #112, Sheet 1, under Dam #4, that would indicate that that dam was lowered because of high water, is there?

A. The records of the gage readings do not show that was why it was lowered.

Q. From your experience and skill as an engineer can you say from inspection of that sheet why it was lowered?

A. I think it was lowered for repairs, but I could not swear to that.

1090 Q. You testified that you determined flow that passed Lock #3 by reading the lower gage. Will you explain how you did that?

A. Knowing the flow at Kanawha Falls and reading the lower gage at Lock #3, the flow would be practically the same for Lock #3, for that gage reading.

Q. I am not quite clear on that. You mean you found out what the flow was estimated to be at Kanawha Falls and then reading the gage below Lock #3 simultaneously, you assumed that gage height corresponded with the same flow through Lock #3?

A. The period used was when Kanawha Falls was running uniformly so that lag would not matter and for that flow the gage readings were taken below Lock #3.

Q. I am trying to get at how you got the reading to apply to the gage below Lock #3, whether right or wrong, the process was you got the estimates of flow past Kanawha Falls and tied them in to a simultaneous reading of the gage below Lock #3?

A. Yes, sir.

Q. And in effect constructed a point on a rating curve for the gage below Lock #3?

A. Yes, sir.

Q. Isn't it a fact that the flow below Lock #3 was dependent upon the leakage in Lock #4?

A. No, sir.

Q. I mean, not the flow, but the gage height was dependent upon the leakage in Lock #4?

A. The gage height below Lock #3 would not be appreciably affected by the gage reading at Lock #4.

Q. Lock #4, or Dam #4, is the dam that retains the pool below Lock #3.

A. The next dam below and it is a movable dam.

1091 Q. Suppose you had a condition of no leakage, with the dam up, at Lock #4, and at another time you had a condition of leakage of 1,200 second feet at Lock #4, with the same stream flow in each case; is it your opinion the gage reading, the lower gage, at Lock #3, would be the same?

A. If the gage reading at Lock #4 was the same for those two conditions, the matter of whether Lock #4 leaked or not would not affect the reading at gage or Lock #3.

Q. I didn't say it would or would not be the same. I asked you whether, assuming two conditions, first, whether Lock #4 was up and no leakage, and the other where there was leakage of 1,200 second feet at Dam #4, with the same flow in the river, would the gage height on the gage below Lock #3 be the same in both instances, necessarily?

A. The gage height at the lower gage, at Lock #3, depends upon the flow in the river, also the elevation of the upper gage, at Lock #4. Now it is their object in maintaining Lock #4 to maintain the pool at normal or higher. The amount of leakage through Lock #4 will depend on how much caulking or needling they put on.

Q. Also on the condition of the dam, as I understand it?

A. Yes, sir.

Q. If there be a large amount of leakage at Lock #4 it will require a larger flow in the river to maintain the upper pool at stage than if there is no leakage?

A. Yes, sir; Lock #4.

Q. And that will be reflected in the flow in the upper end of the same pool, will it not?

A. The gage reading at the upper end of pool #4 is not affected by the leakage through Lock #4.

Q. The gage reading isn't?

1092 A. No, sir; if the elevation at Lock #4 is the same.

Q. The amount of flow is affected by the pool elevation at #4, isn't it?

A. Yes, sir.

Q. And that is affected by the amount of needling or caulking and leakage, isn't it, in low water?

A. The elevation at Lock #4 is affected by the tightness of Lock #4.

Q. And it follows from what you have just said the gage height at the foot of Lock #3 is affected by the tightness of Lock #4, doesn't it?

A. Not necessarily.

Q. May it be or may it not be?

A. It is affected by the elevation at Lock #4 and, if that changes by leakage, then it would be affected.

Q. Now, Mr. Teeter, your attention was also directed to certain elevations of the upper pool at Dam #26, and I think you said that at periods of low water operators tried their very best to hold the pool at or above normal?

A. Yes, sir.

Q. Am I right in understanding that is because at low water it is or may be necessary to hold the pool at normal elevation in order to provide the project depth at the upper end of the pool, above the dam?

A. That is right.

Q. You also testified that Dam #2 had settled, Dam #2 on the Kanawha. Do you know to what extent Dam #2 had settled in 1925?

A. I do not know in 1925. It had settled.

Q. But no measurement was made at that time that you know of?

A. I do not know of any at that time.

Q. Do you know personally now the extent of the settlement of Dam #2 at any time prior to 1930?

1093 A. I don't know the extent.

Q. You did testify in 1930 the settlement of Dam #2 was measured and determined to be $1\frac{1}{10}$ feet?

A. Yes, sir.

Q. Do you know whether that settlement was uniform along the crest of the dam or did it vary from place to place along the dam?

A. I don't know the exact profile of the dam. It was extensive across the river, I think.

Q. Would the settlement of Dam #2 affect gage heights for a given flow of low water?

A. It would affect the gage heights above the dam.

Q. As I understand it on Exhibits Nos. 113 and 114, which are the staff hydrograph cases, you or your office simply took the data from the U. S. G. S. records and platted that on those charts?

A. Yes, sir.

By Mr. Gatchell:

Q. I don't want to leave the wrong impression here. This covers also Kanawha Falls, the gage at Kanawha Falls. Was that taken from the G. S. records?

A. Kanawha Falls was.

Q. Mr. Teeter, I should like now to ask you a few questions about your Exhibit #116, which is entitled "Back Water Studies". I understood you to say this morning that these back water studies were made according to accepted methods, that is methods accepted among the engineering profession; is that right?

A. Yes, sir.

Q. There are a number of methods of making back water studies, accepted in the Engineering profession, are there not?

A. Yes, sir.

Q. And you selected the one of them that depends upon what you described as the Manning formula?

1094 A. The Manning formula was used.

Q. Is it not a fact back water studies are very complicated and involve the exercise of considerable judgment by engineers?

A. Not a great deal here, where we have rating curves to check our flows.

Q. Of course rating curves in turn are based upon estimates, are they not?

A. No, sir; they are based on stream measurements.

Q. To begin with a particular measurement is based upon some current meter readings, which are themselves subject to error, are they not?

A. Not by an experienced person.

Q. It is your testimony that an experienced person makes current meter readings with accuracy?

A. Yes, sir.

Q. No error of judgment on that?

A. There should be a definition of what error means.

Q. Isn't it generally recognized that current meter readings are subject to 5 or 10% errors?

A. I think so.

Q. Isn't it also a fact you simply take a few current meter measurements in a cross section, which may or may not give you the average velocity of that stream?

A. The measurements you take give you the velocity.

Q. At that particular point?

Q. A pin point in the stream?

A. The velocity is affected——

Q. I mean it is a pin point in the cross section of the stream cutting vertically across the river, isn't it?

A. The area a cross section has, at a station on the river, will extend up and down the river several feet.

Q. The river may be 600 feet wide, may it not?

1095 A. Yes, sir.

Q. And may vary in depths from five inches to twenty feet?

A. Across the river.

Q. And you will make a few spot current meter readings here and there in that cross section, won't you?

A. The meter measurements are made often, as often as the cross section changes.

Q. You try to get the average velocity of the water through the cross section?

A. Yes, sir.

Q. And that itself is subject to error, isn't it?

A. Possibly 5 or 10%.

Q. That adds on to the error in the current meter readings, of course, it is accumulative?

A. What is accumulative?

Q. The error of determining what is the average velocity of the water through the cross section? I mean the average velocity.

A. It gives you the average velocity.

Q. Now coming back to the question of back water studies, isn't it a fact that the Manning formula itself contains a factor involving judgment?

A. It contains a coefficient.

Q. And that coefficient has to be selected by the judgment of the engineer making the study?

A. It is preliminary, but checked from current meter measurements.

Q. And certainly unless the back water curve obtained by such studies is tested by actual observation, it is subject to varying degrees of error, is it not?

A. It is not positive, unless checked by actual current meter readings.

1096 Q. You would not want to testify any back water curve developed by computation and not checked by observation of conditions for which the back water curve was computed, would be entirely accurate?

A. I would call it an estimate.

Q. It would be an estimate?

A. Yes, sir.

Q. And the checking you can do on a back water curve applies only at the places where you make your measurements, is that right?

A. The checking of the elevation of the curve at that point is determined by the measurements at that point.

Q. Now what you have said about checking, applies in a case where the back water actually exists, doesn't it?

A. Yes, sir.

Q. And doesn't apply to the predicted back water?

A. It doesn't apply to the back water of a dam that isn't built, however, the coefficient would still be applicable.

Q. The coefficients can be checked only by observation, isn't that so, at specific points?

A. They are checked by current meter measurements for the stream channel. You can run other flows through the stream by these coefficients.

Q. You check your results at certain observation points on the river?

A. Yes, sir.

Q. And the corrections by observation can only apply actually where you make those tests?

A. Yes, sir; at the points.

Q. I now show you Exhibit #116. Where did you get the gage heights for that low water line or curve?

A. The elevation is given for that line.

1097 Q. On what data is that based?

A. The elevation is given on the profile. Knowing the zero of the gage you would have the stage.

Q. For low water flow?

A. Yes, sir.

Q. As I understand it, this low water flow line is drawn according to certain gaging heights, is that right?

A. It is drawn according to elevation.

Q. I want to know if you took those elevations from below the gage readings, or how you obtained them?

A. This chart has been drawn from the past evidence. I had nothing to do with the platting of the low water curve myself.

Q. You don't know the data from which the elevations for the low water curve were obtained?

A. No.

Q. I direct your attention to Plaintiff's Exhibit #117-a, and you will observe that your exhibit shows certain low water gage heights?

A. Yes, I remember that.

Q. Will you tell me the basis for those low water gage heights and elevations?

A. The elevation of low water is known, the elevation of zero is known, and you simply subtract.

Q. How do you know that?

A. From this profile, or I should say from the charts of the Kanawha River.

Q. What charts?

A. We had charts in our office.

Q. You had to have some data from which to draw those lines on the charts. I want the fundamental data?

A. I don't know the authority for that low water.

1098 Q. You don't know where those low water gage heights on Exhibit #117-a come from?

A. They were obtained by subtracting the zero of the gage from the elevation of low water, at that point.

Q. The only way you know low water was because there was a chart in the office?

A. A record in the office of low water.

Q. I am asking you as to the chart to see if from inspection you can tell us where these gage readings or low water appearing on Exhibit #117-a came from?

A. It is marked on the chart the low water. This is Kanawha River Chart #8 in the vicinity of Lock #2.

Q. That is U. S. Engineer office chart?

A. Yes, sir; survey of 1922–1923, inclusive, 1929 and 1930, the low water below Lock #2 is given as 589.61.

Q. That is the same as elevation on your Exhibit #117-a?

A. Yes, sir.

Q. Isn't it true the other low water elevations on Exhibits #117-a to #117-f, inclusive, as far as they relate to the Kanawha River were obtained from the same source?

A. Yes, sir.

Q. That is the low water of 1879, isn't it?

A. It is so marked.

Q. And did you assume it to be the low water of 1879?

A. The low water down the river probably isn't all the low water of 1879.

Q. We are talking about Exhibit #117-a, Lock #2?

A. Yes, sir.

By Mr. Gatchell. Your previous question referred to Exhibit #117-a to 117-f.

By Mr. **Jackson**:

Q. I am confining this particular question to 117-a.

A. This particular lock is on this chart.

1099 Q. Is the same thing true of your low water elevation for Locks 3, 4, and 5, on Exhibits 117-a to 117-f?

A. They are taken from the charts. I am not positive.

Q. For the low water of 1879?

A. I am not positive the 1879 low water applies all the way down the river.

Q. Look at this.

A. That says 1879.

Q. You have no doubt of the source of that data?

A. That is 1879 at that point.

Q. Will you look at the same document and tell me if it isn't low water for 1879?

A. Lock #3, 1879.

Q. And you are now looking at the records for which lock?

A. Lock #4.

Q. At the foot of it?

A. 1879, Lock #4.

Q. Now will you look at the foot of Lock #5?

A. 1879, Lock #5.

Q. Do you know that these low water elevations on this Exhibit #117–a to 117–f were not taken from the readings of low water of 1879 at the locks farther down stream below Lock #5?

A. I think they were taken from the chart.

Q. As far as you know the basic data comes from the low water for 1879 for the other dams further down stream on the Kanawha?

A. Yes, sir.

Q. Now, Mr. Teeter, on your Exhibit #116, you have assumed a low water flow of 1,000 second feet as applied to the elevations which you have used, have you not?

A. This Exhibit #116 recognizes this low water elevation.

1100 Q. Let me ask it this way; isn't it true your Exhibit #116, which you have just testified is based upon elevations of low water of 1879, is platted with a low water flow of 1,000 second feet at those gage heights?

A. Yes, sir, approximately.

Q. Will you look at Exhibit #117–a and tell me whether it is not true that the curves or open river flow at Lock #2 lower pool and Lock #3 lower pool, are likewise platted on those same gage heights, with a low water flow of 1,000 second feet?

A. Yes, sir.

Q. And isn't it true as to all your Exhibits Nos. 117–a to 117–f, inclusive, so far as they relate to these locks on the Kanawha, that they are platted on the gage heights of the low water of 1879, with an assumed low water flow of 1,000 second feet?

A. Yes, sir, with respect to the mouth of the river. I am not certain it is 1879 low water.

Q. At the mouth of the Kanawha?

A. Yes, sir.

Q. Otherwise the answer would be yes?

A. Yes, sir.

Q. I want to direct your attention to Water Supply Paper No. 536, page 85, the second column, and ask you to tell me what was the low water average daily flow of the Kanawha River, at Kanawha Falls, in 1879?

A. This give 1,540 second-feet for that year.

Q. For 1879?

A. Yes, sir, it gives another flow, a lower flow for another year.

Q. Quite so. But the low water flow for 1879 according to the Water Supply Paper #536 was 1,540 feet?

A. Yes, sir.

1101 By Mr. GATCHELL:

Q. Will you read that?

A. This table says "Monthly discharge of Kanawha River at Kanawha Falls for the years 1877 to 1916."

By Mr. JACKSON:

Q. And doesn't the table show one column giving the minimum discharge?

A. Yes, sir.

Q. And you have stated that was 1,540 feet, according to this for 1879?

A. Yes, sir.

Q. You have complete confidence in the Water Supply papers, haven't you, as an engineer?

A. That is a mean daily discharge.

Q. But it was the lowest average flow for the low water 1879?

A. Lowest average day.

Q. Then is it not a fact that the low water flow which corresponds with the gage heights of 1879 was 1,540 second-feet?

A. That is the lowest daily average, according to that.

Q. In 1879 what would have caused the minimum average flow to drop to some unknown point and rise again so as to give an average of 1,540 second-feet?

A. The flow fluctuates somewhat.

Q. During low waters does it fluctuate?

A. Yes, sir.

Q. Pretty rapidly?

A. I have known it to fluctuate rapidy at Kanawha Falls.

Q. After what time was that?

A. In 1930 or 1931 the lowest point on the recordagraph showed a minimum flow of something like 841 second-feet, while the daily average was something higher than that.

Q. How much higher?

1102 A. I don't remember.

Q. What was the cause of that fluctuation if you know?

A. I don't know. It was reported to me the operation of the Glen Farris plant.

Q. The Glen Farris plant didn't have any effect in 1879?

A. No, sir.

Q. No plants on the river then?

A. No, sir.

Q. No dams on the river in 1879?

A. No, sir; I don't think so.

Q. Can you suggest anything else that might have caused some fluctuations in the low water flow for the lowest day of 1879, under conditions that prevailed at that time?

A. No, sir; I don't know.

Q. This minimum average daily flow of 1,540 second-feet in 1879, was at Kanawha Falls—the probability is the flow farther down would be larger, isn't it?

A. The probability is it would be larger, but not necessarily.

Q. But you would think as an engineer the balance of probability was on the side of it being larger? In 1879.

A. Yes, sir.

Q. Is that your judgment that is what probably happened from your studies?

A. I will say it was possible.

Q. How far is Kanawha Falls from Lock #2, roughly?

A. About ten miles, I believe.

Q. Would you think it might lose one-third of its water between Kanawha Falls and Lock #2, under 1879 conditions?

A. I wouldn't think so.

Q. I direct your attention to Exhibit 117–a a moment. There appears on that exhibit a straight line, labeled, "Lock #3 normal upper pool elevation 584.5." Is the upper pool for Lock #3 the same as the lower pool for Lock #2? 1103

A. Yes, sir.

Q. There also appears on that chart another straight line, "Lock #2 normal lower pool elevation 591.57." There appears to be a difference. It is something over five feet between the elevation given for the normal upper pool elevation of Lock #3 and the lower pool elevation of Lock #2. Can you explain that discrepancy?

A. The upper pool for Lock #3 is 591.57.

Q. That is the normal upper pool?

A. For Lock #3.

Q. Is this an error in your Exhibit 117–a?

A. It appears to be an error.

Q. That is this line "Lock #3, normal upper pool elevation 584.5" should read 591.57, is that right?

A. Yes, sir.

Q. I don't want to take time to go through all these curves Mr. Teeter, so as a matter of illustration, will you tell me as briefly as you can, how the curve entitled "Lock #2, Lower Pool," was developed?

A. Lock #2 Lower Pool?

Q. Particularly the open river branch of the curve.

A. Lock #2, Lower Pool, would be, according to the lower gage at Lock #2 while Dam #3 was operating. This open river would mean without Dam #3 in, and we have the elevation of zero flow according to the surveys and we have the elevation of low water according to the surveys.

Q. That is the same elevation we have been talking about in connection with low water of 1879?

A. Yes, sir; and with those two points the curve is run in to join the curve made with Lock #3 operating.

1104 Q. Were those gage readings and ratings which you used affected by leakage in Lock #2 or Dam #2?

A. This was for the lower gage at Dam #2. It is not affected materially by the leakage through Dam #2.

Q. It would be affected by leakage through Dam #3?

A. Only unless it changed the elevation at Dam #3.

Q. Now, Mr. Teeter, you have already testified that these open river curves such as the lower branch of the curve marked "Lock #2 Lower Pool, open river," are obtained by taking zero and then platting on the gage heights obtained from the low water of 1879, a point of 1,000 second-feet, is that right?

A. Yes, sir.

Q. Now, if you had platted with the gage heights for the low water of 1879 the average minimum flow low water flow for any day in 1879, what effect would it have on that curve?

A. It wouldn't have much effect on it.

Q. It would shift your point, for instance connecting with the line marked elevation 589.86 very substantially to the right, wouldn't it?

A. You can see one of the smallest divisions in 200 second-feet.

Q. It would shove it over fifty percent to the right than it now is, measuring from the left-hand side of the chart, wouldn't it?

A. If it was 1,500 second-feet instead of 1,000.

Q. It would shove it over fifty percent farther than it now is?

A. Yes, sir.

Q. And that would affect the shape of your entire curve for open river flow, wouldn't it?

A. It would only affect the shape of it near that point.

1105 Q. Isn't that the controlling point, and the only controlling point you have between your zero and the point where you have connected it with the line of Lock #2 Lower pool?

A. That is the most important control.

Q. It is the only controlling point, isn't it?

A. Yes, sir.

Q. And, therefore, it would entirely control the shape of that lower curve from your zero over to the point of junction with the upper line, wouldn't it?

A. It would change it somewhat according to the difference in flow at that elevation.

Q. Isn't the same thing true for every one of your open river curves on each of these Exhibits #117–a to 117–f, inclusive, on Kanawha River locks, and not the Ohio, of course?

A. I could not say. I have no proof the low water was not 1,000 second-feet.

Q. You have no proof the low water flow was 1,000 second-feet for the gage heights you have used for the low water of 1879, have you?

A. No, sir.

Q. And if it be a fact that the low water corresponds with those gage heights as indicated in the Water Supply paper I showed you, 1,540 second-feet, then it would affect every one of the open river curves dealing with the Kanawha River shown on your Exhibits 117–a to 117–f, the same way you have indicated in your testimony as to lock #2, lower pool?

A. Yes, sir, however low water flow on this standard chart of the Huntington office states low water 1,000 second-feet.

Q. You don't know it was 1,000 second-feet down at the mouth of the Kanawha for 1879?

A. No, sir.

1106 Q. Do you know when this figure of 1,000 second-feet was first put on the sheet in the Huntington office?

A. Put on when the chart was made, I think some years ago.

Q. I show you a chart from the Huntington office bearing the stamp "U. S. Engineer Office" print made November 28, 1930, and ask you if it isn't true that chart does not show a low-water flow of 1,000 second-feet?

A. I don't see it labeled 1,000 second-feet.

Q. So at that time your charts didn't show any indication of low water flow of 1,000 second-feet?

A. That chart doesn't.

Q. Doesn't the chart I have shown you contain the same data, fundamental data, that is mentioned in Plaintiff's Exhibit #118?

By Mr. **Gatchell.** Q. Would you be able to answer that question without an examination of the chart?

By Mr. **Jackson**:

Q. He can say.

A. This print you handed me has no official title on it.

By Mr. **Jackson.** Q. I did not ask you the official title. I asked you whether or not the chart I showed you does not show the same basis of data as Exhibit 118?

By Mr. **Gatchell**: If Your Honor please, I have been letting this examination go along but if he wants an answer to that question the witness ought to be allowed an opportunity to carefully examine the chart. Just to hand the witness a chart and then take it back right away does not give him an opportuhity to answer the question, and I do not see how the witness can tell whether that is the same data without a careful examination of the chart.

By the **Court**:

The witness looked at the chart and said "I cannot tell without a further examination." Possibly he can tell by glancing at it. I don't know. I don't know the nature of the chart or the
1107 amount of examination that it requires for him to answer the question.

A. I cannot tell it is the same profile without examining it from one end to the other.

By Mr. **Jackson**:

Q. Mr. Teeter, in your examination on yesterday I understood you to testify that your rating curve for dams lower down the Kanawha—the old dams I am talking about now—are in most instances based upon computations made from rating curve for lock or dam 2, is that right?

A. For Kanawha Falls?

Q. Kanawha Falls, I should have said.

A. Rating curves at Kanawha Falls and Locks 8 and 9.

Q. The rating curves at Locks 8 and 9, were derived by the use of data from Kanawha Falls, were they not?

A. Only for a very low water.

1108 By Mr. **Jackson**:

Q. Now to dispose of one point generally, Mr. Teeter, will you state which rating curves on your Exhibits 117F to 117S, inclusive, were based on actual concurrent measurements of both gauge heights and stream flow at the places, and under the conditions shown on the chart. If you will just read the curves and answer that question?

A. Lock #2, Lock #5——

Q. (Interrupting.) What exhibit are you referring to now?

A. Those are the Locks. I can read from the Exhibit, Lock 2, on 117A.

Q. You mean Lock #2, lower pool?

A. Upper pool.

Q. Where is your Lock #2, Upper Pool, on 117A?

A. Lock #2, and Upper Pool is not on here, but there was a curve for that.

Q. But I am asking you to tell me the curves shown on your exhibit? Can you tell which of those curves, just reading the title briefly, and designating the exhibit, which of those curves are based on concurrent measurements of both gauge heights and stream flow at the places and under the conditions shown on the chart, or according to your exhibits 117A to 117S. Is there any on Exhibit 117A?

A. There is none on Exhibit 117A.

Q. Is there any on Exhibit 117B?

A. Lock #5, open river.

Q. Lock #5, open river, that was based on measurements made at Kanawha Falls, was it not?

A. Several measurements were made on the Kanawha River for Lock #5.

Q. You did not testify that this reading was made from measurements at Lock #5?

1109 A. They were based on those measurements.

Q. Didn't you testify on your direct examination that it was based on measurements at Kanawha Falls?

A. Not entirely.

Q. Partly at least, was it not?

A. It was supposed to check with the Kanawha Falls flow.

Q. Which one checked with the Kanawha Falls, open river, or the other?

A. Both.

Q. Based on simultaneous gauge heights and stream flow measurements?

A. Based on simultaneous flows at Kanawha Falls and Lock #5.

Q. When did you observe open river flow at Lock #5, or low water flow of 1,000 second-feet?

A. 1,000 second-feet was not measured.

Q. There is not a point on that open river curve that was the result of concurrent gauge reading and stream flow measurements at Lock #5, is there?

A. Yes, sir.

Q. Which one is it?

A. Lock #5, open river, is based on stream measurements, I will say all of it.

Q. You will say all of it now?

A. Yes, sir; from 1,000 second-feet up.

Q. You had some measurements between thousand second-feet at the same point?

A. Yes, sir.

Q. How did the dam happen to be down?

A. This was for the gauge below Lock #5, when No. 6 was down.

Q. How did that happen to be down?

1110 A. It was not down at a thousand second-feet.

Q. And it was not down at flows substantially higher, was it?

A. No; it would be with dam No. 6 up.

Q. Then it would not be open river, would it?

A. No, sir; not below 10,000 second-feet.

Q. The only measurements there related to the upper branch?

A. Yes, sir.

Q. Tell me whether there are any on Exhibit 117C—answering the question I asked you before?

A. This additional curve on 117B, Marmet with pool #6, is based on lock #5 curves which is based on stream flow measurements above 10,000 second-feet.

Q. It is not based on the measurements at the place actually shown, on the curve, Marmet with Pool #6?

A. Not actually.

Q. Now keeping in mind the question I asked you, will you tell me of any curves on 117C that answer that definition?

A. Lock #8.

Q. Do you mean to testify that Lock #8 is based upon concurrent measurements of gauge heights and stream flow at Lock #8?

A. Yes, sir.

Q. And when were they made?

A. At various times since 1930.

Q. Is that true of both branches of the curve?

A. For open river and the upper branch on Lock #8 curve and the lower branch when Lock #9 was down.

Q. When was Lock #9 down, or Dam #9?

A. It was down when the flow was at such a stage that it went down.

Q. It would not be down at any of the lower flows?

A. No, sir.

1111 Q. And it would not be down for any of the lower branches of that curve, would it?

A. Possibly around 12,000 second-feet.

Q. It might go down at 12,000 second-feet?

A. Yes, sir.

Q. Didn't you testify on yesterday on your direct examination that the upper branch of that curve was estimated?

A. No, sir. There is a certain amount of estimation in this case, because it is necessary to know elevations at Lock #9 below in order to determine the flow at #8.

Q. On your direct testimony on yesterday I asked you the following question and you gave the following answer: (P. 2273) "Q. Can you tell me the data from which you obtained the rating curve, Lock #8?

"A. This curve was prepared by plotting gauge readings for #8 for the flow of Kanawha Falls, increased according to the drainage area.

"Q. And did you have any actual measurements for #8?

"A. We have a few measurements at Lock #8 which we used to check the curve." Was that an accurate statement?

A. Yes, sir.

Q. Is there any other curve on Exhibit 117C?

A. No, sir; not on Exhibit 117C.

Q. Is there any curve on 117D that answers the condition of reflecting concurrent gauge readings and stream measurements at the places shown on your curve?

A. Curve for Winfield site.

Q. Does that reflect conditions for all flows on the Ohio, corresponding to the given flows of the Kanawha on the exhibit?

A. Probably not.

Q. It is merely an average, isn't it?

1112 A. Yes, sir.

Q. It would never occur unless it was by accident?

A. It is an average condition very likely to occur according to this curve than otherwise, if that is the average.

Q. There can be very wide departures, of course?

A. Yes, sir.

Q. Now tell me what is the fact about curves on Exhibit 117E. Were they made on actual concurrent measurements of both gauge heights and stream flow at the places and under the conditions shown on the exhibit?

A. No measurements made at 10 and 11 to check these curves.

Q. Referring to Exhibit 117F, are they estimated curves?

A. We have a rating curve for this site on Ohio and Kanawha Rivers which is based upon concurrent meter measurements in the Ohio River.

Q. Is that curve based on concurrent gauge readings and at the places indicated?

A. Open river curve below is based on concurrent meter measurements.

Q. How did the dam happen to be down at those places?

A. That is based on meter measurements when the dam was not down.

Q. That condition did not prevail for the curve open river on the lower water end, did it?

A. No, sir.

Q. So that is all estimated. Is that right?

A. We have a curve for Gallipolis site, which is just below #26 which was used to check this curve.

Q. That was derived from what?

A. From measurements during Ohio River, open river stage.

Q. That was a relatively high stage of the river?

1113 A. It is from 40,000 second-feet or higher. Of course, we have low water on the Ohio River, also zero flow for these points.

Q. Referring to Exhibit 117F where you show lines of low water mile 266, elevation 514.5, what is your authority for that?

A. That is taken from the Ohio River Chart, low water at 266.

Q. What year was that, so that we can identify it?

A. You mean what year was the low water?

Q. Yes, sir.

A. I don't know.

Q. That shows low water flow on your chart of 3,000 second-feet, does it not?

A. A little less than 3,000 second-feet, I would say.

Q. Will you please furnish us with the date of this gauge reading and the date this low flow applied, will you please furnish us the date of each of those?

A. That low flow is given on the elevations on the Ohio River chart.

Q. But I want to get the basis of the data. I will ask you to furnish it, not now, but later, the date for which that flow and elevation occurred. Will you do that?

A. If possible.

Q. On your Exhibit 117D, which I want to refer to for a moment, your curve of the Winfield site, average open river, how many measurements did you have under that condition?

A. I don't know how many measurements, 15 or 20 I would say.

Q. Were they all taken at the Winfield site?

A. They were taken at the site of No. 8 which is just above Winfield.

1114 Q. How far?

A. Three or four miles, I believe, I don't know exactly.

Q. Now, Mr. Teeter, I want a little more information about Exhibit 117B. Your curve entitled "Marmet with Winfield Dam in place" appears to show a leakage of 700 second-feet. Is that approximately right?

A. Yes—not exactly either—it shows that the pool would go down.

Q. Why would it go down?

A. It might go down by use of water out of the pool.

Q. Was this curve drawn to reflect the condition of use of water out of the pool, or what?

A. Probable condition at that low flow.

Q. What use of the water out of the pool was contemplated?

A. This is a pool past Charleston—for all industrial uses of water out of the pool.

Q. Do you understand that that drop in the point of curve is intended to reflect use of water for industrial purposes?

A. It is intended to reflect that the pool was going down when the inflow was 700 second-feet or less.

Q. Do you know of any industrial use down on that river or water that does not return the water to the same pool?

A. There is considerable water used, but I don't know the amount returned.

Q. Do you know of any that does not return, or such water as it does return to the same pool?

A. I don't know of any that does return all of this water.

Q. You understood my question, didn't you?

A. I don't know how much they use out of the river.

Q. I am not asking you that, but I am asking you if the Industrial water, or if the water used by industries, if they do not return the water, whatever is returned to the same pool?

A. They return whatever is returned, to the same pool, yes.

1115 Q. Did you make the estimate of 700 second-feet?

A. That is just an estimate, not based on any physical data of the use of the water.

Q. Do you know that it was based upon the idea of the use of the water at all?

A. Yes, sir.

Q. Did you actually make the estimate?

A. I made that curve.

Q. But did you make an estimate?

A. That is not based on a numerical estimate, but just an estimate when the pool was going down, or when the flow decreased.

Q. What I am trying to get at is this, why you show 700 second-feet, if you did show it?

A. I estimate that it starts lowering at that flow.

Q. But you had no data upon which to base that?

A. No, sir.

Q. What would be the leakage at the Winfield Dam. Have you made any estimate of that?

A. The dam has not been built yet: I don't know.

Q. You made an estimate of the condition of the pool without the dam being built, and I wondered if you had not made an estimate of the leakage?

A. No, sir.

Q. Did your 700 second-feet include any estimate for leakage?

A. Yes, sir.

Q. How much?

A. Estimate when the pool would go down at 700 second-feet but no estimate of how much of that would be leakage and how much would be other uses, &c.

Q. With Marmet and Winfield dam in place is a computed curve necessary?

1116 A. Yes, sir.

Q. Isn't it a fact that you have drawn a curve, showing backwater effect of Winfield dam on Marmet lower pool, which curve shows this backwater effect disappearing at a flow of 7,200 second-feet?

A. Yes, sir, 7,200 second-feet.

Q. Do you believe that is correct?

A. Yes, sir.

Q. Isn't it a fact that it would not be possible for the effect of Winfield Dam on the Marmet lower pool to disappear with a flow of less than well over 100,000 second-feet?

A. It would be possible for the effect to disappear at 7,200 second-feet.

Q. How—explain that?

A. The dam raises the water to pool stage during low flow. At a flow approximately of 75,000 second-feet, the dam will be open.

Q. 75,000 you say?

A. 7,000—no; 75,000. You are right.

Q. But you have platted 7,000 instead of 75,000, haven't you?

A. Under ordinary operation of Winfield dam, that curve will probably go higher than 7,000.

Q. It would go very much higher, would it not?

A. I think it would.

Q. In your judgment, it would go around 75,000 second-feet, would it not?

A. I would say 50,000.

Q. And the connecting point between that curve and the upper branch or curve, would be well off your chart?

A. Yes, sir.

Q. It runs to only 30,000 second-feet?

1117 A. Yes, sir.

Q. Doesn't that show you as an Engineer that this curve for open river, lower branch or curve rather, for Marmet with Winfield dam in place, lower branch, is necessarily an error?

A. Yes, sir; it is.

Q. On this exhibit, referring to the upper branch of curve Marmet with Winfield dam in place, how did you determine how low the end of that curve would go?

A. You mean the zero flow?

Q. The upper branch curve I am talking about.

A. The upper branch Marmet with Winfield in place?

Q. Yes, sir.

A. It goes to below 566 at zero. That is an estimate.

Q. How much is that in feet?

A. As shown here, that is about three-tenths of a foot.

Q. That is an estimate of the variation in the pool?

A. Yes, sir.

Q. Now I want to direct your attention to this chart, and also direct your attention to lower branch of the curve, Marmet with Winfield Dam in place, that is, the branch for open river flow and also lower branch curve, entitled "Marmet 1935," with Pool #6 in place, open river flow, and will ask you whether the branches of the two curves described do not both represent Marmet lower pool with open river conditions?

A. Yes, sir.

Q. I will ask you to explain why the two curves representing Marmet lower pool with open river conditions, do not coincide for the same flow?

A. They are platted on here according to gauge readings and not according to elevation.

Q. This is the same river and the same flow, isn't it?

1118 A. Yes; but the gauges at the two points is different.

Q. It is at the same place?

A. It is.

Q. And platted at the same place, isn't it?

A. Marmet with pool #6, has a lower pool below it than the Winfield pool.

Q. Does that make any difference of open river flow?

A. I was looking to see if the same gauge was used to apply to those curves.

Q. The elevations for Marmet dam are given on the left-hand side, same elevations for both curges?

A. I would say the reason those curves are different is because there is a condition of operation of the two dams, they do not change from pool to open pool and at times part of the dam is down and part is up.

Q. Do not your curves for open river flow mean open river flow and mean the same in both instances?

A. The dam might not all be down in open river.

Q. Then it would not be open river flow, would it?

A. Not strictly.

Q. It would not be open river flow either if part of the dam was up?

A. Part of the dam might be up and it would not affect the flow up at Marmet.

Q. Then if the part of the dam that is up does not affect the flow it is open river condition?

A. Yes, sir.

Q. And if both curves represent open river conditions they should coincide for the same flow, should they not, at the same place on the river?

A. They show a difference of about a foot there.

1119 Q. They should coincide, should they not?

A. They should.

Q. You have already said that on your upper curve, Marmet with Winfield dam in place, that the curve for open river flow shows back water effect terminated at 7,000, instead of 75,000 second-feet? Would not that change in your lower curve change the shape of your upper branch of that curve?

A. That would extend up further, too.

Q. Just as a matter of information, there is one line here which says "Marmet, 1935, with Pool #6." Is there any significance to that date, 1935?

A. No 6 was in existence in 1935 and that is just a date showing that.

Q. Then there is no particular significance in that, and it does not modify the conditions, Marmet with Winfield in place, in any fashion?

A. No, sir.

Q. You will notice that your curve, Marmet, 1935, with Pool #6 in place, drops below the normal pool level. Is that leakage?

A. Yes, sir.

Q. What is the significance of the vertical ordinate ~~0.4~~ at the end of the curve—~~or~~ 0.3 or whatever it is?

A. 0.3 below the pool?

Q. Yes, sir.

A. The dam would certainly go down—the pool would go down in flow, decreased below 1,000 second-feet, probably more than 0.3; that is, a continuation of zero.

Q. Do you know whether or not it goes below 0.3?

A. I would have to look at the gauge readings to see.

1120 Q. You are able to say it does, can't you, from your familiarity with this work on the river?

A. I would say it does; yes, sir.

Q. Well, now, I direct your attention to the curve Marmet 1935, with pool in place, and ask you to say whether or not that does not show the backwater effect of dam No. 6 disappearing at less than—a flow of less than 1,000 second-feet?

A. That is not quite right. With open river curve—the curve should extend to 10,000 second-feet.

It would certainly not disappear in less than 10,000 second-feet?

A. No, sir.

Q. And the upper curve—the lower branch of upper curve Marmet, with Winfield dam in place, should follow the lower branch of the lower curve?

A. Yes, sir.

Q. Exactly?

A. Yes, sir.

Q. Look at curves, Lock 5, open river, and 4, open river, at the extreme left hand and tell me what the drop in these curves below normal pool level means?

A. They were extended to zero if the flow was zero, the pool would go down. I cannot state the amount.

Q. You don't know how much?

A. No, sir; the flow never was zero.

Q. You do know that with greater flows than zero, the pools have been below the elevation as shown on your chart?

A. Yes, sir.

Q. Tell me why, on Exhibit 117-a, you assume no leakage on your curves for Lock No. 2, lower pool and Lock No. 3, lower pool?

A. There would be leakage.

1121 Q. There are none shown on the exhibits?

A. No, sir; there are none shown on the exhibits.

Q. That is an error in the curve, is it?

A. I think so.

Q. On your top curve London old lock, I believe you have 2,000 feet leakage?

A. Yes, sir.

Q. How far did this pool drop—how many feet?

A. I don't know; it must drop at times more than this.

Q. More than your chart?

A. Yes, sir.

Q. How much is shown on your chart?

A. About 0.6.

In the same way, tell about the curves on Exhibit 117–c, for s 6, 7, and 8, lower pools, and in each instance, why did you how leakage on these curves?

I don't know—there would be leakage; in fact all of these s are indefinite below 1,000 second-feet.

The curves are in error to the extent that they don't show ge, are they not?

Yes; they should show leakage.

Will you turn to Exhibit No. 117–d, and tell me how, if at allipolis dam enters into the situation shown by the curves?

The curves at Winfield lower pool will be affected by the tion of the Gallipolis dam.

Is that the only curve that is affected?

That is the only curve that is affected by Gallipolis.

When Gallipolis dam is in operation, lock 9 will be out?

Yes, sir.

Will you tell me whether or not I am right in understanding your upper curve on Exhibit 117–d shows the backwater of Gallipolis dam disappearing at flow 21,000 second-feet, or thereabouts?

Q. That is approximately right.

Q. And do you not know it to be a fact that the back- effect of Gallipolis dam would not disappear at a flow of han 150,000 second-feet?

Gallipolis dam would not affect flows of 150,000 second-feet anawha River.

It will affect flows very much larger than 21,000 second-

Not on average conditions.

You think it will not. Are you sure about that?

That is according to our studies. That is, for Kanawha , which is only 25 percent of flow past the Gallipolis dam.

What allowance did you make for the Ohio River back- —the variations of the Ohio River flows for a given flow on Kanawha, in connection with the curve?

This curve represents the Kanawha's portion of water pass- allipolis.

It gave no effect to any backwater effect of the Ohio River or the variations of your Ohio River flow?

It considers the Ohio River flow backwater to the mouth of Kanawha and the Kanawha's portion with backwater to ield.

That is only on the basis of minimum elevation?

Yes, sir.

What is the minimum elevation?

A. When the Ohio is in flood, the flow below Winfield can be raised by the Ohio River flood higher than this elevation.

Q. Can it be true, even in low water?

A. Not in low water in the Ohio. It can be true of low water in the Kanawha.

Q. Yes. This scale is water in the Kanawha River?

A. Yes, sir.

1123 Q. And, of course, the lower end of this scale does not show anything about flood conditions?

A. No, sir; it is purported to show flow in Kanawha River, as stated down there, with a proportionate amount in the Ohio River.

Q. That is the average; of course, you cannot be certain it will prevail on any particular——

A. (Interrupting.) On any particular date; no, sir.

Q. I neglected to ask you, in connection with Exhibit 117-a—why you don't show the curve London lower pool, with Marmet in place, dropping below the elevation 590, under any circumstances where Winfield was shown to drop?

A. Winfield pool on map 117-d does not go below pool elevation either.

Q. Why, when 117-b——

A. "D."

Q. Isn't it on 117-b?

A. That is true from our map on 117-b.

Q. It is the drop at the Winfield dam?

A. Yes, sir.

Q. Why didn't you show any drop on Exhibit 117-a, London lower pool, with Marmet in place—any drop at Marmet dam?

A. There is no particular reason; if the flow in the river would go below 1,000 second-feet, the pools would drop, in my opinion.

Q. Give your reason.

A. I think it would take 1,000 second-feet in Kanawha River to maintain the pool, less evaporation, leakage, lockage, and so forth.

Q. At Marmet dam?

A. Yes, sir.

Q. What is leakage at Marmet dam?

A. The leakage itself is not material.

1124 Q. Isn't it negligible?

A. It has a negligible effect to a 1,000 second-foot flow.

Q. Yes; do you remember your Exhibit No. 143—what it was?

A. No, sir; I do not. [Mr. Gatchell hands papers to witness.] It is not No. 143—it does not seem to be numbered here, but I presume this is the one.

Q. It is numbered on the back, I think. Isn't it?

A. (Witness examines paper.) Yes, sir; it is number 143.

Q. That shows what kind of curves?

A. That shows stage curves for gauge elevation?

Q. Yes. Well, are those curves shown on your Exhibit 143 in any way based upon the rating curves shown in Exhibits 117-a to f, inclusive.

A. This Exhibit 143 does not show stream discharge.

Q. No discharge at all.

A. Therefore, it is not based on rating curves.

Q. I would like to get that correct—there are no discharges on there at all?

A. I don't see any.

Q. I direct your attention to this citation, on page 2284, of the record, Mr. Teeter, in which you give the official number of the 308 report, referred to in your exhibit as House Document No. 91, 71st Congress, 1st session.

A. It should be 74th Congress.

Q. Otherwise, it is accurate?

A. Yes, sir; it is the 74th Congress, the 91st House Document. Doesn't that correspond with the statement on the document itself?

Q. I think it does. This was noted to be an error.

A. I noticed that yesterday myself.

Q. What is your official title, Mr. Teeter?

A. My official title is Associate Hydroelectrical Engineer.

Q. What is your duties?

1125 A. I am head of a subdivision in our office, engaged in hydroelectric studies, reports, and stream gauging.

Q. You work under—your direct superior is Mr. Winn, who testified here?

A. Yes, sir.

Q. Wasn't this work all done under his direction?

A. His supervision and direction.

Q. And then, what did you mean when you said that it was done under your direction?

A. I had immediate charge of the work.

Q. You had some other people who were actually doing the work and you were in charge intermediately between them and Mr. Winn?

A. Yes, sir.

Q. Under whom did you work in 1931?

A. I worked in 1931 under Mr. Burns.

(Exhibit 514, being letter dated Oct. 20, 1931, from F. B. Duis to F. W. Scheidenhelm, was marked for identification.)

Q. Do you know Mr. F. D. Duis?

A. Yes, sir.

Q. He is connected with the Huntington office?

A. Not at the present time.

Q. Was he in 1931?

A. Yes, sir.

Q. He was the principal engineer?

A He was the principal engineer.

By Mr. Jackson. If Your Honor please, I ask leave and the consent of the Court to make this witness my own for the purpose of identifying this signature, as a matter of convenience and out of order.

By the Court. All right.

By Mr. Jackson:

Q. Mr. Teeter, please examine the signature on Exhibit 514, filed for identification by the Defendant, which purports to be
that of Mr. Duis, principal engineer, and state whether or
1126 not you can identify that signature?

A. (The witness makes inaudible remark to Government counsel.)

By Mr. Jackson. Let the records show that the witness asks Counsel for the Government if it was legal for him to identify the signature; and let the record also show that I said to him that he must answer the question, if it is proper.

By the Witness. It appears to be his signature.

By the Court. You have a well-trained set of witnesses.

By Mr. Jackson:

Q. That appears to be his signature, does it?

A. Yes, sir.

Q. Have you any doubt about it?

1127 A. Well, I didn't see him write it.

Q. Have you seen his signature?

A. Yes, sir.

Q. And you say it is his?

A. I would say that is his signature, but I cannot prove it.

A. I think that is all.

Redirect examination by Mr. Gatchell:

(Exhibit 145, being House Document 91, 74th Congress, First Session, 1935, was offered in evidence.)

Q. I want to ask this witness again if the low water flows shown on these rating curves were low water flow elevations given at the United States District Engineer's office at Huntington, West Virginia, on the official charts that were in the office?

A. Yes, sir.

Q. And was a flow assumed at these elevations of 1,000 second-feet?

A. Yes, sir.

Q. Did you make a special study of flows on New River, other than as shown on the charts which you have identified and testified to?

A. I believe not.

Q. I ask you, in response to a question by opposing counsel with respect to the difference in flows as shown by the Geological Survey records, at Eggleston, October 26, 1921, and at Kanawha Falls, on October 29th, 1921, in which a lower flow was shown to be recorded at Kanawha Falls—if that could have been caused by any ponding of the water above Kanawha Falls?

A. Yes, sir; it could.

Q. And where would that pond have been located, if you know?

A. That is immediately above Kanawha Falls.

1128 Q. Where is the gage located at Kanawha Falls?

A. The gage is located below the Falls—the official gage.

Q. Was the gage below Kanawha Falls likely to register a lower stream flow than any one of the gages above Kanawha Falls?

A. Yes, sir; that is entirely possible, as I said before.

Q. Do you know the lag between the recording at Eggleston and at Kanawha Falls?

A. Not definitely; it must be during low water flow a day and a half or two days.

Q. You have testified as to the accuracy of the stream flow record—the methods of making current measurements by means of current meters. Would you mind describing completely to the Court just exactly the methods that you used in your office in making current meter measurements?

A. The current meter measurements were made by the United States Engineer's Office on the Kanawha River.

By Mr. GATCHELL. Q. Describe the method of making these current meter measurements?

By Mr. JACKSON:

Q. Were these the measurements used in making these charts, or did you use U. S. G. S. measurements?

A. The charts on New River referred to U. S. G. S. measurements on New River. The discharge measurements on Kanawha River below Kanawha Falls are based on discharge measurements made by the United States Engineer's Office.

By Mr. GATCHELL:

Q. Describe to the Court the method of making current meter measurements on Kanawha River?

A. I will describe the method of making current meter measurements at the upper bridge in Charleston, as an example:

During low water, we make soundings across the river to establish the river bottom—profile—that is plotted as a
1129 standard section. Of course, the river bottom is fairly smooth above and below this point—likewise the river banks. Of course, on the profile of these cross sections, we see the changes in the river bottom and designate points of measurements under that section, so that each measurement will give us the average velocity in that particular section. The stationings and the cross sections are marked on the bridge, with the current meter dropped off the bridge, we know exactly the location of the meter measurements and we know the river bottom elevations, but the meter is first dropped to the bottom—the depth checked, and with a gage on the river, and the recorded depth and gage elevation, we know the depth at which to make our measurements. The current meter is dropped in the water with sufficient weight to hold it in place—the velocity of the current turns the current wheel, which is standardized and, according to the number of revolutions, the velocity is determined. That is the procedure across the river with the data recorded, and with this data, the area of each section of water is known—the average velocity is obtained from the current meter notes; the velocity times the area of each section gives the flow in second-feet, the velocity having been given in feet per second. By summing up this data for the total cross section, the discharge in the river is determined in cubic feet per second.

By Mr. Gatchell:

Q. I show you Government's Exhibit 116, Kanawha River profile, backwater studies, and ask you what part the curve showing low water flow played in the computations shown on this chart?

A. The low water flow chart had no effect upon the results shown on this chart.

1130 Q. I show you Government's Exhibit No. 118, Kanawha River profile, 6- and 9-foot projects, and ask you what purpose was served by the low water curve shown on this chart, in connection with the other computations shown on that chart?

A. The low water curve as shown on here—it is shown on here as a matter of reference, but it is not of importance in computing discharges of hydroelectrical studies of the operation of the dams.

Recross examination by Mr. Jackson:

Q. Mr. Teeter, in connection with these discharge measurements at Kanawha Falls and Eggleston, tell me the drainage at Eggleston?

A. I haven't it with me.

Q. I will help you on that. [Exhibiting papers to witness.] Look at page 107 of Water Supply Papers 758, and state whether or not that shows a drainage of 2,945 square miles, at Eggleston?

A. Yes, sir.

Q. Look at page 111 of the same Water Supply Papers No. 758, and state whether or not that shows the drainage area of Kanawha Falls to be 8,300 square miles?

A. Yes, sir.

Q. It is well over three times as great at Kanawha Falls as at Eggleston?

A. Yes, sir.

By the COURT. Q. Did you say 8,329?

A. I am wrong about that.

By WITNESS. Q. It is not well over three times?

A. I think I am wrong the second time. I had 2,945 on my notes and it is 2,495. I was in error.

By Mr. GATCHELL:

Q. (Addressing the witness.) Will you change your answer?

A. I did not compute it myself.

1131 H. G. GERDES

Direct examination by Mr. THOMPSON:

Q. Mr. Gerdes, will you please state your name to the stenographer?

A. H. G. Gerdes.

Q. Where do you reside?

A. Washington, District of Columbia.

Q. With whom are you connected at this time?

A. With the Federal Power Commission.

Q. Will you please state your education and professional experience?

A. I am a graduate of the University of California in Civil Engineering, degree of Bachelor of Science, a member of the American Society of Civil Engineers, and am a licensed civil engineer under the laws of the State of California. After leaving college I was engaged for a number of years in hydraulic structural design, inspection, cost estimating, and valuation engineering in connection with buildings and other structures, tanks, pipe lines, irrigation and reclamation district dams, levees, canals, power and pumping plants, and on hydroelectric and water utility properties in California and the far west generally. Susequently I was connected with the United States Engineer Department for six years as engineer in charge of navigation, hydraulic and hydroelectric investigation, design, and construction work, including, among other things, a tidal hydraulic survey of San Francisco Bay.

By Mr. Jackson:

Q. I didn't catch whom that was made for?

A. United States Engineer Department. Also several "308" investigations and reports covering the Mad and Eel River Systems in California, the lay-out and design of Lock and Dam Systems for the improvement of the Willamette River, Oregon, and the San Joaquin River, California. During 1932 and '33 I was in charge of the field investigations and surveys preparatory to construction of the Bonneville Power and Navigation Dam on the Columbia River, Oregon, and later, after the allotment of funds, was engineer in charge of design and responsible 1132 for the preparation of plans and specifications and construction schedule for the $15,000,000 main spillway dam, now over one-half complete. During the past year and a half, I have been a member of the staff of the Bureau of Engineering of the Federal Power Commission on investigation and analyses of hydroelectric projects connected with the administration of the Federal Power Act.

By Mr. Thompson:

Q. Under whose direction do you work, Mr. Gerdes?

A. Under the direction of Mr. Roger B. McWhorter, Chief Engineer.

Q. Are you familiar with any part of New River between Wylies Shoals and New River bridge?

A. Yes, sir.

Q. How did you obtain this familiarity?

A. I personally have made an investigation and survey of every shoal of any importance on New River between Wylies Shoals and New River bridge at Radford.

Q. When did you make this survey?

A. Between June 22nd to 29th and July 13th to 15th of this year.

Q. How did you make the survey?

A. By visiting every shoal and rapid on this section of the river, wading into the river and measuring the depths and widths of the principal channels and the current velocity on each shoal.

Q. Did you have any one to assist you?

A. I was assisted by a survey party, consisting of a surveyor, current meter operator, two rodmen, and a chauffeur.

Q. What shoals did you visit?

A. I visited every shoal or ripple along this section of the river and made measurements on 41 shoals in this section of the river.

Q. Were all of these shoals named?

A. Certain of these had names. Others which were unnamed were designated by me with a number and the mile above the head of the Kanawha River at which they occurred.

Q. The mile above the Kanawha?

1133 A. Yes, sir.

Q. Above the mouth of the New River or above the Kanawha?

A. The two definitions are identical. It was the mile on the New River which was the mile of the New River above the mouth of New River which is the head of the Kanawha.

Q. State whether or not you have given the numbers of these shoals that were unnamed to anyone?

A. I have transmitted them with my report to Mr. McWhorter, Chief Engineer of the Federal Power Commission.

Q. Have you given him any other data which you may have gathered with respect to these shoals?

A. I have given him the information which I procured as to the depth and width of the channels at these shoals and the current velocity of the water at the same points.

Q. Please state whether there are any falls within this area that you have named on New River?

A. There are not. There are no falls on this section of the river.

Q. What do you mean by falls?

A. I mean where the water falls perpendicularly, or almost so, over an obstacle in the channel.

Q. State whether or not there are any falls in the entire New River under that definition?

A. That I cannot state. There are certainly none of this section of the river.

Q. How do you term these places where the water runs swiftly?

A. They are either shoals or what are commonly termed rapids.

Q. What percentage of the river between Wylies Falls and Radford consists of pools?

A. About 85 percent,

Q. Do you know the range of depth of these pools?

1134 A. Yes, sir.

Q. Please state it?

A. They run from three to six feet in depth or even more.

Q. How do you know this?

A. By soundings that I made.

Q. If 85 percent of the river is pools, that would leave 15 percent as shoals, would you have us understand?

A. It would.

Q. What percentage of these shoals had a minimum depth of less than two feet when you examined them?

A. Between two and three percent.

Q. And what was the depth of the remaining 12 or 13 percent?

A. 2 feet or more; that is, the remaining 12 or 13 percent which could be classified as shoal.

Q. What was the condition of the river at the time you investigated it with respect to depth?

A. Well, as I have related, this section of the river consists largely of pools or quietly flowing water with a depth of 3 to 6 feet or even more in spots and the minor part, 15 percent or less, of shoals, all of which have depths over 2 feet with the exception of 2 or 3 percent.

Q. What was the condition of the water as to whether it was mean flow or low flow when you visited it?

A. According to the Geological Survey gaging station reports, taken from stations on this section of the river at Eggleston, Glen Lyn, and Hinton, the river was about at ordinary summer low water. I might say that was confirmed by my own observation.

Q. And you checked it also with the Geological Survey reports?

A. Yes, sir.

Q. Does this include both periods of time? I think that you said that you were on the river two periods of time, didn't you?

1135 A. That is right. This covers both periods of time. If you desire the flows, I may say that during these periods the flow at Hinton ranged from 1,800 to 2,750 second-feet, the flow at Glen Lyn from 1,740 to 2,770 second-feet, and the flow at Eggleston from 1,480 to 2,530 cubic feet per second in each case.

Q. Will you state whether you took any photographs of the shoals at the time you were making the investigation?

A. I did.

Did you take any photographs of other places than the shoals?

A. I did not.

Q. I hand you what purports to be an album of photographs, marked for identification Government Exhibit 146 and ask you if you know what that is?

A. Yes, sir; I do.

Q. What is it?

A. It consists of views, photographs of shoals and rapids on the unimproved section of New River between Wylies Falls, Mile 88.6, and Radford, Mile 146.1, which were taken under my direction during the period July 13 to 15, 1936.

Q. Were you present when these pictures in this album were taken?

A. I was. In fact, I am shown in most of them.

Mr. **Thompson**. I desire to offer that in evidence.

Note.—This album was filed and marked Government Exhibit No. 146.

Mr. **Jackson**. We object to the comments that have been included under the pictures.

Mr. **Thompson**. I am going to have the witness testify about that. Counsel has been so very strict about my trying to identify before offering in evidence, and I was trying to follow him, but I am going to have him identify each picture.

Mr. **Jackson**. The exhibits ought not to have comments put on them if they are to be offered.

Mr. **Thompson**. They might be unintelligible.

The **Court**. Comments other than indicating points from which the pictures were taken?

Mr. **Jackson**. I just happened to notice the first one—"Boat channel behind island in background." As far as we know there is no boat channel, much less behind island in the background. If they had simply said "Wylies Falls" or anything to indicate where it is, we would not have had any objection to that, but No. 1 is the first one I looked at and it has that comment, and we object to it as being improper on the exhibit. Picture 3 says "View from left bank showing main channel notch."

The **Court**. He is going to identify each of these pictures, he said.

Mr. **Jackson**. I was only worried about the comments.

By Mr. **Thompson**:

Q. What is this typewritten matter you see on the first page?

A. That is a table of contents and index of the photographs in the album.

Q. Will you please turn to the pictures and identify them in turn?

A. Photograph No. 1 is a picture of Wylies Falls, view taken across the rapids from the left bank with the old boat channel shown behind the island in the background.

By Mr. **Jackson**:

Q. Can you point out the place in the picture where the boat channel appears?

A. Approximately in the middle of the picture there is a small island with trees on it and you can see the water going be-
1136 hind the trees at either end of the island. Behind that island with the trees is the boat channel excavated by the United States when this river was under improvement in 1870 to '80.

By Mr. THOMPSON:

Q. Go ahead?

A. Photograph No. 2 shows Wylies shoals, the next point of importance above Wylies Falls. The view is in the middle riffle, photograph taken from the left bank and shows the survey party in midstream measuring the depth, width, and velocity of the principal opening.

Q. Is that the group of men that were working for you?

A. Yes, sir.

Q. What were they doing there?

A. They are measuring the depth and width of the principal channel and the velocity of the current in the center of that opening.

Photograph No. 3 shows an unnamed shoal which I have designated as No. 2. The view was taken from the left bank and shows the main channel notch through the ledge which otherwise partially obstructs the river at this point.

Photograph No. 4 is of the rapid at Shumate's Falls, taken near the upper end of the rapid. The survey party is shown at the far edge of the water in the channel near the right bank.

Photograph No. 5 is taken next upstream at Rich Creek shoals. The view is from the right bank showing the survey party in the upper riffle, again measuring the channel.

No. 6 is of shoal No. 8. The view is from the left bank showing the survey party measuring the channel.

Photograph No. 7 is shoal No. 9. The view is from the left bank showing the survey party. I am not certain whether all of the men are standing within the channel or not. They are
1137 either in it or near it.

Photograph No. 8 is of shoal No. 10, otherwise known as French's Mill Shoal. The view is across the river from the left bank, and shows the principal channel in the foreground. It may be recognized by the relatively smoother water shown on the photograph.

Photograph No. 9 is shoal No. 11. The view is from the left bank and shows the survey party in the river at the lower edge of this shoal.

Q. Where is the channel there, if you can point it out?

A. If I may refer to my notes, I believe that the man in the center of the stream or near the center of the stream is at the edge of the main channel.

Q. Go ahead.

A. Photograph No. 10 is of Shoal No. 12. The view is from the left bank showing the surveyors—in this case the current meter man in the river at the lower riffle of the shoal.

Photograph No. 11 is of Shoal 13. The view is from the left bank looking upstream showing the main channel near the right bank. There is clearly visible in the photograph the smooth sheet of water entering the channel notch.

Photograph No. 12 shows Shoal No. 15 with the survey party at the channel which in this case passes through the upper ledge near the left bank in the immediate foreground.

Photograph No. 13 is of Snidow's Ferry Bar. The view is from the left bank showing the surveyor near or in the channel.

Photograph No. 14 shows Little Stony Creek Bar just below the highway bridge at Pembroke. The view is from the left bank across the lower end of the shoal, showing the survey party in the channel near midstream. At the right edge of the picture is shown the lower edge of the island which divided the river at this point. It can be seen that the main current is in the foreground to the left of the island.

1138 No. 15 is a picture of one of the rapids known as Snidow's Falls. The view is from the left bank and shows the survey party in the channel near midstream at the upper end of the rapid.

Photograph No. 16 is of Upper Sinking Creek Bar. The view is from the left—that is a typographical error. It should be view from the right bank, showing the survey party at the main channel through the ledge near midstream.

Photograph No. 17 is of the Eggleston Shoals, shortly above the highway bridge at Eggleston. The view is from the left bank and shows the survey party at the channel through the ledge near midstream.

Photograph No. 18 is of Shoal No. 23, I believe next upstream, the view from the left bank showing the survey party at the channel across this ledge.

Photograph No. 19 is of Shoal No. 24. The view from the left bank shows a survey party at the channel through the main ledge.

Photograph No. 20 is of Shoal No. 26, the view from the right bank showing the survey party in the river near the main channel.

Photgraph No. 21 is of the Rapids at Big Walker Mountain Falls, showing the channel through the lower ledge with the survey party at the edge.

Photograph No. 22 is of White Thorne Ferry Shoal downstream from White Thorne's Ferry. The view is from the left bank showing the survey party at the main channel through this ledge.

Photograph No. 23 is of Shoal No. 31. The view is from the left bank showing the survey party in the river.

Photograph No. 24 is of Shoal No. 32 at the mouth of Stroubles Creek. The view is from the right bank showing the survey party in the channel.

Photograph No. 25 is of an unnamed shoal which I call No. 39 just below the City of Radford. The view is from the right bank across the river showing the main channel through the ledge near the river bank.

1139 Photograph No. 26 is a view from the river bank across Shoal No. 40 showing the survey party in the channel near midstream.

Photograph No. 27 is of Lower Pepper Falls. The view is from the left bank showing downstream the survey party in the channel through the submerged ledge near midstream.

Photograph No. 28 is of Crab Creek Shoal. The view is from the left bank looking across or along the main ledge showing the survey party in the river and the main channel opening at the right bank.

Photograph No. 29 is of Shoal No. 37, shortly above Crab Creek, the view from the left bank across the submerged ledge and shows the survey party in the river at the edge of the channel.

Q. I hand you marked for identification Government Exhibit #147, being apparently an album of photographs, and ask you what it is?

A. This consists of a series of views of shoals and rapids on the unimproved sections of New River, between Wiley Falls, Mile 88.6, and Radford Mile 146.1, and between Allisonia Mile 173.3, and Austinville Lead Mines, Mile 190.0. Photograph taken June 22 to 29, 1936.

Q. And what is the typewritten matter on the first page?

A. The typewritten matter consists of a table of contents and index of the photographs in this volume.

(Exhibit 147 offered in evidence.)

Q. Were those taken in your presence?

A. They were taken in my presence, under my direction, and in many cases by myself.

Q. Turn to the first page of the photographs. I notice the first photograph is entitled Wiley Shoals from left bank consists of four pictures. How was that taken?

A. That view consists of four pictures put together to form a panorama, photographs taken from the left bank of Wiley's Shoals. There is noticeable on the third photograph from the left an open survey boat used by the U. S. Survey Department.

1140 Q. That is the third picture from the left?

A. Yes, sir.

Q. Will you please describe these pictures pointing out, if you can, the shoals as you go out, or the channel rather?

A. Photograph No. 2 shows shoal #2 from the left bank. The channel unfortunately is in the foreground out of view. In this photograph it is out of view, but it is well shown by one of the photographs in the other album. #3 is a similar panorama showing the rapid at Shumate's Falls looking upstream from the left bank. The principal channel coming downstream starts at the water's edge in the middle photograph to the left of the man standing out in the river. That is the man in the middle distance from about one inch to his left on the photograph the channel comes down several hundred feet toward the view point then turns toward the left and passes downstream past the man standing with his arms outstretched somewhere beneath his arms and then passes in the general direction to the left in the foreground in front of the rocks which are visible, and off to the left of the picture.

Q. You describe this man standing with his arms outstretched, you mean akimbo, or at his hips?

A. Yes, an angle of about 45 degrees downward.

Q. Pass on to Photograph #4.

A. Those photographs, or this panorama, is at East River Shoals, looking downstream from the left bank. The channel here is in the approximate center of the river down running down through the length of the shoals, which start about the second picture from the right and continue onward about to the left margin of the left-hand picture.

Q. Now No. 5.

A. Photograph #6 is of Rich Creek Shoals, looking upstream from left bank. This view shows the left or minor channel in the left foreground, and looking upstream, in the middle distance, two islands.

Q. I only see one island there.

1141 A. Well the channel opening which is visible in the middle of the photograph is between two islands to the left, and right. The main channel passes behind the dense tree growth shown on the left, as well as upstream.

Q. Now Photograph #6.

A. Photograph #6 shows the rapid at Peters Mountain Falls from right bank. The channel is in the immediate foreground, partially concealed by the treetops.

Photograph #7 shows Little Stony Creek Bar at Pembroke Highway Bridge from the left bank. This view is almost identical with another one in the other album.

Photograph #8 is a panorama taken from the right bank showing rapid at Snidow's Falls, main bar from right bank, which consists of three bars, one of which is shown in the right-hand picture, and there is another shown about on the border line between. The left picture and the second from the left, and the upper riffle as it might be called, is about in the middle of the left-hand picture.

Photograph #9 is a close-up of this upper riffle taken from the left bank. The channel is slightly in front of the two men shown visible standing in the stream.

Photograph #10 is of Lower Sinking Creek Bar taken from the right bank. The men are on the edge of the channel which is in the approximate center of the clear water visible.

Photograph #11 is of Shoal #24, taken from the left bank.

Q. Is that #11 a named shoal?

A. No, sir; that is an unnamed shoal which I numbered.

Photograph #12 is of the Bear Spring Shoal, taken from the right bank.

Q. Where is the channel there?

A. I may add that shoal #24 the channel is near the far side.

Q. This is #12.

1142 A. I referred back to photograph #11 which was of Shoal #24, the channel there is in the background near the right bank of the river. Returning to Photograph #12 Bear Spring Shoal, from the right bank, the channel is in the foreground near the right bank.

Q. Photograph #13 is of Shoal #26 taken from the right bank, where the channel is near the right center.

Photograph #14 is of the lower portion of shoal at Sifford's Falls, looking downstream from the right bank. The channel is near the right bank.

Photograph #15 shows a rodman in the river standing between some of the submerged ledges of Sifford's Falls. These falls, may I add, are one of the most peaceable places on the river.

Photograph #16 is another view of submerged ledges of Sifford's Falls.

Photograph #17 shows one of the ledges at Sifford's Falls, from the right bank.

Photograph #18 is a view looking downstream from the right bank, across some of the submerged ledges at the head of Sifford's Falls, just below McCoy's Ferry.

Photograph #19 is from the left bank of upper Sifford's Shoal, just above McCoy's Ferry, which I have named #29. The survey party are standing on the shoal near the channel, which is between them and the island, shown in the picture.

Photograph #20 is of Shoal #32 from the right bank.

Photograph #21 is a view looking upstream from the left bank showing some of the ledges above Jackson's Ferry, a mile or two below Austinville.

Photograph #22 is a view looking downstream from the same point showing another group of ledges.

Q. Photographs #21 and #22, as I understand it, you did not make any soundings or make measurements?

A. That is correct. I merely made a visual inspection.

1143 Photograph #23 is a view of the rapid at Barnett's Falls, looking upstream from the right bank.

Photograph #24 is really a continuation of the panorama in #23.

Photograph #25 is a view of Radford Shoal #41 taken from the right bank. Here the channel comes up in the foreground near the right bank and passes across the picture in what appears to be the open water.

Photograph #26 is of the rapid at Foster Falls, looking upstream at the right bank from the lower end of the falls.

Q. Where is Foster Falls?

A. On the upper river, about a mile or two perhaps below the highway bridge at Jackson's Ferry which is several miles below Austinville.

#27 is of the rapid, the lower of the two rapids at Foster Falls, looking downstream from the right bank.

Now returning to the section of the right on which I made depth and channel measurements, Photograph #28 is of Crab Creek Shoals taken from the left bank. The channel is in the background of the picture near the right bank.

Returning again to the upper river photograph #29 is of Pine Run ledges from the right bank, which are just above Allisonia.

Going upstream #30 is a view of the shoal near Barren Springs, below Carter's Ferry.

No. 31 is a view of Carter's Ferry ledges looking upstream from the right bank.

Carter's Ferry ledges are located immediately upstream from Carter's Ferry.

Photograph #32 is a panorama showing the upper portion of Baker ledges from the right bank. These ledges are located about a mile below Foster Falls.

Q. Mr. Gerdes, where did you proceed in connection with your assignment of examining the shoals of the nonimproved sections of New River between Hinton, West Virginia, and Radford, Virginia?

1144 A. I went first to Wiley's Shoals, located mile 89.1, above the junction of New River with the Kanawha River, 0.5 miles above Wiley Falls. This shoal is the first one above the section which had been improved for navigation by the United States.

Q. Please state what were the critical depth, width, and current velocity at this point?

A. The soundings were made across Wiley Shoals from a survey boat following the best channel, which was found approximately in midstream. The depth of soundings averaged four feet, with a minimum depth of two feet.

The minimum width of the clear channel between boulders was found to be twenty-four feet.

The current velocity at the minimum section was measured and found to be 1.9 miles per hour.

Q. Please state the next shoal you visited?

A. The next shoal in order upstream is an unnamed shoal at approximately mile 90.8 which I noted as Shoal #2.

Q. Is that Shoal #2 according to the photographs you identified?

A. Yes, sir.

Q. What condition did you encounter there?

A. This shoal consists of a rock ledge extending across the river through which there is a chute or notch 24 feet wide at a point about 100 feet out from the left bank.

The depth of water was found to be 3.0 feet at the near edge, the chute channel being deeper out toward the middle.

Q. What was the current velocity?

A. The current velocity was measured 6 feet out from the side of the notch and found to be 2.8 miles per hour.

Q. What was the maximum?

A. The maximum center velocity was estimated at the same time by comparison as 3.6 miles per hour.

1145 Q. What was the next shoal you visited?

A. An unnamed shoal about ½ mile upstream at mile 91.3, noted as shoal #3.

Q. What conditions did you encounter there. What was the channel width?

A. The channel was 18 feet wide found midstream, with a depth of 2.5 feet or more.

Q. What was the velocity?

A. The current velocity was measured and found to be 2.3 miles per hour.

Q. State the next shoal you visited?

A. The next shoal upstream is Shumate's or Neilly's Falls, a minor rapid, located at mile 92.8 which was noted as shoal #4.

Q. What is the drop of the river at Shumate's Falls?

A. At Shumate's Falls the river drops approximately 6 feet in a horizontal distance of about 800 feet.

Q. Where is the principal channel?

A. The principal channel leads upstream through the center of the rapid first toward the left bank then turning toward the right bank passes into the upper pool.

Q. What is the width of the channel?

A. The channel at the lower end has a width of 28 feet and a minimum depth of 2.3 feet over the boulders, the depth increasing generally upstream tc 3 and 4 feet.

Q. What is the minimum notch channel in the middle portion of the rapid?

A. This channel has a width of 16 feet with a depth of, a minimum depth of 2.1 feet over the boulders.

Q. What is the width of the channel?

A. 16 feet.

1146 Q. The width?

A. That is the minimum width.

Q. What is the width at the head of the rapids?

A. At the head of the rapids over 40 feet wide, and over 3 feet deep.

Q. Then what is the velocity?

A. The velocity at the head of the rapid is 2.3 miles per hour, and the minimum channel notch 1.9 increasing to 3.5 miles per hour at the foot of the rapid.

Q. What was the next shoal you visited?

A. East River Shoals.

Q. Where is that located?

A. At approximately mile 94.1, just below Glen Lyn.

Q. What is it known as?

A. This shoal was known as East River shoals and noted on my list as #5.

Q. What is the character of it?

A. These shoals form a gravel and boulder bar approximately 2,000 feet long.

Q. You mean by that up and downstream?

A. Yes, sir; soundings were made in the main channel, which runs approximately down the center of the stream.

Q. What is the width of the channel?

A. A clear channel over 30 feet wide was found, with a minimum depth near the head of 1.5 feet, increasing downstream to 3 feet at the foot of the shoals.

Q. What was the maximum velocity?

A. The maximum current velocity measured at the head of the shoals was found to be 2.5 miles per hour.

Q. What was the next shoal you visited?

A. Rich Creek Shoals, which I located opposite the mouth of Rich Creek, at mile 97.5, and noted as Shoal #6.

1147 Q. Describe it?

A. This shoal consists of several ledges at a point where the river channel is divided by islands. Where the river channel is divided by islands.

Q. Any gravel there?

A. Yes, sir; the river bottom at this point consists of gravel with some boulders and in most places a solid rock ledge foundation where the current is swift.

Q. Where is the channel located?

A. The principal channel is on the right-hand side there near the head of the upper island.

Q. What is its width?

A. This channel was found on the right-hand side of midstream, about 28 feet wide, or rather was measured 28 feet wide with a minimum depth of 2.2 feet.

Q. What was the velocity?

A. The current velocity through this notch was 2.4 miles per hour.

Q. Where was the next shoal?

A. Peter's Mountain Falls.

Q. Where is it located?

A. A rapid located at mile 100, 1 mile below the Narrows Highway bridge.

Q. Please describe the conditions you found in this Peter's Mountain Shoals?

A. At Peter's Mountain a series of rocky ledges extend across the river, causing a total drop of approximately 5 feet in 1,000 feet, the greater part of which occurs at the lower group of ledges.

Q. Where is the principal channel located?

1148 A. The principal channel occurs through a notch in the lower ledge, approximately in midstream, ascending toward the right bank and then upstream through a notch in the upper ledge, about 100 feet from the right bank.

Q. What is the depth, minimum depth you found there?

A. The minimum depth found was 2 feet in the lower notch with a minimum channel width of 15 feet.

Q. What was the velocity?

A. The current velocity measured in the lower notch 4 feet from the border was 2.9 miles per hour, from which the maximum notch velocity was estimated to be 4.3 miles per hour.

Q. What was the next shoal you visited?

A. An unnamed gravel bar 1½ miles above the Narrows Highway Bridge, at approximately mile 103.0 noted as Shoals #8.

Q. What was the character of the channel there?

A. Here a wide channel was found near midstream with a depth of 2.6 feet for a width over 40 feet.

Q. What was the velocity?

A. The current velocity was 3.2 miles per hour.

Q. Please state the next shoal you visited?

A. The next shoal upstream is an unnamed shoal near Pearisburg railway station, at approximately mile 104.3 noted as shoal #9.

Q. Are you correct on that 103.8, isn't that 104.3?

A. Yes; you are right; that is, I would like to pass that, I have the reference but it will take a little time to look it up. It is within ½ mile anyhow. [After looking at notes.] 104.3 is right.

Q. What is the character of the river bed at that point?

A. Here we found a ledge at the foot of an island, with a minimum channel depth of 2.6 feet, over a width of more than 30 feet.

Q. What was the maximum current velocity?

A. The maximum current velocity was measured and found to be 4.4 miles per hour.

1149 Q. Where was the channel located?

A. It laid near the left bank toward the foot of the island.

Q. Please state the next shoal you visited?

A. The next shoal is French's Mill shoal, at mile 106.2 noted as shoal #10, where there was found a ledge and gravel bar with a channel near the left bank 33 feet wide, having a minimum depth of 2.3 feet and the current velocity was 2.9 miles per hour.

Q. You stated that shoal was located at mile 106.0, isn't it 106.2?

A. That is correct. May I say that all of the mileages noted in this testimony are for the purpose of identification and are subject to slight approximation, they were taken from the best available maps, and various maps differ, but I believe they are sufficient for identification.

Q. What was your next shoal?

A. An unnamed shoal at mile 107 noted as shoal #11.

Q. What was the nature of the channel there?

A. Here there was found a ledge and boulder bar with a channel 18 feet wide, having a minimum depth of 2.6 feet near midstream.

Q. What was the current velocity?

A. The current velocity at a point 15 feet upstream from this notch was found to be 1.2 miles per hour from which the velocity in the notch was estimated at 2.3 miles per hour.

Q. Where was the next shoal?

A. Henley French shoal, mile 108.3, which was noted as shoal #12.

Q. What was the condition of the flow of the river at that point?

A. Here there was found a gravel boulder bar about 1,000 feet long, with a channel near the left bank.

Q. What was its width?

A. 18 feet.

Q. What was the depth?

A. Having a minimum depth of 2.2 feet.

1150 Q. What was the maximum channel current there?

A. The maximum channel current velocity was 3.4 miles per hour.

Q. Did the next shoal you visited have a name?

A. The next one is unnamed, at mile 109.3, noted as Shoal #13.

Q. What was the condition of the river bed at this point?

A. Here there was found a ledge across the river with a large notch at the right bank 28 feet wide, having a minimum depth of 4 feet.

Q. What was the current velocity?

A. The current velocity was measured 4 feet from one side of this notch at 2.3 miles per hour.

Q. What was the maximum current velocity?

A. The maximum current velocity was estimated at 3.0 miles per hour.

Q. Please state the next shoal you visited?

A. Another unnamed shoal at mile 110.0 noted as Shoal #14.

Q. What was the structure of the river bed at that point?

A. Here we found a rock ledge downstream from a boulder-strewn bar with a large notch at the left bank 30 feet wide and over 30 feet deep.

Q. Thirty feet deep?

A. Over three feet deep.

Q. What was the maximum current velocity at this point?

A. Maximum current velocity was found to be 3.3 miles per hour.

Q. What was the next shoal you visited?

A. Unnamed shoal at Mile 111 just above the Ripplemead highway bridge, noted as Shoal #15.

Q. What was the condition of the river bed at this point?

A. Here there was found a rock ledge across the river with a channel near the left bank 20 feet wide and having a minimum depth of 2 feet. The current velocity was found to be 2.6 miles per hour.

Q. What was your next shoal?

A. Snidow's Ferry shoal, at mile 112, noted as #16.

1151 Q. That is 111.8 is it not?

A. Yes, sir; which was found to consist of two ledges about 500 feet apart with openings near midstream.

Q. What was the minimum channel depth?

A. The minimum channel through this opening was found to be 2.6 feet deep.

Q. What was the width?

A. 40 feet.

Q. And the velocity?

A. The current velocity 1.1 miles per hour.

Q. Where did you next visit a shoal?

A. Walker's Creek Bar, at mile 113, noted as Shoal #17. Here there was found a gravel and ledge bar 2,400 feet long, with a broad channel between upper and lower islands.

Q. What was the minimum depth and width there?

A. Having 2.2 feet minimum depth and a minimum width of 23 feet.

By Mr. Jackson:

Q. May I inquire for my information when you speak of gravel and ledge bar being 2,400 feet long, you mean measured up and down the river?

A. In the direction of stream flow.

By Mr. Thompson:

Q. What was the maximum velocity?

A. 3.1 miles per hour.

Q. Where was the next shoal?

A. Little Stony Creek bar, at mile 114.7, just below Pembroke highway bridge, noted as Shoal #18.

Q. What was the condition of the river bed there?

A. Here there was found a gravel bar 1,400 feet long, with a major channel south of an island, below the mouth of Little Stony Creek.

Q. Where was the channel located?

A. In midstream.

Q. What was its depth?

A. A miniimum of 2.6 feet.

1152 Q. What was its width?

A. 35 feet.

Q. State the maximum current velocity?

A. 3.3 miles per hour.

Q. What was your next shoal?

A. Next shoal was Snidow's Falls, which is a minor rapid, located at mile 118 and noted as Shoal #19.

Q. What was the condition of the river bed you found there?

A. A boulder ledge and gravel bar about 2,000 feet long. With upper, middle and lower riffles.

Q. What was the channel width at this place?

A. Through the lower riffle a wide channel enters the midstream following up toward the left bank, with a width of over 30 feet, and a depth of 3 to 4 feet or more.

Q. Continue to describe that channel?

A. Through the middle riffle a channel extends in midstream over 30 feet wide, and more than 3 feet deep, following up near midstream through the upper riffle the depth decreases to a minimum of 2.3 feet, with a minimum width between boulders of 16 feet.

Q. What is the maximum current velocity at this point?

A. In the lower riffle 2.5 miles per hour and the middle riffle 3.2 miles per hour, and in the upper riffle 3.9 miles per hour.

Q. Where was the next shoal you visited?

A. Sinking Creek Bar, at mile 119.2.

Q. What was the condition of the river bed there?

A. There was a gravel and ledge bar about 1000 feet long with upper and lower riffles.

Q. What was the channel width at this point?

A. Over 30 feet.

Q. Where was it located?

1153 A. Near midstream.

Q. And what was its depth?

A. Over two feet.

Q. What was the maximum current velocity?

A. 2.1 miles per hour.

Q. Describe the next shoal?

A. This was Upper Sinking Creek shoal, at mile 119.7 noted as Shoal #21, which was found to be a ledge rock bar, with a channel 20 feet wide and more than 3 feet deep, near the center of the ledge.

Q. What was the current velocity?

A. The current velocity was measured 6 feet from the edge of the notch at 2.8 miles per hour.

Q. What was the maximum velocity?

A. The maximum velocity at the center was estimated at 3.4 miles per hour.

Q. What was your next shoals?

A. Eggleston Shoals, at mile 120.7, ½ mile above Eggleston, noted #23.

Q. What is the maximum current velocity?

A. This shoal was found to be a rock ledge and with an open channel in midstream 18 feet wide, having a minimum depth of 1.8 feet, maximum current velocity was 2.9 miles per hour.

Q. What was the next shoal?

A. An unnamed shoal at mile 121.5, noted as Shoal #23.

Q. What was the character of the stream bed there?

A. There was found to be a rock ledge projecting from the right bank with a channel opening 16 feet wide.

Q. What was the minimum depth?

A. 2.6 feet.

Q. Where was it located?

1154 A. Near midstream.

Q. What was the current velocity?

A. May I clarify, the channel opening was near midstream with a minimum depth of 2.6 feet. The maximum current velocity was 4.4 miles per hour.

Q. Please state the next shoal you visited?

A. An unnamed shoal near mile 123.1 noted as Shoal #24.

Q. What was the condition of the river bed at this point?

A. This was found to be a series of rock ledges extending diagonally across the river, with a minimum open channel through the lower ledge 40 feet wide, near the right bank.

Q. What was the minimum depth?

A. The minimum depth was 2.3 feet.

Q. And what was the current velocity at this notch?

A. 2.6 miles per hour.

Q. Do you care to describe the ledges any further?

A. Above this minimum section there are upper ledges grouped in the same shoal which are located about 1,000 feet upstream with an open channel through them.

Q. State the next?

A. An unnamed shoal at mile 123.3, where there were found four rock ledges extending across the river with a channel 30 feet wide, near the right bank over 3 feet deep.

Q. What was the current velocity at this point?

A. 1.8 miles per hour.

Q. Do you care to describe the river bed any further?

A. Approximately 1,000 feet upstream another series of four rock ledges, which were noted as shoal #26, extend across the river, with a channel between midstream and the right bank, having a minimum width of 16 feet, and a minimum depth of 2.1 feet. The current velocity being 2.0 miles per hour.

1155 Q. What was the minimum channel depth?

A. 2.1 feet.

Q. And what was the current velocity?

A. 2.0 miles per hour.

Q. State whether or not there were any riffles on the open channel?

A. 500 feet upstream four minor riffles with an open channel also are visible.

By Mr. JACKSON:

Q. The four minor riffles 500 feet upstream are at what shoals?

A. They form part of shoal #26.

By Mr. THOMPSON:

Q. Describe the Big Walker's Mountain shoals?

A. Big Walker's Mountain Falls constitute a rapid located at mile 124.6 noted as shoal #27, where two major and three minor rock ledges extend across the river causing a drop of approximately 5 feet in a 300-foot length.

Q. What is the width of the channel there?

A. Twenty to thirty feet.

Q. Describe the down-stream conditions of the river bed.

A. This channel with a depth not less than 3 feet extends through the two down stream major ledges, about 200 feet from the right bank, and then upstream toward shore, through a notch in the upper ledge 100 feet from the bank, thence straight upstream. At one point between the upper and lower ledges a rock projection constricts this channel to a width of 16 feet with a depth over 4 feet.

Q. What is the current velocity?

A. 4.2 miles per hour.

Q. Please describe the next shoal?

A. Sifford's Falls, a shoal noted as #28 consists of a series of ledges, extending across the river over a length of about 2 miles.

By Mr. JACKSON:

Q. Did you give the mileage?

A. I will if you wish it, approximately from mile 125 to mile 127.

Q. Three miles long?

A. That is right.

By Mr. THOMPSON:

1156 Q. What is the total fall?

A. The total fall is approximately 30 feet, which is divided between the large number of rocky ledges, the fall across each one amounting usually to only a few inches. The current velocity is moderate, ranging from 1 to 2 miles per hour.

Q. Did you locate a channel there?

A. Yes, sir.

Q. Where was it?

A. There was a channel having a minimum clearance through the smallest openings which occurred through the middle portions more than 1 foot depth over an 8 foot minimum width.

Q. What was its depth?

A. Over a width of 8 feet, a minimum of 1 foot, a depth of 2 feet or more could probably be maintained near the middle of these openings.

Q. What was the condition upstream?

A. This channel follows close the right bank about 1¼ miles above Walker's Mountain and then persists about middle of the river upstream, the depth of water in the many pools separating those rock ledges ranges from 3 to 5 feet.

Q. What was your next shoal?

A. Upper Sifford's Shoals, approximately ½ mile above McCoy's Ferry, noted as Shoal #29, but forming a part of what may be considered Sifford's Shoals, mile 127.2.

Q. Describe the stream bed at this point?

A. This shoal was found to consist of two rock ledges with a minimum channel opening through the lower ledge near midstream, having a width of 10 feet, with a minimum depth of 1 foot, and a current velocity of 1.4 miles per hour. A depth of 2 feet or more would probably be maintained in a narrower opening.

By Mr. **Jackson**:

1157 Q. What do you mean when you say that?

A. This clear channel may be described as a rectangle of the dimensions I have given, inserted in the clear opening of the natural channel, which is, of course, regular, so that a channel may be for instance 2½ feet deep and 25 feet wide, and at the same time have a center depth of 5 or 10 feet.

Q. You have testified there was a minimum depth here of 1 foot?

A. Yes, sir.

Q. Did you find any other place in this entire stretch that was as shallow depth as that?

A. I did not.

By Mr. **Thompson**:

Q. What is the next shoal you visited?

Q. Whitethorne Ferry Shoal, near Mile 130.3, noted as Shoal No. 30, which was found to consist of four rock ledges extending across the river, with a minimum channel of 20 feet wide and 1.5 feet deep, passing through openings in the ledges near midstream. The current velocity was 2.4 miles per hour.

Q. The Whitethorne Shoal was Mile 130.5?

A. Yes.

Q. Should it not be 130.3?

A. Yes, sir.

Q. What is the next Shoal?

A. An unnamed Shoal, near Mile 134 in the so-called Horse Shoe Bend, noted as Shoal 31, which was found to be a gravel bar and ledge with a channel in midstream 20 feet wide, having a minimum depth of 2.3 feet, and a current velocity of 3.2 miles per hour.

Q. What was the next shoal you visited?

A. An unnamed shoal near Mile 136.6, noted as Shoal 32.

Q. 136.6, isn't it?

A. That is right.

Q. What was the condition of the river at this point?

1158 A. This was found to be a gravel bar 600 feet long, with a broad, shallow channel near midstream.

Q. What was the minimum depth?

A. The minimum depth was found to be 2.2 feet.

Q. What was the minimum width?

A. The minimum width was 28 feet.

Q. What was the current velocity?

A. The current velocity was 1.4 miles per hour.

Q. Did you next visit Barnette's Falls?

A. Yes, sir.

Q. That is spelled "Barn-e-t-t-e"?

A. Yes, sir.

Q. Where was it located?

A. This was a minor rapid located at Mile 138.0 and noted as Shoal No. 33.

Q. What was the condition of the river bed?

A. Here there were found five rock ledges extending across the river with a gravel bar at the right bank. A channel with a minimum width of 15 feet and a minimum depth of 2 feet extending up through the lower rapid on right side of channel not far from midstream passing by upper ledges near the right bank.

Q. What was the current velocity?

A. 2.7 miles per hour.

Q. Check on that, please. Is it not 2.8?

A. Yes, sir; you are right.

Q. State the next shoal you visited?

A. Lower Pepper Falls, a shoal noted as No. 34, 0.3 of a mile below Pepper's Ferry.

Q. Where was it located as to mileage?

A. This lower Pepper's Falls is at Mile 139.7 on the river.

Q. What is the condition of the river bed?

A. This was found to consist of two rock ledges about 400 feet apart extending across the river with boulder patches between them. These ledges are submerged and a channel with a minimum width of 13 feet, minimum depth of 2.4 feet passes across them, and between the boulder patches somewhat to left of midstream. The maximum current velocity here was 3.7 miles per hour. 1159

Q. Did you keep any record of the width of the river when you were making these measurements?

A. No, sir.

Q. Now what was the next shoal you visited?

A. Upper Pepper Falls, a minor rapid located 0.2 miles above Pepper's Ferry, at Mile 140.3, noted as Shoal 35.

Q. What did it consist of?

A. This shoal was found to consist of a number of irregular rock ledges extending across the river, with a channel 30 feet wide and more than 2 feet deep, passing through openings approximately 100 feet from the right bank.

Q. What was the current velocity?

A. 2.3 miles per hour.

Q. Where was your next shoal?

A. At the mouth of Crab Creek, Mile 142.1, noted as Shoal 36.

Q. Just check back on that, it that 142.1 or 141.8?

A. Make that 141.8.

Q. What is the river bed there, what does it consist of?

A. Here there was found a ledge extending from the left bank with an opening at the right bank over 60 feet wide by 3 feet deep. The current velocity was found to be 3.9 miles per hour.

Q. What was the next shoal you visited?

A. An unnamed shoal; near Mile 142.8 and noted as Shoal 37.

Q. Please look at your figures again and see if you stated that correctly about the mile?

1160 A. Make that Mile 142.8.

Q. What was the condition of the river bed there?

A. This was found to consist of three submerged ledges with channel openings near midstream. The minimum clear opening through middle ledge was found to be 2.1 feet deep by 40 feet wide. The current velocity was 2.3 miles per hour.

Q. On coming to these shoals which you have been describing and the channels, did you notice whether there had been any work done there? Was there any artificial construction of channel or was this all natural channel that you have been describing. Were there any indications of such?

A. Without exception, I believe these were natural channels. At one or two points there have been improvements in the nature of mills, notably at French's Mills, Shoal 10, and Pepper's Mountain, Shoal 7, but so far as it was observable, nothing has ever been done to the channel.

Q. There were no remains of wing dams or anything of that kind?

A. No, sir.

Q. What was the next shoal you visited?

A. An unnamed shoal at Mile 143.9, which was noted as Shoal 38.

Q. Now describe the river there?

A. This shoal was found at a small island near the center of the river, with a rock ledge projecting into the channel, which was to the left of the island, with a clear width of 35 feet in midstream and a minimum depth of 2½ feet.

Q. What was the velocity?

A. The current velocity was 3.0 miles per hour.

Q. What was your next shoal?

A. An unnamed shoal near Mile 143.4, noted as Shoal No. 39, where a rock ledge was found extending across the river, with a channel 25 feet wide near the left bank.

1161 Q. What was the minimum depth?

A. The minimum depth was 2.5 feet.

Q. What was the current velocity?

A. 2.8 miles per hour.

Q. Now please read the next shoal that you visited?

A. An unnamed shoal near Mile 143.9.

Q. Should not that be 144.2?

A. May I have the last question read?

(Question read.)

A. That should be Mile 144.2, noted as Shoal No. 40.

Q. Now this is the last one you are describing.

A Yes, sir.

Q. Go ahead and describe the conditions there?

A. Here there was found a submerged ledge extending across the river, with a 30 foot clear channel near midstream, having a minimum depth of 2 feet and a current velocity of 2.3 miles per hour.

Q. Now state the next shoal you visited?

A. An unnamed shoal, near Mile 145.0, noted as Shoal No. 41, where there were found three rock ledges extending across the river, with a channel between midstream and the right bank over 20 feet wide, and with a minimum depth of over two feet, and a current velocity of 2.5 miles per hour.

Q. Does that conclude all of the shoals or rapids that you visited at the time you have named and described between Wiley's Shoals and Radford?

A. It does.

Q. Were you able to form any general conclusions as to the nature of this section of the river?

A. Yes, sir.

Q. What was it?

By Mr. Jackson. We object to "general conclusions," unless counsel clear it up. General conclusions in what respect?

By Mr. Thompson. As to rapids, shoals, bars, and channel depths.

By the Court. Go ahead.

A. During the survey which has been described, the

1162 entire stretch of New River between Wylie Falls and New River was examined, and all shoals, bars, and rapids were visited and surveyed as just described. A channel depth of from 3 to 6 feet prevails generally, with a limiting depth at shoals of 2 feet or more, with the five exceptions noted.

Q. Five exceptions?

A. Yes; the current velocities encountered in this section are to be considered quite moderate, inasmuch as the maximum found was 4.4 miles per hour, and velocities of 5 to 6 miles per hour are easily negotiated by launches and other river craft——

By Mr. JACKSON. I move to strike out the last sentence, because that must be nothing but an opinion of the witness.

By the COURT. I will let it stay in for the present.

By Mr. JACKSON. We desire to take an exception.

A. (Continuing.) May I add that my work with the United States Engineering Department has included extensive operations and direction of launches and river boats.

By Mr. THOMPSON:

Q. Did you observe any navigation on the river, or that part of the river which you have been describing?

A. Yes, sir.

Q. What was the nature of it?

A. There were many small boats observable along the river, several equipped with motors and ferries are being operated at numerous points on the river.

Cross-examination by Mr. JACKSON:

Q. When did you graduate from the University of California?

A. In May 1922.

1163 Q. On your direct examination you told us about what you described as a survey made from Wiley Falls to Radford Bridge. Is that right?

A. That was right.

Q. What date was that?

A. From June 22, to 29th, and July 13th to 15th, all dates inclusive.

Q. How far did you go from June 22nd to June 29th?

A. I covered the entire stretch of river described.

Q. Then you were back again on July 13th?

A. Yes, sir, that is correct, the 13th to the 15th.

Q. Did you make a survey when you were there July 13th to July 15th?

A. I revisited the same points.

Q. When you say you covered the whole stretch from Wiley Falls to Radford Bridge on your trip, June 22nd to June 29th—is that correct?

A. Yes, sir.

Q. Did you complete the survey during that period?

A. No.

Q. How far did you complete the survey during that period?

A. I visited a number of shoals, well, I visited all of them, and measured the greatest number, and then on my revisit of 1164 July 13th to 15th, I went back and remeasured some of those I had been over previously, and measured a number of others in addition. In other words, on my first trip I made measurements at the principal shoals. On my revisit I went back and measured all that were thought to be of any significance.

Q. Tell me what shoals you measured on your first trip, just name them?

A. I will have to dig back in my note book. I measured some of them once, and some twice. I have all inclusive dates here and exclusive ones I will have to refer to my original notes for.

Q. When did you actually start making these so-called surveys?

A. June 22nd.

Q. From where?

A. At Wiley's Shoal.

Q. Did you continue on that survey without any interruption?

A. Yes, until the end of that week, June 26th, and then I went back the following Monday and Tuesday, June 28th and 29th.

Q. Then you spent seven days on the work at that time?

A. Eight days, is it not, Monday to Saturday, inclusive, and Monday and Tuesday?

Q. How many people were with you on that first occasion?

A. There were four with me.

Q. Who were they?

A. The surveyor.

Q. His name——

A. Johnson.

Q. Of the Commission?

A. United States Engineering Department—two rodmen and a chauffeur. Part of the time I had five men and the rest of the time I had four.

Q. What was the work of the fifth man?

A. He was a rodman.

1165 Q. Would you survey along the bank of the river?

A. No; we went along the river and I inspected the entire river.

Q. Did you walk?

A. We walked and rode in an automobile.

Q. Was there a highway along the river much of the way?

A. A good part of it, and wherever we could see the river from the road, we rode, and where we could not see the river from the road, we walked. As you know, the Norfolk & Western and

Virginian traverse most of the stretch and we used the railroad grade a great deal.

Q. And you and your party were working all of that time, walking sometimes and riding sometimes?

A. Yes, sir.

Q. And you and your party covered this distance from Wiley Falls to Radford Bridge, either on foot or along the highway, where that was close enough to see the river?

A. That is right.

Q. How did you determine when you would go down to the river and examine the bed?

A. As we went along, I watched the river and stopped and examined any point where the current showed any signs of interruption, and at those points where the depth was less than three feet, we went down into the river, waded out and measured it.

Q. What criteria did you apply in forming your opinion as to whether the depth was probably less than three feet or not?

A. The appearance of the water.

Q. You did not follow the bed of the stream then continuously?

A. I did not.

Q. You did not wade the stream?

A. Continuously, no.

Q. You did not attempt to boat up the stream?

A. Only at two points.

Q. Your trip was made, as I understand it, during this week, either on foot or by automobile?

1166 A. Yes, sir; that is correct.

Q. Now, when you came to a point where you decided to examine the bed of the stream, how did you make the examination?

A. We went down to the river first and looked at the shoal, walked up and down, examined the length of the shoal, picked out the points where the depth or width or current velocity appeared to be critical, that is, where the depth was least, where the width was least or the current velocity was fastest, and by an examination it was possible to make a fairly satisfactory selection of the one, two, or three critical points. Then these were visited, that is, we waded right out in the river, as shown by those photographs and measured the depth and width of the river at those points, and current velocity. The ones I have given you are ones of minimum depth and width and maximum velocity.

Q. Didn't you tell counsel on your direct examination that you did not measure the width of the river?

A. The width of the clear opening of the channel. I was interested in finding a clear opening as wide as 30 feet or wider. If it was wider than that, I did not bother much about the excess width.

Q. Do you mean that you attempted to measure the width of the channel?

A. That is correct.

Q. How many miles did you cover on this occasion?

A. From Mile 88.6 to Mile 146.1 or approximately 57 miles.

Q. Did you walk the substantial part of it?

A. A pretty substantial part.

Q. How rapidly did you walk?

A. I expect about three to four miles an hour when we were walking.

Q. Did you have any equipment to carry?

A. Yes, sir.

Q. Much?

A. Rods, current meter, notebooks and maps.

1167 Q. Was the current meter pretty heavy?

A. No; it weighed about 5 pounds. These were what is known as wading measurements, and a man held the meter in his hand and we omitted the customary weight, which is ordinarily 25 pounds.

Q. When you reached one of these falls, or shoals as you call them, which was 2,000 or 2,400 feet up and down the river, how did you find out what was the shallowest point on that shoal?

A. By looking at it.

Q. You did not attempt to pick out the channel and walk up and down the channel for the full length of that shoal to determine where the shallowest place would be?

A. I did for all portions of the shoal that appeared to be the shallowest. Now when I started in I spent quite a bit of time on Wiley's Shoal and at Shumate's Fall, I spent some time fooling around there and sharpening up my judgment as to the depth of the water from its appearance, and that is a specialized kind of judgment that can be acquired in a couple of days, and lost just as quickly, but I did that. As I went along I used that knowledge as to each shoal, one, two, three, and when conditions were the most important, then I would go out to these one, two, three, or four places and make actual measurements.

Q. So that if, however, your sharpened judgment was not adequate to pick out from an inspection on the bank either the shallowest or swiftest part of the channel, there would be no examination made by you or your party, which would check and reveal that error, would there?

A. That is correct. I purposely stated in my direct examination that this survey was an examination and survey. That is, a descriptive title used by the United States Engineers to describe the kind of survey which I made. It is intended to be practical and adequate to cover the purposes for which it was intended and not to go into unnecessary refinement.

1168 Q. It is a sort of spot check survey, isn't it?

A. It would be a spot check if it were blindly placed. The words "spot check" are used in accounting by accountants, and he, when he is making an examination, knows nothing at all about the background of those figures. I had to look at the whole river, which is a continuous check and then I chose to investigate more intensively those parts that looked suspicious which, in my judgment, is adequate for the purpose which it was intended, which is to develop an open channel sufficient to pass boats.

Q. It is not what you would regard as an engineering survey of the stream?

A. It is not a complete instrument survey, which I gather is what you are driving at.

Q. It is not the kind of survey that was made by Mr. Hutton in 1872, is it?

A. Yes, sir; it is.

Q. Do you think it is?

A. Wait a minute.

Q. Do you know how many months he spent on that?

A. Mr. Hutton covered a lot more of the river than I did, too. It partakes of the nature of the survey made by Mr. Hutton in that he sounded the river at critical points, just as I did. The work he did in addition to what I did, was to carry along over a part of his survey, the compass line or traverse line and also to sketch in the mountains and hillsides as he went along.

Q. What time did you start to work in the morning?

A. Usually seven o'clock, sometimes a little earlier.

Q. Where did you stop?

A. Anywhere from six to seven in the evenings, sometimes a little later.

Q. I meant at what place did you stop?

A. I beg your pardon.

1169 Q. Will you give me the name of some of the places you stopped in June, while you were making this survey?

A. Most of the time I stopped at Narrows.

Q. At the Hotel there?

A. At a boarding house, a surveyor's Boarding House, used by the United States Engineers, and one night at Blacksburg. May I add, Mr. Jackson, in addition to the two periods I spent on the river, I spent additional time on the river inspecting, looking and forming my judgment.

Q. Just a moment, what kind of a survey did you call it?

A. Inspection and survey.

Q. This is an inspection and survey?

A. I beg your pardon—examination and survey.

Q. You covered 57 miles of the river in eight days the first time?

A. That is right, eight days plus three days.

Q. Later on you went back and made a recheck?

A. That is right.

Q. But your initial examination took eight days?

A. The recheck included measurements at points which I had not measured the first time, so that you might say the survey covered a period of eleven days.

Q. Was the reason for your survey that the sharpening of your judgment at Wyley's Falls the first time had not been sufficient to detect all the shallow places in the river going upstream?

A. No the reason was the first time I had general instructions to examine the river, and I did so, according to my best judgment, and looked at and located and measured the principal—what I thought were the principal shoals—and when I came back, I checked more carefully those I had passed by lightly, the second time.

Q. Do you remember those that you passed by lightly the first time?

A. Yes, sir; Rich Creek Shoals for one, I think.

Q. And what led you to think that you had better examine it again?

1170 A. Orders from Mr. McWhorter to omit no shoals.

Q. Did you have a copy of the Hutton Survey with you, Mr. Gerdes?

A. Yes, sir.

Q. In making this inspection?

A. Yes, sir.

Q. Did you rely on that for the location of the shoals?

A. I did not.

Q. Did you check with it at all going along?

A. I checked with it and found it was quite accurate and at the end of the survey, I found—by the end of the survey, I would say I found it quite accurate.

By Mr. **Thompson**:

Q. You say you found it quite accurate?

A. I found it quite accurate; yes, sir.

By Mr. **Jackson**:

Q. In one particular instance, you were asked for the maximum velocity at these channels, as you describe, and shoals, and you said the apparent velocity was some figure. What did you say about apparent velocity?

A. What I said was velocity was measured at some points not in the center of the channel, where the maximum center velocity was measured by comparison. That is a simple process known and practiced by hydro electric engineers. You measure some places by comparison, and I measured the velocity near the side and then tossed chips into the stream where the maximum thread was and observed the ratio of flow, as to whether it was 120, 130 or 150% in comparison.

Q. That requires pretty well educated judgment, too, does it?

A. To a hydraulic engineer, not unusually so.

Q. You have to keep that sharpened up to use it, do you?

A. I say it will have to be kept sharpened.

Q. Had you done much of that before you made this survey from Wyley's shoals?

A. Not for the past year. Previous to that time, I had spent considerable years doing that.

1171 Q. Yes. But you don't call a year a short time in that connection, do you?

A. It is like swimming—once learned, it is not easily forgotten.

Q. I want to call your attention especially to your shoal 13?

A. Yes.

Q. Do you have that. I understood you to say that that had a channel 28 by 4 feet?

A. That is right.

Q. And that you measured the current velocity?

A. Yes, sir.

Q. Four feet from the edge of the notch, as being 2.3 miles per hour?

A. Shoal 13—may I check the statistics here? [Witness refers to papers.]

Q. All right.

A. [Witness examines papers.] That is right.

Q. And then you say you estimated the velocity in the middle of the channel at some figure?

A. Three miles an hour.

Q. Why didn't you measure the velocity of the middle of that channel?

A. May I have the maps, please. [Papers are handed witness by Government counsel.]

Q. Was it too dangerous to get in the middle of the channel?

A. I will tell you in a moment. [Refers to papers.]

Q. You cannot now recall as to whether or not it was too dangerous?

A. If you will permit me to glance at the shoal. [Examining papers.] I want to be sure which shoal I am thinking of and I will answer you. It is easier to recall them by location and description than it is by number.

Q. I thought you remembered if it was too dangerous to get out in the middle?

A. Number 13 [indicating with papers]—that would be 1172 French. May I have the photograph album? [Book is handed to witness by Government counsel.]

Q. Your notes do not enable you to say if it was too dangerous?

A. Yes; my notes do. Do you mind if I consult my record? [Examines book and papers.] This is part of my notes [indicating photograph album].

Q. The photographs are part of your notes.

A. That was 13. The combination of depth and velocity was—of the water—was more than it appeared a man could stand up in while holding a current meter. I do not say it was too dangerous, but we were trying to get along and get it finished.

Q. Isn't it a fact that in all of these cases, on this examination-survey, where you have testified that the current velocity at a certain point on the side of the channel was so much, and that you estimated it to be so much greater in the center of the channel, that you regarded it as being unsafe to go into the center of the channel and make the current meter measurements?

A. I don't know that I would use the word "unsafe." I regarded it to be most practical to measure where I did.

Q. You regarded it as unwise to go into the center of the channel, did you?

A. Unwise in that I had a survey party under my direction and it cost a number of dollars a day in expense to do the work, and there was no use wasting time around there.

Q. Some places you went into the middle of the channel, did you?

A. Yes, sir.

Q. And it did not take you much longer to walk out in the middle or 28 feet—in the middle of a 28-foot channel, than to walk four feet from the side, did it?

A. If a man had to try it three times and swim down stream with a current meter and we had to hitch a rope around him, it would take several hours.

1173 Q. If a man was in the middle of the channel and was washed downstream with a current meter, that would take time and be hazardous, wouldn't it?

A. No, sir.

Q. Did you go in the middle of the channel and make those yourself?

A. Yes, sir.

Q. I suppose, being in charge of this party, you felt some responsibility for the safety of the men, did you not?

A. Yes, sir.

Q. Under you?

A. Yes, sir; that is right.

Q. And you would not have felt justified in exposing them to undue hazards in going into the channels to make measurements?

A. Since you stress hazards so, I will say I did not think it hazardous, because these places were usually restricted openings in an otherwise wider channel and immediately below, and using ordinary prudence——

Q. And shallower? Is that right?

A. Well, no, sir; it gets shallower in the larger sections——

Q. But it is not prudent?

A. We are getting paradox on paradox. A channel opening may become broader and at the same time it causes the water to slow up and the volume of water requires more space; the velocity slows up and a man can walk easier in it.

Q. The reason you do not think it is hazardous, is because you think, downstream, there will be a place where the current will have slowed down enough so that a man would be able, if carried away, to rescue himself?

A. Yes, sir.

1174 Q. But, of course, at all places, where you regarded it was practically safe or feasible, you did take the current measurements in the middle of the channel?

A. Yes, sir.

Q. When you have given the width of one of these channels as so many feet, and the minimum depth as so many feet, did you make any determination over how wide a portion of the bottom of the channel the minimum depth obtained?

A. Yes, sir; I did.

Q. You testified that the minimum depth stated by you prevailed over part of the width of the channel, you stated?

A. Yes, sir.

Q. There was no case where the channel was deeper in the middle than on the side, was there?

A. There is, but I said the minimum depth prevailed over the width. The use of the word minimum means it was the least depth over that width. The depth may be often and usually was, much greater over a part of that.

Q. You did not, in any of these shoals or rapids, undertake to try to find the minimum depth by riding a boat down through the shoals and rapids from one end to the other, did you?

A. I did.

Q. Where?

A. At East River Falls and at Wyley's shoals.

Q. Any other place?

A. No, sir.

Q. Why did you abandon that practice?

A. I did that at those two places because there were survey boats available at those two points, and at other points, I did not think it necessary to bring a boat for that purpose.

Q. At these two points, you said there are notches cut by the Government—Wyley's Falls?

1175 A. I did not. I mentioned Wyley's shoals.

Q. How far downstream are Wyley's Falls from Wyley's shoals?

A. It is a half mile above Wyley's Falls.

Q. There is no notch at Wyley's shoals?

A. No, sir; there is not notch there. The notch is at Wyley's Falls.

Q. You have changed all the historic terminology of Falls and Shoals on this river?

A. I used the word "Falls" where they were known as Falls. If you hear me say "Wyley's shoals," rapids you may know what I mean.

Q. Yes, sir. When you examined what you describe as the channels of these shoals and falls, did you find any of them crooked?

A. Yes, sir; occasionally, quite so.

Q. Will you describe what kind of channel you found at Peters' Mountain Falls?

A. (Witness examines papers.)

Q. And can you say if this is the same Falls at The Narrows?

A. Peters Mountain is the rapid just below Narrows highway bridge, one mile below it.

Q. And sometimes called the Falls of the Narrows?

A. I never heard it as that name. Yes, sir, it is shown as "Narrows" on the Hutton survey.

Q. Is there the remnant of a power station there?

A. According to the foundation on the left bank, which I understand belonged to a mill—which I was told belonged to a mill that had been erected there.

Q. Go ahead and describe the channel you found through Peters' Mountain Falls?

A. At Peters' Mountain Falls, the principal channel crosses through a notch in the lower ledge, approximately at mid-stream then towards the right bank and upstream through an opening in an upper ledge 100 feet from the right bank.

(Exhibit 515 marked for identification.)

1176. Q. I show you this photograph, marked defendant's Exhibit for identification No. 515, and ask if you can identify the view that appears thereon as that of the Peters' Mountain Falls?

A. (Examining photograph.) That appears to be the rapids at Peters Mountain Falls; yes, sir.

Q. There are how many ledges there?

A. There are visible in this photograph, I would say, three or four—one, two, three, and one that you might call this—submerged—the 4th is in there.

Q. Do you remember coming upstream where the so-called channel is, which side of the stream that is on this photograph?

A. Yes, sir.

Q. Which side?

A. The main channel enters approximately in the middle of the stream.

Q. Doesn't it enter on the right hand bank—on the opposite bank?

A. It does not.

Q. Where does it go from where you say it enters?

A. It enters at approximately mid-stream and goes up-stream towards the right bank, which is to the left in the photograph.

Q. Don't you travel back to the right bank a notch?

A. No. sir.

Q. Are you sure of that?

A. That is the way I see it.

Q. Isn't it a fact that when you examined that fully, you found that you had to travel along across that notch between the ledges and cross the other ledge at the other end [indicating]?

A. I don't quite follow you.

Q. When you entered from—this is going up-stream [indicating], is it?

A. Yes, sir.

Q. Looking at the photograph. When you entered here
1177 [indicating], you turned to the left and cut across the
middle here [indicating] and isn't it a fact that the channel turns to the right and you have to go to the right bank to get across the upper ledge?

A. When I examined the stream, in my judgment, the best channel was when entering midstream then traveling up towards the right bank and going upstream there between the ledges near the right bank.

Q. Did you actually follow the main channel through the ledge?

A. I did not.

Q. You cannot say, can you, that the main channel does not turn back between the middle and upper ledges and then cross the upper ledge to go into the pond above?

A. If I may define the main channel, as that carrying the principal flow of water, the best channel is as I have described it.

Q. Was the water high when you got there?

A. No, sir; it was fairly low.

Q. Was it higher than appears from Exhibit 515, offered for identification by the defendant [indicating to witness].

A. Well——

Q. Was the water higher when you got there than it was as shown in Exhibit 515 [indicating]?

A. It is quite difficult to say. I don't think I could judge.

Q. Does that fall within the field of educated observation, from seeing the pictor'al reproduction of it, which you state you had developed when you went on this examination survey?

A. Did I say that?

Q. I thought you said you had sharpened your ability to do that?

A. I don't recall that I said anything about being able to judge the depth of water from photographs.

Q. Does it extend to that?

A. It is considerably more difficult when looking at a photograph, not accompanied by the real thing.

1178 Q. You said that you saw ferry boats on the river when you made this trip?

A. Yes, sir.

Q. And you saw some canoes?

A. Well, those were boats constructed of boards. I don't know that you would call them canoes.

Q. They were a sort of little flat bottomed sort of skiff; is that right?

A. Right—rowboats.

Q. And you saw a few that had outboard motors attached?

A. Yes, sir.

Q. When did you see these?

A. At various places along the river.

Q. Just name some of them?

A. East River Shoals; Wyley's shoals; one tied up at Wyley's Falls.

Q. Is that all?

A. Rich Creek, and a number of points along the river—mostly tied up at landings on the river bank.

Q. Were they pretty thick?

A. It looked like every farmer along the river had a boat.

Q. A motorboat?

A. Some of them.

Q. Mr. Gerdes, you said that you examined the Hutton survey and you found his records agreed in general with your observations?

A. Yes, sir.

Q. Now, when you examined that, did you notice in the reports of the Chief of Engineers for 1881, this statement made in Government's Exhibit 37, on page 906 of the Chief's report—the report of the District Engineer in 1881, and repeated by the Chief on page 144, as follows, without referring to the stretch of New River from the mouth of Wilson in Grayson County, Virginia, to the mouth of the Greenbrier in West Virginia—did you
1179 notice on both the district and chief engineer's reports, the summarized conditions, as follows:

"Throughout this distance, the navigable channel originally consisted naturally of chutes through the ledges and shoals of varying width, rarely over one foot in depth in some places, and so tortuous as to render navigation extremely difficult and dangerous." Did you observe that?

A. No, sir; if so, I do not recall it at this time. I must have read it, because I read those reports.

Q. Do you recall that the same statement or description was repeated by the district and chief engineers in subsequent reports for 1887, 1888, 1889, 1890, and 1899, and perhaps others?

A. I do not so recall at the present moment.

Q. There are a good many more but you, I take it, can't recall any of them now?

A. Possibly those gentlemen visited the river at a different stage.

Q. You think they might have visited the river at a low water stage?

A. They might have done it at extreme low water; I can't say, and, of course, if it is repeated from one report to the other, you understand, one observation may be reported in a number of reports.

Q. But they all relate to the original natural condition as found by the early Army Engineers. You understand that?

A. Do I understand your remarks or your quotation to refer particularly to the stretch of the river which I observed or to refer more specifically to the upper stretch of the river below Wilson Creek?

Q. It refers to the whole stretch from the mouth of Wilson in Grayson County, Virginia, down to the Greenbrier and down to the landing at Hinton.

A. Well, I would say then that there is a marked difference between the upper and lower portions of this reach described by your quotation and that my observation applied to the lower portion of that reach.

1180 Would it appear, according to this statement, that in the natural condition the shoots were rarely over a foot in depth that either the early engineers had been successful in finding the limiting depths or more successful than you or that there had been a great change since the early days?

A. I would say that that was a general statement and I expect considered the limitations of that entire stretch of river, which limitations would naturally be more severe in the upper section than in the lower which I examined.

Q. Do you understand, Mr. Gerdes, that this isn't limited to the upper section, that it extends to the Greenbrier which is below?

A. I did not so say. I said that is a general statement and naturally the limiting depths which it speaks of would be more apt to occur in the upper section than in the lower section where the stream flow is greater which you must admit.

Q. When I read the quotation you didn't overlook the significance of the opening words "throughout this distance," did you?

A. No, sir; I did not.

Q. I thought from your answer that you had. Will you refer to your Shoal No. 29. You found there, I believe, a channel ten feet wide and one foot deep?

A. Those are the limiting dimensions.

Q. And I understand you to tell counsel on your direct examination that you found no other depths so shallow on your examination and survey?

A. That is correct, no other depths shallower.

Q. Did you find other depths just as shallow?

A. Yes; at Shoal 8 immediately below.

Q. These are going upstream?

A. Yes.

Q. I take it from what you have said that you did familiarize yourself before making this examination and survey with the official reports of the Chief of Engineers dealing with the stream; is that right?

1181 A. I read over them.

Q. And did you observe repeated from time to time the statement that New River was a typical mountain stream, consisting of a series of pools interrupted by shallows, shoals and rapids?

A. I do not recall that statement.

Q. Well, whether you recall it or not, would you not say that that is an accurate description of the characteristics of New River in that regard?

A. Will you repeat that statement?

Q. (The question was read.)

A. That description is very broad. It might apply with equal propriety to a navigable river, and to a mountain torrent. I think New River would be covered by it.

Q. You told us about two trips that you made to New River, one from June 22nd to 29th, 1936, and the other one from July 13th to 15th of this year?

A. Yes.

Q. And I thought you said that you had made some other inspection of the New River; is that right?

A. That is right.

Q. Tell me what that inspection was and the date when it was made?

A. I had reference there particularly to the previous week.

Q. Previous to what?

A. Previous to July 13th–15th. I haven't the dates in mind at the moment, but I think that is July [illegible]th to 8th, inclusive.

Q. July 6th to 8th?

A. Yes.

Q. And, generally, what sort of a trip was that?

A. That was an automobile and foot inspection of the river covering the same ground, reviewing and thinking over the work of the previous week.

Q. That is the river from down at Wylies Shoals up to Radford bridge?

A. That is right.

1182 Q. And any other occasion when you were at New River?

A. Yes; I have been on New River on other occasions.

Q. Recently?

A. Yes.

Q. When was the last time?

A. July 19th–20th and July 22nd.

Q. Who was the party with you then?

A. Each time there were a number of surveyors and rodmen of the United States Engineer Department. Do you want me to name them?

Q. Yes, please.

A. Johnson was in the party on the 19th and 20th. No; Johnson wasn't along that time. Pursinger July 6th to 8th, Gragnon July 19th to 20th and at the same time there were Gill and a couple of others whose names I don't place at the moment.

Q. Local people?

A. These were all local people over there.

Q. Were they employed by the United States Engineer Office?

A. The United States Engineer Department.

Q. All of them?

A. Yes.

Q. You were there the 19th?

A. Yes.

Q. Were you in a boat that day?

A. Yes.

Q. Did you get hung up on the falls?

A. Yes.

Q. Did you leave the boat at the falls?

Q. Did you get hung up at any falls on July 19th?

A. No.

Q. Were you at Bull Falls that day?

A. Yes, I believe I was.

1183 Q. Did you get out and pull the boat over Bull Falls on the 19th?

A. We got out and pulled the boat up through the old boat chute or navigation channel at Bull Falls.

Q. Why did you get out?

A. Because that was the easiest way of going up the channel.

Q. Easier to go on foot than in a boat, wasn't it?

A. Well, the boat we had was an Engineer Department boat with a small outboard motor on it. The motor didn't, we thought, have power enough to buck the current so we pulled the boat up.

Q. I suppose they didn't want their boat smashed up either, did they?

A. I don't think that entered into it.

Q. And did you get over Harvey's Ledge that day?

A. Yes.

Q. Did you get out and walk again?

A. That is right.

Q. You pulled the boat along?

A. That is right.

Q. Did you get up to Wylies Falls that day?

A. That is right.

Q. Did you get out and walk up there?

A. Not that day.

Q. You walked another day at Wylies Falls?

A. We pulled the boat up through the chute at Wylies Falls on another day.

Q. Did you get to Peters Mountain Falls?

A. That is right.

Q. Did you walk again there?

A. We pulled the boat up there.

Q. Did you get to Shumate's Falls that day?

A. That is right.

1184 Q. And was it hard to pull through there? Did you get out and walk through there too?

A. That is right.

Q. You did almost as much walking as riding?

A. I would say we pulled the boat up through those rapids in the same fashion that the boys used to do when they ran bateaux on the river.

Q. You think anybody that ever did get through there got out and walked?

A. I believe you have records in this case that it has been done before.

Q. There are some very unusual records. That is what made Ripley rich. Now, Mr. Gerdes, are your notes in such fashion that you can follow me quickly and promptly with some of these shoals? I want to take them up briefly. Will you turn to 13. That is the one where the fellow couldn't get out with the current meter. At what mile is that shoal?

A. Mile 109.3.

Q. How many miles upstream from that is your Shoal No. 14?

A. About 7/10 of a mile.

Q. How many miles upstream from your Shoal No. 14 is your Shoal No. 15?

A. About one mile.

Q. And how many miles upstream from that is your Shoal No. 16?

A. About 8/10 of a mile.

Q. And how many miles upstream is your Shoal 17 from the last one, from 16?

A. About 1.2 miles.

Q. And how many miles upstream from Shoal 17 is Shoal 18?

A. About 1.7 miles.

Q. And that one is 1,400 feet long, isn't it?

A. That is right.

Q. And the one back of it is 2,400 feet long?

1185 A. That is right.

Q. So that there is a lot of that distance taken up in shoals; is that right?

A. You by chance perhaps picked on the section of the river best augmented by shoals, or one of the best. I call your attention again to my statement on direct examination that about 15 percent of the channel consists of shoals.

Q. That is right and they are all put in between the pools, aren't they?

A. That is right.

Q. They weren't fortunate enough to put those 15 percent of shoals all in one place and the pools all in another; is that right?

A. Perhaps it is a good thing; otherwise the upstream navigator would get tired all in one place.

Q. They would get good exercise. How many miles above Shoal 18 is your Shoal 19? I want to be fair, because I think that is a little farther?

A. That is about 3.3 miles.

Q. And how far above that is your next shoal? That one was 2,000 feet long, was it?

A. Yes; 1.2 miles.

Q. Was that a long shoal too?

A. 1,000 feet. You understand, of course, Mr. Jackson, that these lengths of shoal are not continual lengths of maximum difficulty. Those lengths embrace a group of channel obstructions of some sort or other, which if one were to try to pass them there would be breathing spells in between.

Q. I understand there is not a continuous obstruction. How far above Shoal 20 is 21?

A. $\frac{1}{10}$ of a mile.

Q. How much?

1186 A. I beg your pardon—$\frac{5}{10}$.

Q. How far up is Shoal 22?

A. One mile.

Q. And how far is the next shoal, 23?

A. $\frac{8}{10}$ of a mile.

Q. And how far to the next shoal, 24?

A. 1.6.

Q. And how far to the next one?

A. $\frac{2}{10}$ of a mile.

Q. And those shoals are how long?

A. Which numbers?

Q. 24 and 25?

A. They are 300 and 600 feet, respectively.

Q. You go up to 26?

A. 26 is 1,000 feet long.

Q. How many miles above 25?

A. $\frac{3}{10}$ of a mile.

Q. And then there is a further extension of 500 feet upstream?

A. 500 feet upstream there is another minor ledge.

Q. Which you included in 26?

A. Yes.

Q. Now you come to 27. How much farther up is that?

A. Pardon me. That is included for reference in order to be sure that it is identified.

Q. How much farther up is 27?

A. 27 is 1 mile above 26.

Q. And how much farther is 28?

A. 28 is a shoal consisting of a group of ledges, the beginning of which is approximately $\frac{4}{10}$ of a mile above 27.

Q. $\frac{4}{10}$ of a mile above and that falls is three miles long, isn't it?

1187 A. That shoal is approximately two miles long.

Q. I understood you to say three on your direct?

A. I wish to correct that.

Q. You gave the mileage of 125 to 127, inclusive. What should it be?

A. I am not sure of these decimals but it is two miles long beginning at mile 125. That would be to the beginning of mile 127.

Q. Can you tell me how many ledges you found at those falls, that is your item 28?

A. I didn't count them because they graduate from those that are easily identifiable to those that are submerged and barely distinguishable but there are more than fifty.

Q. You would hardly have time to count them on a very rapid examination and survey like you made?

A. Well, I think I would had I cared to do it.

Q. You found the controlling channel there to be eight feet wide by one foot deep?

A. Yes.

Q. If you haven't done so, will you tell me what the stream flow was for the period June 22nd to 29th, inclusive, at such stations as you consulted?

A. The stream flow in this section of the river, as you understand, was continually fluctuating because of power waves being put out from power plants up stream. At Eggleston the maximum discharge during the period June 22nd and 29th was 2,530 second feet. The minimum was 1,480 which is only a little bit more than half as much. At Glen Lyn the maximum and minimum, respectively, were 2,770 and 1,740; at Hinton or near Hinton, at Pack's Ferry, 2,750 and 1,800.

Q. And did you have any figures for up around Radford, the upper end, above Eggleston?

1188 A. I have the figures for Allisonia for June 27th and 29th which show a variation from 2,190 second-feet to 1,030 second-feet.

Q. Have you got similar figures for these same places for July 13th and 15th?

A. I have some of them.

Q. Will you give what you have?

A. July 13th to 15th, the maximum flow at Eggleston was 2,180 second feet and the minimum 1,580. At Packs Ferry, just above Hinton, the maximum flow was 2,610 and the minimum 2,100.

Q. That is all you have?

A. Those are all that I have.

Q. At each of those places those flows were several times the minimum flow of the stream, were they not?

A. At each of those places? I have only definite recollection of the minimum flow at Hinton.

Q. You understand what I mean, the minimum flow during the time when you took your pictures compared with the record minimum flow?

A. That is what I was going to say. This flow at Hinton, which was the only place that I have any knowledge of the minimum flow, the record minimum flow, was considerably in excess, let me say, of the extreme minimum flow. However, these flows ranged around very closely to what would be called ordinary low water which is the minimum flow that occurs practically every year. You will understand that the minimum flow that you have reference to is an extreme minimum of record that occurred once in fifty years, or whatever the period of record is.

Q. I understand when you undertook to locate a channel in one of these shoals you found what you thought was the controlling section and that you didn't then undertake to follow that channel throughout the shoal lengthwise of the river to see what its shape might be and what curves it might make and that sort of thing?

A. Your question might be put a little bit more definitely. I think I would say yes, in a majority of cases I did under-
1189 take to find out what the channel was.

Q. You told me a while ago on cross-examination that you didn't walk up and down the length of the channel through the shoals; is that wrong?

A. That answer was correct. In the majority of cases I did not walk up and down any extensive length of river but in every case I was able to pick out the channel either by walking, which I did a number of times, or by tracing out the path of the maximum flow and having——

Q. That was something you did with your eye?

A. Yes.

Q. As a result of this training?

A. I did it by eye just as a Captain of a boat would see the channel by eye too.

Q. And did you find that all the channels were perfectly straight?

A. No; I did not.

Q. Did you find they were quite crooked?

A. A few of them were what would be called quite crooked. A number of them were by no means—let me say most of them were by no means straight but were channels that could be easily followed by boat.

×

CLERK'S COPY.

P.V.

175

402.909
Sup Ct.

TRANSCRIPT OF RECORD

(IN THREE VOLUMES)

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, ~~1939~~ 1940

1

No. ~~674~~ 12

THE UNITED STATES OF AMERICA, PETITIONER

vs.

APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

VOLUME 2

PETITION FOR CERTIORARI FILED JANUARY 23, 1940
CERTIORARI GRANTED MARCH 4, 1940

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1939

No. 674

THE UNITED STATES OF AMERICA, PETITIONER

vs.

APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

INDEX

	Original	Print
Record from D. C. U. S., Western District of Virginia	1	1
Praecipe for transcript of record	2	1
Writ of subpoena	4	2
Bill of complaint	5	4
Motion to amend bill of complaint, with amendments	23	19
Answer of defendant, as amended	44	39
Order granting leave to amend complaint, etc., September 19, 1935	81	67
Petition of the State of Virginia for leave to appear as *amicus curiae*	83	68
Petition of the State of West Virginia for leave to appear as *amicus curiae*	92	72
Motion for taking deposition filed on the 26th of August, 1936	98	75
Order of August 26, 1936, on motion for taking deposition	106	83
Stipulation re plaintiff's requests for findings and conclusions	106–A	84
Plaintiff's suggested findings of fact and conclusions of law and plaintiff's supplemental requested findings of fact and conclusions of law as renumbered and rearranged for purposes of appeal	107	84
Opinion of the court, Paul, J.	133	101
Findings of fact and conclusions of law	194	154

Record from D. C. U. S., etc.—Continued.

	Original	Print
Final decree and order granting exceptions	199	157
Assignment of errors, as amended	201	158
Order extending time for transcript of record	224	178
Order extending time for transcript of record	225	178
Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on Appeal	227	179
Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on appeal	228	180
Order extending time for transcript of record	229	180
Order extending time for transcript of record	230	181
Stipulation as to printing record on appeal under Rule 23	231	181
Stipulation as to sending up original exhibits	232	182
Order of February 2, 1939, directing the clerk to transmit all original exhibits which are not copied in full in the approved statement of evidence	233	183
Order approving statement of evidence	234	183
Statement of evidence under Equity Rule 75	236	184
Testimony for plaintiff:		
Fred D. Bradford—Direct	237	185
Lewis Harvey—		
Direct	237	185
Cross	239	187
J. W. Flannagan—		
Direct	241	189
Cross	243	190
T. W. Coleman—		
Direct	253	198
Cross	255	199
Redirect	259	202
Recross	259	203
Walter H. Towe—		
Direct	260	203
Cross	261	204
Redirect	261	205
Recross	261	205
E. H. Linkous—		
Direct	261	205
Cross	263	206
E. P. Hartsock—		
Direct	264	206
Cross	264	207
Redirect	265	208
R. L. Howard—		
Direct	265	208
Cross	271	213
Redirect	276	217

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
William Collins—		
Direct	277	218
Cross	279	220
George M. Webb—		
Direct	284	224
Cross	287	226
Charles F. Weiss—		
Direct	289	228
Cross	293	231
Redirect	296	234
J. G. Graham—		
Direct	297	235
Cross	298	236
Redirect	299	237
James Breeding—		
Direct	300	237
Cross	305	241
J. E. Owen—		
Direct	308	244
Cross	310	246
Redirect	315	250
Recross	316	251
J. W. Crowell—		
Direct	317	251
Cross	319	254
A. S. Breeding—		
Direct	320	255
Cross	322	256
Redirect	327	260
A. W. Snyder—		
Direct	327	260
Cross	330	263
Recross	334	266
L. T. Meredith—		
Direct	335	266
Cross	337	268
E. C. Meredith—		
Direct	337	269
Cross	338	270
Redirect	339	271
Ely Duncan—		
Direct	339	271
Cross	342	273
Redirect	343	274
T. C. Redpath—		
Direct	343	274
Cross	344	275
Redirect	345	276
Recross	346	276

Record from D. C. U. S., etc.—Continued:

Testimony for plaintiff—Continued.

	Original	Print
H. L. Fagg—		
Direct	346	276
Cross	348	278
J. D. Haley—		
Direct	348	278
Cross	350	280
Thomas Monahan—		
Direct	350	280
Cross	353	282
Dan Hodge—		
Direct	359	287
Cross	360	289
Redirect	361	289
James Micou—		
Direct	362	290
Cross	363	291
Redirect	363	291
Zattoo Farmer—		
Direct	364	291
Cross	366	293
Redirect	367	294
Recross	368	295
Albert W. Snidow—		
Direct	368	295
Cross	372	299
Redirect	376	302
W. P. Snodgrass—		
Direct	377	302
Cross	379	304
Redirect	381	305
D. C. Allison—Direct	381	305
H. B. Allison—		
Direct	382	306
Cross	383	307
Paul L. James—		
Direct	386	309
Cross	395	317
John H. Peters—		
Direct	399	319
Cross	402	322
Redirect	414	332
Recross	415	333
James H. Howard—		
Direct	417	335
Cross	419	336
Redirect	420	337
Recross	420	337

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Henry S. Skeen—		
Direct	422	339
Cross	424	341
Redirect	425	342
William Price—		
Direct	425	342
Cross	427	343
Redirect	431	347
J. R. Smith—		
Direct	432	348
Cross	437	352
Redirect	451	364
B. T. Johnson—		
Direct	451	364
Cross	454	367
Redirect	459	371
Recross	460	372
J. A. Medley—		
Direct	461	372
Cross	465	375
Redirect	480	387
H. A. Starbuck—		
Direct	482	389
Cross	483	390
J. H. Dickinson—		
Direct	485	391
Cross	488	394
Redirect	490	395
D. L. Lane—		
Direct	490	395
Cross	492	397
Emmett M. Smith—		
Direct	493	398
Cross	494	399
E. N. Farley—Direct	495	399
Charles Edward Kenley—		
Direct	496	400
Cross	498	402
R. E. Lucas—		
Direct	500	404
Cross	501	404
J. W. Reed—		
Direct	502	405
Cross	504	407
Redirect	506	408
Lewis M. Smith—Direct	507	409

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Everett W. Lilly—		
Direct	510	412
Cross	512	413
Redirect	514	415
J. H. Hoover—		
Direct	514	415
Cross	515	416
Marshal Richmond—		
Direct	516	416
Cross	517	418
J. W. Graham—Direct	519	419
P. H. McGrath—Direct [omitted in printing]	519	419
D. H. Kauffelt—		
Direct [omitted in printing]	522	
Cross [omitted in printing]	522	
James John Green—Direct [omitted in printing]	523	
W. L. Burks—		
Direct	524	420
Cross	526	421
Z. V. Burks—		
Direct	527	422
Cross	531	426
Redirect	532	426
Recross	533	427
Gordan A. Farmer (deposition)—		
Direct	534	428
Cross	537	430
Redirect	538	431
Recross	539	432
Mrs. Hettie D. Helvey—		
Direct (deposition)	539	432
Cross	544	436
Redirect	544	436
Lucy Calfee Smith—		
Direct (deposition)	545	437
Cross	547	438
Redirect	551	442
Solomon C. Furrow—		
Direct (deposition)	551	442
Cross	553	443
Redirect	553	443
Recross	554	444
Redirect	555	445
D. R. Peterson—		
Direct (deposition)	555	445
Cross	556	446
Redirect	558	448
Re-redirect	558	448

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Robert Hill Moore—Direct (deposition)	559	449
William M. Martin—		
Direct (deposition)	561	450
Cross	563	452
Redirect	564	453
William M. Dalton (deposition)—		
Direct	564	453
Cross	566	455
Redirect	567	456
Recross	567	456
Redirect	567	456
Recross	567	456
Harvey C. Johnson (deposition)—Direct	568	456
W. C. Anderson (deposition)—		
Direct	570	458
Cross	572	459
C. H. Wauhop (deposition)—		
Direct	573	460
Cross	576	463
Redirect	578	464
Andrew G. Flanagan (deposition)—		
Direct	579	465
Cross	584	469
Redirect	585	470
T. G. Skaggs (deposition)—		
Direct	586	470
Cross	590	474
I. C. Stover (deposition)—		
Direct	594	477
Cross	596	478
Redirect	597	480
Robert Calloway (deposition)—		
Direct	598	480
Cross	599	481
Matthew V. Calloway (deposition)—		
Direct	599	482
Cross	602	484
Redirect	603	485
Recross	604	485
A. E. Miller (deposition)—		
Direct	604	486
Cross	609	489
Redirect	610	490

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
R. W. Martin (deposition)—		
Direct	610	490
Cross	612	492
Redirect	612	492
Recross	612	492
Re-redirect	612	492
Re-recross	612	492
J. C. Martin (deposition)—Direct	612	492
Elbert E. Tomkies (deposition)—		
Direct	613	493
Cross	617	496
Redirect	621	499
Recross	621	499
Re-redirect	621	499
Re-recross	622	499
Dorsey B. Barton (deposition)—		
Direct	622	500
Cross	627	503
Redirect	628	505
W. C. Ratcliffe (deposition)—		
Direct	629	505
Cross	631	507
John Likens (deposition)—Direct	632	508
C. E. Roop (deposition)—		
Direct	634	509
Cross	636	511
Redirect	638	512
Recross	638	513
Redirect	639	513
William Kessler—		
Direct	640	515
Cross	651	524
Redirect	656	528
Recross	657	529
Witness recalled—		
Direct	657	529
Cross	659	531
J. J. Dirzulaitis—		
Direct	664	535
Cross	667	537
Redirect	673	541
Recross	674	542
Charles H. Pierce—		
Direct	676	543
Cross	703	565
Redirect	725	582

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Glen E. Edgerton—		
Direct	732	587
Cross	752	606
Redirect	770	619
Recross	780	626
Mrs. Minnie Lee Ward—		
Direct	787	632
Cross	790	635
Redirect	792	636
Recross	793	637
W. S. Winn—		
Direct	794	637
Cross	808	649
Redirect	889	711
Recross	894	715
Harry M. Trippe—		
Direct	896	716
Cross	926	748
Redirect	955	768
Edwin W. Kramer—		
Direct	956	769
Cross	1000	805
Earl E. Teeter—		
Direct	1051	847
Cross	1084	871
Redirect	1127	900
Recross	1130	902
H. G. Gerdes—		
Direct	1131	903
Cross	1162	926
Redirect	1189	947
Recross	1194	950
Col. Lewis H. Watkins—		
Direct	1203	957
Cross	1256	1000
Redirect	1363	1004
Recross	1365	1006
John R. Douglass—		
Direct	1367	1082
Cross	1384	1095
Redirect	1415	1116
Recross	1421	1120
Capt. C. Stone—		
Direct	1423	1121
Cross	1435	1130
Redirect	1439	1132
Recross	1439	1132

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
E. A. Sherman—		
Direct [omitted in printing]	1441	
C. L. Forsling—		
Direct [omitted in printing]	1453	
Cross [omitted in printing]	1462	
Redirect [omitted in printing]	1472	
Recross [omitted in printing]	1474	
Dr. H. T. Cory—		
Direct [omitted in printing]	1477	
Cross [omitted in printing]	1493	
Redirect [omitted in printing]	1498	
Recross [omitted in printing]	1501	
Redirect [omitted in printing]	1503	
Recross [omitted in printing]	1506	
Redirect [omitted in printing]	1508	
H. G. Gerdes (recalled)—		
Direct	1510	1133
Cross	1526	1150
Redirect	1532	1155
Cross	1532	1155
Redirect	1546	1166
Recross	1548	1168
Capt. Phillip C. Elsey—		
Direct	1550	1169
Cross	1561	1178
Redirect	1577	1191
P. A. Gragnon—		
Direct	1579	1193
Cross	1603	1211
Redirect	1620	1224
John D. Fitch—		
Direct	1625	1228
Cross	1630	1231
Redirect	1632	1233
Recross	1632	1233
Roger B. McWhorter—		
Direct	1633	1233
Cross	1674	1266
Redirect	1740	1333
Recross	1743	1335
James W. Johnson—		
Direct	1745	1338
Cross	1792	1380
Redirect	1808	1400
Recross	1812	1410
Dr. F. F. Barnes—Direct [omitted in printing]	1821	
John A. Davenport—		
Direct	1835	1415
Cross	1861	1434

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
H. G. Gerdes (recalled)--		
Direct	1871	1441
Cross	1896	1465
Redirect	1934	1493
Recross	1937	1495
Testimony for defendant.		
C. Rufus Spangler—		
Direct	1939	1498
Cross	1941	1500
Redirect	1944	1503
W. H. Spangler—		
Direct	1945	1503
Cross	1946	1505
Redirect	1951	1509
S. L. Buckland—		
Direct	1952	1509
Cross	1955	1511
Redirect	1960	1516
Recross	1962	1517
B. C. Lilly--		
Direct	1962	1517
Cross	1963	1518
Redirect	1970	1524
Recross	1971	1524
James Adair, Sr.—		
Direct	1971	1524
Cross	1973	1526
Redirect	1976	1528
Recross	1977	1529
N. A. Kersey—		
Direct	1979	1530
Cross	1982	1532
Redirect	1986	1536
H. Palmer Roberts—		
Direct	1986	1536
Cross	1988	1538
J. B. Talbot—		
Direct	1991	1540
Cross	1992	1541
Redirect	1996	1543
William Ingles—		
Direct	1996	1544
Cross	1996	1544
William R. Gerald—		
Direct	1999	1547
Cross	2002	1549
Redirect	2006	1552
Recross	2006	1552

Record from D. C. U. S., etc.—Continued.

Testimony for defendant—Continued.

	Original	Print
William R. Gerald (deposition)—		
Direct	2007	1552
Cross	2009	1554
A. Moore—		
Direct	2011	1555
Cross	2013	1557
Isaac Huff—		
Direct	2018	1561
Cross	2020	1562
Redirect	2023	1564
J. H. Knode—		
Direct	2024	1565
Cross	2031	1571
Redirect	2039	1577
F. B. Kegley—		
Direct	2041	1579
Cross	2070	1604
Redirect	2099	1629
Recross	2102	1631
E. C. Gannaway—		
Direct	2104	1632
Cross	2105	1633
Redirect	2108	1635
Recross	2108	1635
N. B. Harvey—		
Direct	2109	1636
Cross	2111	1638
Redirect	2118	1643
Recross	2118	1643
W. R. Hundley (deposition)—		
Direct	2119	1643
Cross	2123	1647
Redirect	2125	1648
Recross	2126	1649
Redirect	2126	1549
John G. Osborne—		
Direct	2127	1649
Cross	2130	1652
Redirect	2134	1655
Recross	2135	1656
Robert C. McWane—		
Direct	2135	1656
Cross	2143	1662
Redirect	2152	1669
Recross	2153	1670

Record from D. C. U. S., etc.—Continued.

Testimony for defendant—Continued.

	Original	Print
Frank F. Turner—		
Direct	2155	1671
Cross	2157	1672
J. B. Snethlage—		
Direct	2158	1673
Cross	2159	1674
A. A. L. Mathews—		
Direct	2160	1675
Cross	2174	1686
Redirect	2195	1702
Recross	2197	1704
Harold W. Buck—		
Direct	2198	1704
Cross	2203	1709
R. J. Holden—		
Direct	2216	1720
Cross	2236	1737
Redirect	2254	1751
Recross	2259	1756
H. S. Slocum—		
Direct	2260	1757
Cross	2273	1767
T. A. Patton—		
Direct	2282	1774
Cross	2283	1775
Rufus W. Putnam—		
Direct	2286	1777
Cross	2313	1797
S. M. Yarbro—		
Direct	2355	1834
Cross	2355	1834
Harold A. Thomas—		
Direct	2364	1841
Cross	2422	1883
Redirect	2488	1930
Recross	2504	1941
Daniel W. Mead—		
Direct	2506	1942
Cross	2530	1972
Redirect	2579	2011
F. W. Scheidenhelm—		
Direct	2581	2012
Cross	2664	2077
Redirect	2710	2118
Recross	2714	2123
Redirect	2717	2125
Recross	2721	2132

Record from D. C. U. S., etc.—Continued.

Rebuttal testimony for plaintiff:

	Original	Print
John E. Carpenter (recalled)—		
Direct	2723	2136
Cross	2747	2152
Re-direct	2772	2172
Re-cross	2774	2173
Re-direct	2775	2174
Rowland P. Castle—		
Direct	2777	2175
Cross	2788	2184
Re-direct	2800	2193
Harry R. Bright—		
Direct	2802	2194
Cross	2806	2199
W. H. Marshall—		
Direct	2810	2202
Cross	2815	2205
Thomas H. Graham—Direct	2828	2214
Roger B. McWhorter (recalled)—		
Direct	2832	2216
Cross	2840	2225
Lewis H. Watkins—		
Direct	2845	2228
Cross	2858	2240
H. G. Gerdes (recalled)—		
Direct	2881	2260
Cross	2891	2269

Plaintiff's exhibits:

	Original	Print
Exhibit No. 1—Map of New River (original exhibit)	2901	2277
Exhibits Nos. 2–13, inclusive—Photographs of bateaux and other types of boats on New River (original exhibits)	2903	2277
Exhibits Nos. 16–26, inclusive—Physician's certificates pertaining to certain witnesses for plaintiff (omitted)	2903	2277
Exhibits Nos. 27–29, inclusive—Day books and ledger of Lilly Lumber Company (omitted)	2903	2277
Exhibit No. 30—Photostat copy "Index to Reports, Chief of Engineers, U. S. Army, 1866–1912" (original exhibit)	2903	2277
Exhibit No. 31—Report of Chief of Engineers, 1873	2904	2277
Exhibit No. 32—Report of Moore and Briggs, 1819	2924	2298
Exhibit No. 33—Report of Chief of Engineers, 1877	2950	2324
Exhibit No. 34—Report of Chief of Engineers, 1878	2952	2326
Exhibit No. 35—Report of Chief of Engineers, 1879	2961	2333
Exhibit No. 36—Report of Chief of Engineers, 1880	2994	2360
Exhibit No. 37—Report of Chief of Engineers, 1881	3005	2370
Exhibit No. 38—Report of Chief of Engineers, 1882	3018	2382

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 39—Report of Chief of Engineers, 1883	3033	2394
Exhibit No. 40—Report of Chief of Engineers, 1884	3050	2404
Exhibit No. 41—Report of Chief of Engineers, 1885	3051	2405
Exhibit No. 42—Report of Chief of Engineers, 1886	3053	2406
Exhibit No. 43—Report of Chief of Engineers, 1891	3061	2413
Exhibit No. 44—Report of Chief of Engineers, 1897	3065	2416
Exhibit No. 45—Excerpt from The River and Harbor Appropriation Act of June 13, 1902	3067	2417
Exhibit No. 46—1912–1913—Alstaetter, Rossell, Bixby reports (House Document 1410, 62nd Congress, 3rd Session) on examination of New River from Radford, Virginia, to Hinton, West Virginia	3068	2418
Exhibit No. 47—Report of the Secretary of War, dated April 18, 1913	3078	2427
Exhibit No. 48—1930—January 24, 1930, to March 11, 1930—Kanawha River at Kanawha Falls, West Virginia—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 49—1930—March 11, 1930, to April 5, 1930—Kanawha River at Kanawha Falls, West Virginia—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 50—1930—January 25, 1930, to March 10, 1930—New River at Caperton, W. Va.—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 51—1930—March 12, 1930, to April 4, 1930—New River at Caperton, W. Va.—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 52—1929–1936—Rating curve for Kanawha River at Kanawha Falls, W. Va. (original exhibit)	3112	2466
Exhibit No. 53—1929–1931—Rating curve for New River at Caperton, W. Va. (original exhibit)	3112	2466
Exhibit No. 54—1929–1934—Rating curve for New River at Hinton, West Virginia (original exhibit)	3112	2466
Exhibit No. 55—October 27, 1928, to September 30, 1931—Rating table for Kanawha River at Kanawha Falls, W. Va. (original exhibit)	3112	2467
Exhibit No. 56—November 20, 1928, to September 30, 1930—"Rating table for New River at Caperton, West Virginia" (original exhibit)	3112	2467
Exhibit No. 57—4 sheets constituting "Rating tables for New River near Hinton, W. Va." for the following periods: October 1, 1929, to September 30, 1934; December 1, 1923, to September 30, 1929; December 1, 1923, to September 30, 1929; December 1, 1, 1923, to September 30, 1929 (original exhibits)	3113	2467

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 58—March 15, 1930—"Water Records at Glen Lyn for the week ending Saturday, March 15, 1930" (original exhibit)	3113	2467
Exhibit No. 59—1930—"Water Records at Glen Lyn for week ending Saturday, March 22, 1930" (original exhibit)	3113	2467
Exhibit No. 60—1930—"Water Records at Glen Lyn for week ending March 29, 1930." (original exhibit)	3113	2467
Exhibit No. 61—1930—"Water Records at Glen Lyn for week ending April 1, 1930" (original exhibit)	3113	2467
Exhibit No. 62—1930—Chart "New River at Eggleston, Va., March 11 to March 31, 1930" (original exhibit)	3113	2467
Exhibit No. 63—1930—Chart "New River at dam site "A" at Radford for the period from March 10, 1930, to April 1, 1930" (original exhibit)	3113	2467
Exhibit No. 64—1930—Chart "New River at Allisonia, March 11 to April 1, 1930" (original exhibit)	3113	2468
Exhibit No. 65—1930—Chart "New River at Ivanhoe from March 11 to April 1, 1930" (original exhibit)	3113	2468
Exhibit No. 66—5 pages, containing rating curves for— (a) Glen Lyn 1927–1928; (b) Eggleston 1911–24, 1925–28; (c) Dam site "A"; (d) Allisonia, 1930; (e) Ivanhoe, 1928–1930 (original exhibit)	3114	2468
Exhibit No. 67—5 sheets containing rating tables for New River at— Glen Lyn, 1927–1928; Eggleston, Oct. 1, 1920, to Sept. 30, 1931; Dam Site "A" 1927–1929; Allisonia, 1930; Ivanhoe, 1928–1930 (original exhibit)	3114	2468
Exhibit Nos. 68–83, inclusive—Water Supply Papers of United States Geological Survey (original exhibits)	3114	2468
Exhibit No. 84—Daily discharges for year ending September 30, 1935, at the gaging station on New River at Ivanhoe, Va. (original exhibit)	3114	2468
Exhibit No. 85—Daily discharges for the year ending September 30, 1935, at the gaging station on New River at Allisonia, Va. (original exhibit)	3114	2468
Exhibit No. 86—Daily discharges for the year ending September 30, 1935, at the gaging station on New River at Eggleston, Va. (original exhibit)	3114	2468
Exhibit No. 87—Daily discharges for the year ending September 30, 1935, at the gaging station on Little River at Graysonton, Va. (original exhibit)	3114	2468

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 88—Declaration of Intention to construct a dam and other project works	3115	2469
Exhibit No. 89—1926, August 30—Assignment of Declaration of Intention of New River Development Co. to Appalachian Electric Power Co. (original exhibit)	3121	2471
Exhibit No. 90—1926, August 30—Application for license by Appalachian Electric Power Co	3122	2471
Exhibit No. 90-A—1926, August 30—Maps accompanying application for license (also revised maps accompanying application for minor part license) (original exhibit)	3175	2482A
Exhibit No. 91—1926-27-28-31-32—Excerpts from 6th, 7th, 8th, 11th, and 12th Annual Reports of Federal Power Commission dealing with Radford project	3176	2483
Exhibit No. 92—1925, August 20—Report of General Taylor, Chief of Engineers on Declaration of Intention for project No. 739	3207	2517
Exhibit No. 93—1925, July 23—Report of District Engineer, Major A. K. B. Lyman and Endorsement (7/25/29) Division Engineer, C. W. Kutz on declaration for project No. 739	3214	2522
Exhibit No. 94—1925, October 15—Letter and memorandum of Major Trippe, District Engineer to Lt. Col. Edgerton, on probable effects of proposed Radford project on Kanawha River	3218	2524
Exhibit No. 95—1926, April 7—Letter from Merrill, Executive Secretary, to General Taylor, C. of E., transmitting data with respect to Pitt River. Attached is memo initialed "R. W. D." and diagram of variations on Pitt and Sacramento Rivers (original exhibit)	3221	2526
Exhibit No. 96—1926, July 23—Report of Hubert Deakyne, C. of E., to Merrill Executive Secretary on declaration for project No. 739	3222	2526
Exhibit No. 97—1925, December 29—Report of General Taylor, C. of E., to Executive Secretary on declaration for project No. 739 (original exhibit)	3224	2527
Exhibit No. 98—1927, April 12—Report of General Deakyne, C. of E.; 1926, December 22—Report of Major Trippe, District Engineer; 1927, January 13—1st Endorsement Col. Kutz, Division Engineer. In dealing with application for license for project #739	3232	2533
Exhibit No. 99—1925, October 22—List of 22 affidavits submitted to Federal Power Commission for consideration upon Declaration of Intention of New River Development Company	3257	2556

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 100—1926, March 2—Transcript of hearing before Federal Power Commission on Declaration of Intention	3305	2584
Exhibit No. 101—1926, October 28; September 28; November 20—re Application for license. Notice of public hearing at Radford, September 28, 1926. Mailing list of notices September 28, 1926. Transcript of public hearing at Radford, October 28, 1926. Statement filed on behalf of Appalachian Electric Power Co. regarding protests, November 20, 1926	3329	2604
Exhibit No. 102—1926, September 2—Letter from Curtis, Mallet-Prevost, Colt & Mosle to Federal Power Commission enclosing assignment of declaration from Development Co. to A. E. P. Co. and application for license of A. E. P. Co.	3355	2624
Exhibit No. 103—1925, December 9—Telegram to Mr. Merrill, Executive Secretary, from Mr. Kramer re Pitt River	3356	2625
Exhibit No. 104—1925, December 15—Letter to Mr. Merrill from Mr. Kramer re Pitt River and enclosing hydrographs	3359	2626
Exhibit No. 105—1927, May 2—Letter from Mr. Bonner to Mr. Merrill enclosing copy of Kramer's report of Klamath River	3360	2628
Exhibit No. 106—1926, October 24—"Memorandum to Federal Power Commission re Declaration of Intention of New River Development Company" prepared by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3383	2635
Exhibit No. 106-A—1925, October 23—Letter from L. J. Bevan to C. M. Micou, re drainage areas and run-off (original exhibit)	3383	2635
Exhibit No. 106-B—Memorandum of request of New River Development Company in regard to Report of Chief of Engineers dated Aug. 20, 1925, upon the proposed project of the Company for a water power development on New River, in Virginia, with respect to which declaration of intention has been filed by the Company with the Federal Power Commission, dated Oct. 26, 1925	3384	2635
Exhibit No. 106-C—1925, October 1, 1925—"Supplemented Memorandum re Declaration of Intention of New River Development Company (original exhibit)	3388	2638
Exhibit No. 107—1926, February 20—Letter from Mr. Merrill, Executive Secretary to, Bascom Slemp giving notification of public hearing of March 2, 1926 (original exhibit)	3388	2638

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 108—1930, October 16—Letter from C. M. P. C. M. to Federal Power Commission enclosing new drawings for minor part license to be substituted for certain drawings filed with original application for license (original exhibit)	3388	2638
Exhibit No. 109—1926, April 15—Charge sheet pertaining to removal of General Taylor's report dated December 29, 1925, from files by F. P. C. (original exhibit)	3388	2638
Exhibit No. 110—"Record of the daily gage readings at Lock No. 24, Ohio River" (original exhibit)	3388	2638
Exhibit No. 111—"Record of daily gage readings at Lock No. 25, Ohio River" (original exhibit)	3388	2638
Exhibit No. 112—4 sheets being "gage readings of Locks Nos. 2, 3, and 4, Kanawha River, and Locks Nos. 26, 27, and 28, Ohio River, during low water periods of 1921, 1925, 1930, and 1932 (original exhibit)	3388	2638
Exhibit No. 113—Diagram showing hydrographs at gaging stations (Kanawha and New Rivers) with published mean daily flows July and August, 1932. Prepared U. S. Engineers Office, Huntington, W. Va., September 1935 (original exhibit)	3388	2638
Exhibit No. 114—1930, July and August—Diagram showing hydrographs at gaging stations (Kanawha & New Rivers) for July and August 1930. Prepared U. S. Engineer Office, Huntington, W. Va., September 1935 (original exhibit)	3389	2639
Exhibit No. 115—1936, January—Diagram—Kanawha & New Rivers, Discharge at gaging stations—Data compiled from Automatic Water Stage Recorder—U. S. Engineer Office, Huntington, W. Va., January 1936 (original exhibit)	3389	2639
Exhibit No. 116—1936, July 7—Diagram "Kanawha River Profile—Backwater studies—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3389	2639
Exhibit No. 117-A—1936, July 9—Diagram "Rating Curves—Kanawha River Lock No. 2, Mile 84.8, London Dam, Mile 82.81, and Lock No. 3, Mile 79.7—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3389	2639
Exhibit No. 117-B—1935, December 10—Diagram "U. S. Engineer Office, Huntington, W. Va., Rating Curves—Kanawha River, Locks Nos. 4 & 5, and Marmet" (original exhibit)	3389	2639
Exhibit No. 117-C—1935, December 5—Diagram—"Rating Curves—Kanawha River—Locks Nos. 6, 7, 8" (original exhibit)	3389	2639

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued

	Original	Print
Exhibit No. 117-D—1936, July 8—Diagram "Kanawha River—Rating Curves—Locks No. 9 and Winfield—U. S. Engineer Office, Huntington, W. Va." (original exhibit)	3389	2639
Exhibit No. 117-E—1935, December 5—Diagram "Rating Curves—Kanawha River Locks Nos. 10 and 11" (original exhibit)	3389	2639
Exhibit No. 117-F—1935, December 10—Diagram "Rating Curves—Ohio River below Point Pleasant at Lock No. 26—U. S. Engineer Office, Huntington, W. Va." (original exhibit)	3390	2640
Exhibit No. 118—1935, December—Diagram "Kanawha River Profile—Six & Nine feet projects"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 119—1935, December—Diagram "Kanawha River and Tributaries—proposed improvements"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 120—1935, December—Diagram "Kanawha River and Tributaries—proposed improvements—profiles"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 121—July 4-21, 1936—Gage recorder chart for New River at Eggleston, Va. (original exhibit)	3390	2640
Exhibit No. 122—July 6-21, 1936—Gage recorder chart for New River at Hinton (Packs Ferry), W. Va. (original exhibit)	3390	2640
Exhibit No. 123—1919, August 29. Request for permit for repairs and replacements by Electro Metallurgical Company with following enclosures: (1) 1919, Aug. 29; Letter from W. J. Knapp, V-P, Electro-Met. Co. to Secretary of War. (2) 1919, Sept. 15 and 17; 1st and 2nd Endorsements by Howell and Beach, C. of E. (3) 1919, Sept. 27; 3rd End. by Pillsbury, C. of E. (4) 1919, Oct. 4; 4th End. by Howell, C. of E. (5) Plan of proposed location of replacement dam. (6) 1899, Mar. 2; Letter from Chief of Engineers Office to Major Bixby, C. of E., enclosing permit. (7) 1899, Feb. 27—Permit to Wilson Aluminum Co. (original exhibit)	3390	2640
Exhibit No. 123-A—1934, October 24; Copies of correspondence and reports relating to the Kanawha Falls Plant of Elec-Met. Co. as follows: (1) 1934, Oct. 24; Letter from Capt. Clay, C. of E. to McNinch Chairman, F. P. C. enclosing the following: (2)		

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
1898, Nov. 12; letter from Wilson Aluminum Co. to Secretary of War. (3) Part of handwritten letter to Brig. Gen'l John M. Wilson, Chief of Eng. dated January 26, 1899. (4) War Department memorandum. (5) 1899, Feb. 13; Letter from Major Bixby to Brig. Gen. John M. Wilson, Chief of Eng. (6) War Department memo. (7) 3 endorsements by War Department. (8) Copy of telegram dated Feb. 17, 1899, from Mr. Wilson, Chief of Engineers to Wilson Aluminum Co. (9) Letter dated Feb. 18, 1894, from Wilson Aluminum Co. to Mr. Wilson, Chief of Engineers. (10) Letter from Sec. of War, Feb. 27, 1899, to Wilson Alum. Co. (original exhibit)	3391	2641
Exhibit No. 124—1926, November 30—Protest of Great Kanawha River Imp. Ass'n to H. M. Trippe	3393	2641
Exhibit No. 125—1926, November—Protest of Public Service Commission of W. Va	3396	2643
Exhibit No. 126—1925, May 28—Letter C. B. Slemp to General Taylor re letter from Mr. Buck	3400	2645
Exhibit No. 126-A—1925, May 27, Letter Mr. Buck of V. B. & B. to General Taylor, C. of E	3402	2645
Exhibit No. 126-B—Map—New River Development Co.—preliminary layout, Dam site above mouth of Little River	3405	2647
Exhibit No. 127—1925—June 1—First endorsement General Jadnin (C. of E.) to District Engineer, re Buck letter 5/27/25	3408	2647
Exhibit No. 128—1925, June 15, 2nd end. Trippe to Chief of Engineers (project on New River)	3410	2648
Exhibit No. 129—1925, June 18—3rd end. Col. Kutz to Chief of Engineers (project on New River)	3413	2650
Exhibit No. 130—1927, July 1—Letter from O. C. Merrill, Executive Secretary to C. M. P. C. M. together with form of license tendered A. E. P. Co.	3414	2650
Exhibit No. 131—1931, May 5—Letter from George Otis Smith to A. E. P. Co., together with form of license tendered at that time	3414Q	2663
Exhibit No. 132—Plate 11. Diagram showing change in wave as it passes downstream (original exhibit)	3414GG	2675
Exhibit No. 133—March 1930. Discharge hydrograph wave study of New River at Allisonia, Va., from March 11, 1930–March 31, 1930 (original exhibit)	3414GG	2675
Exhibit No. 134—March, 1930—Discharge hydrograph wave study New River at Eggleston, Va. from March 11, 1930–March 31, 1930 (original exhibit)	3414GG	2675

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued. Original Print

Exhibit No. 135—March, 1930—"Discharge hydrograph wave study New River at Glen Lyn, Va., March 12, 1930–March 30, 1930 (original exhibit) 3414GG 2675

Exhibit No. 136—March, 1930—"Discharge hydrograph wave study New River at Hinton, W. Va., March 13, 1930–March 30, 1930 (original exhibit) 3414GG 2675

Exhibit No. 137—March, 1930—"Discharge hydrograph wave study New River at Caperton, W. Va.—March 12, 1930–April 3, 1930 (original exhibit) 3414GG 2675

Exhibit No. 138—March, 1930—"Discharge hydrograph wave study New River at Damsite 'A' near Radford, Va., March 11, 1930, to March 31, 1930" (original exhibit) 3414GG 2676

Exhibit No. 139—1930, March—"Discharge hydrograph wave study at Kanawha River at Kanawha Falls, W. Va., March 12, 1930, to April 1, 1930" (original exhibit) 3415 2676

Exhibit No. 140—1930, March—"Discharge hydrograph wave study of New River at Ivanhoe, March 12, 1930, to March 31, 1930" (original exhibit) 3415 2676

Exhibit No. 141—1930, March—"Discharge hydrograph wave study of Kanawha River at Montgomery, W. Va. (Lock #. 2), March 14 to March 31, 1930" (original exhibit) 3415 2676

Exhibit No. 142—1935, System Load Curve, A. E. P. Co. and Amer. Gas & Electric Co.—Weekday, Oct. 28, 1935, Sat. Nov. 2nd, 1935, and Sunday, Nov. 3rd, 1935 3416 2676

Exhibit No. 143—1930, June 1, chart "New Kanawha River Power Waves, 3/11/30 to 4/3/30" (original exhibit) 3418 2676

Exhibit No. 144—10 sheets: Plans of locks and dams, Nos. 2 to 11, inclusive, on Kanawha River, as follows:
(a) Kanawha River—Lock and Dam No. 2;
(b) Kanawha River—Lock and Dam No. 3;
(c) Kanawha River—Lock and Dam No. 4;
(d) Kanawha River—Lock and Dam No. 5;
(e) Kanawha River—Lock and Dam No. 6;
(f) Kanawha River—Lock and Dam No. 7;
(g) Kanawha River—Lock and Dam No. 8;
(h) Kanawha River—Lock and Dam No. 9;
(i) Kanawha River—Lock and Dam No. 10;
(j) Kanawha River—Lock and Dam No. 11 (original exhibit) 3418 2676

Exhibit No. 145—1935—74th Congress, 1st Session, House Doc. 91, 308 Report of Kanawha River, W. Va., Va., and N. C 3419 2677

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 146—Views of shoals and rapids on unimproved section of New River between Wiley Falls, mile 88.6 and Radford, mile 146.1—July 13–15, 1936 (original exhibit)	3445	2714
Exhibit No. 147—Views of shoals and rapids on unimproved sections of New River between Wiley Falls, mile 88.6, and Radford, mile 146.1, and between Allisonia, mile 173.3, and Austinville Lead Mine, mile 190.0—June 22–29, 1936 (original exhibit)	3445	2714
Exhibit No. 148—Photograph of stern of boat showing type of propeller guard in July 1936 (original exhibit)	3445	2714
Exhibit Nos. 149–151, inclusive—Photographs of Gerdes' Party at Bull Falls in July 1936 (original exhibit)	3445	2714
Exhibit Nos. 152–154, inclusive—Photograph of Negro at Bull Falls in a rowboat in July 1936 (original exhibit)	3445	2714
Exhibit No. 155—1926—House Doc. #308, 69th Congress, 1st Session—Estimate of cost of examinations, etc., of streams where Power Development appears feasible (original exhibit)	3445	2714
Exhibit No. 156—Record of hearing before State Corporation Commission containing application and copy of State license (original exhibit)	3445	2714
Exhibit No. 157—Pilot license of John R. Douglass (read into the record) (omitted)	3445	2715
Exhibit No. 158—Map—"Parts of National Forests and Areas approved as National forests within the Kanawha River and New River watersheds" (original exhibit)	3445	2715
Exhibit No. 159—1922, June 12, letter from Geo. Otis Smith, Director U. S. G. S., including the Report #34 enclosed in said letter (excluded)	3445	2715
Exhibit No. 160—Map "Monongahela National Forest—West Virginia" 1936 (excluded)	3445	2715
Exhibit No. 161—"Graph of stream flow—storm of March 26, 1936—Bent Creek Experimental Forest" (original exhibit)	3446	2715
Exhibit Nos. 163–182, inclusive—"Photos of dams and reservoirs on upper New River showing silt deposits" (original exhibits)	3446	2715
Exhibit No. 183—Views of pools, shoals, rapids, and dams of Kanawha River and New River between London Lock, W. Va., and Hawks Nest, W. Va.—July 22, 1936 (original exhibit)	3446	2715

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 184—Photograph entitled "State line in vicinity of Round Bottom Branch" (original exhibit)	3447	2715
Exhibit No. 185—U. S. G. S. "Peterstown sheet" (original exhibit)	3449	2715
Exhibit Nos 186–187—Maps and deed descriptions, re Bluestone reservoir (original exhibits)	3451	2718
Exhibit No. 188—Key property map of A. E. P. Co. for Bluestone reservoir (original exhibit)	3452	2718
Exhibit No. 189—Report (pp. 3–4, 9–39) of Commissioners appointed to view certain rivers within Commonwealth of Virginia (original exhibit)	3454	2718
Exhibit No. 189–A—Map accompanying exhibit No. 189, John Marshall report (original exhibit)	3478	2735
Exhibit No. 190—Series of maps entitled "New River Survey, 1872 and 1878" (original exhibit)	3478	2735
Exhibit No. 191—Kanawha Valley Power Company license for project #1175 W. Va., including London and Marmet Dams (original exhibit)	3478	2735
Exhibit No. 192—Views of pools, shoals, and rapids on New River between Hinton, West Virginia, and Narrows, Virginia—July 19–20, 1936 (original exhibit)	3478	2735
Exhibit No. 193—Views of pools, shoals, and rapids on New River between Narrows, mile 101.0, and Allisonia, mile 172.0—July 9–13, 1936 (original exhibit)	3478	2735
Exhibit No. 194—Photostat of the chart from automatic gage, at Caperton, W. Va., for period August 8 to August 21, inclusive (original exhibit)	3478	2735
Exhibit No. 195—Blueprint of the recording gage chart at Kanawha Falls, for period July 30 to August 24, inclusive, 1930 (original exhibit)	3478	2736
Exhibit No. 196—Profile of New River, N. C., W. Va. and Va. (original exhibit)	3479	2736
Exhibit No. 197—Map styled "Railroads" (original exhibit)	3481	2736
Exhibit No. 198—Map entitled "New River, Va. and W. Va., Navigation improvements between Hinton and Wilson Creek, 1877 to 1889" (original exhibit)	3482	2736
Exhibit No. 199—Load curve of the Appalachian Electric Power Co. for week ending November 3, 1935 (original exhibit)	3484	2736
Exhibits Nos. 200–200–B—3 prints, U. S. Eng. Office, Huntington, W. Va., showing navigation features (barge lift, log chute, etc.) for Bluestone reservoir project (original exhibits)	3486	2736

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 201—Map showing existing ferries below the mouth of Wilson Creek on New and Kanawha Rivers (original exhibit)	3486	2736
Exhibit No. 202—Map showing ferries in operation prior to 1935 (original exhibit)	3486	2737
Exhibit No. 203—Photograph album of ferries on New River (original exhibit)	3486	2737
Exhibit No. 204—Illustration showing how Radford project could affect operating results of Bluestone development (original exhibit)	3486	2737
Exhibit No. 205—Photograph taken to show or to determine the direct measurement thickness of sediment in Byllesby reservoir (original exhibit)	3486	2737
Exhibit No. 207—Sedimentation map of Washington Mills reservoir showing original and present contours (original exhibit)	3486	2737
Exhibit Nos. 208–209—Topographic maps of sections of Washington Mills reservoir showing conditions—April 17 and April 23, 1936—after break-down (original exhibits)	3486	2737
Exhibit No. 210—Cross sections showing profiles on two ranges across the Washington Mills reservoir as of 4/17, and again on 4/23, 1936 (original exhibit)	3487	2737
Exhibit No. 211—Columnar sections of borings through sediment of Washington Mills reservoir (original exhibit)	3487	2737
Exhibit No. 212—Sedimentation map of Byllesby reservoir (original exhibit)	3487	2738
Exhibit No. 213—Chart showing longitudinal profiles of Byllesby reservoir (original exhibit)	3487	2738
Exhibit No. 214—Map of Buck reservoir showing present shore line (original exhibit)	3487	2738
Exhibit Nos. 215–217, inclusive—Cross section showing original and present profiles of the Buck reservoir (original exhibits)	3488	2738
Exhibit Nos. 218–220, inclusive—Cross sections showing the original and present profiles of Fields Mfg. Co.'s reservoir (original exhibits)	3488	2738
Exhibit Nos. 221–221–E, inclusive—Charts of the Ohio River, Pittsburgh, Pa. to mouth showing topography and soundings (original exhibits)	3488	2738
Exhibit No. 223—Federal Power Commission, National Power Survey, Principal Generating Plants and Electric transmission lines, United States, 1935 (original exhibit)	3488	2738
Exhibit No. 225—1 page—"Energy transactions between Appalachian Electric Power Co. and interconnected systems, 1934	3490	2738

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 226—Chart—"Study showing operation of Radford with stream flow conditions, as of the week ending Sunday, November 2, 1930, based on load curve, shape proportional to system load reported by Appalachian Electric Co., for week ending November 3, 1935" (original exhibit)	3491	2739
Exhibit No. 227—Map—"Appalachian Electric Power Co., wave study, New and Kanawha Rivers, March 1930" (original exhibit)	3493	2739
Exhibit No. 228—Map—"New River and Kanawha River Power Waves, March 11 to April 3, 1930" (original exhibit)	3493	2740
Exhibit No. 229—Chart—"Automatic Gauge Records, London and Marmet June 15–19, 1936" (original exhibit)	3495	2740
Exhibit No. 229–A—Corrected Exhibit No. 229 (original exhibit)	3495	2740
Exhibit No. 230—Profile of London, Marmet, and Dam No. 6 pools for June 16, 1936 (original exhibit)	3495	2740
Exhibit No. 230–A—Corrected Exhibit No. 230 (original exhibit)	3495	2740
Exhibit No. 231—Letter dated March 1, 1928, Curtis, Mallet-Prevost, Colt, & Mosle to Federal Power Commission, re Project No. 739, A. E. P. Co. (original exhibit)	3495	2740
Exhibit No. 232—Executive Order of the President authorizing the construction of the Bluestone reservoir project on New River (original exhibit)	3495	2740
Exhibit No. 233—Letter from Wm. W. Belknap, Secretary of War, in answer to the resolution of the House, on February 3, 1871, House Document No. 110, concerning James River and Kanawha Canal (original exhibit)	3495	2740
Exhibit No. 234—"The Congressional Globe"—1873, page 204 and page 206, adoption of resolution offered by Senator Windom (original exhibit)	3495	2740
Exhibit No. 235—"Journal of the House of Delegates of the State of West Virginia for the 11th Session, 1872–3" re James River and Kanawha Canal (original exhibit)	3495	2741
Exhibit No. 236—Report of the Committee of the House of Representatives, containing report No. 76 of the 3rd session of the 42nd Congress, re James River & Kanawha Canal (original exhibit)	3496	2741
Exhibit No. 237—"Congressional Record," Special Session of the Senate of the United States, March 4 to 26, 1873, Volume #1, re James River and Kanawha Canal (original exhibit)	3496	2741

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 238—Report of Major Craighill with report of Engineers Hutton and Harris, "James River and Kanawha Canal, United States Engineer Office, Baltimore, Md., April 11, 1873" (original exhibit)	3496	2741
Exhibit No. 239—Letter from Senator Davis, of the State of West Virginia, to Sec. of War, W. W. Belknap, dated November 12, 1873, re James River and Kanawha Canal [omitted in printing]	3497	2741
Exhibit No. 240—Report of the Board of Engineers of March 18, 1874, on the James River and Kanawha Canal [omitted in printing]	3499	2741
Exhibit No. 241—Report 307, Part 1, Senate, 43rd Congress, 1st Session, "Select committee on transportation routes to the seaboard, April 24, 1874" (original exhibit)	3565	2741
Exhibit No. 242—Photostatic copy of four pages from "Congressional Record," year 1874, re James River & Kanawha Canal (original exhibit)	3565	2741
Exhibit No. 243—Statutes at large, Volume 18, Part 3, Page 237, etc., re Act passed June 23, 1874, chapter 457, for estimates and surveys on transportation routes to the seaboard (original exhibit)	3565	2742
Exhibit No. 244—Report of Major Craighill, Corps of Engineers, U. S. A., entitled "Third Subdivision of the Central Transportation Route, January 13, 1875" (original exhibit)	3565	2742
Exhibit No. 245—Letter (pp. 54–57 printed herein) from the Sec. of War, etc., Senate Document No. 15, 44th Congress, 2nd Session, containing the reports of Major Craighill and Brig. Gen. Humphreys, Nov. 10, 1876 (original exhibit)	3567	2742
Exhibit No. 246—U. S. G. S. Report No. 20, the Whitetop Area, Virginia-Tennessee (original exhibit)	3575	2748
Exhibit No. 247—Photostatic copy of hearing before Major H. M. Trippe, re Diversion of New River to N. C. Jan. 13, 1925 (original exhibit)	3575	2749
Exhibit No. 248—Copy of letter addressed to the Hon. R. J. Noell, East Radford, Va., and signed by R. J. Holden, Professor of Geology, dated March 4, 1936 (original exhibit)	3575	2749
Exhibit Nos. 249–252, inclusive—"Aerial photos of certain reaches of New River, being Nos. 35, 58, 56, 57, in Government Exhibit No. 273" (original exhibits)	3575	2749
Exhibit No. 254—Letter dated November 14, 1927, to Major E. D. Ardery on "New River Development #6, Radford, Geological Examination," signed by F. W. Scheidenhelm (original exhibit)	3575	2749

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 255—Letter dated November 17, 1927, to Major E. D. Ardery from F. W. Scheidenhelm on "New River Development No. 6 (Radford), Geological Examination" (original exhibit)	3575	2749
Exhibit No. 256—Letter dated October 16, 1931, to Major Fred W. Herman from F. W. Scheidenhelm, pertaining to maintaining pool levels at dams 2, 3, and 4 on Kanawha River (original exhibit)	3575	2749
Exhibit No. 257—Letter dated September 18th, 1934, to Major John F. Conklin on subject of "Hydroelectric project of Appalachian Electric Power Company on New River near Radford, Va.," by F. W. Scheidenhelm (original exhibit)	3576	2749
Exhibit No. 258—Letter of April 2, 1936, to Major John F. Conklin on "Radford Hydro Project of Appalachian Electric Power Company, Capacity Curve of Reservoir," by F. W. Scheidenhelm (original exhibit)	3576	2749
Exhibit No. 259—Letter dated April 12, 1932, to Major Fred W. Herman, on New River Power Wave Study, by F. W. Scheidenhelm (original exhibit)	3576	2750
Exhibit No. 260—Letter dated April 20, 1932, to United States Engineer Department, signed by Daniel W. Mead and F. W. Scheidenhelm, re "New-Kanawha River Power Wave Study" (original exhibit)	3576	2750
Exhibit No. 261—Telegram dated December 10, 1930, addressed to F. E. Bonner, Executive Secretary, Federal Power Commission, sent by F. W. Scheidenhelm (original exhibit)	3576	2750
Exhibit No. 263—Letter signed by John F. Conklin, Lt. Col., Corps of Engineers, District Engineer, addressed to Kanawha Valley Power Company, "Kanawha River pool fluctuations resulting from operation of the Marmet and London hydroplants"	3576A	2750
Exhibit Nos. 264–A, B, C—Aerial photographs of New River from Hinton, W. Va. to Narrows, Va. (original exhibits)	3577	2752
Exhibit No. 265—Document on Report on Application for License, Federal Power Project No. 1175, West Virginia, to Chief of Engineers, U. S. Army, Washington, D. C., dated Feb. 24, 1932, at St. Louis, Mo. (changed to defense exhibit No. 525 as it was already in evidence) (original exhibit)	3577	2752

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 266—Dated March 12, 1932, informal comment upon the report of the United States Division Engineer at St. Louis, Feb. 24, 1932, on application of Kanawha Valley Power project No. 1175, West Virginia, by F. W. Scheidenhelm, consulting engineer for applicant (original exhibit)	3577	2752
Exhibit No. 271—Copy of protest to A. E. P. Co. against application of town of Galax, Va., for grant and loan from Government for construction of municipal hydro and diesel engine power plant and distribution system (original exhibit)	3577	2753
Exhibit No. 272—Letter dated April 9, 1932, from George Otis Smith to Mr. Thompson (original exhibit)	3578	2753
Exhibit No. 273—Book of aerial photographs of New River, W. Va., Va., and N. C. (original exhibit)	3578	2753
Exhibit No. 274—An Act approved May 6, 1887, incorporating the New River Steam Boat Company, and authorizing them to operate a steam boat on New River (original exhibit)	3578	2753
Exhibit No. 275—Act of February 3, 1888, of the General Assembly of Virginia, to authorize the Radford Land and Improvement Company to erect a dam across New River (original exhibit)	3578	2753
Defendant's exhibits:		
Exhibit Nos. 500–504—Discharge hydrographs, a wave study of New River (original exhibits)	3579	2753
Exhibit No. 505—Document dated May 9, 1927, New River Development Company—Record for minutes (original exhibit)	3579	2753
Exhibit No. 506—Copy of 7th Annual Report of the Federal Power Commission 1927 (original exhibit)	3579	2753
Exhibit No. 507—Gage recorder chart of Kanawha River at Kanawha Falls, W. Va., for the period July 6 to 13, 1936, incl. (original exhibit)	3579	2753
Exhibit No. 509—House Doc. No. 190, 70th Congress, 1st Session (original exhibit)	3579	2754
Exhibit No. 510—Letter dated Feb. 5, 1927 from Major H. M. Trippe to F. W. Scheidenhelm (original exhibit)	3579	2754
Exhibit No. 511—Letter dated February 4, 1927 from F. W. Scheidenhelm to Major H. M. Trippe (original exhibit)	3579	2754
Exhibit No. 512—House Doc. No. 91, 74th Congress, 1st Session (original exhibit) (same as exhibit 145, a part of which is set forth at fol. 3419 herein)	3579	2754
Exhibit No. 513—Chart—Power Waves on New and Kanawha Rivers (original exhibit)	3579	2754

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 514—Letter dated October 20, 1931, from F. B. Duis to F. W. Scheidenhelm re pool levels on Kanawha River (original exhibit)	3580	2754
Exhibits Nos. 515–517, inclusive—Photographs of certain sections of New River (original exhibits)	3580	2754
Exhibit No. 518—Dublin, Va., W. Va., U. S. G. S. Quadrangle sheet	3580A	2754
Exhibit No. 519—Scarborough's New Census Map of Virginia, West Virginia, Maryland, Delaware, and District of Columbia (original exhibit)	3580B	2754
Exhibit No. 520—Map entitled "The Middle Atlantic Group comprising Virginia, West Virginia, Maryland, Delaware, and District of Columbia," published by National Power Survey (original exhibit)	3580B	2755
Exhibit No. 521—Map of Virginia, Maryland, Delaware, and District of Columbia, published by National Map Co., Indianapolis, Indiana (original exhibit)	3580B	2755
Exhibit No. 522—Randall McNally Map of Virginia (original exhibit)	3580B	2755
Exhibit No. 523—Map entitled "Commonwealth of Virginia, State Highway System, State Highway Commission, July 1936" (original exhibit)	3580B	2755
Exhibit No. 524—Map of Giles County, Commonwealth of Virginia, Department of Highways, Richmond, Va. (original exhibit)	3580B	2755
Exhibit No. 525—Copy of a report on application for license, Federal Power Project No. 1175, W. Va., dated Feb. 24, 1932 (original exhibit)	3580B	2755
Exhibit No. 526—Photograph of Shumate Falls (original exhibit)	3581	2755
Exhibit No. 527—Map dated 11/21/1912. Reconnaissance Map of New River from Hinton, W. Va., to Radford, Va., compiled under direction of Major F. W. Alstaetter. (Same as original exhibit 558–G)	3581	2755
Exhibit No. 528—Report of Major Craighill, Corps of Engineers, U. S. A. dated April 17, 1891	3583	2755
Exhibit No. 529—Letter dated February 4, 1930, addressed to Federal Power Commission, signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle	3589	2760
Exhibit No. 530—Memorandum, re Federal Commission's authority to adopt a policy of issuing a minor part license for projects located on non-navigable streams and not involving the use of any land or other property of the United States, dated February 4, 1930	3589C	2762

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 531—Photostatic copy of letter dated July 21, 1930, addressed to Attorney General of United States and signed Patrick J. Hurley, Secretary of War	3589LL	2779
Exhibit No. 532—Document dated September 22, 1930, addressed to the President and signed by Wm. D. Mitchell, Attorney General. "The following opinion of the Attorney General was released by the Federal Power Commission, Sept. 26, 1930."	3589PP	2781
Exhibit No. 533—Letter of October 6, 1930, to Federal Power Commission signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle	3589YY	2787
Exhibit No. 534—Photostat copy of letter of October 16, 1930, to Federal Power Commission, signed—A. E. P. Co. by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3589ZZ	2788
Exhibit No. 535—Letter dated November 7, 1930, from War Department, Office of Chief of Engineers, to F. P. C. Exec. Secy. signed for Chief of Engineers by Major J. J. Kingman	3589AAA	2788
Exhibit No. 536—Letter dated October 31, 1930, from F. E. Bonner to A. E. P. Co. re Project No. 739 (original exhibit)	3589BBB	2789
Exhibit No. 537—Letter from F. P. C. to A. E. P. Co., dated November 6, 1930, signed by F. E. Bonner, Executive Secretary, and revised draft of minor-part license	3589CCC	2789
Exhibit No. 538—Photostatic copy of letter of November 8, 1930, to General Brown, Chief of Engineers, and signed by F. E. Bonner, Executive Secretary	3590	2790
Exhibit No. 539–A—Letter by Federal Power Commission of December 15, 1930, signed by F. E. Bonner, Executive Secretary to Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3590A	2795
Exhibit No. 539–B—"Inclosure 7992, from Federal Power Commission, U. S. Government Printing Office 1927." Marked copy. War Department office of Chief of Engineers, Washington, 11/11/1930, addressed to Federal Power Commission, signed "Lytle Brown, Major General, Chief of Engineers"	3592	2795
Exhibit No. 540–A—Letter dated 11/28/1930 from F. E. Bonner, Exec. Secy. of F. P. C. to A. E. P. Co. (original exhibit)	3593	2796
Exhibit No. 540–B—Certified copy of action of the Federal Power Commission upon application of the defendant for Minor Part license (original exhibit)	3593	2796

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 541—Memorandum dated October 28, 1930 for the Exec. Secy., signed M. C. Tyler, Lt. Col. Corps of Engineers, Chief of Engineers	3593A	2796
Exhibit No. 542—Copy of letter dated 11/8/1930 to F. E. Bonner from F. W. Scheidenhelm	3593L	2806
Exhibit No. 543—"Maneuvers of dams on Kanawha River during wave test, 1930" (original exhibit)	3593M	2806
Exhibit No. 544—"Report of Power Waves, New and Kanawha Rivers" (original exhibit)	3593M	2807
Exhibit No. 545—Location map	3593N	2806A
Exhibit No. 546—Certificate for W. R. Hundly, East Radford, Va. (omitted)	35930	2807
Exhibit No. 547—Four pages; namely, page 848 of the Congressional Record for January 10, 1901; page 1001 of the Congressional Record for January 14, 1901; page 1002 of the Congressional Record for January 14, 1901; and page 1096 of the Congressional Record for January 16, 1901	3595	2807
Exhibit No. 548—Map—"Railroads in relation to New River"	3603	2812A
Exhibit No. 549—Album of photographs (original exhibit)	3605	2813
Exhibit No. 550—Map "Geological Map of the New River, Cripple Creek region, showing the approximate location of ore openings and properties tributary to the Cripple Creek Extension of the Norfolk and Western Railroad, by E. N. D'In-Villiers, Geologist, 1887" (original exhibit)	3605	2813
Exhibit No. 551—Letter addressed to Dr. J. E. Williams, Dean at V. P. I., Blacksburg, Va., dated February 2, 1936, and signed by R. J. Noell (original exhibit)	3605	2813
Exhibit No. 552—Carbon copy of a letter dated March 2, 1926, addressed to Hon. R. J. Noell, East Radford, Virginia, and without signature except "Dean of the College" and bearing the initials "JEW" (original exhibit)	3605	2813
Exhibit No. 553—Letter dated March 4, 1936, from R. J. Holden, Professor, of Virginia Polytechnic Institute, Department of Geology, Blacksburg, Virginia, addressed to Hon. R. J. Noell, East Radford (original exhibit)	3605	2813
Exhibit No. 554—Album, together with the identification map and the 60 photographs of New River (original exhibit)	3605	2814
Exhibit No. 555—Map showing locations of photographs, and photographs Nos. 114 to 127, inclusive, of New River (original exhibit)	3605	2814

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original.	Print
Exhibit No. 556—Annual report of the President and Directors of the Board of Public Works to the General Assembly of Virginia, in pursuance of an act, entitled "An act creating a fund for internal improvements" (original exhibit)	3605	2814
Exhibit No. 557—Pages 140 and 141 of the Journal of the Virginia House of Delegates for 1817–18 containing a portion of the report of the House Committee on roads and inland navigation brought in on January 21, 1818 (original exhibit)	3605	2814
Exhibit Nos. 558–A–558–G—Map dated November 21, 1912, survey made by Major F. W. Alstaetter, Corps of Engineers. Sheets 1 to 7, inclusive, of the Alstaetter map dated November 21, 1912, marked, respectively, 558–A to 558–G (original exhibits)	3606	2814
Exhibit No. 559—Pages from the Report of the Chief of Engineers for 1875	3606–A	2814
Exhibit No. 560—Report of Chief of Engineers, 1887	3607	2823
Exhibit No. 561—Report of the Chief of Engineers for the year 1888, pages 225, 226, 1760, 1761 (original exhibit)	3612	2832
Exhibit No. 562—Report of the Chief of Engineers for the year 1889, pages 261, 262, 1961, and 1962 (original exhibit)	3612	2832
Exhibit No. 563—Report of the Chief of Engineers for the year 1890, pages 235, 236, 2249, 2250, 2251 (original exhibit)	3612	2832
Exhibit No. 564—Report of Brigadier General Casey, Chief of Engineers, United States Army, to the Secretary of War, dated November 16, 1894, to which is attached a third endorsement by Col. Craighill's underlying report, and also a second endorsement	3614	2832
Exhibit No. 565—Letter from the Secretary of War dated Dec. 16, 1903, transmitting letter from Chief of Engineers including report made by him on New River	3618	2835
Exhibit No. 566—Memorandum to the Secretary of War by Gen. Black, Chief of Engineers, dated May 19, 1916	3623	2840
Exhibit No. 567—Page 1284 of the Annual Reports of the Chief of Engineers of the War Department, year 1917 (original exhibit)	3634	2849
Exhibit No. 568—Copy of letter dated July 1, 1925, addressed to Mr. C. Bascom Slemp, and signed by O. C. Merrill, Executive Secretary of Federal Power Commission	3634–A	2849

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 569—Letter dated July 3, 1925, addressed to Honorable O. C. Merrill, Exec. Secy., F. P. C., Washington, D. C. and signed by C. B. Slemp (original exhibit)	3634-B	2850
Exhibit No. 570—Letter dated October 24, 1925, addressed to the Federal Power Commission, Washington, D. C., and signed by Curtis, Mallet-Prevost, Colt, and Mosle	3634-C	2850
Exhibit No. 571—Letter of October 24, 1925, addressed to Major General Harry Taylor, Chief of Engineers, War Department, Washington, D. C., signed by Curtis, Mallet-Prevost, Colt & Mosle, as counsel for the Appalachian Electric Power Co., or its predecessors	3634-D	2851
Exhibit No. 572—Report of Major General Taylor, Chief of Engineers, dated December 29th, 1925, addressed to the Executive Secretary of the Federal Power Commission, Washington, D. C. (text of this exhibit is same as Government Exhibit No. 97) (original exhibit)	3604-E	2851
Exhibit No. 573—"Defendant's Exhibit No. 505" identified by Col. Edgerton as a part of the minutes subsequently printed as the minutes of the meeting of June 1, 1927 (original exhibit)	3635	2851
Exhibit No. 574-A—Photostat of letter of July 1, 1927, from Federal Power Commission, addressed to Curtis, Mallet-Prevost, Colt & Mosle, signed by O. C. Merrill, Executive Secretary bearing reference "Ep-739-VA Appalachian Electric Power Company"	3635-A	2852
Exhibit No. 574-B—Certified copy of a part of the minutes of the 88th meeting of the Power Commission held on the first day of June 1927	3635-B	2852
Exhibit No. 574-C—"Federal Power Commission, Washington, D. C. License on Navigable Waters, Project No. 739, Virginia, Appalachian Electric Power Co." with it is a form of license consisting of 16 pages (original exhibit)	3635-C	2853
Exhibit No. 575—Letter dated March 1, 1928, to Hon. Dwight F. Davis, Secy. of War, Hon. Hubert Work, Secy. of Interior, Hon. Wm. N. Jardine, Secy. of Agriculture, constituting the Federal Power Commission, and signed A. E. P. Co., by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3635-D	2853
Exhibit No. 576—Letter dated March 5, 1930, to Lt. Col. M. C. Taylor, Chief Engineer, Federal Power Commission, Interior Building, Washington, D. C., and signed by F. W. Scheidenhelm (original exhibit)	3635-D	2854

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 577—Photostatic copies of pages 6, 7, 8, and 9, of the Tenth Annual Report of the Federal Power Commission for the year 1930	3635–E	2854
Exhibit No. 578–A—Letter dated October 3, 1930, to Gen. Brown, Chief of Engineers, and signed by F. E. Bonner, Exec. Secy. (original exhibit)	3636	2857
Exhibit No. 578–B—Letter dated October 10, 1930, to the Exec. Secy., F. P. C., Washington, D. C., signed for the Chief of Engineers, by Hugh J. Casey, First Lieut. Corps of Engineers (original exhibit)	3636	2857
Exhibit No. 579–A—Photostatic copy of letter dated November 5, 1930, to Exec. Secy., F. P. C. and signed by Lytle Brown, Major General, Chief of Engineers	3638	2857
Exhibit No. 579–B—Photostat of report entitled "Second endorsement U. S. E. O. Huntington, W. Va., Oct. 18, 1930, Div. Engineer, Upper Miss. Valley Division, St. Louis, Mo., signed by Major Herman, District Engineer."	3638	2857
Exhibit No. 579–C—Photostat copy of report on navigability of New River, Va. (Huntington District, August 29, 1930). Third endorsement office, Division Engineer, Upper Miss. Valley Div., St. Louis, Mo., October 24, 1930, to Chief of Engineers, U. S. Army, Washington, and signed George R. Spalding, Lt. Col. Corps of Engineers	3638	2857
Exhibit No. 580—Memorandum dated October 21, 1930, entitled "Memorandum for Exec. Secy." and signed by J. F. Lawson, acting Chief Counsel (original exhibit)	3647	2865
Exhibit No. 581—Document dated October 30, 1930, entitled "Memorandum for the Sec. of Int., Acting Chairman," and signed by F. E. Bonner, Exec. Sec	3647–A	2865
Exhibit No. 582—Photostatic copy of letter dated November 8, 1930, to Hon. John G. Pollard, Gov. of Va., and signed by F. E. Bonner, Exec. Sec	3647–C	2866
Exhibit No. 583—Photostat of letter from Hon. John Pollard, Gov. of Va., to Mr. F. E. Bonner, Exec. Sec., F. P. C., dated Nov. 10, 1930	3647–D	2867
Exhibit No. 584—Letter Jan. 27, 1931, from Curtis, Mallet-Prevost, Colt & Mosle to F. P. C. re Project #739 (original exhibit)	3647–E	2867
Exhibit No. 585—Telegram dated January 28, 1931, from F. P. C., signed by George Otis Smith, Chairman, addressed to A. E. P. Co. (original exhibit)	3647–E	2867
Exhibit No. 586—Photostat of letter dated September 18, 1934, to Sec. of War, Washington, D. C., and signed by A. E. P. Co., by George N. Tidd, President	3647–F	2868

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 587—Photostatic copy of letter dated October 9, 1934, to A. E. P. Co. and signed by G. H. Dern, Secy. of War	3647-I	2871
Exhibit No. 588—Letter dated October 18, 1934, to Hon. George H. Dern, Sec. of War, and signed by George N. Tidd, President A. E. P. Co.	3648	2871
Exhibit No. 589—Letter dated September 18, 1934, to Hon. Frank R. McNinch, Chairman, F. P. C., signed by Appalachian Electric Power Company, by George N. Tidd, President (original exhibit)	3648-B	2873
Exhibit No. 590—Letter dated October 19, 1934 to Frank R. McNinch, Chairman, F. P. C., without signature but counsel for both sides agreed that it was signed by I. F. Millikan, General Counsel of the Company (original exhibit)	3648-B	2873
Exhibit No. 591—Photostatic copy of letter to M. F. Millikan, American Gas and Electric Company, signed by G. W. Dineweaver, Secretary, Federal Power Commission, dated October 23, 1934 (original exhibit)	3648-B	2873
Exhibit No. 592—Map showing locations of certain photographs from 61 to 113, both inclusive, of New River (original exhibit)	3648-B	2873
Exhibit No. 593—Paper on which Prof. Thomas drew sketch of wave	3648-D	
Exhibit No. 594—Hydrograph representing a possible hydrograph of operation of the A. E. P. Co. plant during a rather severe peak load operation, showing the discharge from the plant in cubic feet per second at various hours of the day	3649	2874A
Exhibit No. 595—Chart showing a wave drawn during presentation of testimony of Prof. Thomas	3651	
Exhibit No. 596—Diagram of triangular wave prepared by Prof. Thomas	3651-A	2874B
Exhibit No. 597—Diagram by Prof. Thomas pertaining to principle of integrating model	3651-B	2874C
Exhibit No. 598—Diagram by Prof. Thomas showing reduction of Waves	3651-C	2874D
Exhibit No. 599—Chart upon which Dr. Mead made diagram in connection with his testimony, pertaining to stream flow (original exhibit)	3651-D	2874
Exhibit No. 600—Chart bearing legend, "Profile New and Kanawha Rivers to Forks of New River and North Carolina to Ohio River, showing existing and and proposed power developments"	3652	2874F

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 601—House Document No. 306, 74th Congress, First Session, entitled "Ohio River, letter from the Sec. of War transmitting, pursuant to Section 1 of the River and Harbor Act approved January 21, 1927, and Section 10 of the Flood Control Act, approved May 15, 1928, a letter from the Chief of Engineers, United States Army, dated August 14, 1935, submitting a report, together with accompanying papers and illustrations containing a general plan for the improvement of the Ohio River for the purposes of navigation and efficient development of its water power, the control of floods, and the needs of irrigation" (original exhibit)	3654	2874
Exhibit No. 602—This exhibit is the Table 45, Appendix A, referred to in the paragraph 263, page 146, of exhibit 601. The appendices to the reports otherwise embodied in House Document No. 306 (being exhibit 601) were not printed as part of that document (original exhibit)	3654–A	2874
Exhibit No. 603—Photostat of cover page of document entitled "The Ohio River Chart, drawings and description of features affecting navigation, navigable depths and tables of distances for its tributaries, compiled under the direction of the Chief of Engineers, United States Army," and also photostat of page 267 of that document (original exhibit)	3654–B	2874
Exhibit No. 604—Copy of letter dated June 13, 1936, from Mr. Baker to the late Sec. of War, Mr. Dern (original exhibit)	3654–C	2874
Exhibit No. 605—Reply of S. D. Embick, Acting Secretary of War, to Mr. Baker, dated June 22, 1936 (original exhibit)	3654–C	2874
Exhibit No. 606—Letter dated June 26, 1936, from Hon. John Paul to Secretary of War (original exhibit)	3654–C	2875
Exhibit No. 607—Letter dated July 17, 1936, to the Hon. John Paul, from Mr. Woodring, Acting Sec. of War (original exhibit)	3654–C	2875
Exhibit No. 608—Letter dated June 26, 1936, from Col. Conklin, addressed to the Kanawha Valley Power Company (original exhibit)	3655	2875
Exhibit No. 609—Letter dated July 10, 1936, to U. S. District Engineer Office, Huntington, W. Va., signed by Kanawha Valley Power Company, Graham Claytor, Vice President, subject "Kanawha River Pool Fluctuations resulting from operation of the Marmet and London Hydroplants"	3655–A	2875

Record from D. C. U. S., etc.—Continued.

	Original	Print
Defendant's exhibits—Continued.		
Exhibit No. 610—Letter dated July 28, 1936, from the War Dept., United States Engineer Office, Huntington, W. Va., addressed to Col. F. W. Scheidenhelm, and signed by John F. Conklin, Lt. Col., Corps of Engineers, District Engineer (original exhibit)	3655-C	2877
Exhibit No. 611—Executive Order No. 6251, dated Aug. 19, 1933 (set forth in full at fol. 2900 hereof)	3655-D	2877
Memorandum required by Rule 14, Section 7	3656	2877
Clerk's certificate [omitted in printing]	3657	
Proceedings in the United States Circuit Court of Appeals for the Fourth Circuit	3658	2878
Docket entries	3658	2878
Appearance for appellee	3658	2878
Appearance for appellant	3658	2878
Argument of cause	3660	2880
Opinion, Chesnut, J	3661	2880
Dissenting Opinion, Parker, J	3718	2922
Decree	3745	2943
Order staying mandate	3745	2943
Order as to use of original transcript of record	3747	2944
Clerk's certificate [omitted in printing]	3748	2944
Order allowing certiorari	3749	2944
Stipulation as to printing of record	3750	2945

8

H. G. Gerdes—Continued

Redirect examination by Mr. Thompson:

Q. Mr. Gerdes, on yesterday on cross-examination I believe you testified that there were some large variations in stream flow at the time you were on the river making your investigation. Will you please give us in second feet the stream variation there?

A. During the period I was on the river the stream flow at Eggleston, for instance, ranged from 1,480 to 2,530 second-feet which was a variation of 1,050 second-feet or about 70 percent. This amounted to 7/10 of a foot change in depth on the Eggleston gage.

Q. Would 7/10 of a foot make any difference in going over these bars?

A. Oh, yes; that 7/10 of a foot obviously is a very large increase over two feet, for instance.

1190 Q. What caused these variations?

A. These were caused by power waves from the Buck and Byllesby Power Plants. The 7/10 of a foot which occurred during the June week I was on the river is not the largest change or fluctuation. For instance, I noticed on the automatic gage record that on June 13th there was a fluctuation of over one foot. There may be still other larger fluctuations. These were picked more or less at random.

Q. Do you know whether these power waves diminish the controlling depths in the section that you described below the natural flow?

A. Yes; they do.

Q. Yesterday Mr. Jackson asked you about your pushing a boat over Bull Falls and some other places. I believe there were about five of them, weren't there, or something like that?

A. That is right.

Q. Will you tell the court what depths that boat drew?

The Court. Five boats or five people or five falls?

Mr. Jackson. Five falls.

A. This boat drew from two and one-half to three feet of water.

By Mr. Thompson:

Q. Explain how that was?

A. That was an Engineer Department survey boat equipped with an outboard motor, which, when the boat was in motion, drew from two and one-half to three feet of water.

Q. Did that motor strike the ground at all?

A. Yes; that was the principal cause of our pulling the boat up through these rapids. The outboard motor, as is common with outboard motors, had an unprotected propeller sticking down behind the boat. The river was quite muddy, as it ordinarily is, and in going up these rapids a number of times we hit shoal spots with the propeller and that slowed up our progress and caused us to decide in these several instances that the most direct way to proceed was to pull the boat up through the remainder of those rapids.

Q. Did you know that detectives or spies were following you up the river?

A. Yes; we did.

By Mr. JACKSON. We have had no evidence yet that any detectives or spies were following him. As far as they know there may have been frankness on the part of Government representatives.

By Mr. THOMPSON:

Q. You saw men following you up the river, didn't you?

1191 A. Yes, sir.

Q. You actually took photographs of them, didn't you?

A. Yes, sir.

Q. When you drew the boat through these places that you speak of, state what you did by way of report?

A. We took photographic——

Q. Did you report the fact to me?

A. Yes, I did.

Q. What did you do with the boat?

A. I went back to Hinton and changed the rig on the boat, put a guard under the propeller and then went back up the river.

Q. What would that guard do with respect to the propeller?

A. That was so situated that it would strike shoal ground before the propeller and protect the propeller.

Q. Is that a crude way of a modern method of constructing boats that go through water depths of this kind?

A. Yes, sir; that was an adaptation which, added to this boat and outboard motor combination, converted it into the rough equivalent of a boat built with a propeller guard for shallow draft navigation.

Q. It is a fact, isn't it, that they do build boats now going over waters of this type so that the propeller is above the bottom of the boat?

A. That is correct. I have used such boats in my work.

Q. You fixed this boat up in a crude way, following that idea?

A. I did.

Q. Then what did you do?

A. I took this boat out to Bull Falls Ferry and run it down through the falls and then turned around and ran it up through the falls.

Q. Were there any detectives watching you at the time?

A. I didn't notice any the second time.

1192 Q. Did you have any trouble going up through Bull Falls?

A. Not the slightest bit.

Q. I hand you marked for identification Government Exhibit No. 148 and ask you what it is?

A. This is a photograph of the stern of the boat we used showing the motor and the propeller guard which were attached.

Q. What was the propeller guard?

A. It consisted of planks set on edge under the stern of the boat to form a so-called skeg which is standard equipment in shallow draft boats, and an iron bar extending under the propeller which also is a replica of a skeg common on a shallow draft boat.

Q. What is a skeg?

A. It is a timber and steel projection extending under the after end of a boat intended for use in shallow water which acts as a propeller guard, protecting it from striking the bottom.

Q. From what angle did you take that picture?

A. This was taken from a position about two feet off the ground, looking up under the stern of the boat.

Q. For what purpose did you take it that way?

A. In order to show the under side of the boat and the propeller guard to the best advantage.

(Exhibit 148 offered in evidence.)

Q. I hand you a photograph marked for identification Government Exhibit No. 149 and ask you if you know what it is?

A. I do.

Q. What is that?

A. That is a picture of the boat and crew approaching the lower end of Bull Falls.

Q. How many were in that boat?

A. Four men.

By Mr. Jackson:

Q. On what date was that?

A. That was last Monday, the 27th of July.

By Mr. Thompson:

Q. I hand you for identification Government Exhibit No. 150 and ask you what that is? 1193

A. This is a photograph of the boat and crew ascending Bull Falls at about the middle of the falls.

By Mr. Jackson:

Q. On what date was that taken?

A. The same day, July 27th.

(Exhibit 150 offered in evidence.)

Q. I hand you for identification Government Exhibit No. 151 and ask you what it is?

A. That is a photograph of the same boat and crew at the head of Bull Falls, just after having climbed up the rapid.

(Exhibit 151 offered in evidence.)

Q. I hand you, marked for identification, Government Exhibit 152 and ask you what that is, if you know?

A. That is a photograph of a negro boy poling his boat up Bull Falls.

Q. And that boy poled the boat up Bull Falls, did he?

A. He did.

By Mr. Jackson:

Q. When was that taken?

A. July 27th, 1936.

(Exhibit 152 offered in evidence.)

By Mr. Thompson:

Q. I hand you, marked for identification, Government Exhibit No. 153 and ask you what it is?

A. That is a photograph of the same negro boy just as he completed poling his boat up Bull Falls.

(Exhibit 153 offered in evidence.)

Q. I hand you, marked for identification, Government Exhibit No. 154 and ask you what that is?

A. That is a photograph of the same negro boy riding his boat down Bull Falls.

(Exhibit 154 offered in evidence.)

Q. Do you know any reason why you couldn't, from your experience on this river, propel a boat of that type with that protection through the shoals and shallow parts and pools of this river from Hinton north?

A. I do not.

Q. Hinton upstream, I should say.

A. I do not.

1194 Recross-examination by Mr. Jackson:

Q. You testified on your redirect, Mr. Gerdes, that there was a variation in gage heights by reason of waves from power dams on the river at the time you made this so-called examination survey; is that right?

A. That is right.

Q. Did you measure your depths at the top of those waves or at the trough?

A. The depths were measured at the time that I visited these shoals.

Q. And from that it follows that a good many of them are measured on the peak of these waves, doesn't it?

A. From that it would follow that the measurements were approximately equally distributed over all phases of these waves. Some were at the peak, some were at the trough and some were in the intermediate ascending and descending portions.

Q. I don't know that that follows, but the question I am asking you is—isn't it a fact that you made a good many measurements on these shoals at the peaks of these so-called waves?

A. In answer I would say that probably some of these measurements were made at the peak of certain of these waves; however, no more at the peak than at any other particular phase of these waves.

Q. Isn't it a fact that I could ask you to turn to any one of your measurements on a particular shoal and you couldn't tell me whether it was made at the peak of the wave or not?

A. No, sir; that is not a fact.

Q. You could tell me?

A. Yes.

Q. Turn to 13 and tell me whether it was made at the peak or not and tell me the hour of the day it was made?

A. Shoal No. 13 was visited at about 9:50 A. M. on July 14th, 1936.

Q. Do you know whether that was the time of peak flow or not at that particular point?

A. At that time at Shoal No. 13 there was passing a low crest.

1195 Q. How do you know that?

A. From the automatic recording gage charts.

Q. Is there any automatic recording gage at Shoal 13?

A. No; but there was at Eggleston.

Q. How far away was that?

(Discussion.)

Q. Can you answer the question and say how far that shoal 13 is from Eggleston gage?

A. Eggleston gage is at Mile 120.4 on the river and Shoal No. 13 is at Mile 109.3 which is 11.1 miles downstream.

Q. You said that you made this trip in a boat on this river on July 19th and that you were followed by some detectives; is that right—spies or detectives?

A. I believe some such.

Q. Well, as far as you know, they may have been G-men or Treasury agents or agents of the P. W. A. or W. P. A. or Triple A or some other governmental arm, may they not?

A. Well, that is possible, but not at all probable.

Q. You mean that those agencies haven't had any detectives?

A. These fellows didn't exactly conform to my idea of G-men.

Q. You didn't identify any of them?

A. Oh, yes; I knew who they were.

Q. Who were they?

A. You would like their names?

Q. Yes.

A. A former railroad brakeman and river boatman, now turned farmer, named Bud Lilly, was one of them. The other fellow was a local farmer on the river, I think at Indian Bottom. I wouldn't swear at which of the bottoms he is located—named Billy Harmon.

Q. Don't you think the very circumstances of local farmers along the river seeing three or four fellows out trying to run through Bull Falls was enough to excite their interest and bring them out to watch to see what those fellows could possibly be trying to do?

1196 A. Well, of course, curiosity undoubtedly does a lot of things, but when two men and an automobile truck follow you along for two days, that is kind of stretching curiosity right out of the picture, particularly when they get up at six o'clock in the morning to do that.

Q. So you were two days trying to get up through those falls, walking through the falls?

A. We were two days covering the section of the river. I will say we were a day and a half covering the section of the river between Hinton and the Narrows.

Q. Mr. Gerdes, how long was this boat that you took out on the river?

A. Sixteen feet.

Q. And how wide was it?

A. Five feet.

Q. You are sure it wasn't four feet?

A. Yes, sir.

Q. You think it was as large as sixteen by five feet?

A. Yes. You might ask how I knew that.

Q. If you are anxious to tell me, you can volunteer it. I am willing to take your statement.

A. (No response.)

Q. You said that the river was muddy. Had there been a rain?

A. I don't recall the date of the last previous rain. New River is ordinarily rather muddy. It gets muddier after a rain and then gradually clears up until the next rain, usually more or less turbid.

Q. Isn't New River pretty clear in dry weather?

A. Not during the periods when I was on the river. It clears up rather slowly, because the country through which it flows is evidently silty and the turbidity persists for a considerable time.

Q. Had there been any recent rains at all when you went through there?

A. Yes; there was—of course, I am not trying to give the meteorological statistics (you can get them from the
1197 Weather Bureau) but, as I recall it, there was a considerable rain the night before we made—no, there was a considerable rain on Saturday night which was a day and a half before we made this trip.

Q. That is the reason you selected the time to make the trip, wasn't it?

A. No, the reason I selected that time was because that was when I was at Hinton.

Q. You went to Hinton, of course, for the purpose of making the trip, didn't you?

A. That is right.

Q. So you had that time under your control, didn't you?

A. It rained after I got to Hinton, so that would be arguing a considerable degree of cooperation with the Almighty.

Q. I thought perhaps you relied on the Weather Bureau forecasts. Did you get the stream flow on the gage when you were there trying to run over Bull Falls on that day?

A. No, sir; I didn't.

Q. You didn't do that?

A. I can figure it up here now if you want it. No; I haven't got that chart. However, if you would care for it, I will say that the flow was not remarkably different from what it had been a few weeks previous.

Q. I wouldn't care for that as well as I would a record of what the flow actually was, the gage height. Were there any waves in the river the day you were there?

A. I didn't observe the shore line with that in mind, but I presume that the power waves were coming down the river as they apparently do.

Q. Didn't you try to go over the falls on the crest of one of those waves?

A. No, sir. The time I went over the falls was fixed by the time when the preparation of the boat was complete.

Q. And how many days preparation did you make before you made this attempt?

1198 A. Half a day.

Q. Didn't you tell me last evening that in your judgment the reason you couldn't get over the falls on the 19th was because you didn't have power enough?

A. That was correct. That was one of the reasons.

Q. But this morning you have given another reason, haven't you?

A. That is also correct.

Q. You didn't think of that yesterday?

A. No, sir.

Q. It wasn't very strong in your mind as a reason?

(Discussion.)

Q. What time of day was it when you went over Bull Falls?

A. About 7 o'clock in the evening.

Q. On the 27th?

A. Right.

Q. That was Monday evening?

A. That is right.

Q. You went to Hinton Saturday night, didn't you?

A. That is right.

Q. And you got over the falls by 7 o'clock Monday evening?

A. That is right.

Q. In a 16-foot boat?

A. That is right.

Q. Do you know where the channel is at Bull Falls?

A. I think I do now fairly well.

Q. Did you go over in the channel on the 27th?

A. To the best of my knowledge, we did.

Q. Where did you go over it with reference to the shores?

A. Near the right bank.

Q. Looking down stream?

A. That is right.

Q. Mr. Gerdes, will you look at your Exhibit 149 and tell me whether you and your party are not wearing life preservers?

1199 A. That is correct. Life jackets are required by Engineer Department regulations.

Q. Well, however that may be, when you made this experimental trip over Bull Falls in a 16 foot boat, you and all of your party were wearing life preservers, wheren't you?

A. That was required by the regulations with which we complied.

Q. Did you wear life preservers when you were making your measurements on the examination survey?

A. No; I did not. I might also add it was 7 o'clock in the evening and it is customary to wear life jackets about that time because it is cool. During the day the regulations are sometimes not observed.

Q. Whether you were cold or not, you wore the life jackets when you went on the river on the 27th, didn't you?

A. That is shown by the photographs.

Q. You have produced some photographs of a negro boy in some sort of a boat. Did you hire him to make this trip?

A. No; I did not.

Q. He made this trip for nothing?

A. That is right. He just happened to be going by while we were out there and the photographer took his picture.

Q. Just an accident?

A. That is right.

Q. And he was going up and down Bull Falls?

A. Yes, sir.

Q. Just playing?

A. Apparently so.

Q. What size boat is that that the negro boy was in?

A. I didn't measure it. You will have to judge from the photograph.

Q. Well, with your experience with boats, having the benefit of having seen it, don't you know that is nothing but a little rowboat?

A. It is a rowboat.

1200 Q. And he is poling?

A. That is right. However, we were discussing earlier the velocity of Bull Falls and I thought that might be interesting in that connection. You can substitute "fierceness" for "velocity" if you like.

Q. Exhibit 154—isn't that typical of pictures of shooting rapids that we see from time to time, especially of skilled Indians and the like, who having negotiated some certain very wild rivers break into the rotogravure pictures on that basis.

A. No; I wouldn't say so. If you think that the farmers along the river fall in that category, I am afraid I can't agree with you.

Q. You are not trying to testify that this boy in this boat is typical of the farmers along the river, are you?

A. Yes; I am.

Q. Are they all negroes?

A. No; but a good many of them have boats and several of them told about various trips that they had made up and down Bull Falls. One fellow living at the ferry there told us he had gone down the falls in a little ten-foot tin boat.

Q. Don't tell us what your hearsay is.

Mr. **Thompson**. You asked and he is testifying. Let him finish his answer.

Mr. **Jackson**. I didn't ask him. The witness is a little too anxious.

By Mr. **Jackson**:

Q. I address your attention to Exhibit 154. Does that show that a Negro boy is bringing his little rowboat down against the bank?

A. He is rather closer to the nearer bank than he is to the middle.

Q. You think that is a fair description of his position, that he is rather closer the nearer bank than he is the middle?

(Discussion.)

Q. Why is he in so close to the bank, if you know?

A. Well, I don't know that I could read his mind. Presumably he did that because he felt that way about it.

Q. You don't think the current had anything to do with that?

A. I have no doubt that it did.

Q. You don't think he was trying to get out of the swift part as far as he could?

1201 A. He chose the best place for his boat just as I chose the best place for my boat when I passed that rapids.

Q. That is in order to avoid the currents, as far as possible?

A. Well, his boat had a considerable less draft than mine and he chose the slowest current consistent with the draft of his boat just as I did with my boat when I went through.

Q. What was the draft of the negro's boat, do you know?

A. I don't know.

Q. Do you think it would be as much as four inches?

A. Yes.

Q. It wouldn't be more than that, would it?

A. Yes; I think it would.

Q. Five?

A. If you want me to guess, I will say between six inches and a foot.

By Mr. THOMPSON:

Q. Did you ever see this negro before?

A. No, sir.

Q. Did you hire the negro?

A. No, sir.

Q. Was it or not purely accidental that he was there?

A. Purely a coincidence.

Q. And did he go through by himself or did he have some assistance from anybody?

A. He went through all alone.

Q. And when he came down through he came down through the center, didn't he, or close to the center?

A. He was rather closer to the right bank as shown in the photograph.

Q. Did the negro have a life preserver on?

A. No, sir.

By Mr. JACKSON:

Q. When you say he is rather closer to the right bank than the center, you think, you refer to Exhibit 154. I just want to get how much reliance is to be placed on your educated eye with refererice to judging distances and water conditions. Exhibit 152, I think will help us.

1202 A. When you asked me that question before, you showed me a different photograph.

Q. Look at that one. You still say he is rather closer to the right bank than the middle?

A. Why in this photograph, which is different from the other one, may I again say for the record he is right close to the right bank. He is going upstream in this picture.

Q. And Exhibit 154 is the one which, casting your eye over it, you say you think perhaps he is rather closer to the bank than he is the center?

A. That is right. He is not right up against the shore in this picture, No. 154.

Q. I should say your statement is conservative.

1203 **COL. LEWIS H. WATKINS**

Direct examination by Mr. THOMPSON:

Q. Colonel, will you please state your name?

A. I am Col. Lewis H. Watkins, Corps of Engineers, United States Army. I am 54 years old and I am residing in Washington, D. C. I am a commissioned officer in the Corps of Engineers, United States Army, now engaged on duty on the War Department General Staff.

Q. What training have you had, Colonel, as an engineer?

A. I graduated from the United States Military Academy at West Point, New York, in the class of 1907. I have had twenty-nine years service in the Corps of Engineers, United States Army. Immediately after graduation I was on duty in surveys for land defense projects involving the construction of topographic maps, the layout of fortifications, estimates of cost, labor and material. I graduated from the Army Engineers School at Washington Barracks in 1913. Immediately thereafter I was on duty in the United States Engineer Office at Washington, D. C., which had charge not only of river and harbor work, but also of the water supply of the District of Columbia, the reclamation of Anacostia flats and the maintenance of fortifications for the defense of Washington.

In 1914–15 I was on duty on a survey for a proposed waterway from Toledo to Chicago, which involved the preparation of plans, estimates of cost for two alternate waterways, each with an estimated cost of approximately $150,000,000.

I graduated from the Army Field Engineers School at Fort Leavenworth, Kansas, in 1916. Immediately thereafter I was assigned to duty as District Engineer in charge of possible railway operations from Brownsville, Texas to Mexico City, Mexico; later as District Engineer, Brownsville District, and in charge of the Engineer Depot.

1204 During the World War I was ordered to France in the fall of 1917 to duty on the General Staff of the American Forces in France. Later when the 1st Army was organized I was assigned to duty as the Assistant Chief of Staff of the 1st Army. After the World War I was on duty for a short time in the office of the Chief Engineers, then as instructor at the Command and General Staff School at Fort Leavenworth.

I graduated from the Army War College in 1925 and from the Naval War College in 1926. Immediately thereafter I was assigned to duty in charge of the United States District Engineer office at Chattanooga, Tennessee, and in addition thereto as the United States District Engineer Officer at Nashville, Tennessee, and a little later, in addition thereto, as the United States District Engineer Officer at Florence, Alabama. I remained on that duty until 1931 when I was ordered to duty in command of Fort duPont, Delaware, and of the 1st Engineer Regiment of the United States Army. I was assigned to my present duty in 1934.

Q. What were your duties on your assignment at Chattanooga?

A. I was in charge of the construction, operation, and maintenance of existing projects on the Tennessee River and its tributaries and on the Cumberland River and its tributaries. I was in charge of the operation and maintenance of the power plant at Wilson Dam. I was in charge of the investigation and reports upon Declaration of Intention, and applications for permits for power projects on the Tennessee River and its tributaries, and on the Cumberland River and its tributaries. I had charge of the survey of the Tennessee River and its tributaries, and of a preliminary examination of the Cumberland River and its tributaries, for their development for navigation, and for the prosecution of plans therefor in combination with the most effective development of the river for flood control, power, and other public beneficial uses.

1205 Q. During your detail at Chattanooga, or immediately prior thereto, do you recall any legislation that Congress passed relative to navigable streams of the United States, and their tributaries?

A. I remember in particular the Act of 1925 and the Acts of 1927 and 1928.

(Exhibit 155, being photostatic copy of pages 1 to 6, House Document 308, 69th Congress, First Session 1926 was offered in evidence over defendant's objection and stricken by the court.)

Q. State if you ever had anything to do with the making of a 308 report on the Tennessee River and its tributaries?

A. I had charge of the survey of the Tennessee River and its tributaries, in conformity with the policy of the Federal Government, for the preparation of plans for the development of our water-ways, and their navigable tributaries for navigation, and for the prosecution of those plans for the development of navigation in conformity with the most efficient development of power, flood control, and other public beneficial uses.

Q. Did you have anything to do with the making of the report?

A. As I stated, I prepared the survey and report.

Q. What became of that report?

A. I took charge of the survey in 1926. I submitted a preliminary report in December 1927. This was forwarded through the Division Engineer to the Chief of Engineers. A complete and final report was forwarded in March 1929.

A. I was going on with it anyway. I was not through. The report was forwarded and approved by the Division Engineer and by the President of the Mississippi River Commission, with suggestions that the project be limited to a smaller extent than that recommended in the report. It was approved by the Board of Engineers for Rivers and Harbors and by the Chief of Engineers and forwarded to the Secretary of War in 1930, 1206 March, I believe. It was forwarded by him to Congress. The project recommended in the report was adopted by Congress.

By Mr. **Jackson**. I object to this statement of the witness. It is irrelevant and immaterial and not part of his qualifications, what Congress did.

By Mr. **Thompson**. It shows he reported it and the project was adopted by everyone and approved by Congress, and upon which Congress voted money.

By Mr. **Jackson**. There will be lots of questions about that if that is made an issue in this case, we might spend weeks on that question, whether it was approved by Congress or what was done, and it seems to me no part of his qualifications, but an attempt to bring in this case something incompetent.

By the **Court**. He made a recommendation approved by his Chief and adopted by Congress. I think that is all right.

By Mr. **Jackson**. Exception.

Q. During your service in the corps of engineers, have you had any actual experience in the improvement and maintenance or in opening channels of rivers for navigation?

A. For five years I had charge of the construction, operation, and maintenance of the existing projects for navigation on the Tennessee River, the most of which were open river navigation.

For three years I had charge of the construction, operation, and maintenance of the existing project for navigation on the Cumberland River, the upper part of which was open river navigation.

While in charge of the Chattanooga District I reviewed and I modified, when necessary, all of the contemplated projects for open river improvements of the whole of the Tennessee River from its mouth to Knoxville, and I did a considerable amount of work in constructing those open river improvements for navigation.

Q. State whether or not you have had any experience in the operation and maintenance of Locks and Dams for navigation?

A. For five years I had charge of Locks and Dams on the Tennessee River, of which there were seven locks and four dams. For three years I had charge of locks and dams on the Cumberland River of which there were about 15 locks and dams.

Q. State whether or not you have had any actual experience in surveys including the preparation of plans for improving waterways by open channel improvements and by locks and dams?

A. The survey of the proposed Lake Erie-Lake Michigan Waterway; the survey of the Tennessee River and its tributaries, and the preliminary examination of the Cumberland River and its tributaries, all considered both open channel improvements and improvements by locks and dams.

Q. Have you had any personal experience in the navigation and inspection of navigable waterways improved by open channel methods and by Locks and Dams?

1207 A. A number of times. I personally navigated and inspected the whole of the Tennessee River from its mouth to Knoxville; the whole of the Cumberland River from Burnside, Kentucky, to its mouth. I inspected the Mississippi River from St. Louis to New Orleans with the President of the Mississippi River Commission and all his District Engineers, we went over and examined practically all of the works of improvement and we discussed them. I inspected all of the locks and dams on the Ohio River from Cincinnati to its mouth, and a number of them several times with the Division Engineer and the District Engineer.

Q. Are you familiar with commerce which may use the waterways with open channel improvements and locks and dams?

A. I am very familiar with commerce which may use the waterways, from a most thorough study of commerce which may use waterways, the survey of the Tennessee River, and also of the Lake Erie-Lake Michigan Waterway. During the inspection trips and navigation trips, to which I have previously referred, I had an excellent opportunity to actually observe boats that were on the river and the freight they were carrying and the difficulties they encountered.

In my personal navigation of the rivers I obtained a very clear idea of the difficulties which they encountered.

Q. State whether or not you were detailed to make an investigation of the Kanawha and New Rivers at any time?

A. In the summer of 1935, I received instructions from the Chief of Engineers, which required me to report to the Attorney General in connection with the Radford case. I reported to Mr. Thompson and he requested me to make such personal inspections of the river, and such studies of same as was necessary to collect information and engineering data necessary to determine the navigability of the New River, and the effects which the Radford
1208 project would or could have upon navigation and interstate commerce.

Q. Since you were detailed, state whether or not you have made any studies of the New and Kanawha Rivers?

A. In conformity with the request of Mr. Thompson, I have twice inspected New River all the way from its mouth to the mouth of Kanawha, as thoroughly as could readily be done by automobile and train.

Q. You stated "New River from its mouth, to the mouth of the Kanawha". Is that right?

A. From the mouth of Wilson Creek to the mouth of Kanawha River. This included observations of the river at many points, inspection of each dam and power project on the New River, and of each dam and power project and locks in connection therewith of the new dams and some of the old dams on Kanawha River.

It also included an inspection of the proposed site of the Radford project, of the Bluestone project, Sandstone Project and many other possible potential projects on the New and the Greenbrier Rivers.

Q. What else did you do, if anything, in making that study?

A. I also read the brief in this case in former law suits, and the Court's decisions.

I also read reports on file in the office of the Chief of Engineers and reports of other officials, including the report of Chief Justice Marshall, in 1912, and the report of Moore and Briggs in 1819.

Q. You stated you read the report of Chief Justice Marshall made in 1912; it should be 1812, should it not?

A. Yes. I also read a number of reports by Major Craighill, Corps of Engineers and his assistants, in 1872 to 1879. I also read the reports of the Chief of Engineers from 1872 to 1902 and the report of Major Alstaetter of Corps and Engineers in 1912.

1209 These reports, when taken together, have large scale hydrographic maps which show the depth of the river. They also contain written detail descriptions giving engineering data on practically every pool and shoal in the entire river, from the mouth of Wilson Creek to the mouth of Kanawha.

They also contained plans prepared by these officers of the corps of engineers, Major Craighill and his assistants, for the improvement of the whole of New River, from the mouth of Wilson Creek to Kanawha River, by open river improvements, supplemented by locks and dams in the worst places.

They also contain information on works of improvement which were actually carried out by the Federal Government for the improvement of the River for navigation. They furnished a great deal of information on past navigation on the river and commerce transported thereon.

I have also read the 308 report, which contains the existing project of the Federal Government for the development of the river for navigation.

Q. May I interrupt you right there? Do you mean by that House Document 91, and I believe this is a copy of it (handing witness Exhibit Govt. 145).

A. House Document No. 91, containing the existing plans of the Federal Government for the improvement of Kanawha River and its tributaries for navigation, and for the prosecution of those plans in combination with the most efficient development of power and flood control.

By Mr. **Jackson**. Mr. Thompson, may the record show that House Document No. 91 which you showed to the witness is Government Exhibit 145?

By Mr. **Thompson**. Yes, that is right.

By Mr. **Thompson**:

Q. That is the 308 report that I asked you about, Col. Watkins?

A. Yes; that is the 308 report.

Q. Col. Watkins, I call your attention to Government Exhibits 119 and 120, being Kanawha River and tributaries, 1210 proposed improvements on Kanawha River and tributaries, proposed improvements profile, and will ask you under whose orders they were prepared?

A. They were prepared in conformity with the Act of 1925.

By Mr. **Jackson**. We object to the statement as to how they were prepared and that they were prepared in conformity with the Act. Let him state what directions were given for their preparation?

1211 By the **Witness**. They were orders under which the District Engineer carried out his survey. They were the official instructions which the Federal Government issued to these District Engineers office, and they are his law and Bible, and they have to carry it out.

By Mr. **Jackson**: I move to strike the answer out.

By Mr. **Thompson**:

Q. Will you look at those exhibits and explain the colors and configurations on there, please?

A. This is a map showing Kanawha River and its major tributaries.

By Mr. **Jackson**:

Q. This is Exhibit 119?

A. Yes. It shows new dams on the Kanawha River for navigation. It shows the key project for the development of the major tributaries, including New River, for navigation, and the general plan for the prosecution of those plans in conformity with the most efficient development of flood control, power and other public beneficial uses.

Q. What are the blue colors there?

A. The blue colors show what we may call the run of river project, they have no reservoir storage.

The black project shows existing projects already constructed, including the proposed new navigation dam on the lower river and power project on the New River.

The red projects are storage projects which are used for increasing the flow for navigation on the New, Kanawha, Ohio, and Mississippi Rivers.

Also for flood control and for the most efficient development of power in combination with the development of the Kanawha River and its tributaries for navigation, this part——

Q. Is that Exhibit 120?

A. Yes. This chart is a set-up profile showing all on a single chart, including the Kanawha River, New River, Gauley River, Elk River, Greenbrier River, and Coal River. It shows the same information on the profile that is contained on the map, including new dams for navigation on the lower river, and key projects for reservoirs.

They are shown on this project with red colors which
1212 indicate quantity of storage. They show existing power
projects on the New River.

If I may explain, the reservoir projects or key projects on the tributary system for the development of Kanawha River and its tributaries for navigation, and for carrying out those plans in combination with the most effective development of the river for power, flood control and other uses, include improvement for navigation, by increase in stream flow by these reservoirs, on the New, Kanawha, Ohio and Mississippi Rivers and also for the benefit for control of floods on those same streams.

Q. Now I will call your attention to Government Exhibit No. 145, and will ask you to look at paragraph 16 on page 4. (With the Court's permission I would like to have that read into the record.) Please read that paragraph.

"16. After due consideration of these reports, I concur in the views and recommendations of the Board. The projects authorized by Congress and by the Public Works Administration for the modernization of the navigation works on the Kanawha River, now well advanced toward completion, afford the most effective improvement of the main stem for the purposes of navigation and [illegible] the most efficient development of water power in combination with such improvement. The tributaries of the river and especially the New River, have large potential power resources which can be developed by water conservation in storage reservoirs and the utilization of the stored water at a series of dams and power houses. Under effective and unified control these reservoirs can be operated to reduce the height of destructive floods on the Kanawha and Ohio Rivers, to benefit navigation by reducing flash floods from these tributaries, and to increase the low water flow of the river in the interest of sanitation and navigation. Such control can be effected by Federal Construction and operation or by private construction and operation under license from the Federal Power Commission. 1213 A comprehensive plan for the complete development of the water resources is submitted with this report. It can be accomplished in successive steps at a rate suitable for utilization of the power. The work of greatest immediate general public advantage is the construction of the Bluestone Reservoir, which can be operated to afford a large measure of flood control and water conservation and at the same time yield a substantial return from power production. I therefore recommend the construction by the Federal Government of the Bluestone Reservoir project for the purposes of power development, flood control, and navigation in accordance with the general plans set forth in this report with such modifications as may be approved by the Chief of Engineers, at an estimated cost of $13,000,000, provided that definite agreement is entered into before construction is begun for the disposal of the power at prices and under conditions that in the opinion of the Secretary of War will fully protect the public interest."

Q. Now will you please read paragraph six.

A. Paragraph 6 is found on Page 2, and it reads as follows:

"6. The larger tributaries of the Kanawha are susceptible of improvement for navigation by the utilization of the pools formed by the construction of high dams for power and flood control purposes, if locks or other devices are constructed for passing vessels from one pool to another. The large cost of providing and operating such locks or other devices does not appear to be justified by any commerce immediately in prospect, and no general plans are now presented for the utilization of these tributaries as routes for modern barge navigation. Reservoirs on the New River for power and for the control of flood waters can be operated to afford some beneficial effect on navigation on the main steam on the Kanawha and on the Ohio, and will reduce the heights of destructive floods on these streams. General plans for such reservoirs are herein considered."

Q. Colonel, have you studied the width and depth of the pools of the New River?

1214 A. Yes.

Q. What would you say as to whether they are satisfactory for navigation?

A. The pools of the New River constitute about 85 percent of the total length of the New River from its mouth to the mouth of Wilson Creek. In other words, about 214 miles of the total 252 miles, of the river. The reports which I have previously referred to indicate that the width of these pools are about 300 feet wide at the mouth of Wilson Creek, that the river gradually widens to between 1,000 and 1,100 feet, and contracts again at the Lead Mines to about 450 feet; between Radford and Hinton the river varies between 500 feet and 1,000 feet.

By Mr. Jackson:

Q. Colonel, would you mind stating what reports you are now interpreting?

A. They are the official reports—that last statement, for example, is from the report by Major Alstaeter in 1912, and the one of the upper river was made by an assistant to Major Craighill.

Q. Are you referring to the mile by mile survey now?

A. I am. Then the width of the river becomes narrow again, the gorge section. A study of the map which, in the section covered by the Radford Pool, indicates that the width of pools there are about 800 to 1,000 feet, maybe more. In other words, it is quite a wide section.

So much for the width of these pools. The previous report and the hydrographic map accompanying those reports show that the average depth of pools on the upper river is about four feet.

By Mr. Jackson:

Q. Will it be inconvenient for you to give a reference to the report you are relying upon as you go along, by name?

A. Very well, Report of the Assistant to Major Craig-
1215 hill, I think it was approximately in 1874, and it was
printed maybe in 1876 or 1878, the one covering the upper river, states that the average depth of the pool on the upper part of that section is about four feet.

Q. That is again the mile by mile survey?

A. Yes; it is. And about 5 feet in the Radford Section.

An examination of the map accompanying the report of the section between the Lead Mines and Hinton, I believe it was made in 1873, show many soundings have been made along the pool.

By Mr. **Thompson**:

Q. May I ask you at this time if you are referring to the report of Chief of Engineers of 1879, House Document, Part II, Volume II, 46th Congress, Second Session?

A. I have to look and find the section covered by these reports and they are not always shown in a very convenient place.

By Mr. **Jackson**:

Q. I just wanted to find out whether #35 was the Exhibit.

A. The figures I mentioned were on the survey of the river from the Lead Mines up to the head of the river.

These reports contain information on the Greenbrier and on the Elk. This document here contains information on the improvement of New River from the Lead Mines in Wythe County, Virginia, to the mouth of Greenbrier River, West Virginia.

This is Executive Document 1-2, Volume 2, 46th Congress, Second Session, and is marked Exhibit No. 35.

Q. I hand you Government Exhibit No. 31, and will ask you what that shows?

A. This is an examination and survey of New River from the mouth of Greenbrier, West Virginia, to the Lead Mines in Wythe County, Virginia.

Q. Please examine it and see if it shows the mile by mile report?

A. The best mile by mile description of this section is the Report of Moore and Briggs, wherein they describe each of those shoals. I will have to go through it and take time to find 1216 the pages on which this part of the river is covered by the report.

Q. Here is Government Exhibit 32, being the report of Moore and Briggs, and will ask you if that shows any mile my mile report?

A. The Moore and Briggs report, Government Exhibit No. 32, gives a detailed description of each shoal and method of improving the river.

By Mr. **Jackson**:

Q. Over what stretch?

A. That is what I am trying to find out now. Over Dunlaps Creek, Ogleys Creek, Howards Creek, Greenbrier River, New River, from the mouth of Greenbrier, up to Sinking Creek.

Now, continuing with my description of the depth of these pools from the maps accompanying the reports of these officers of the Corps of Engineers, I readily estimate the average depth of the pools in the section between the Lead Mines and Hinton, to be approximately four to six feet, and on the section of the river from Hinton to Kanawha Falls, some six to eight feet. The depth of some pools are greater and some less.

Now, considering the large portion of the river covered by these pools, their great width and the depth, I say, they are very satisfactory for the transportation of loose logging and rafting, boats and barges of shallow draught, pleasure boats, fishing, and so forth.

By Mr. **Thompson**:

Q. Give the depth of the water over the shoals, rapids and falls of New River for various stages.

A. Check on the actual length of the shoals in New River, indicates that about fifteen per cent only about fifteen per cent of the river is in shoals. In other words, I believe that is——

Q. Did you say fifty per cent?

A. Fifteen per cent. I believe that is about thirty-six miles only of the total of 252 miles.

1217 Q. What is the depth?

A. The official reports previously referred to, that is, the one for the survey from the Lead Mine to the mouth of Wilson Creek, and the report of Major Allstaeder, in 1912, indicate that, in their natural condition, at the worst of the rapids the depth available at low flow was approximately one foot.

Q. What is the depth at Eggleston?

A. The depths I have given refer to low flow. By the study of—but, of course, that does not hold true to other stages of the river.

Q. Please state whether or not in your opinion New River can be improved to maintain a three-foot navigation of greater depth over the shoals, rapids, and falls, over low flow periods.

By Mr. **Jackson**. We object to the question as being irrelevant and immaterial.

The above objection was overruled by the Court and the defendant by counsel excepted to the ruling of the Court for reasons stated.

A. May I explain that shoals are obstructions to navigation, in general, are only during periods of low flow. As the stages of the river rise above low flow, the elevation of the water in the upper end of the pools increases much more rapidly than it does over shoals until soon the slope over shoals and rapids alike become more and more uniform, until eventually the shoal is eliminated as an obstruction to navigation.

The dams on the Tennessee River are a good explanation of this fact.

By Mr. **Jackson**. We object to any testimony with reference to the conditions on the Tennessee River.

The objection is overruled and the defendant, by counsel, excepts to the ruling of the Court.

By the **Witness**. Very well. In the development——.

By Mr. **Thompson**. Can he answer, Your Honor.

By the **Court**. He has already answered; let it stand.

By Mr. **Jackson**. May I ask if the witness is to proceed with any comparisons, because, if so, I wish to object.

By the **Witness**. No, sir; I will not make any comparisons. I will illustrate the design and the effect and operation of dams on the Cumberland River, which are like the other rivers in the whole United States. It is a fact that this hydraulic effect——

By Mr. **Jackson**. (Interrupting.) I move to strike the reference to the Cumberland River and object to any testimony of the witness in comparing the stated condition of the Cumberland River or any other river.

By the **Court**. I do not understand that he will do so.

Counsel for the Defendant excepted to the ruling of the Court for reasons stated.

By Mr. **Thompson**:

Q. Express your view with respect to the effect of boulders and obstructions of that kind on New River.

A. There are many boulders in New River. However, these boulders would not block the channel to boats in general—boats can pass them. If most of them are concealed, and not known, they would be dangerous to navigating New River. However, if the best channel in the river be marked out with buoys in the water or stakes on the shore and the boulders within the channel are removed, it is possible for one to navigate the river safely, if he knows how to operate his boat and knows how to follow those channel markers.

Q. State whether or not in your opinion New River can be improved to maintain a three-foot navigation of greater depth over the shoals.

By Mr. **Jackson**. May we note our objection to the relevancy of the question and that the Court overruled the objection and we excepted to the ruling of the Court?

By Mr. **Thompson**. I want to call the attention of the Court to the decision of the Supreme Court, which has repeatedly used the phrase "susceptible to improvement for navigation." That is what I am bringing out.

By the **Court**. All right.

The defendant, by counsel, excepted to the ruling of the Court for reasons stated.

A. The reports of the officers of the Corps of Engineers, previously referred to—those between 1872 and 1879, show that 1218 the whole of New River, from the mouth of Wilson Creek to the mouth of the River, may be improved for navigation by open channel improvement, supplemented at the worst places by locks and dams, or locks and short canal sections.

By the COURT:

Q. From your answer—you were asked whether or not in your opinion it could be improved, and you said the reports of somebody else said it could be. We have that report here; it has been here for a long time. We want your opinion.

A. Very well, sir. From a careful study of their reports and the description of these shoals and looking at the plans which are shown on the reports, it is my opinion that New River may be readily improved for navigation by open channel improvements, supplemented by locks and dams at the worst places, and it may be readily improved by high locks and dams for nine-foot navigation.

By Mr. THOMPSON:

Q. Does that include—you expressed your opinion, not only the views you got from studies of others, but from your own personal opinion as to the navigation of the river?

A. Yes, sir; my own personal opinion from the study of maps, and not only the reports of these engineer officers, but the maps of the United States Geological Survey. That is data which an engineer needs more than anything else for making his study and forming his opinion.

Q. In your inspection of New River, did you find any artificial obstructions to navigation?

A. Yes, sir.

Q. What?

A. There was a dam across New River a short distance below the mouth of Wilson Creek; there was another at Washington Mills; there was the Buck and Billesy projects and the Hawks' Nest project. While the pools of these dams are a benefit to navigation, the dams built across the river have no provision—the main dam has no lock and no provision for the passage of logs or small boats, and so will prevent the use of the river for loose logging and rafting and small boats and shallow draft boats, engaged in carrying commerce on the river.

1219 By Mr. THOMPSON:

Q. In your studies, have you noted other artificial interference with navigation?

A. Yes, sir.

A. I discovered that; during the years, the summers of 1930 and 1932, the Buck and Byllesby plants, in carrying peak loads, were appreciably fluctuating the navigable depth of the river and rendering them more or less unreliable.

Q. Rendering what unreliable?

A. The navigable depth.

By Mr. **Jackson**:

Q. That is New River that you are talking about, it is?

A. Yes, sir; New River.

By Mr. **Thompson**:

Q. Let us say the effect on the navigable capacity or channel of waterways.

A. Must I answer the question?

Q. Yes.

A. Yes.

Q. What was that personal experience?

A. While I was in charge of the Tennessee River, I received complaints——

By Mr. **Jackson** (interrupting). We object to the statement of the witness of what complaints he received, if any. He can tell whether or not he made studies of the Tennessee River or any other river, but he does not need to detail the complaints or the places where he says he found——

By the **Court** (interrupting). I presume that this is preliminary to his saying that he made an investigation because something incited him to do it.

By Mr. **Jackson**. Without being boring, I would like to make one observation. I am familiar with the method of qualifying an expert, when he says he studied certain questions while on the Tennessee River, as District Engineer, but I am not familiar with the method of qualifying an expert, where he says he has complaints on the Tennessee River and goes into details in regard to that. The only material thing is that he made certain studies, and, unless his qualifications are questioned, he need not go into the nature of these complaints.

By Mr. **Thompson**. I asked if he had had any personal experience.

By the **Court**. I think that is a sort of opening statement, just like in a criminal case of a revenue officer, where he says that, as the result of complaints, he visited a certain residence, and so on, stating his reasons for having been there. I think that is all. We do not want the nature of the complaints, but that he made investigations as the result of it having been brought to his attention that an unsatisfactory condition existed. He can tell that.

By Mr. **Jackson**. We will take an exception to the ruling of the Court, for reasons stated.

A. As the result of complaints from boatmen going aground in the Tennessee River, when they expected good water, and they could not understand why the boats had gone aground.

By Mr. **Jackson**. We move to strike that statement so far.

By the **Court**. Tell us what you found—why the boats went aground.

By Mr. **Jackson**. May I further say this: If it is competent for the Colonel to tell what he found about boats going aground on the Tennessee River, it must be competent for us to examine and see where and when and go and check and see if they did go aground. I am not familiar with that method of qualifying an expert witness, and have never seen it done before. The only thing it seems to be is an attempt to bring in, under the guise of qualification, testimony as to conditions on other streams. If they were issues, I would not hesitate to meet them, but I hesitate about it, when we are already engaged in a long case of this kind—I hesitate to embark on a collateral inquiry as to the conditions on the Tennessee River.

The foregoing objection was overruled and the Defendant, by counsel, excepted to the ruling of the Court for reasons stated.

By the **Court**. Confine the witness to your question, Mr. Thompson.

By Mr. **Thompson**:

Q. Give the result of your investigation of conditions of this kind on the Tennessee River.

By Mr. **Jackson**. We object to that, as directly involving testimony as to conditions on the river. He asked for the results or conditions on the river.

By Mr. **Thompson**:

Q. Do you know where Hale's Bar Power project is on the Tennessee River?

A. Yes, sir.

By Mr. **Jackson**. We object to that as being immaterial, irrelevant, and incompetent.

The objection is overruled, and the Defendant excepted for reasons stated.

By Mr. **Thompson**:

Q. Was Hale's Bar Power project operated in your time?

Counsel for the Defendant objected to the question as being immaterial, irrelevant, and incompetent; the objection was overruled and the Defendant excepted, for reasons stated.

A. Yes, sir.

Q. Were there ever any complaints in regard to the waves made by Hale's Bar Power project on the Tennessee River?

By Mr. **Jackson**. We object to that as being irrelevant, incompetent, and immaterial.

The objection was overruled by the Court, and the Denfedant, by counsel excepted to the ruling of the Court for reasons stated.

1220 By Mr. **Thompson**:

Q. Where is the Hale's Bar Power project?

A. It is a short distance below Chattanooga.

Q. Did you make an investigation of the complaints that came from Hale's bar—because of complaints of Hale's Bar project?

A. Yes, sir.

Counsel for the defendant objects to the question and moves to strike the question and answer from the record, which objection is overruled and the Defendant, by counsel, excepts to the ruling of the Court for reasons stated.

By Mr. **Thompson**:

Q. From your study of the Radford project and studies that others have made on this river, to which you have referred, and your investigation on the ground, state whether or not in your opinion, the Radford project, if constructed, could affect the navigable capacity on the New and Kanawha Rivers.

By Mr. **Jackson**. We object, because it is not shown that the New River has any navigable capacity, and we further object because it is again in the disjunctive and could be answered "Yes", although there would be no effect on New River and Kanawha River, and vice versa. We are entitled to have a question that does not permit of a Delphic Oracle answer.

By the **Court**. You said New River and the Kanawha River, Mr. Thompson.

By Mr. **Thompson**. Yes, sir, we still regard that as one and the same river.

By Mr. **Jackson**. I don't want you to change the facts.

The objection of the Defendant is overruled and the defendant, by counsel, excepts to the ruling of the Court for reasons stated.

A. Yes, the New—the Radford project, as proposed by the Defendant, could affect navigation by its lock and dam—by the operation of its reservoir.

By Mr. **Jackson**:

Q. When you say "by its lock and dam", that confused me.

A. By its dam and pool. May I change that?

By Mr. **Thompson**:

Q. In what way?

A. Let me finish the other. By its reservoir operations—by the carrying of peak loads and by increasing or decreasing the height of floods, by the operation of its flood gates, and by the proposed design of the dam.

Q. How may it affect navigation with its dam and pool?

A. The pool, when full, is about 21 miles long, and when drawn down to its full extent, about 17 miles. It would furnish excellent navigation within the length of its pool for 6 and 9 foot boats. It would furnish an excellent harbor for assembling loose logging and rafting; it would furnish an excellent harbor during floods for boats of all kinds. Those of course, would be beneficial effects on navigation.

The dam built across the river, as proposed in the plans, makes no provision for a lock, nor for a chute for the passage of logs or small boats. It would, therefore, stop navigation which may be going up and down the river at the dam; that would adversely affect navigation.

1221 By Mr. Thompson:

Q. How may the Radford project effect existing Interstate Commerce by this reservoir?

By Mr. Jackson. We object to the question.

By Mr. Thompson. Change it to navigable capacity.

By Mr. Jackson. On what?

By Mr. Thompson. On New River.

By Mr. Jackson. We object to that, because it does not appear that New River has any navigable capacity.

The objection is overruled and the Defendant, by counsel, excepts to the ruling of the Court, for reasons stated.

A. The Radford project has a reservoir capacity of 100,000 acre feet, as contained in the plans now. It is a fundamental principal, governing the operation of a reservoir, which is one of a group of hydroelectric projects, that the reservoir be used for reducing or cutting off the stream-flow whenever there is abundant power at the other hydroelectric projects in the system.

Now, in the normal lay-out of a group of hydroelectric projects, the storage project is placed at the head-water of the group, because from there the regulated power which it furnishes passes not only through its own head, but over the head of the other power projects below.

Now, in that condition, when it does reduce or cut off the flow of the stream, it cannot cut it off entirely, because to do so during the low flow—would cut off all power of the system—so, in the normal situation, the reservoirs do not cut off all of the flow during low flow. Now, the lay-out of the hydroelectric projects of the Appalachian Electric Power Company is very unusual.

The proposed Radford project is below the Buck and Byllesby projects. When there is abundant flow at these projects—let us say, then there is a local rain on the upper river, or during a flood, the Radford project may be cut off—may cut off the flow, without reducing the flow at the Buck and Byllesby projects in the least. The same thing applies to the hydroelectric projects on the James and the other little river over the mountain—I forget its name. In other words, cut off the flow entirely at any time, whether high or low or normal, when there is abundant flow at the other projects.

The Appalachian Electric Power Company has leased the power stations at the London and at the Marmet and at the Winfield dams. These dams are submerged during floods for a
1222 number of days. They cannot, therefore, be relied upon
to assist in carrying the prime peak load of the Power Company's system, for which you must always have available at any time necessary power to supply your maximum demand.

Furthermore, their permit from the Federal Power Commission requires them to maintain a minimum low flow.

By Mr. **Jackson**. We object to the statement of the witness as to what the permit contains. It speaks for itself.

By the **Court**. You said that Marmet, London, and—that those dams would be submerged at times?

A. Yes, sir.

Q. With what effect?

A. They can furnish no power when submerged, or when it reaches near the top of the dam.

Q. What relation would that have to the operation of the Radford dam?

A. It means simply—it is my intention to bring out the fact that the shutting off of the Radford project will not cut any prime load-carrying plant out of this system. You see what I mean, sir?

In other words, the Appalachian Electric Power Company can still carry its prime power load without running its low head projects, which are submerged in flood and cannot be depended on during a maximum peak demand. Do you get the idea?

Q. If water gets high enough to submerge Marmet and London, it does not matter what Radford does with reference to interfering with navigation?

A. No, sir; but inasmuch as they cannot be counted on in floods, Your Honor, the Appalachian Electric Power Company must have, in addition to the plants, sufficient power plants ready to produce sufficient energy to carry this peak load.

Now, in addition to that factor, the regulations that it must maintain low flow at all times, means that there will be times——

By Mr. **Jackson** (interrupting). We object to all the interpretations of the licenses and the documents made by the witness as to the relations between the licensee and the Government. It is perhaps only descriptive, but I don't want to be understood as accepting the interpretation of the witness as to these matters.

By the **Witness** (continuing). In so much as these projects in the lower river cannot develop more power at 1223 the time of minimum low flow, than the minimum low flow power, they cannot be used for carrying peak loads. In other words, in low flow periods, when there is minimum low flow, these projects cannot pond water for peak loads, they must pass all water as soon as received to maintain minimum low flow. They cannot be relied upon for carrying peak loads. They may, of course, do so at times, but I mean relied upon.

This is a second reason why these projects are not prime power projects in this system. Therefore, the Radford reservoir can cut off its power without cutting off water from the prime projects carrying its peak load. It may cut off water flowing to London, Marmet and Winfield.

Now, the purpose for which these three dams down there may be particularly used are for furnishing power during low flow, for conserving water in the Radford reservoir, and for permitting the Radford project to fill whenever they can.

By Mr. **Jackson**:

Q. Are you speaking of projects on the Kanawha?

A. I am, exactly; yes, sir. Therefore, it is very clear that in carrying out the fundamental principles of the operation of a reservoir project in a group of hydro-electric projects, the Radford project must cut down the flow—reduce and at times cut off, even during low flow perhaps, the flow of the stream at its project whenever there is ample power at those other projects.

It must be so in order to secure—the maximum economical returns from its reservoir. It must do that often—at times, in low flow, and at times in mid-flow and times in high flow.

Mr. **Thompson**. I desire at this time to offer in evidence a document marked for identification Government Exhibit No. 156, being a record before the State Corporation Commission covering the application of the Appalachian Electric Power Company for a license to construct a hydro-electric development on New River near Radford, Virginia, and this contains the hearing and the license, and the license is referred to in both the complaint and the answer, and I am offering it as a public document at this time.

Mr. **Jackson**. We do not question the authenticity of the document, and we do not object to that part of the document which embodies the license issued by the State of Virginia. We object to the record of the minutes of the application and hearing as incompetent, irrelevant and immaterial in this case.

The COURT. Is there any objection other than its irrelevancy?

Mr. JACKSON. I don't think it would be a competent method of making proof at the hearing of this case if it is offered to prove facts that may be adverted to at that hearing. I don't know what it is offered for.

The COURT. I see no objection to allowing it to go in as a whole, subject to your objection.

Mr. JACKSON. May we have our exception to all of the exhibit except the license?

The COURT. Yes.

By Mr. THOMPSON:

Q. Colonel, I believe before lunch you testified that the Radford project, from your study of it, would have to be run as a peak load project to be efficient and economical?

A. Yes.

Q. If run as a peak load project, what effect will the cutting off or reducing of the stream flow by the Radford reservoir have on the navigable capacity of New River?

Mr. JACKSON. I object to the form of the question because it assumes a cutting off if run as a peak load operation, and also on the ground that it assumes the navigable capacity of New River, not shown in the testimony, and that if run as a peak load, it will have to cut off.

The COURT. If it is to be operated as a peak load project, I think it will be proper for the witness to say what that will involve.

By Mr. THOMPSON:

Q. What effect would the running on a peak load have
1224 on the stream flow of the New River below the dam?

A. To fully answer your question, it is necessary to show that it will have to do it in order to secure the maximum economic return, and the amount of cut-off and the stages at which it is cut off. In that connection, the plans of the project as submitted by the defendant show the hydraulic capacity of the plant to be about 9,000 cubic feet per second. I believe they have stated in court that it has been changed to 8,000. The regulated flow of the stream at the plant is approximately 1,230 cubic feet per second.

By Mr. JACKSON:

Q. The regulated flow?

A. The regulated flow. The average annual flow is approximately 3,300 cubic feet per second as claimed by the defendant. Considering the large number of steam plants owned by the defendant, the fact that the application shows that is is to be used to furnish power for public use, the Radford project must be

used to carry peak loads in order that it may secure the most economic return from its project. I will tell you why. If it is not used to carry peak loads, the maximum power which it may develop from the plant is that of low flow power which is only approximately 8,000 to 10,000 kw. Only that amount may therefore be used by the company in meeting the demand for power, that is for prime power purposes. Now, by the simple process of ponding the stream flow at night and on Saturday afternoon and Sunday, or the whole of Saturday, it will be able to carry a peak load which will constitute prime power to meet its power demands many times more than the low flow power. If it is not used for peak load, it will be necessary for the Appalachian Electric Power Company to construct or maintain in service and to operate and maintain all or a greater part of approximately 65,000 kw. of auxiliary steam plants and operate those
1225 steam plants to carry peak loads. The regulated low flow at the project is approximately 1,230 cubic feet per second. By ponding they may increase that power or flow to the maximum capacity of the unit which is 9,000 cubic feet per second. Cutting off of the flow at night and on Saturdays and using this water for power during the middle of the week would cause fluctuations in the stream flow below the project varying from zero to 9,000 cubic feet per second. The volume in this daily load is important in this problem. During the period of low regulated flow the daily volume which it may accumulate for its weekday load is approximately 3,000 acre-feet. The volume which it may accumulate during periods of average annual flow is 8,000 to 9,000 acre-feet. From my experience as an expert who has worked out hydraulic effects of changes and alterations in the stream flow, I know that this wave would go all the way down the New River and down through the new project they are constructing there, though those latter projects without any reduction in any way whatsoever, into the Ohio and down the Ohio until it is dissipated by the regulating effect of one foot in each of the low Ohio dams. This would, of course, cause a wide fluctuation in the navigable depth in the New River below the Radford project, being reduced to zero immediately below the project, to about one-half foot at Hinton and, before the Bluestone project is built, it would widely fluctuate the operation of the old wicket dams in the Kanawha River. It would require continuous operation of the bear trap dams in the Ohio River. It would cause large fluctuation in the upper ends of the pools of the dams, both new and old, in the Kanawha and Ohio Rivers.

In the new dams which we are now constructing, this fluc-
1226 tuation would amount to first approximately one foot above the horizontal, to one foot below the horizontal, or below

a particular stage at which the river was running at the time the wave came down. It may be low flow, it may be average annual flow, or higher.

By Mr. Jackson:

Q. Does the last statement refer to the Kanawha dams and pools?

A. The new Kanawha dams. I am not going into the old ones.

By Mr. Thompson:

Q. Colonel, if there are waves created by a discharge that are intermittent and they are carried down the river as far as the London and Marmet dams, what effect will that have in the pools behind these dams?

A. As I have already explained, it would fluctuate the pools to an elevation about one foot above normal to about one foot below normal in the new dams on the Kanawha River. This would reduce the navigable capacity of the water. With a nine-foot waterway it would reduce the navigable capacity approximately eleven percent. For example, barges which go in the nine-foot waterway, a fleet of them would be able to carry approximately eight freight trainloads of 20 to 40 freight cars each, could with this reduced fluctuation carry much less trainloads because they could not be loaded to full capacity. If they did, they would run aground. On the New River it would reduce the navigable capacity to almost zero. In the Bluestone project after it was built it would fluctuate the upper end of the pool approximately ten feet.

Q. Will you please state to the Court what you mean by fluctuate, is that oscillating the water?

A. I have a chart by which I can explain it.

By the Court. I want to be certain I understood something in your previous testimony. I understood you to say from a standpoint of economy, economical operation at this proposed plant at Radford, would make it necessary for it to be operated as a peak-load plant?

A. Yes, sir; that is correct.

By the Court. I understood you to say that would
1227 involve the use of its capacity, hydraulic capacity?

A. The greater part of it.

By the Court. Which involves the discharge of 9,000 cubic feet per second?

A. Yes, sir.

By the Court. Sometime in your testimony you spoke of a run-off amounting to 3,000 feet, when was that?

A. During average annual flow. I mentioned that in order to explain.

By the Court. In what period of time would they discharge that amount of water?

A. Daily, during every week day, that is, during Monday, Tuesday, Wednesday, Thursday, and Friday, that is normally if required, and you would expect sometimes to get that every one of those days, just like that.

By the Court. It would be more than that in twenty-four hour operation?

A. But in order to get the maximum economical returns it should not be operated twenty-four hours, because if it did so, it could turn out only about eight to ten thousand kilowatts for use in carrying its prime load; whereas, by using it to carry peak loads it can at any and all times carry a peak load of 75,000 kilowatts. It has just got that property, that is the peculiar property of hydro-electric plants, if you can get enough stream flow to pond to carry that big a peak.

By Mr. Thompson:

Q. The map on oscillation I believe is Government's Exhibit #118. Will you explain that?

A. This chart is a profile of the Kanawha Rivers. It shows both new and old dams in the river, including the dams
1228 and elevation of the upper end of the pools, and in addition thereto it shows and gives a pictorial view of the rise above normal pool created when the crest of the wave arrives. It also shows a drop below horizontal which would be caused by these fluctuations. The reason it would drop below horizontal is due to physical laws that are well known to engineers, and it is well known to all laymen.

As a boy you have no doubt carried a bucket full of water and if you are not careful and swing it a little too hard this way and that, (indicating with hands), the water will slush over the top.

You have also perhaps set your soup plate upon the table, not carefully, but tipped it, and the water (soup) spilled over the top.

I take this pointer in my hand and hold it at one end with my left hand. Its normal point of rest is vertical below my finger. With my right hand I pull it to the right one and one-half feet. It is now ready, with the law of gravity acting upon it, to swing on an incline slope just like the water running into a reservoir. I release it from that position and it falls, not only to the point of rest but to approximately the same distance beyond. If, in addition to turning it loose, I give it a shove, there is another force acting on it, in addition to the force of gravity—upon the head of the water, that is the momentum of water that would cause it to continue still farther.

Now it is a fact well known to engineers that the normal point of rest of water in the pool of a dam is the horizontal. If water flows

into the pool it causes the upper end of the pool to rise above the horizontal, and it holds it there fixed, just like I held this pointer in my hand, it holds it fixed at that point as long as the discharge continues. If that discharge stops the water may fall. It is
1229 acted upon by two forces, the force of gravity on the head
above the normal point of rest, and it is acted upon by the momentum of the large body of water moving through the pool of the dam, so if the flow be cut off those two forces will cause the water in the upper end of the pool to fall, not only to horizontal, but below the horizontal, my experience has been, to a distance approximately equal to that at which it was held above. So that is what you see here.

Now in explaining its navigable capacity, let us look at those pools. You will note in the section near the dam the water is deep, but in the upper end of the pool it becomes shallower and shallower, until finally at the point you enter the lock it is only twelve feet below the normal pool. These dams were designed with a lower miter sill twelve feet below the normal pool, and the channel was dredged from the river to the lock. I have indicated in brown the area in which there is comparativey shallow water, in the upper and of these four new dams. That was the situation when the dam was first constructed, and after the channel to the lock was dredged.

Whenever a small flood or the tail of a big flood flows through the upper end of these pools, there will be material deposits of silt and sand and gravel in the upper end of these pools, so that you will not have the depth which this indicates, but a shallower depth. The engineering department has to operate and keep that channel down to the nine-foot depth. It expends a large amount of money on it annually.

Q. How does it do it?

A. By dredging operations. Now boatmen in navigating the river know what depth they can expect. They know what bars
they can go over. They know how great a load they can
1230 put on, and watch the weather reports, and rains that fall
on the river above. They get a report an inch rain has fallen at Galax, or the upper New, and they know that within so much time you are going to have so much water down on the Kanawha. These fluctuations are a very important item in the navigable capacity of a water way.

Q. What has been your experience in dams at the upper end of the pools with respect to the deposit of silt?

A. It is a well known fact that they do fill up, and we have to go and dredge out the channel leading into the lock and, at times at some troublesome bar you have to go out and dredge after each flood, and for some reason long after a flood has passed. The final settlement or adjustment of bars will cause the navigable depth to be reduced at those bars.

Q. Is there a necessity for dredging in the face of the dams as well as the back parts of the pools?

A. You mean near the dam?

Q. Yes.

A. No, you have deep water there, it is the upper end of the pool which I have shaded in brown on this chart that is critical.

Q. Do I understand you arrive at the situation here where the upper end of your pool has been lessened in depth because of the deposit of silt and that meeting with a condition of oscillation in the pool reduced the depth of the water from above so you have a shallow depth, shallower than normal or naturally, in the back end of the pool?

A. You would not have the indicated reliable capacity of depth, which means capacity, with or without additional dredging, but the additional dredging required makes it all the more aggravating. This fluctuation means you have to maintain
1231 one foot greater depth than you would without it.

Q. Would such a condition arise behind the pools of the London and Marmet dams, provided there was a cut-off of the flow of New River?

A. Yes, sir.

Q. From the Radford dam site?

A. I think unquestionably the waves coming downstream would create fluctuations in these pools. I say so because the characteristic wave of the New River as indicated by studying it, is approximately the same shape as the power load of the Appalachian Electric Power Company, and the experience which I have had has shown that power plants carrying commercial load and cutting the load off at the rate that those plants do for commercial loads, does have that effect. So we seem to have all the conditions similar.

Q. I call your attention to Government's Exhibits #117-a, b, c, d, e, and f, being rating curves, and ask you what relationship they bear to this stream flow?

A. These curves may be used to determine a fair measure of the effect of fluctuations in the upper end of these pools.

Q. Will you explain what you mean by that?

A. When I was assigned the duty of studying the effect which the Radford project may have upon the navigable capacity of the water ways of New River I knew from my previous experience that it would fluctuate the upper end of the pools of dams, so I asked the U. S. District Engineer office, at Huntington, for a rating curve below the pools of the new dam, and he stated they had none. Then I asked Mr. Winn if he couldn't please con-

struct me rating curves, and he said, "No, I can't; the discharges in the stream go hay-wire." I realized at once that those large fluctuations were due to the power loads of the Buck and Byllesby plants. So now, as it was not practical by taking a single
1232 stream flow or discharge and accurately locate a point on some curve, I did the thing which any good engineer would do, or perhaps to explain it a little more effectively, like any good Battalion or Battery Commander in the Army would do if he was ordered to hit a target, and he knew his chances of hitting it with a single shot were not good. He would look up the probability of hitting the target. Let us say he found the probability of one shot hitting the target was only one in twenty. Then he would fire twenty shots to hit the target, and by all reasonable chances he would hit it. Well, in this case when I saw that we could not get the curve by measuring these discharges with a single shot, I asked the Huntington office to plot a group of shots all up and down the lines we desired to measure; then draw a line to give the slope.

Now we have records of discharges on those dams on the river extending over a period from the time they were constructed until today, some ten or fifteen thousand, so we can plot all we want. I asked them to plot enough to locate reasonably accurately those curves.

Now after all the long discussions over these curves in this court, it is very fortunate the fluctuations created by the Buck and Byllesby project did cause me to adopt a method which would eliminate all possible error. This does. It eliminates the error due to variable heights in the dam below. It reduces possible errors which may be caused by the fluctuations of the Buck and Byllesby project, etc. So the slope which we obtain from those old dams is a very good curve. We had no rating curves for the new dams in the Huntington office. For each of the old dams we have curves which we know are very good. Above and below the new dams we know approximately where the slope of the curve would have to go.

Now the modification of the curve would be that due to
1233 making the new dam higher than the old so that you have what we might call a back water curve to the other curve and meeting it at some point on the slope. That is the curve we used in making the measurement. In order to get it as accurate as we reasonably could in some cases we plotted actual back water curves to the slope lines and in others we took observations of actual stream flow. So long as that line moves from the point, the zero point, of the curve, which is the height of the crest of the dam, to a point upon the slope curve, which we know is accurate, to a point about 20,000 or 30,000 c. f. s dis-

harge, it will make practically no difference in the result, the ltimate result we get, if the line be moved up any reasonable listance, or ir it be moved down any reasonable distance. I invite the defense on my cross examination, if they feel that I do ot get accurate measurements with this curve, to draw any easonable line from the point representing zero at the crest f the dam to a point over on the slope curve somewhere around 0,000 to 30,000 c. f. s. and ask me what difference would it make n the results compared to the line you submitted. I assure you ow it will make very little difference.

I will go further. I will permit them to make any reasonable adjustment in this basic slope curve. It will not materially change the results. I will not allow them to change the fixed height of the dam, because we know it won't be true.

By Mr. **Thompson**:

Q. I believe you said you had examined Exhibit 145, or the 308 report, House Document #91, on the Improvement of Kanawha River and its Tributaries?

A. Yes, sir.

Q. Will you turn to that part which has to do with the Bluestone reservoir. By the way, who signed this report?

1234 A. It was signed by the Chief of Engineers. That section of the report was signed by Major General E. M. Markham.

Q. He is the present Chief of Engineers, isn't he?

A. Yes, sir.

Q. What will be the effect of waves produced, as you have described them, from the Radford project functioning as peakload project in the event the Bluestone reservoir is built?

A. In case the Bluestone reservoir is built the peak-load wave f the Radford project would have the same effect on navigation n the New River between the Radford project and the Bluestone, which I have already explained, that is, it would reduce avigable depths to almost zero immediately below the project, nd to only about one-half foot just above the upper end of the ool. It would fluctuate the upper end of the pool approximately en feet.

Q. Ten feet?

A. Yes; it would virtually destroy any development of commerce from the pool of the Bluestone project to the river above.

Q. How much length would the pool of the Bluestone be, if ou know?

A. It is shown on the profile, some thirty miles, you can get he correct figure right off the map here.

Q. Isn't it 36 miles?

A. Thirty miles is about correct, that is, the normal pool elevation. It is a little bit further than that, but not much, I think thirty would be the correct answer.

Q. State whether or not such a pool would provide water for navigation?

A. It would provide excellent water for deep-water
1235 navigation, for barge navigation, also for shallow draft boats like those which might want to go ahead and use the open channel portion of the river above.

Q. Colonel Watkins, assume that the Radford project is constructed and operating on the peak load basis, and having intermittent discharges, is there any way to correct that situation?

A. Yes.

Q. How?

A. The usual method employed in the issuing of permits for power projects under the Federal Power Act, is to require minimum discharge through dam or dam project equal to the minimum flow of stream, but it has been my experience that that is not satisfactory for the simple reason that in order to operate most economically, or get the most economic returns from hydroelectric projects, it should carry peak loads. And I have found it difficult to keep power projects down to it, to discharge the minimum low flow. They will go ahead and carry peak load and cut it off further because it means so much to them. So that, to get a simple means of absolutely eliminating this factor, I suggested in connection with the Tennessee report——

By Mr. JACKSON. I object to this testimony because it is not competent here.

Objection overruled. Defendant excepts.

A. (Continuing.) I will change that if you wish, and say as an engineer that I know all the troubles would be eliminated by the simple method of constructing a low head project below the large high project, using it for power and re-regulation of the stream flow, or in case the power companies do not desire that, to construct a temporary cheap dam with enough head to re-regulate the flow below their project. This would eliminate
1236 all difficulties caused by the peak load.

Q. Colonel, have you made any study of the waves created by the Buck and Byllesby projects, with New and Kanawha Rivers?

A. Yes, I have.

Q. What was the result?

A. I asked the U. S. Engineering office at Huntington to furnish me a chart upon which the gauge height at the various stages along the river, from gauges above the Buck and Byllesby projects and all those below it, all the way to Kanawha Falls, and also of the Greenbrier and Gauley, as they proved when there was not a rain, causing the waves, and the result was that this chart showed very clearly——

By Mr. JACKSON: Are you testifying now about something that was told you by the District Engineer's office?

A. No, sir; I am testifying from information which he has furnished me which I presented or which has been presented in evidence here.

By Mr. THOMPSON:

Q. You mean by this chart here, Government Exhibit 141?

A. No, that is not it. It is a long roll which they have ready to present here, two long charts of 1930 and 1932. Here they are. These charts are Exhibits 113 and 114. Exhibit 113 which shows fluctuation in stream flow between July and August, 1932, also chart, Exhibit 114, which shows this same information for July and August, 1930.

Now these two charts are plotted, along the horizontal line, 1 inch represents half days beginning with the month of July and ending with August. The vertical line shows elevation in feet. Two inches equal one foot on the gauge. These two charts show fluctuations by stages. As it happens, on the upper river, a discharge of say 2,000 second-feet, makes a much larger change in the stage than the same discharge does on the lower river. So looking at the chart, at first glance, you may
1237 think that the persistency of the wave is almost ironed out. So in order to illustrate that, they have prepared a third chart which shows horizontally plotted, the days of the week, and it shows vertically the discharges.

By Mr. JACKSON:

Q. Is that chart in evidence, Colonel?

A. Yes; that is Exhibit 115. These curves show conclusively, beyond any shadow of doubt, that during the years 1930 and 1932, the operations of the power plants at the Buck and Byllesby projects were fluctuating navigable depth in New River, way down the river and into the Kanawha River.

Q. Do they show how far down the Kanawha River?

A. No; because my last stage is at Kanawha Falls.

Q. What conclusions do you draw from this study of the special test of waves?

A. As I just stated, it did extend all the way down the river.

Q. That is your conclusion?

A. Yes, sir; normal operation.

By Mr. **Thompson**:

Q. Was this a special test of waves?

A. It is a test of waves created by normal operation of the plant during those two summers.

Q. That is, the Buck and Byllesby plants?

A. Yes.

Q. What capacity is it compared with the Radford plant, in storage?

A. It has the capacity in installations of the Buck plant, which is a small plant, and the capacity in pondage of both the Buck and the Byllesby plants, which may be utilized to help create waves. This is very small compared with the capacity of the Radford project for accumulating and ponding water over night, and Saturday and Sunday, and carrying the peak loads in the middle of the day in the week.

1238 Q. Colonel, what do you understand by channel storage?

A. The river has in it a natural channel—all rivers do more or less, channel storage capacity for the regulation and control of floods. When the rain falls and the discharge of the river is low, the river has not the capacity to carry off the flood water, without first taking the time to fill up the channel. When it reaches the high stage of 10 feet, it can carry a fairly large discharge, and when it reaches the stage of 20 feet, a still greater discharge, until finally the capacity is large enough to carry away the flood waters which arrive from above.

Q. Have you ever estimated the channel storage capacity of the Radford project?

A. In testimony given in the license for the Radford project to the commission of the State of Virginia, one of the officials of the project stated that the amount of river channel within the pool of the project was approximately 1,700 acres. From my study of the gauge heights along the river during maximum floods of record, and the line which I drew on account of my experience in working out flood heights for rivers, the average height of the maximum flood of record in the Radford pool was probably about 30 feet. Multiplying 1,700 acre-feet by 30 feet, we get 51,000 acre-feet. We know that the channel storage displaced by the pool of the Radford Reservoir was greater than that, for the simple reason that the channel widens as it extends higher, so that it is over 50,000 acre-feet.

By Mr. **Jackson**:

Q. When you say "channel storage of Radford reservoir"—what do you mean?

1239 A. Channel flood storage, or storage used by the river in its natural condition in that channel.

Q. In that area?

A. Within the pool of the dam.

By Mr. THOMPSON:

Q. How much of this channel storage of the river would the Radford project destroy if it was filled up to its usuable storage line?

A. The results that I have just given you were for the channel storage used by the river in its natural condition, for the control of floods which would be filled up, or we might say eliminated by the pool of the dam when it is filled all the way up.

Q. So that your figure is approximately 54,000?

A. It is over 50,000 acre-feet.

Q. Have you made any study of the floods on the New and Kanawha Rivers?

A. Yes, I have made quite extensive studies of various floods on the New River.

Q. In your studi~~es~~ did you read what the 308 report said about floods, on these rivers?

A. Yes, sir.

Q. State whether or not the Kanawha and the New Rivers are in need of flood protection?

By Mr. JACKSON. I object to the question as irrelevant.

Objection overruled. Defendant excepts.

A. The 308 report indicates that there has been in the past about 10 feet higher floods than those recorded during the periods of record. My study also confirms the fact that there probably will be much higher floods than the maximum during the period of record.

The 308 report shows very clearly the destructive effect of
1240 floods and calls special attention to the maximum flood of record on the lower river, that is the 1861 flood, which was very destructive, at a time when the Valley was not developed as much as it is now.

Q. Assume that the construction of the Bluestone reservoir is completed—will not that take care of the flood conditions in the upper New River and below it?

A. No.

Q. Why not?

A. It is not of sufficient capacity to stop maximum floods. It can only eliminate a certain amount of their peak. The main body of water will continue on past the Bluestone Dam.

Q. Assume the Radford project constructed and filled up to its useable storage and a flood came down the river, what would have to happen there with respect to the operation of the project?

A. If, we assume that the Radford project be constructed as shown in the plan submitted by the applicant, and operated as described by their representative before the Power Commission of Virginia, the Radford Project would increase the height of flood on the New River below the project and even down to and in the Kanawha, and in the Ohio, below the mouth of Kanawha River.

Q. Would not these dams down below have some protection so far as flood conditions are concerned—I mean these Government dams, wouldn't they break up floods or hold them back?

A. No.

Q. Why not?

A. For the simple reason that they cannot hold out water to eliminate or alter the shape of the flood.

Q. Do I understand you to say if channel storage is filled by a pool which is more or less stationary, or intended to be as near
stationary as possible, that the flood condition will be
1241 more serious under the conditions of that kind than if you
did not have reservoirs in the river?

A. Yes. May I explain two situations?

Q. Yes, go ahead.

A. Ordinarily power companies operate their project, even reservoir projects, at as near what thay call normal pool elevation as possible. If a flood comes along they endeavor to maintain pool elevation up to normal pool height.

Another situation is that explained by a representative of the company during application for permit, that it may be drawn down as flood approaches and then catch some storage later. In the first place, if they attempt to operate pools at normal fixed elevation, it will increase the height of floods immediately below.

Q. How is that?

A. For the simple reason that the river in its natural condition had to fill up its flood channel before the flood waters could pass through 21-mile length of the pool of the dam. When the dam is built the pool of the dam is already filled up, or has already filled up that portion of the channel except a very small portion in the upper end.

Its flood gates in the dam have a capacity ready to discharge the water equal to that of the maximum possible flood. It can do that at any minute. As soon as the small portion of the natural flood channel in the upper end of the pool is filled up, which requires very little time, compared with that of filling up the entire 21 miles of natural flood channel, the whole body of water within the pool of the dam is ready to move down just like a train pulling out of a station.

The rate at which it moves down will be that of wave action of 20
to 40, to 60 miles an hour. It is hard for some people to see
1242 that, yet I know it is true. Even when we do not include

wave action and consider only the fact that it takes only a short time to fill the rest of the flood channel in the upper end of the pool, when the whole mass of water in the pool is ready to move, we understand that the time is very short.

Now as I have already explained, if they are operating and must maintain the pool at a fixed elevation when the water starts moving, they have got to open those gates and let it down, if they don't it will rise up and up and up, and overflow the dam. They must let it out.

Now the river is ready to discharge at the upper end just as fast as the water comes and the gates must let it out at the lower end, so the time of passage of flood through the pool or dam will be shorter after the dam was built than it was before the dam was built. Now if the time of passage is shorter, any one should be able to understand that it has got to go higher.

Q. Suppose in order to meet this storm they let the pool down or let the water out, what happens?

A. All right. In that case, if they drew down as the flood approaches, they could catch some of the water at the peak and prevent the flood from being so high immediately below the dam, which would be a benefit to the Radford project. But, by advancing the flood by opening of gates to draw it down as the flood approaches, they advance a quantity of water, much greater than when operating at normal pool. They have advanced the center of gravity of the mass of the flood, with the result that as the bulk of water in the flood goes downstream and is combined with waters flowing in from all of the lower tributaries, the height of the flood below will be not only that equal to the increased height—caused by the displacement of the natural flood channel storage in the pool of the reservoir, but also that due to advancing the center of gravity of the body of the flood. 1243 It would, therefore, cause flood height on the lower river even greater than that of operating at normal pool elevation.

Q. Is there any remedy for that?

A. Yes, if the Radford project provided for reserve flood storage, equal to the amount of water in the natural flood channel of the river displaced by its pools, it could not only avoid increasing floods below, but it could greatly reduce floods below just that much.

By the COURT:

Q. Is there any reserve at the Bluestone dam?

A. Yes, a much greater amount.

By Mr. THOMPSON:

Q. Does the Bluestone sur-charge cover the amount of capacity that will be displaced by channel storage at Bluestone?

A. Yes, sir, it is much greater than the flood storage displaced by the pool of the Bluestone Dam, and it therefore, has a much greater capacity for controlling floods.

By Mr. **Thompson**:

Q. Referring to the Bluestone Reservoir, I believe you testified that it had a large sur-charge for flood conditions, but that it was not sufficient to take care of watershed above it. Is that correct?

A. It is correct. It could hold out only a small part of the volume of our major floods.

Q. What effect would the Radford project, in the event of high water or floods, have upon Bluestone?

A. The Radford project would increase floods below Bluestone; in other words, the advance of the volume of water caused by the Radford project will go right on past the Bluestone project as though it were not there, during major floods.

1244 Q. By "major floods" you mean what type of flood?

A. Oh, floods——

Q. (Interrupting.) What years?

A. The year of major floods, or I call them major floods, those like the 1916 flood and higher.

Q. Assuming conditions such as they were—did you hear Mr. Pierce testify here?

A. I hea'd some of his testimony.

Q. In regard to stream flow. Let me ask you this. On what plan is the Bluestone project to be constructed so far as minimum discharge is concerned?

A. As I recall, the Bluestone project, without the assistance of increase in low flow which the Radford project may give, is prepared to give a minimum low flow, or continuous low flow discharge of 2,000 cubic feet per second.

Q. Assuming that the Radford project is cut off for a period of say ten days, so that the flow is not coming down the river, or a longer period than that, what effect will it have on the discharge of Bluestone down the river, if any?

A. The Bluestone project could not maintain a minimum low flow of 2,000 cubic feet per second as proposed. If the Radford project cuts off this flow at a time when the stage in the Bluestone project is low, it may cause a great reduction in the discharge of the Bluestone below 2,000 cubic feet per second. In any event the Bluestone cannot count upon maintaining the proposed 2,000 cubic feet per second, if the Radford project is allowed to cut off the flow of the stream above for a considerable period of time. I say that because the operator of the reservoir in utilizing its storage for increasing low flow goes back over all flows of record, and he plots a mass curve or a mass table showing the accumulated volume throughout the period of record. He then draws a 1245 line which shows the amount of water which the reservoir should discharge at any time, and the maximum rate it can discharge during low flow periods.

That is based upon expectancy that the river will flow in the future as it has flown in the past. If you can obtain a long enough period of record, you can most assuredly prepare a rule curve by means of which you will be able to maintain a minimum flow of 2,000 cubic feet per second. If, however, there is a project above, which is permitted a cut off of the stream flow at any time, and especially a project like the Radford project, with its unusual layout, which I have already explained, the stream flow which the Bluestone project could count upon as indicated by the rule curve, would not arrive and the Bluestone project could not, therefore, go ahead and maintain its minimum low flow of 2,000 cubic feet per second.

Q. Mr. Pierce has testified here that the flow at the Radford dam site was 760 feet on a certain date, that the flow on the same date at Kanawha Falls was 1130 cubic feet. Now, assuming conditions with respect to the dams in the Kanawha River to be the same as they were on June 1st, 1927, with a six-foot navigation project, and assuming that the Radford project is cut off for a period of four or five days, what effect would this have on navigation in the Kanawha River?

By Mr. Jackson. I object to the question because any answer the witness might give would be irrelevant and immaterial. He is asking about conditions that prevailed in 1927. The Court is not asked for an injunction under conditions prevailing in 1927, but under conditions that prevail now, or will prevail in the future, and which conditions can only be determined when the project is completed.

By the Court. Read the question. (Question read.)

By Mr. Jackson. I object further to the question because there is no basis in the testimony for the assumption that the Radford project flow would be cut off for four or five days.

By Mr. Thompson. What I am trying to bring out here is as to the action of the commission on June 1, 1927, which is in issue, whether they acted lawfully or with judgment or with care and I am asking the witness to assume conditions that existed at that time, in other words, here was a river at that time which did not have these new projects in, the London and Marmet dams, and I am taking the stream flow such as occurred in 1930, and the idea being if such a condition had existed——

By the Court. You said in 1930.

By Mr. Thompson. Yes, sir.

By the COURT. I thought it was 1927.

By Mr. THOMPSON. I say the flow of the stream such as existed in 1930, the low flow condition, and I am asking about those conditions in the river as of June 1, 1927.

By the COURT. Assuming those conditions, you are asking what are the conditions whenever they existed.

By Mr. THOMPSON. All right, I will strike out June 1, 1927.

By the COURT. Should not the question be as to the conditions whenever they existed?

By Mr. THOMPSON. Yes.

By the COURT. I think he can answer that.

Defendant excepts.

A. By mental computation, 760 from 1130 leaves 370 cubic feet per second. If the Radford project cut off 760 feet per second during the period of low flow, as you exaplained, the remaining low flow on the river below at Kanawha Falls would be—would only be 370 cubic feet per second. If that had occurred at any time during the period or before 1927 or after 1927.

By Mr. JACKSON:

Q. How much after?

A. Now—right today—or 1930, it would have reduced the supply of water to less—decidedly less—than that necessary to maintain the elevation of the water in the pools to the crest of the dams. The water would, therefore, be lowered in the pools.

By Mr. THOMPSON:

Q. What effect would that have on the upper ends of the pools at the present time in the Kanawha, so far as navigation is concerned?

A. Of the new dams?

Q. Yes. Assuming the new dams to be there?

A. Assuming the new dams to be there and cut off 760 cubic feet per second during low flow may be measured on those rating curves which I have constructed for the upper end of the pools of the dam. I believe at that stage the difference in the navigable stage would be only about .1 to .2 of a foot.

Q. What effect would that have on the back end of the pools?

A. I am giving you this for the back end of the pools—it would have reduced the navigable depth, which means navigable capacity, by that amount. The cutting off of the flow by the Radford reservoir, however, I may explain is not limited to those low flows. It may cut off the flow at any stage. If this stage happens to be about that of the average annual flow at the Radford project, which is 3,300 cubic feet per second, that on the lower river is then 12,000 cubic feet per second, it would cause fluctuation of stage in the upper end of the pools of about .4 of a foot.

Q. Now, what—in that last question, were you reducing from a certain flow to a certain flow?

A. As I have explained the Radford project. On account of the
unusual layout, this project will act as a regulating power
1247 project. It is not interested in maintaining a uniform flow
at the Radford project. It is interested in maintaining a
flow to secure a maximum uniform power for the entire system, so
whenever there is an increase in flow, or a reduction in flow, at any
one of its group of projects, it must go up or down in order to
keep up that maximum uniform rate for the system.

1248 Q. Colonel Watkins, House Document No. 91, for 308
Report, states on page 2, paragraph 6: "The larger tributaries of the Kanawha are susceptible of improvement for navigation by the utilization of the pools formed by the construction of high dams for power and flood control purposes, if locks or other devices are constructed for passing vessels from one pool to another. The large cost of providing and operating such locks and other devices does not appear to be justified by any commerce immediately in prospect, and no general plans are now presented for the utilization of those tributaries as routes for modern barge navigation." Do studies made by you indicate that the New River may be economically developed for 9-foot navigation at some future date?

By Mr. Jackson. We object to the question. He is reading a statement to the witness on direct examination and is not cross-examining him. I object to the form of the question.

By Mr. Thompson. What I read and quoted to the witness was from House Document 91, as to Report 308.

By the Court. Your question apparently anticipated that you wanted an answer contrary to the report.

By Mr. Jackson. We also object, because they are trying to impeach their own evidence.

The Court overruled the objection and the defendant, by counsel, EXCEPTED to the ruling of the Court for reasons stated.

A. Yes, sir; my studies indicate that, as power is developed in the system, each pool may be used for navigation, as each dam is built.

By the Court:

Q. That would be true of any dam on any river anywhere, would it not?

A. Yes, sir; that is true. As more dams are built, it would soon become possible to connect them up for a longer connected waterway. Now, my studies indicate that practically all of the whole system of projects on the New River and some of its tributaries, will be economically feasible, and most of them very desirable plants, provided the key projects shown in the 308 report—that is, the reservoir projects, are developed. If that be done, the locks for the dams may be readily put in as soon as there is sufficient demand for navigation to compensate for their cost. And where there are gaps in the lines, there may even be great enough demand for navigation alone to put in some of the dams, or by some arrangement to provide for cooperating power within in constructing a series of dams in common.

Also those dams for navigation may come as an answer to meet the demands for local movements within New River or for
1249 movements of commerce from the New River to the Ohio River system, or from the Ohio River system back to the New River, or for a train shipment from any point on the New River to any point in the United States or it may come as a demand for a through waterway from the Ohio River to the Atlantic seaboard—either through the Kanawha River or perhaps over the Tennessee River and other sources. The rate for this—the rate that you may expect for such a development is, therefore, dependent to a great extent upon whether there is a demand for power which will justify the development of the power projects.

By the COURT:

Q. Why is naviation—if I understand, the development of power is a mere incident to the development for navigation purposes?

A. Yes, sir.

Q. Assuming that the Federal Government had no right to go into the power business, as such?

A. Yes, sir.

Q. But, having built dams for navigation purposes, Have you been through the New River gorge?

A. Yes, sir.

Q. Do you think it is economically sound—an economically sound proposition to say that New River gorge is a navigable stream?

A. My studies show clearly that it may be readily developed for navigation by a series of reasonably high dams; that if there is a demand for navigation between the New River, or for through navigation—like that from the Kanawha and the James River to the Atlantic Seaboard, it would be an excellent navigable waterway. I mean just that—it would be excellent.

Q. If I understood Mr. Thompson's question, he asked you whether or not it was practicable and would be justified?

A. Yes, sir.

Q. From an economical standpoint, to develop New River as a navigable stream?

A. Yes, sir.

1250 Q. You think it would be?

A. Yes, sir. It depends solely on the amount of commerce that the demand would supply and upon the length which that commerce is hauled. In other words, the estimates must show enough commerce to justify the interest on the investment that the Government makes in building a dam; and an amount sufficient to enable the Government to operate and maintain these locks. You see what I meant. We build no projects—the Corps of Engineers never recommends any navigation projects to Congress, unless, at the time it recommends it, it can see a justification for it by returns to the public in the way of navigation to justify interest on the investment that the Government puts into it—the amorization of the money and the operation of the locks and the maintenance of the locks. In other words, it is just a business proposition. We never recommend it——

Q. And it is your opinion, from your knowledge and the commercial development of the country generally, and your knowledge of the area over which the New River flows, the production there that might be the subject of commerce, that there is sufficient prospect to justify the very large outlay necessary to make New River navigable throughout its length?

A. I say that without hesitation.

Q. As a business proposition?

A. Yes, sir; as a business proposition.

By Mr. Thompson. He has a right to take into consideration flood control and other useful purposes.

By the Court. I am getting to your question. I think your question was based on navigation.

By Mr. Jackson. May I now move to strike out all of the testimony of this witness dealing with the possibility of creating navigability for New River and the possibility of future commerce, both as being immaterial, irrelevant, and incompetent, and entirely speculative so far as future commerce is concerned?

By the Court. I asked the question myself and I do not believe I will strike it out.

To which action of the Court in refusing to strike said evidence, the defendant, by counsel, excepted, for reasons stated.

By the Witness. I say without hesitation, in the future, when the demand for power becomes great enough to justify their development, and dams are put in, or perhaps suppose there are some gaps in there not put in—the Government would unquestionably be justified in constructing locks to help cut in the dams for a water-way, like the through water-way by way of the James to the Atlantic seaboard.

Q. Supposing none of these dams were utilized for the 1251 development of electric power and it was forbidden that any dam in the New River should generate power, do you think construction of the dams themselves on that condition—eliminating and making it impossible to produce or use electric power, would be justified in the interest of navigation?

A. Not at the present date. I haven't gone into the subject thoroughly enough to make a definite answer and an answer to that requires a field study to determine the exact cost. My estimate has been an estimate made as carefully as I could, considering the slope of the river—the character of the sites—the height of the dams—the material in the dams, the railways affected—the amount where you have to remove them out of the way—of little communities to be removed. They did take into consideration those physical factors which will be involved. You may have to change the location of the site.

Q. You also took into consideration the commerce that will utilize it?

A. Yes, sir; also the factor on the other hand as to the amount of commerce, because if it is to be only a certain amount, then you are justified, and if a greater amount, you are justified in a greater cost. If you get back enough of it, it would justify the cost. I do not know that we have that amount today or when it will become that amount in the future or how long it would be. But the Government is confronted with this situation, as I see it—if it built the dam for navigation, it can just as readily be let out for power, so that in fact you have two economical developments which are both developed on the river. You see the idea!

Now, we know that there is demand for power. We know that it is coming along, just like the demand for navigation. I do not think either should have to do all on the common dam used by both—used by both is a better expression, but I know 1252 it is to the public interest to have them both, and that——

By Mr. **Thompson**:

Q. Do studies made by you indicate that the New River may be economically developed for 9-foot navigation at some future date?

By Mr. **Thompson** (continuing). That will include the time when there was commerce which was really sufficient to make it look worth while as a project and the thought of amortization by the creation of power.

By the **Court**. I suppose nearly any stream in the world, if the banks are high enough for the erection of dams, could be made navigable by a succession of dams and locks. Is that true?

A. To my mind, I think it is very simple. I have gone over and described the physical characteristics of this stream. It is wide and the channel is straight. It is just the kind of a stream that would make a good water-way. While it would have to have more dams than a flat stream, it is straighter than most streams. The flatter a stream, the more crooked it is. This is straight. I do not think the increase in dams would cause much delay in time. It would be a deep water-way and would carry nine foot barges, like the Ohio and the Mississippi.

Q. In a mountain stream—the ordinary trout stream between mountain hollows, if you had demand enough, you could make that navigable, couldn't you?

A. Let me explain this. You take a small stream, the physical characteristics of which I have explained; they are not satisfactory for a water-way. The river is not wide enough—the channel is not straight—the supply of water is not good and all of these features have to come in. When you get to a water-way that is small, it would be eliminated on those grounds; and it was the physical characteristics that I looked at to justify what I have in mind as navigable water-ways, in the United States and in Europe—in France and Germany and even in Oriental China. I compared in my mind the sizes and the physical characteristics of waterways, and I may say that, if this water-way were in France or in Germany or in oriental China, there would be no doubt but that it would be carrying a large volume of freight.

By the **Court**:

Q. I am not comparing streams, but I am asking you this, if you spent enough money, you could make most any stream navigable?

A. If you spent enough money, yes, sir. My answer was
1253 based on Section 3, of the Federal Water Power Act—giving you the engineer's features for answering that way. If it hasn't got the physical properties and characteristics that that calls for, then it is not a navigable waterway. If it has, it is navigable. You see the idea.

By Mr. **Thompson**:

Q. Mr. Watkins, will you state whether or not in your opinion, New River is susceptible of navigation in its natural state?

A. It has been used—It has been used for navigation in the past and if the artificial obstructions and interference be removed, it could be utilized today; I say especially for the transportation of loose logs—loose logging and rafting, which can be transported on the waterway more economically than by any other known means. It could be used for shallow draft boats. It can—steamboats or power boats and barges, drawing 3½ or 4 feet, can unquestionably operate satisfactorily in the pools.

As I explained, I am convinced that, during the stages of good water, which means that above low flow, when the shoals, except the bad ones, become eliminated, boats could unquestionably move up and down sections of the river if the channel were marked out and boulders in the channels were removed to eliminate the danger of striking concealed boulders. At the worst places, the barges would have to be passed by—what I consider is covered by the term of "portage," until they are improved and facilities are made for passage. That is the way I look at it.

By the **Court**:

Q. In your dream of commerce on New River, you do not picture it in a natural stage, but when there is a succession of dams built and locks and they are going from one lock to another?

A. If the Court would allow me to tell you about others—about other rivers, I could make it clear to you in a second, but you will not allow me to make comparisons.

Q. Yes, go ahead.

1254 A. Well, now, the most of the shoals on this river are no worse than a number or many, I will say, on the Tennessee River.

By Mr. **Jackson**. I move to strike that answer.

By the **Court**. I asked him for it. The motion is overruled.

By Mr. **Jackson**. In order to keep the record straight, we will except to the ruling of the Court.

A. None of them except the two worst places—the gorge section for 25 miles above the mouth of Gauley River, and the 15 mile section above Ivanhoe—none of them except those two sections, are as bad as used to be the old Muscle Shoals section of the Tennessee River or the Riverton section of the Tennessee or the Old Gorge section that now covers or is covered by Hales Bar Falls.

By the **Court**:

Q. What I want to know is this—Mr. Thompson asked you about improving the conditions of the river to make it navigable?

A. Yes, sir.

Q. In response, you pictured its possibility as an open waterway to the Atlantic Ocean?

A. Yes, sir.

Q. And dams and pools and locks?

A. Yes, sir.

Q. Your next view was in its present condition. Were you considering the navigability of New River from an economical standpoint—from the standpoint, I mean, of a business proposition?

A. Yes, sir.

Q. How did you picture it—its present condition or as a stream upon which locks and dams have been built, making pools of substantial draught and moving or carrying vessels by moving them from one pool to another—pool or lock?

A. I considered it in both, Your Honor, both its possibilities today and what it has been and its possibilities today and in the past and in the future, both for the amount of traffic it might use upon the river for navigation. This river in its natural condition or in an improved condition or water-ways like the Government is trying to build today. It has spent most of its
1255 money on the 9 foot navigation waterways and none on
the small. It has since 1900 not spent much to help the man with the shallow draught boat on open rivers. It is due, primarily, as a matter of fact, to economics. While the movement of loose logging is very economical and rafting is very economical and this is a great saving to the man shipping it and the man receiving it, and while the movement of freight in the shallow draught boat is a great help to the particular individual that it handling it, the sum total of demand for commerce is not great enough to justify the expenditure to greatly improve the river. You see my point. If the Government will go and put money in a thing, you must get enough commerce to justify the expense. Now, the waterway may be 100 feet deep and they may want an obstruction removed across it. The prospective commerce may be only 100 tons per year and it may cost a lot to remove the obstacle to provide a passage in a water-way 100 feet deep that would be navigable. It has all the physical characteristics, except a slight obstruction, which could be removed.

Continuing on with the economy questions, our water-ways in the old days had practically no greater navigable depth at low flow than has New River now. You did not let me finish about the Tennessee River. I was going to give you the navigable depth there. They are all that way. Of course, you get big rivers like the Ohio, and you hit a few where the navigable depth was less, in its natural condition—less than two or three feet. Whereas, there are other water-ways, like the Tennessee, there are a number of shoals in the upper 400 miles, where the navigable depth was not over 1 or 1.3 feet. I can give them to you, if you wish.

By Mr. Jackson. We move to strike the testimony of this witness where it purports to show natural and other conditions of the various rivers of the United States.

By the Court. The motion is overruled. I developed it myself. I will let it stay.

To which action of the Court the defendant excepted.

1256 Cross examination by Mr. JACKSON:

Q. Colonel Watkins, in the course of your direct examination you made some reference to fluctuations at the upper end of the Bluestone pool on the hypothesis of the construction of the Bluestone project and the operation of the Radford project on a peak load basis. What did you say the fluctuation would be?

A. My estimate on the fluctuation was based upon the increase in gauge height which would be caused at Glen Lyn.

Q. I first want to know how much you said it would be.

A. About ten feet at the upper end of the Bluestone pool.

Q. Upon what assumptions did you base your conclusion that there would be a fluctuation of ten feet at the upper end of the Bluestone pool under the conditions stated?

A. If you will take the U. S. G. S. rating curve at Glen Lyn which is approximately the upper end of the pool of Bluestone after it is constructed, that is the normal fluctuation, the fluctuation in the stream flow on that gauge amounts to about five feet. Look it up.

Q. That is the total fluctuation?

A. Yes; for a wave it would amount to about 8,000 cubic feet per second, I believe. You can check the exact amount right on the rating curve.

Q. Let me see if I understand you. You mean that the daily fluctuation on the Glen Lyn gauge is five feet?

1257 A. The fluctuation for a peak load wave of 8,000–9,000 leaving Radford and I estimated about 8,000 when it gets to Glen Lyn (it may be a little more or a little less), would be about five feet on the curve, if I am not mistaken. We can look right on the curve and get it.

Q. That is an estimate which you have made?

A. Just a rough estimate.

Q. You don't mean to testify that you read any fluctuations of such magnitude off the gauge at Glen Lyn?

A. Well, I might say this for Glen Lyn and for all of these other rating curves. They have been constructed by the United States Geological Survey. I have had a great deal of service in connection with the United States Geological Survey. On the Lake Erie-Lake Michigan Waterway, I personally, and with a number of engineers, laid out and constructed and operated and measured the stream flow and computed the water supply for a large number of gauging stations. On the survey of the Tennessee River, the United States Geological Survey District Engineer who was in charge of computing the stations at that place ran out of funds. I supplied him with funds from my own allotment. I gave him a seat in my office. I worked with him on those surveys. I took his discharges and I used them. I used them as a good engineer like the Geological Survey did when he computed his rating. In order to get them accurately he shot a whole lot of points all up and down the line and he drew a line through them. So having seen those points right on his curve there as he plotted them, well, they are good enough for me.

By Mr. JACKSON. I move to strike out the answer as not responsive and ask to have the question read to the witness.

Q. (The question was read.) Answer my question as to whether you did read fluctuations of that magnitude off of the gauge records at Glen Lyn?

1258 A. I do not exactly understand your question.

Q. You know what a gauge record is, of course?

A. No.

Q. Do you know what a record of an automatic recording gauge is?

A. Yes.

Q. Is there one at Glen Lyn?

A. I think the Geological Survey has an automatic gauge record there.

Q. Did you find any such fluctuation of the order of magnitude described by you shown upon any record of the automatic recording gauge at Glen Lyn?

A. I saw it on the rating curve.

Q. You understand my question, Colonel?

A. Well, now, listen—the rating curve is the official final recorded data from these automatic gauges.

Q. Please answer my question. Did you see any fluctuation of the order of magnitude described by you upon any record of the automatic recording gauge at Glen Lyn?

A. No.

Q. Then this fluctuation in gauge height at Glen Lyn was an estimated fluctuation, was it not?

A. It depends upon the meaning which you give to "estimated". It was based upon reading of the rating curve for Glen Lyn which had been constructed by the Geological Survey and is reliable enough for these purposes.

Q. But it was not an observed fluctuation?

A. No; it was not observed. It couldn't possibly be because it hasn't been there yet, but it will be at some future date.

Q. What are the assumptions upon which you estimated a ten-foot fluctuation in the upper end of the proposed Bluestone reservoir?

1259 A. My estimate of the ten-feet fluctuation in the upper end of the pool of Bluestone project is based upon the fact that an 8,000 cubic feet per second wave such as those created by peak loads from the Radford project, when it reached that point it would cause the upper end of the pool to rise to an elevation of approximately five feet above the horizontal, that is the point of rest, as I have explained, I think, quite clearly in this chart showing the fluctuation of the water in the upper end of the pools of the Kanawha. You would have a similar result in the upper end of the pool of the Bluestone. In other words, the wave as it approaches would cause the upper end of the Bluestone reservoir to be tipped up or suspended five feet.

Q. Raised five feet?

A. It would be tipped up and held five feet above the horizontal point of rest. Then as the discharge is cut off by the tail end of the wave as it comes in, the gravity of that water five feet above the point of rest, plus the momentum of the water, the whole body of water of the Bluestone reservoir, moving down stream would cause the water in the Bluestone reservoir to fall not only to the horizontal but to five feet below horizontal.

XQ. Well, now where was the 8,000 second-feet measured or assumed?

A. The difference between the trough of the wave and crest of the wave just below the Radford project would be approximately equal to the maximum hydraulic capacity of your installation, that is 9,000 cubic feet per second.

XQ. You are talking now about the size of the wave immediately below the dam?

A. Immediately below the Radford project. That wave would travel downstream. Insomuch as the load curve, the daily 1260 load curve of the Appalachian Electric Power Company is in virtually the same shape as that of the characteristic wave of the New River, it is only reasonable to assume that it would travel down river with very little dissipation, because none would be lost, shaping and molding the wave, that would be the same; so my rough estimate, without going into it and computing it would be, I would say, be reduced from 9,000 to let us say about 8,000, when it got to the upper end of the Bluestone pool.

XQ. What do you mean by the characteristic wave of New River?

A. The characteristic wave of New River is a wave of a shape caused by the various elements in the channel which permit it to flow fast or slow, or otherwise; for example, the characteristic wave in the New River has a sharp rise, it goes to a fairly sharp peak and it has quite a sharp fall.

XQ. How is a characteristic wave in New River produced?

A. By the various physical characteristics of the channel. The most important of which are the slope of the stream and the lack of large amounts of channel storage.

XQ. Have you any graphical record of what you call the characteristic wave of New River?

A. I have plotted various floods on the New River, the height of them, plotted them from discharges, and there are a large number, are in the Water Supply papers. I was furnished copies of hydrographs by the U. S. District Engineer office at Huntington, and I think I am quite familiar with the characteristic wave of New River.

XQ. And you assumed there would be no dampening out of the wave between the time when it was assumed to leave the Radford plant and its arrival at the upper end of the Bluestone project?

A. I assumed there would be very little loss, for the simple
1261 reason the typical load wave of the Applachian Electric
Power Company is very near the same shape as the typical
wave on the New River, so there should be very little loss in the
total volume of the wave as it goes down stream.

XQ. In other words, you are testifying that the waves do not dampen out, is that right?

A. They do not dampen out very much. It depends of course upon the shape you release the wave, probably it is going to dampen out approximately the same shape as that of the characteristic wave of the stream, a certain amount will be lost until it gets that shape, then it will carry on.

XQ. And you computed what you call the characteristic wave of New River from the data you found on floods, is that right?

A. I have drawn a picture of it in my mind, from the large number of waves, flood waves, or what ever kind of waves you want to call them.

XQ. Can you give us that picture now?

A. As I have already described it, it is a wave which goes up with quite a steep slope and reaches a peak, a fairly sharp peak, and then it has quite a steep fall. Is that clear?

XQ. What is the relative slope on each side of the wave, just give the rate of slope on the front?

A. I can express it for you this way——

XQ. If you can give the rate of slope it will probably be etter, I can understand it better than otherwise probably.

A. Well, I am not quite a good enough engineer yet to sit ere and describe to you whether it would be a ten degree slope n the vertical or fifteen degrees, because you know there is such thing as an optical delusion; in other words, we know we look t a match this way and then this way, and it will appear to be ifferent lengths. If I had an instrument and had the curve rawn, I probably could give you a fairly good estimate, but fter all, if we wish to know what it is, let us go to the records and plat one, and see, because they are there and we can get them.

1262 XQ. In other words, this picture that is in your mind of the wave is not clear enough for you to pick off of it, or read off of it for me the slope of the front of the wave?

A. I could make estimates, but they are subject of course to actually getting the thing and drawing it. I have a picture in my mind, it may go up at the rate of about fifteen degrees from the vertical or ten degrees from the vertical up to peak, and then down to a somewhat lesser one.

XQ. How long have you been working on this subject, I mean on New River?

A. I was ordered to report to the Attorney General in the summer of 1935, about a year.

XQ. You have been working on it ever since?

A. Yes, sir; spent a great deal of time on it.

XQ. I take it from what you have told me you can't give me the slope of the back of the wave either?

A. Well, as I have told you in my own mind I have a picture of it, but it is difficult to give accurate figures. I could draw one if you would give me a piece of paper, but roughly let us say somewhere around ten or fifteen degrees.

Q. Ten or fifteen degrees?

A. From the vertical.

XQ. The slope from the back of the wave?

A. Yes, sir; these are subject to actually drawing them down and measuring them with a rule.

XQ. Now the slope of the front of the wave would be the same?

A. Something of that same nature, it may be a little larger.

XQ. A little larger, you mean a little steeper?

A. Yes, it depends somewhat on the volume of the wave.

1263 XQ. And that means it is less departure from the vertical on the front of the wave than the back?

A. Yes, the larger the volume of the wave the steeper you may find that slope. It depends on a number of things. As the wave became higher it would be larger and steeper.

XQ. What rate in change of power load did you assume?

A. You mean between the maximum and minimum?

XQ. I mean the rate of change?

A. It was a curve of the rate of change about like a characteristic curve of New River.

XQ. Have you in mind the exhibit of so-called load curves offered by Mr. Kramer?

A. No; I don't know the exhibit he offered.

X Q. Can you see that chart, Exhibit #142?

A. Yes, sir.

X Q. Now that power load in point of time that chart reads from left to right, doesn't it?

A. Yes, sir.

X Q. Is that the sort of curve you assumed?

A. We will note that curve looks quite flat, as you look at it, because the lowest part of the curve is only a little above 100,000, where the upper part is about 250,000, and the period of time covered by the whole base of the curve is only from about 4:30 in the morning until about 12:00 at night, in other words, you have only a portion of the day.

Now we will look further, and we see up there at the point about 2:00 or 2:30 or 3:00 you make a big drop. Now I don't believe you will always have that high bulk you have on that wave. You may or may not. It is going to pop down sometimes, and at times you will have a wave actually lower than that, you will have waves that will pop up around 300,000 and it may be sharper than that, sometimes you have a couple of little peaks, it won't always be the same, but in the same general shape as the curve characteristic of New River.

Q. Directing your attention again to that upper curve on Exhibit #142 am I right in reading that curve as having 1264 a much flatter slope in front than at the back?

A. It is steeper, in front than what I would call the back. That is, the later period of time. But you are not going to always have that little peak over there. I mean that little fat part over on that end. You will have quite a bit because you have quite a nice night load. Sometimes it will be higher in the middle. Now you are coming to what I am driving at, the general conformity of your curve will conform closely to the general conformity of New River.

X Q. Have you any information about the future load of the Appalachian Electric Power Company that is not available to the defendant?

A. I will tell you this. May I express it this way—— when I came on to this study I asked the engineer of the Power Commission for a peak load of your characteristic load. Well, he didn't get it for me. I went ahead and worked out all the factors of this problem from my knowledge of the kind of loads that power companies carry, loads for use in the public service, and I am here to state right now I did not get those characteristic load curves until about two weeks ago, and I have not changed one figure.

X Q. I don't doubt that, but you don't question the accurary of the load curve that was presented by Mr. Kramer, Exhibit #142, do you?

A. We have a number of curves, they won't always be the same shape as this one.

X Q. You think Mr. Kramer didn't present a typical load curve, in his testimony?

A. If you will look over the load curves of your company, they are available to you, and I doubt if you will get any two of those curves exactly the same shape, but every one will have more or less the same characteristics.

1265 X Q. Everyone will be the shape of this characteristic curve of New River that is in your mind?

A. I said the same general shape.

X Q. What sort of peak load operation did you assume?

A. Well, from my knowledge of the operation of power projects, I worked up the volume of the load which you could discharge for various stream flows. I took your low regulated flow of 1230 cubic feet per second and went on up to the average annual flow, and I worked out the volume you have on that curve, and considered the manner in which it would be discharged. Your loads are going to vary, you are not going to put them out just the same, but you will do what I say you will, put it out in a general mass or shape or form somewhat like the natural hydrograph of the river.

X Q. I want to ask about another matter. Referring back to your testimony about the oscillation, at the upper end of the pool at Bluestone, or at Glen Lyn as you described it, will the extent of the oscillation below pool level at Glen Lyn or the upper end of Bluestone be in any way dependent on the rate of increase in water levels due to the incoming waves as measured at Glen Lyn or the head of the pool?

A. No; for the simple reason that that power which tips the pool of the Bluestone project above the point of rest, above the point of horizontal, that physical power holds it up there and it would stay there until doomsday if you didn't stop sending the water down the river. It would stand there forever. But it has got in it at all times those two old potential powers, that is the power of the head above the point of rest and the power of momentum of that volume of water flowing down, and the minute you cut that flow off and don't keep it going the way you have got it there, if you quit, it will go right on down.

X Q. In your judgment would it make any difference
1266 whether the five foot rise occurred in one minute or two hours?

A. It wouldn't make any difference in the amount of rise.

X Q. Not the slightest difference?

A. It might make it go down a little farther because it would be flowing faster.

X Q. But your opinion is the oscillation you have described would be as free if the increase came in twelve hours as though it came in one minute?

A. Hardly one minute, for the simple reason I gave you, those two factors.

X Q. Call it five minutes then.

A. It is physically impossible for you to go ahead and tip that reservoir six feet in the upper end, in five minutes, so you are asking something against the law of nature, you would have to shoot a great amount of water and then—[witness indicated]—booie.

X Q. Give it five minutes.

A. Five minutes can't do it.

X Q. How long would it take?

A. Well, you are asking me to compute something which you can take a piece of paper, you are a good engineer, you could compute it. Any normal increase you get will not affect your problem. If I must I will take a piece of paper and figure out something.

X Q. Will you, just as we adjourn, tell me, if you know, how long it will take, and if you know, say so?

A. I do not know, it would be foolish in answering that without computing it, and it can be computed.

X Q. You had not done it before you testified?

A. I know it was not possible for it to come down like you
1267 spoke of, and I know from those physical laws I tried to explain to you, which any engineer ought to understand, it makes no difference, it isn't the time it took, it just don't make any difference.

X Q. I gathered you had some definite opinion.

A. It isn't a question of thinking, I know.

1268 By Mr. Jackson:

Q. Colonel, you were asked something about boulders in New River. What do you include within the term "boulders"?

A. I include any large stone which a boat may run upon.

Q. That is any stone that is projecting in the channel?

A. Projecting or loose or whatnot in the channel.

Q. It wouldn't matter whether it was loose or attached to the bottom; it is a question of whether it is a protruding stone, projecting stone?

A. If it happened to be one over a rapid or something like that attached to the bottom and just an element of it, I wouldn't call that a boulder. It would be a part of the shoal.

Q. It would be a part of the rock formation in the shoal?

A. Exactly.

Q. Colonel, at 2539 of the record there is a sentence that reads, after you said "There are many boulders in New River. However, these boulders would not block the channel to boats in general"—then this sentence, "If most are concealed and if they are not known." Is that "if" right or is that an error? I merely thought that the "if" was an error.

A. There are several places in here that the sentences are not properly punctuated. In other words, they have a half of one sentence into another. What page is that?

Q. 2539, and it says "If most of them are concealed." I thought that must be an error and I wanted to find out whether the "if" was wrong.

A. May I read my correction of that paragraph?

Q. I would rather you would tell me whether that "if" is wrong now. Do you see the sentence I mean where it says "If most of them are concealed."

A. That should read, "If most of them are concealed and not known." Is that clear? Then a comma—"they would be dangerous." You can omit "or dangerous"—"to navigating New River" is the meaning of it.

1269 Q. I had no trouble except with the "if." I thought you probably stated definitely either that most of them are concealed or not one or the other.

A. My testimony required making long statements and I was interrupted time and time again by the lawyers and perhaps at times I didn't state just what I meant. There are a few places where it should be corrected and this is one of them.

Q. As I understand it, Colonel, you feel that if these boulders or rock obstructions are removed from the channels and the channels marked so as to enable boats to avoid any concealed boulders or rocks, and so forth, and local facilities are provided for by-passing the worst places, the river could be used for light draft navigation?

A. Yes, sir, I will tell you why. There are many boulders in the Tennessee River all the way from Big Bend Shoals——

Q. I don't want you to describe the Tennessee River because I am not asking you about it. I don't want to be captious but I don't want you to go into that because we will have a long discussion about it.

A. What I wanted to explain was my own personal experience.

Q. I don't want you to do that.

A. If you don't want me to put the word "Tennessee" in, very well. I can leave the word "Tennessee" out. Now, in my experience as an officer in the Corps of Engineers, when engaged upon the operation and maintenance and construction of open river improvements for navigation, I have found many boulders in the channel of large navigated rivers for 400 miles in almost every pool. When I took charge of the office that section of the river had never been marked out.

Q. Took charge of what office?

A. You won't let me mention any names. I will leave it out.

Q. I don't want you to tell a story with an assumed name any more than I want you to tell one with actual names.

1270 A. Wait a moment. You have asked a question.

Q. You have answered the question, Colonel, and I don't want to get into a discussion.

A. I have not completely answered it and I think the Court should get this because it is very good.

(Defendant objects to the answer of witness on grounds that it is not responsive to the question and raises a collateral issue and defendant excepts to the ruling of the Court in allowing the answer).

By the Witness (continuing):

Continuing my explanation of the reason why I said the boats could use the river, when I took charge of the office. I had this 400 miles of river marked out. I had boulders removed. After that was done I myself personally, in a boat, our boat, with a draft, one of them, of only about four inches and the other only about a foot when running at a speed of about 40 miles an hour, navigated this river up and down in the open river section. These two boats were bought just a short time before I left there and the District Engineer ran the entire length of the river. He was no pilot, had nothing to guide him except these markers.

By the Court:

Q. What river are you talking about now?

A. I am talking about the Tennessee River. So that you see that if the river is properly marked——

By Mr. Thompson:

Q. Which river?

A. If any river is properly marked and the channel is properly marked out there should be no danger of a person who knows how to properly run his boat in following the markers provided the velocities are not too fast and things of that nature. In other words, the markers are the perfect guide for avoiding the concealed boulders.

1271 By Mr. Jackson:

Q. Colonel, did you ever operate a large electric power system?

A. I had charge of the operation and maintenance of the Wilson Dam Power project at Muscle Shoals for about five years.

Q. Was that a large electric power system?

A. No, I have never had charge of a large electric power system but in my experience in the Corps of Engineers I was ordered to take charge of surveys for the improvement of rivers for navigation and for the prosecution of general plans in conformity with the most efficient development of the river for flood control, power and other beneficial uses. In that it was absolutely essential, in order to carry out that survey, that I make a most thorough study of the operations of power projects so far as they effected the development of the river for navigation and other purposes, in order to see that the power projects could be most efficiently developed. Those projects included about 150 projects on one stream and about 50 or 60 or 70 projects on another, on all the numerous, various tributaries and all kinds of streams.

Q. Coming back now to your actual operations, Colonel, your experience in the operation of Wilson Dam consisted in operating a single generating station and selling the power to utilities on a dump basis?

A. I can explain.

Q. Can you answer that directly, Colonel?

A. Will you please explain to the Court so he will not miss it, what dump basis means?

Q. Will you explain what dump basis means to you?

A. I have asked you because I desire the question——

By Mr. Jackson:

Q. The colonel asked me to testify. I don't know how much weight it will carry. By "dump basis" I mean you simply have a power plant running and if and when you have power
1272 available and if and when somebody wants it, you sell it to them
wholesale, no responsibility for maintaining and carrying any load or anything else.

A. No; it was not run on a dump basis. It was run under contract for delivery of the power to a power company.

By Mr. Jackson:

Q. The contract required delivery merely on a dump basis, didn't it?

A. No; it required us to deliver the power available when called for. We were on the other end of the line. Instead of us going ahead and going around and marketing it when they needed it, they asked us to furnish them the power and we did so.

Q. Did you always have maximum capacity of power available?

A. No; I think a clear understanding of that question requires a little explanation. While I was in charge of Wilson Dam power project Congress did not know what to do with Muscle Shoals. They would not permit the Chief of Engineers to make a contract for the sale of power from the project which could not be revocable, I believe it was, in one month notice, or something like that. As a result, any company that we would want to go ahead and sell or lease the power to could not afford to pay us any more for the power than the necessary cost of coal and actual operating of its steam plants for the simple reason to get around the necessity of a power company having enough actual installations in its system ready and at all times available to carry its maximum peak demands. Therefore as the contract was revocable upon short notice, they could not rely upon this power for furnishing their maximum prime power demands. Therefore we could not operate the power project and develop the entire load there. We simply had to sell and get the best we could out of it until Congress made some provision for the operation of the project.

Q. I am not complaining about it, Colonel. Whatever the reason, the fact is that the Muscle Shoals power plant was
1273 operated when you were District Engineer on the basis of selling the power as dump power, when and if available, to such persons as wanted it or when and if the contract purchaser wanted it; is that right?

A. Well, perhaps you and I interpret somewhat differently the word "dump." I would say it was sold under contract subject to their call when they needed it. That would be a clearer explanation. I think the Court could understand it clearer.

Q. As far as I know the question of dump power hasn't anything to do with the question of whether it is a contract, but we will let that be. It is, of course, a fact that from the standpoint of operating a particular generating plant, the operation may range anywhere between run of river operations and extreme peaking such as you described in your direct testimony; is that right?

A. That is correct.

Q. And as a practical matter, isn't it a fact that peaking may and probably will vary with the time of year and the flow conditions in the stream?

A. Yes, and there are other factors and a very important one is the amount of pondage which can be made available.

Q. Do you know how the Appalachian peak was apportioned among its generating stations in 1935?

A. No.

Q. You do know that the Appalachian peak was carried in 1935 without the Radford plant, don't you?

A. Your question implied that I should know that in order to determine this problem.

Q. I am making no implications. I would like to get facts, Colonel.

A. Will you read the question.

Q. (The question was read.)

A. Yes, sir, that is clearly understood. The Radford project was not built.

1274 Q. And you don't know how the Appalachian peak will be apportioned among generating plants in 1936 and '37, do you?

A. That is not necessary for me in the solution of the problem which I was ordered to determine.

Q. You understand I am not arguing with you, if you will just give me the facts.

A. I must know the general form and shape, and so forth, and that is all I need to know. I do know that you can plot and assign those hydro-electric power units to carry that peak load in any shape, form or fashion which the needs of the system demand.

Q. There may be a wide variation in distributing those peaks?

A. There may be a wide variation in distributing those loads, yes, sir. That is correct.

Q. Colonel, am I correct in understanding you to say that the regulated low water flow at Radford will be 1,230 second feet and that the maximum or hydraulic capacity of the installed machinery at Radford will be around 9,000 second feet?

A. I took those figures from your own data. If you wish to modify them slightly, it is perfectly O. K.

Q. I am just trying to get something that we agree on so we can go to something else.

A. That is fine.

Q. Will you tell me what is the hydraulic capacity of the installation in the Government London navigation dam?

A. Those are data of record. I haven't the terms before me right now.

Q. Isn't that hydraulic capacity 9,000 second feet?

A. As I stated, I haven't data before me at present and I do not know exactly what they are now.

Q. Isn't your study of the problem sufficiently extensive and thorough that you can say that is approximately right?

1275 A. I would have to look up that. No, I could not tell without knowing exactly what they are.

Q. Isn't it a fact that the low water flow at the London plant is approximately 1000 second feet, the natural low water flow?

A. The natural low water flow at the London Dam is about 1,000 to 1,100.

Q. Don't you know it to be a fact that the hydraulic capacity of the power installation in the Marmet Government Dam is about 9,000 second feet?

A. About 9,000 second feet. I am very glad to know that. The exact amount of it was not necessary for my solution and I did not take the trouble to look it up.

Q. Can you tell me whether it isn't also true that the low water flow at Marmet, natural low water flow, is around 1,000 or 1,100 second feet?

A. It is approximately that, yes, the extreme low.

Q. And isn't it a fact that the hydraulic capacity of the power installation to be placed in Bluestone in accordance with the Government plans is approximately 10,000 second feet?

A. I do not know exactly what that is, as it has no relation to this project except that insofar as the Bluestone project may affect the hydraulics of the flow—that is, may affect your modifications of the stream flow as they come down stream. I think I have seen it but I haven't it figured right now. It had no bearing on the present problem.

Q. I don't want to argue with you about that, Colonel. I have no objection but if you will only answer what I ask you it will save a lot of time.

A. I am doing my best so we can get through. I am not trying to simply combat you in the least. I simply desire to do my best to give the information you want, to you and the Court, but I don't want things you ask me misinterpreted. That is all.

1276 Q. At page 94 of Government Exhibit 145, House Document 91, the so-called flood control report on the Kanawha watershed, one of the pages in reference to Bluestone, it states, "The project includes 120,000 horsepower hydroelectric plant."

A. Where is that.

Q. The sentence just above the table in the middle of the page.

A. The total parts of the project?

Q. "Including 120,000 horsepower hydro-electric plant." As an engineer, don't you know with a head of 120 feet such as is contemplated at Bluestone and an efficiency of 88 percent, with the reservoir full, this power would require a hydraulic capacity of about 10,000 second feet?

A. You are asking me some questions now which require making mental computations and I haven't yet seen the sentence you are talking about. "The total cost of this combined project, including a 120,000 horsepower hydro-electric plant is estimated," and so forth. Your question was "wouldn't I know as an engineer——"

Q. At Bluestone with this project with a 120 feet head and 120,000 horsepower at 88 percent efficiency it would require 10,000 second feet flow—for any reasonable efficiency?

A. Just a moment. Maybe I can help you. I can look up the data and give you an exact answer but if you wish to assume 9,000——

Q. 10,000.

A. I mean 10,000, I will accept that for the time being.

Q. If you find any error in that, let me know.

A. That is perfectly satisfactory—fine.

Q. Isn't it a fact that the planned or expected minimum regulated flow at Bluestone is to be 2,000 second feet?

A. That is correct, as I understand.

Q. Colonel, is it not a fact that the operation of a reservoir for power purposes is based upon a so-called rule curve which is computed for the worst year of record, that is to say, to provide throughout the low water season as much of the installed capacity as possible throughout the longest low water period of record.

1277 A. I would say your rule curve should be based upon platting the entire period of record, the entire period of record, not the worst years, but the entire period of record, so you can do two things. One is you can so regulate your reservoir it will not be reduced below the minimum, and in the second place, so that you can operate that reservoir at the same time; that is, not go below the minimum, and at the same time get the total maximum output you can out of it, because if you don't do that you will find you are continually and continually operating that reservoir to be sure of a low flow, when if you went on the constructive rule curve, you could turn out a great deal more output in many periods.

X Q. Simply stated, am I right in understanding the facts to be this, that in operating a reservoir the operators construct a rule curve which enables them to determine how they should use that reservoir throughout the low water period, so they will be able to have a uniform benefit of it throughout that period, and consume it as nearly as possible by the end of the low water period, but not exhaust it?

A. Yes, sir; but you qualified it by stating a rule curve based on low periods, is why I took so long to explain.

X Q. And in any practical operation that is the way a power reservoir should be operated?

A. That is the way a power reservoir should be operated; if there were not any group of projects, where it has to vary its flow to meet those of others now that is true, for the entire output of the system, instead of platting a single reservoir, and you platted a mass curve or table for each of the projects of the system, and plat one for the total and make your rule curve for the total.

XQ. As a matter of practical operation doesn't every utility have a rule curve for its reservoirs?

A. Yes, sir; except when you get that line showing what you can turn out, that will be modified by what your demand is.

XQ. You cannot modify the amount of water?

1278 A. This line does indicate an average of what you have to stick to.

XQ. In practical operation the rate of use during the low water period may be accelerated or retarded according to variations in water conditions departing from that rule curve that may occur during that period, but always in a fashion so as to preserve the capacity throughout the low water season; isn't that true?

A. Your question is involved, but I think you are correct, that is the idea of it.

XQ. Now in normal operating practice, the development of power at a reservoir would not be discontinued during low water season for the purpose of replenishing the reservoir, would it?

A. That may come about in a number of ways.

XQ. I am asking you for normal operating practice?

A. Of a normal reservoir system, no, sir, but of the unusual layout of the Appalachian Electric Power Company system I can readily see, without going ahead and trying to work it out, that there will be times when your reservoir, in order to secure the maximum economical return, will vary its flow greatly; does that answer your question?

XQ. I understand you to say in your opinion you have, or might depart from that normal procedure, if you were operating the Radford reservoir?

A. I will state it this way. In order to secure the maximum economic return from the Radford reservoir, you would have to fluctuate it up and down in order to maintain a uniform supply demand for your system.

XQ. We don't have to subordinate everything in our business and other relations to securing the maximum economical return to ourselves, do we?

A. I will state that a little clearer, if you wish. It is a practical common sense, usual method. You can leave out economics for the time, letting the operator of the reservoir meet your demand
and that is what he does. He has to vary it with this reser-
1279 voir of yours. You have absolute liberty of fluctuating it up
and down, to meet the demand.

XQ. You are talking about a fluctuating output rather than fluctuating reservoir, are you not?

A. I think you will find that statement answers your question, because you may fluctuate it up and down at all flows you want to. You may be required to fluctuate it up and down.

XQ. The only compulsion you can suppose is what you conceive to be the necessity of obtaining the maximum economic advantage of any transaction; is that right?

A. It is a little more than that, I think. If I were operating it, or if you were operating it, and you were there, it would just be common sense for you to do it, knowing the way it is operated. I wouldn't say it is. I make that statement emphatically. You must do it. If you think after all we don't have to operate this and get the most money, very well, it is just common sense to do it. May I state it that way.

XQ. As I understand you, you consider it common sense to operate something, or to do something, to get the maximum economic return out of it, whether or not that would be forced labor or in some other manner an infringement on the rights or privileges of others?

A. The question is a little long and involved.

XQ. Read the question. [Question read.]

A. Yes, of course, there is the human element in all business and all factors, yet I think we generally find it as a business proposition. We do go ahead and attempt to get the maximum economic returns from our investments. The President and Board of Directors of power companies would have a very hard time explaining to their stockholders if they did not do it, unless they showed justification.

XQ. They would only attempt to obtain maximum benefits within legitimate limits?

A. Yes.

1280 XQ. Would you recognize legitimate limits?

A. Yes, sir; but I think the management would have to explain why they didn't go ahead and secure the maximum results, if the variations were large.

XQ. You have been talking now about variations from normal practice. You are speaking now of variations in load out-put and not about any shutting off of the production of power to replenish the reservoir during low water?

A. Variation in load out-put means virtually the same thing as variation in stream flow, I mean in volume, but not the discharge.

XQ. I mean, we were talking about the operation of the reservoir in accordance with the rule curve and my point is that all you have said about possible departure from normal has had to do with departures which you assume might be desirable for the purposes of handling the load?

A. Yes.

XQ. And which might affect the rate of draw-down?

A. Yes, sir.

XQ. But you were not supposing departures from the normal f such character as would involve the cessation of power devel- pment during low water, and the use of a low water period to eplenish the reservoir solely for that purpose?

A. I see your idea. I can explain it this way. I can see in the peration of your system, including the Radford project, that hese fluctuations will go up and down at all times, or at all tages.

XQ. What fluctuations?

A. Of the actual flow you turn out, or actual power you pro- luce for that specific project. Now due to the fact that cutting ff your reservoir does not cut off any of the other prime projects f the system, I can see where that will get closer and closer to ero. Now, furthermore, looking at your peak load curve of your ystem, and the power projects you have, and seeing the pondage you have available at the other projects, and the enormous 281 capacity you have available at this project, I can see at times you are going to utilize the great storage of this roject, to meet big variations in demand. Now that, in itself, s going to cause you to go ahead and use more power sometimes han you would ordinarily expect. There may be times when our rule curve isn't exact, due to exceptional demands your op- rator has utilized all his power down to the bottom. You see ny idea. Now if that happened at a time when you did not have o use these installations, not the maximum, you could readily nake up for that, compensate for that, by utilizing such installa- ion necessary. On the top of peak loads you could readily catch p the mistake of your operator. You see there are wide fluctua- ions, controlled by two factors; first, keeping your reservoir so s to have available, I might say, or demand, to meet so much; nd in the second place, to variate that demand to meet your ower demand; and in the third place, vary the actual amount f water used out of that reservoir to meet the actual peak de- nands. So a number of factors come in to help cause these luctuations. Any good engineer should be able to see it.

XQ. I don't think we understand each other, Colonel. De- artures from the rule curve merely involve changes in rate of rawn-down and not changes solely for the purpose of replenish- ng water storage in low water season; isn't that right?

A. I can't get the involved question.

XQ. Question read.

A. I don't get it. I can tell you why they occur, and have ried to, but departures from the rule curve involve changes in he draw-down?

XQ. Yes.

A. You do depart from what you prepare to be able to maintain.

X Q. For power production purposes?

A. From what you are prepared to be able to maintain.

X Q. And those departures in the rate of drawn-down are for the purpose of meeting power demands?

A. They are.

X Q. And they are not solely for the purpose of replenishing the water in storage during low water season? 1282

A. As I stated a moment ago, that is one of the things which may cause you to cut down or reduce or restrict your flow as much as practicable, in order to make up for either an exceptionally large demand on which you have used your storage in the reservoir to provide the pondage.

X Q. Do you intend to testify that in any normal or practical operation any utility operating a reservoir would depart from the rule curve merely for the purpose of shutting off the production of power during low water season, and undertake to fill its reservoir during low water season?

A. I mean to say an operator, operating an electric system, should follow a common sense practice. On one hand he has to sit there and try to make available a certain amount, and on the other hand he has to have the power demand.

X Q. Please read the question. [Question read.]

A. Frankly, your question is not a clear statement of fact, which I could answer with yes or no.

X Q. Let me try to make it clear.

A. I will appreciate it if you will.

X Q. Is it your opinion, or are you undertaking to testify that any normal practical operation of a reservoir for power development would involve a method of operation which would result in shutting off power production entirely during the low water season, solely for the purpose of filling your reservoir during low water season; that is, would you regard it as proper practice to operate a reservoir so as to call for its being filled during low water season?

A. Well, I may answer that by stating not in the normal layout system—now, in a system where we have an unusual lay-out—— [interrupted].

X Q. I understand you think everything is unusual here.

A. I am trying to present facts. You would have to squeeze down at times, if you had to turn out certain demand and your installation was part of the prime, you would have to 1283 turn out that much, but if you put it up to the peak to squeeze that part, you still have the prime power and can reduce it without injury.

X Q. Are impounding reservoirs generally filled in low or high water seasons?

A. In high water seasons, for the simple reason with the proper lay-out of the system, with your reservoir up, you can cut down your flow with abundant power below, but in this lay-out of the Appalachian Electric Power Company, if you cut down the reservoir you do not cut down the flow of any of the other prime plants of the system.

X Q. In your opinion it would not be abnormal to fill the reservoir in low water season?

A. If you follow the fundamental principles of operation you have to follow that fundamental principle. That is, your reservoir project, any power system, has got to reduce or cut down its flow, when there is abundant power at its other projects, that, of course, is subject to the actual amount of installation at that project.

X Q. Is there abundant power in your low water season—— [interrupted].

A. At times local showers—the Mississippi and Ohio and Kanawha are all dependent upon these varied local showers, one comes here and one there.

X Q. What has the Ohio and Mississippi got to do with the Radford power load?

A. It gets its water supply there, that is it exactly, and you get a mighty good flow for that section.

X Q. But, Colonel, will you just answer my question? Is there abundant power during low water season at other hydroelectric plants of the Appalachian Power Company?

A. I said due to these local showers——[interrupted].

X Q. Is there or is there not abundant power at other hydro-projects of the Appalachian Electric Power Company system during low water season?

A. That will occur at times, yes.

1284 X Q. It is your testimony there will be frequent times of substantial duration when there will be abundant power at the hydro stations of the Appalachian, down on the head of the Kanawha and over on the James, during low water season?

A. There will be enough to cause appreciable modification of the flow of water coming out from the Radford project.

X Q. And that would cause a modification or appreciable modification, in your opinion, in the rate of draw-down at Radford?

A. Yes, sir.

X Q. You testified this Radford project could be operated so as to carry a 70,000 kw. peak, something like that, is that right?

A. It has 75,000 kw. I believe. If you have that installation there, you have the enormous capacity of this reservoir, and there is no reason why you can't utilize it to help meet the prime demand of your system at any time of the day or year, and week or month, with that enormous supply, as long as you keep the water in your reservoir, and that is an important part, and provided you keep catching it, even in low flow, to keep the water in there, so you do that.

XQ. Colonel, I have no objection, except it will take a long time, if you make a long dissertation in each answer—— [Interrupted.]

A. I am trying to make it emphatic, to give you all the opportunity in the world to catch me up, I am right here, you can catch me up as much as you please.

XQ. I fear the limitation of time will interfere.

A. I will try to make my answers as brief as possible.

XQ. Would it be possible to operate the Radford project on a limited peak, at low water season, so as to produce say 35,000 or 40,000 kw. capacity, for peaking purposes?

A. Yes, that is true, but—— [Interrupted.]

XQ. You need not go into it any further, unless you feel some sort of economic compulsion.

A. This is the point, this is a highly technical thing, and I would not like it misinterpreted.

1285 XQ. I don't think we will misinterpret it. Would it not be a very practical advantage to use the Radford project for peaking, even to the extent of providing 35,000 or 40,000 kw. of peak capacity, in the low water season?

A. I mentioned in the variation of your load that at times you may even go ahead and reduce the peaking load you will carry, in order to conserve water in your reservoir. There would be times you would want to do it.

XQ. I will ask that the question be read. [Question read.]

A. Oh, I see, you mean as a matter of economics. Why I have not gone into the economics to that great an extent, and it is not necessary in my problem. What I have stated is, you do carry peak loads, you must carry peak loads. I am not so much interested in the exact amount; the factor is there, and you do affect the stream flow with it.

XQ. You have stated at low water season the run-of-river operation would only produce 8,000 to 10,000 kw. power?

A. Approximately.

XQ. Would it or not be an advantage to peak that operation to the limited extent which would raise the peak power production to 35,000 or 40,000 kw. in prime peaking capacity, as compared with your 8,000 to 10,000 run-of-river production?

A. Now if you desired, and your demands required you, at that plant, to have only a peak of 35,000 or 40,000 kw. why make it 75,000? That is, if that is all that was necessary to go in your prime base. You see we have to go back and see if we have enough prime plants to go in that base.

By Mr. JACKSON. I move to strike the answer, and ask to have the question read, and the witness answer it.

NOTE. Question read.

A. The correct answer is as I have given it, and I will tell you why.

NOTE. Question and answer read.

By Mr. JACKSON. I asked if peaking to the extent of 35,000 or 40,000 was a practical advantage compared to run-of river operation? Any engineer can answer that yes or no.

By the COURT. I don't think you got an answer to your question.

XQ. Will you say whether it is or is not a practical
1286 advantage, to operate that project by peaking it to the
extent of producing 35,000 or 40,000 kw. of prime peaking capacity, as compared to a run-of-river operation producing 8,000 or 10,000?

A. It would be of greater benefit; is that what you mean?

XQ. Yes.

A. That is O. K.

XQ. In your testimony what did you assume to be the duration of the Appalachian peak in hours.

A. That is not material to the solution of my problem.

XQ. I didn't ask if it was material.

A. I didn't assume any fixed duration.

XQ. How long did you assume the Radford plant would carry the peak load of 75,000 kw. assumed by you?

A. It will vary greatly.

XQ. What did you assume in low water season?

A. Well, I will answer, if you will give me time. The figures I gave for the ponding, for the amount of the volume, indicate quite clearly to any engineer that it was operating about half time and put it half time you have, or you might vary more than that, but about that figure. Does that answer you? That was simply an average. You can go greater or less, as much as you please.

XQ. You stated the regulated flow during low water season would be 1230 second feet. Will you tell me how long during the day the Radford project could operate at the peak load producing 75,000 kw. such as you assume?

A. I desired to obtain simply average figures to put in
1287 these estimates; therefore, I put in your poundage for
half a day each week and on Saturday and Sunday——
[interrupted].

X Q. But, Colonel——[interrupted].

A. I am answering it about as positively and briefly as I can. That will allow you to fill up and concentrate on half of say these two loads. Now, looking at any utility peak it isn't a straight block, it is a curve, very often the big mass is somewhat of a triangle. Now, if you have 2⅖ of the average daily regulated flow, there available, multiplied by two, that is a triangle, then you have something like this load going up here, something like that shape [indicating with hands]. It is a general mass I am hitting at.

X Q. It may be clear to an engineer, but doesn't mean anything to me. I will ask the question be read, and that you tell me, in hours, how long you assume this peak would be carried? [NOTE.—Question read.]

By the COURT. I thought he answered that he assumed it would be operated about half the time.

By the WITNESS. It would be operated about half the time for the bottom of the base and may go up to the top.

X Q. I will ask the question again. I don't think it has been answered. How long did you assume that the Radford project would be operated so as to produce a peak capacity of 75,000 kw. each day during the low water season, when you say the regulated flow was 1230 second-feet?

A. I assumed it would be operated?

X Q. How many hours?

A. It will vary and fluctuate, just so you turn out a certain volume of power.

X Q. You were going to turn out 75,000 kw. peaking capacity. I want to know how long you were assuming you would turn it out each day in low water season?

A. You can vary it as long as you please, so long as you turn out the volume. As I have explained to you, an average would 1288 be about a half day, if you do not have an excessive demand, that would require you to utilize your storage. I have given you the stream flow and volume and figures. That may be squeezed in tighter and squeezed in lower.

X Q. Coming back to averages, is it or is it not a fact, with a regulated flow of 1230 second-feet for a day you could not operate the Radford plant at a peak to produce 75,000 kw. more than a little over three hours?

A. That is just exactly what you could do, you could run it all day long with a large storage in there if you wished.

X Q. I asked you how long, with a regulated flow of 1230 second-feet, for twenty-four hours, you could operate the Radford plant, so as to produce 75,000 kw?

A. My answer is you could run it all day long with the storage available—— [interrupted.]

XQ. I gave you 1230 second-feet?

A: You asked me how long I could run the Radford project. It is not dependent on the stream flow, because of the enormous capacity of the reservoir for pondage.

By the COURT. What is your question?

By Mr. JACKSON. My question is how long the Radford project could be operated to produce 75,000 KW during a day, utilizing, and utilizing only, the 1230 second-feet of regulated flow that is available or supposed to be available, day after day, during the low water season.

By the COURT. I am not certain I know exactly what you mean. If you released or regulated that flow when that dam is erected, you never would produce any 75,000 KW. You have to release about 9,000 cubic feet to reach the normal capacity.

By Mr. JACKSON. You are expected to have available every day in the low water season 1230 second-feet. That means at a uniform rate. You have a uniform amount of water of 1230 second-feet, twenty-four hours, and if you took the volume of water flowing, how long could you produce 75,000 KW with the Radford installation, and that is what I have been trying to get the witness to answer.

By Mr. THOMPSON. It seems to me there is a conflict in his own statement. May I say this, counsel has said, as I understood it, the witness has said there would be a regulated flow of 1230 second-feet. I don't understand he has conceded that at all, but has conceded that might happen, and he says if running peak loads it wouldn't happen.

By the COURT. Wouldn't the answer be what that proportion of the twenty-four hours represented to the 1230 second-feet?

By Mr. JACKSON. I think that is right, or a little over three hours.

By the WITNESS. May I explain?

XQ. Would you say that would be a little over three hours?

A. It is a misleading question. I have been sitting here maintaining for hours you don't have to turn out any of the 1230 second-feet. You might vary it as widly as you please; therefore, the only correct answer I can give you is, it varies widely. They can run it twenty-four hours if they please, with the enormous pondage in the Radford project. They can change it from day to day.

By Mr. JACKSON: I move to strike the answer.

By the COURT. If they did that, they could not maintain this storage to give them this regulated flow of 1230 second-feet.

A. My point is, there will be demands larger one day than the next, and they will not stick to the 1230, and the system will not require it.

XQ. If the regulated flow throughout the low water sea-
1289 son is 1230 second-feet, is it not a fact you could not on
the average, operate your project to produce 75,000 kw.
hours more than three hours a day?

A. Let's work it out.

XQ. You can tell that in a minute.

A. It would be a short proportion of the day. If it is necessary, we will figure it out.

By Mr. **Jackson**:

Q. Now you said a short time ago that you were willing to assume that the hydraulic capacity of the Bluestone installation would be about ten thousand second-feet. Is that right?

A. Subject to any further corrections that we might find later on.

Q. Then if that is true, is it not a fact that the installation which the Government proposes to place in the Bluestone, will have a capacity to operate on peak, which would result in flows varying from zero to a flow of 10,000 second-feet?

A. Your general idea is correct, Mr. Jackson, but, frankly, I have not looked up for some time the installation at Bluestone, because they had no bearing on the problem I was dealing with. I will be glad to look it up, but granting it is that, yes, sir; it would indicate that same idea.

Q. If there is 10,000 second-feet, it would be capable of doing that?

A. Yes, sir; something like that, that is correct.

Q. If that is not true, I wish you would let me know. Now, of course, it is a fact, is it not, that the Bluestone project is substantially closer to the head of navigation on the Kanawha than the Radford project?

A. Exactly, that is correct.

1290 Q. In your opinion, would peak operation at the Bluestone project have any effect on navigation on the Kanawha?

A. ~~If~~ proper provisions were not made to protect navigation it certainly would have a very deleterious effect, if those provisions were not made.

Q. It has a potentiality of operating on the extreme peaks you have been describing, has it not?

A. I have not gone into the Bluestone project. I am really not trying to argue with you, but I am trying to answer your questions frankly, and I said I have not looked up the installation, and I am sorry I have not.

Q. But if it is 10,000 second feet, it has that potentiality?

A. Yes, sir, if it is not properly regulated.

Q. Do you know whether the plan for the Bluestone project contemplates peak operation?

A. I have not gone into that question, because it does not enter into this problem. I will answer your question a little further. If the installation is as you say, 10,000 second feet, it would indicate that they would, and I do know if they are going to get the maximum economical return out of that installation, they have got to carry peak load. I am trying to give you the information that you want, exactly as you want it.

By Mr. Jackson. Please read the answer of the witness.

(Answer read).

Q. You mean in that answer about 2,000 second feet, regulated flow?

A. Put that in if you want to; 2,000 second feet.

Q. Regulated flow.

A. Yes, 2,000 regulated flow.

Q. Now I desire to read to you from Page 116 of Government Exhibit 145, being a part of the report of Major Conklin with reference to the Bluestone project, as follows:

"65. If the plant was operated under a 100 percent utilization factor, approximately half of the power would be generated during the hours of heavy demand for power and half
1291 during the low demand period. For convenience, these periods will be termed day and night, respectively. The unit value of power generated in the two sections of a 24-hour period is about in the ratio of 3 to 1 in favor of the day power. It is therefore advantageous to power development to generate as much power as practicable during the day period. After careful consideration it was decided that the plant can be operated to use during the day twice as much of the daily flow as at night without injurious effect on navigation or power developments downstream. Studies of waves produced by intermittent operation of power plants in the upper reaches of New River indicate that operation with moderate changes in daily flow such as proposed at Bluestone will not require re-regulation for navigation and existing power plants downstream."

Do you agree with that statement?

A. I have gone into a much further study of this project than the District Engineer's Office has at Huntington, and I do not agree with that statement.

Q. You have gone into a much further study of the Bluestone project than the Engineer who made the report on the Bluestone project.

A. In this particular case, because I desired to go into the details of the effect——

Q. One minute, you say you have made a much more detailed study of the Bluestone project than the members of the corps of engineers, who were charged with the duty of making that investigation and report, and to make that report. Is that right?

A. Yes, sir, for the simple reason that the object of this report is to obtain a general plan but I had to go into more specific information than this report proposed to do.

Q. Now if any project as to the Bluestone plan, was approved, it is the project contained in this report, isn't it?

A. It is the project referred to and listed in this report, but the final plans of the project are not approved. This was simply a general plan of a suggested layout, and the final plans, I do not believe are yet completed.

1292 Q. Now, I will read to you further from the report of the Chief of Engineers, dated January 28, 1935, and appearing at page 2-3 of Government Exhibit 145, as follows:

By Mr. THOMPSON. Is that General Markham's report?

By Mr. JACKSON. Yes, that is right. I will read as follows: "On the New River and its tributaries, the plans provide for a series of dams with a storage reservoir capacity of nearly 1,400,000 acre feet, the utilization of upward of 2,000 feet of head, and the development of 454,000 primary horse power of nearly 1,500,000 primary peak horsepower at 30 percent load factor."

1293 Q. I will ask you whether that does not indicate or mean operation on a peak load basis?

A. If you will look up——

Q. Please answer my question.

A. I cannot say that it don't, because it don't necessarily in this report, it is on account of the report is prepared. If you will notice——

Q. Now, Colonel——

A. One minute—it does indicate it, but if you will let me explain it and tell you what it is exactly——

Q. Just tell me whether the statement does not mean that, this statement I have read to you, does not mean that there would be peak load operation to the extent of three and one-third times the regular flow?

A. Not that statement there, because you are speaking of this 30 percent load factor, and the basis of that is the manner in which the District Engineer prepared his economics of the development. He has listed in here prime power, then he has listed what he calls secondary, and he has the installation; all of this comes in there, and the way it is written up in this report, has 30 percent load factor. You see the idea?

Q. Well, let me ask you this question: Does the statement that the project will produce nearly 1,500,000 primary peak horse power—does that refer to peaking, or not?

A. Not unless you look at the average annual power and the flow.

Q. Can you produce 1,500,000 primary peak horsepower without peaking?

1294 A. Certainly, if you had a continuous flow. Over Niagara it would not be peaking in the least, it would be continuous.

Q. It would not be peak power?

A. No, sir.

By Mr. Jackson:

Q. I direct the attention of the witness again to the sentence which I have already read as follows: "On the New River and its tributaries the plans provide for a series of dams with a storage reservoir capacity of nearly 1,400,000 acre-feet, the utilization of upward of 2,000 feet of head, and the development of 450,000 primary horse power or nearly 1,500,000 primary peak horse power at 30 percent load factor." And I asked the witness whether or not the production of 1,500,000 primary peak horse power at 30 percent load factor would not require peaking in the ratio of 3½ times the regulated flow?

By the Court:

That means the utilization of the complete hydraulic

1295 power on a stream, does it not, or a project on that stream?

A. Yes, sir.

Q. Which would mean their operation at maximum capacity, wouldn't it?

A. Yes, sir.

Q. Wouldn't that be peak?

A. Not necessarily. I will explain why. The method that the officers used in working up this power, if I am not very much mistaken, was to call the primary horse power the low regulated power, you see what I mean, that is what they call primary horse power. All right. Now they call secondary power that part above this which, if generated, would turn into secondary power. That is the method used in District Engineer offices, in their study of the problem. It is not what I would use in my own study, I would use an entirely different method or system.

By Mr. Jackson:

Q. You notice the figure is 454,000 primary horse power?

A. That was the low flow power.

Q. That is power from the regulated flow?

A. Yes, sir, the low flow power.

Q. Isn't the figure 1,500,000 primary peak horse power the result of converting primary horse power into peak power?

A. I do not believe it is. I think it is exactly what I told you, if you take the duration period, and I will say here, if it is important, I will be glad to look it up and see if it is that. I am practically positive that that is the way the District Engineer computed it here.

Q. Is not one million five hundred thousand substantially 3⅓ times 454,000 primary horse power?

A. Let us look it up, if you want to argue about it. Perhaps I will concede what you want me to say. What do you want?

Q. I just want you to answer my question.

A. I have answered it, but we will look it up in this book, and we will see if that is correct.

Q. Read the question. [Question read.]

A. Approximately that, yes.

1296 Q. And that is the same as dividing a hundred by 30 or 30 percent?

A. That is correct, and you get the same result the other way.

Q. Now while you are on that page I want to direct your attention to a statement of the Chief of Engineers in his report, page 3, paragraph 10, reading as follows:

"On the main stem of the river the regulated flow of the tributaries would afford at the Kanawha Falls plant and the three navigation dams, a total of 51,000 primary horse power or about 123,000 primary peak horse power, at 41 percent load factor."

Then there are a number of figures which we are not interested in in this case.

I will ask you whether that does not state a plan to operate the power plants of the three navigation dams on the Kanawha River, that is, the London, Marmet and Winfield, whereby the peak would be 2½ times the regulated flow?

A. I will have to give the same answer which I gave before, it depends upon the way this officer worked that up. If there is to be any further argument about it, let us look back there and see what it is, if you wish to take up the time.

Q. The Chief of Engineers made that statement.

A. But he took it from the District Engineer's Report. You can probably find the very same words in the District Engineer's report, and the Chief of Engineers took it from that. It is simply their system. It is not a system that I would use, but we can look it up if it is important in this problem, and definitely determine it. I am not trying to avoid anything. You want to find out if the plan makes provision for peak?

Q. Yes.

A. I know if you develop a power system up here you 1297 have got to have peak loads.

Q. Have you finished your answer?

A. Yes.

By Mr. **Jackson**:

Q. Colonel, assuming that the Bluestone project be constructed and in operation, would not any effect on the navigable capacity of Kanawha River be dependent upon the method of operation dictated and carried out at Bluestone?

A. It would, yes, sir. In their report they state they will have a continuous flow of 2,000, but they do not state how they will carry it out.

Q. Was it continuous or regulated flow?

A. Continuous flow of 2,000 second-feet.

Q. Will you look up and let me know where that is—not now, but later on?

A. Yes, I will look it up if you want the information, but frankly when the project was submitted, the idea was continuous, and——

Q. I think you had better wait and bring that out after you have looked it up, because we are wasting a lot of time.

A. Just a moment, I think I have it here, no, that is the head. I wanted the flow of 2,000.

Q. If there is such a statement it is in Government Exhibit 145?

A. Yes.

Q. Now there is a difference between regulated flow of 2,000 and continuous flow of 2,000?

A. Exactly so, that is the point, there is a big difference, that is correct.

Q. And you insist that in this report, Government Exhibit 145, it is to be continuous flow, is that right, used continuously?

A. That is my understanding of the report now, and I am practically sure that is correct.

1298 Q. Just read the statement to which you refer.

A. In the middle of paragraph 13, on page 3, I read the following: "The District Engineer finds that this reservoir should be operated to reduce floods on the Kanawha and the Ohio Rivers, to increase the low-water discharge of the New River, to 2,000 cubic feet per second, which is about three times the natural minimum discharge, and to produce power, the revenue from which he estimated at over $900,000 annually."

That does not state continuous there, but I feel sure there is some statement in the report which does state that.

Q. Would that be consistent with a capacity of 120,000 horse power?

A. I again come to the very point we were talking about before. The engineer in preparing his estimate used the duration curve in which he called prime power, regulated low flow, and he called secondary power which would be actually produced by the water as it came along. You see what I mean? This is an entirely different thing from the peak load with which power projects normally operate to secure a higher prime flow during low water.

Q. It is your understanding that the Government project at Bluestone provides for installation for 10,000 cubic second feet hydraulic capacity to be used with the run of the river regulated low water flow of 2,000 second feet. Is that right?

A. It is my understanding when the final plans are drawn up, they will have prepared a plan and project, or the statement of it just as I said. He simply called prime power low flow of the water and just as I told you in regard to the secondary power. You understood what I said and really that is my understanding of it, I have read it over, and I know I changed from his method and went to the normal method in my study.

This was simply a rough study made by the District Engineer to determine the feasibility, but I went into it in more detail.

Q. In other words, you disagree with the project as described
in Exhibit 145, and approved by the Chief of Engineers
1299 and you believe it will be carried out in some other way?

A. I do not disagree with him, but his method was simply a rough method of making an estimate. In other words, his method was simply the method used in a number of District Engineers' offices, in making preliminary estimates.

Q. You thought the difference of those installations between the production of one million five hundred thousand kw. and 454,000 primary horse power, was represented by variations in the run of the river production?

A. That is it, and not peak. That was simply a very rough estimate.

Q. That is, notwithstanding the fact that 1,500,000 is labelled "primary peak horse power"?

A. I don't understand his meaning of that in this particular study, because he has worked it out just as I told you, that is the way they have done it.

Q. You would not know what primary peak horse power meant, as applied to the run of the river plant, would you?

A. You would have to look at the context to see how he had worked it out, to really find that out.

Q. It would be an animal that you never ran across in ordinary engineering, primary peak horse power, with the run of the river?

A. It is a little unusual, yes, to be frank.

Q. Is it not true that it would not take three inches of Bluestone Reservoir to absorb all of the daily wave from Radford of he kind assumed by you?

A. You are speaking of three inches covering the entire reservoir at Radford?

Q. Yes, sir.

A. Two forces apply. In the upper end of the reservoir, you et the idea, it is applied to the upper end. As the flow of this
water comes downstream, it causes the upper end of the
300 reservoir to tilt. It then has two potential power factors
that cause oscillation.

Q. One minute, I am not talking about oscillation but the imple question is whether or not three inches on the top of the 3luestone reservoir would not absorb the volume of the entire laily wave from the Radford project, produced by operation ssumed by you, when, for instance, 2,000 second foot flow for 24 ours is being converted into peak wave?

A. It could not absorb it—what is it, did you say three inches?

Q. Yes.

A. Three inches of water all over the surface of the pool is ot struck uniformly by this mass of water. Does that explain our idea?

Q. The volume would be no greater than that, would it?

A. I have not gone down to the figures of it because it was not ecessary for me to go into the figures, you understand?

Q. From your study of the Bluestone project, about which you ay you are better informed than the engineers who made the eport, don't you know that three inches on the surface would ave a volume greater than the volume of such a wave as you ssumed for a day, utilizing the equivalent of a 2,000 second oot day?

A. I know this, I know the wave did not lift the whole 2,000 ne inch all over the reservoir, it tilted the upper end, and that s where the force was applied, and that is where your oscillation ccurs.

By Mr. Jackson:

I move to strike out the answer of the witness and will ask hat my question be read and that the witness answer it.

A. Would you mind withdrawing the words that I assumed hat I knew more than the engineers who prepared the report lid, because I never said that.

Q. Naturally you did not. Now read the question without hose words.

(Question read to witness.)

1301 A. Now, having removed that statement, I do not see how I can answer it without explaining that the force is applied at one end.

Q. One minute. All I asked you for is a comparison of volumes and as an engineer you certainly can tell me whether these volumes would be equivalent or would not, or that you do not know?

A. My answer as an engineer is that this one inch of the whole reservoir is not concerned with it, because it is not there, and cannot be lifted or forced up or down or what not. It is the upper end that is forced up and down.

By Mr. JACKSON. I move to strike the answer out, ask that my question be read to the witness again, and will ask the witness to answer the question.

(Question read to the witness.)

Q. Can you answer the question.

A. I can say that I don't know exactly, but I think I have got a right to qualify my answers so that they will give you the information you ask for, as that is what I am trying to do. Frankly, I am not trying to argue, I just want to answer your questions as well as I can.

Q. If you cannot exactly say, that is enough.

By the COURT:

Q. Has any evidence been introduced to show the acreage of the pool behind the Bluestone Dam?

A. I believe we have it right here.

By Mr. JACKSON. It is in Exhibit 145.

By Mr. THOMPSON. At page 11 it says: "Area and volume of reservoir, the following table gives the reservoir area and capacity for the various elevations shown."

By WITNESS. Q. What is the normal pool elevation, do you know. Mr. Jackson, will you give me that, I have forgotten it from memory.

By Mr. JACKSON:

Isn't it 1490?

A. It runs up to nearly 1500, and the area is figured there.

By Mr. THOMPSON. Q. Will you give him the pool elevation so that he can answer your question?

By Mr. JACKSON:

I think the witness might state, if he can, the area surface at the elevation for power purposes and then the elevation at the very top.

1302 A. I have a table showing the area here, but I do not recall from memory the normal pool elevation of the project. It shows on page 11 areas and volume of reservoir for various heights, but I do not recall from memory exactly what the pool elevation was.

Q. Colonel, to answer the question asked by the Court as to the elevation, 1,520 feet, the area is 9,040 acres, is it not?

A. That is correct.

1303 Q. Then at 1515, it is 8,636 acres?

A. Yes, sir.

Q. At 1500 it is 7,446 acres?

A. Yes, sir.

Q. At 1490 it is 6,698. Is that right?

A. Yes, sir.

By the COURT. That is all right, I have those figures here.

By Mr. THOMPSON. Your Honor asked some question about the flow on the Radford dam.

By the COURT. Yes, I think I have that. I thought your question referred to using the minimum hydraulic capacity of the plant and I was making some figures here of 9,000 cubic feet per second.

A. That was not the situation at that time. If there was such a flow as that it would be flowing through both plants and really on the run of the river basis.

1304 By Mr. JACKSON:

Q. Colonel Watkins, the London dam has an installation with hydraulic capacity of 9,000 second feet. Is it not a fact that that installation has a potential capacity of varying the flow from zero to 9,000 second-feet?

A. It has in the London dam, but that is subject to regulation.

Q. That installation was put in a Government navigation dam, under a government license?

A. Yes, and subject to regulation.

Q. But the installation provided does have a potential capacity of varying the flow from zero to 9,000 second-feet?

A. I don't know who put the installation in there. I believe the power company put in the installation on which it desired, but they were approved by the Government.

Q. They were licensed by the Government?

A. They were approved.

Q. Would any possible effect on the pool of the Kanawha by peak load operation be greater from a plant situated in one of the navigation dams than in one plant situated at Radford, 160 miles above those pools?

A. If it were allowed to operate at peak capacity, probably so. That is, to operate so that it does go ahead and do that.

Q. Now I produce a copy of a document entitled Federal Power Commission, Washington, D. C., License on the navigable waters, Project 1175, West Virginia, Kanawha Valley Power Company, and I read you the last sentence of Article 16, as follows:

"It is hereby understood and agreed that the United States specifically retains and safeguards the rights to use water in such amount, to be determined by the Secretary of War as may be necessary for the purposes of navigation. The operations of the licensee, so far as they affect the use and discharge of the water and the regulation of the elevations of all pools shall be controlled
at all times by the Division Engineer, War Department,
1305 in charge of the improvements of the Kanawha River,
pursuant to such reasonable rules and regulations as may be made from time to time by the Secretary of War in order to prevent any impairment of navigability."

Now the next sentence, which is the one I want to call to your attention is this: "Subject to the foregoing paramount conditions, the licensee shall so operate the power stations and utilize the pondage of the London Pool between elevations 614 and 611, that it will make the most efficient use of the water power potentially available."

And will ask you whether that last sentence would require some peaking?

A. It would require the maximum efficient development of power there which would require such peaking as may be done without interfering with navigation. Does that answer your question?

Q. Yes; and to utilize 3 foot pondege, for power at all, you would have to peak?

A. Yes; but that is a thing which the District Engineer and the representative of the power company should work out and between the two go ahead and so supervise and regulate it so that there is no interference. The point has two economic things, one is navigation, and one is power, and it should not be wasted, but we should utilize it as much as we can without interfering with navigation.

Q. Is it not a fact that the installation at Marmet and the proposed installation at London, one is and the other will have a probable hydraulic capacity in the vicinity of 9,000 second-feet, with potentiality or capacity to vary the flow from zero to 9,000 second-feet?

A. It will, subject to control, but not to interfere with navigation, it will have a potential capacity but subject to control.

Q. When I referred to London and Marmet, a little while ago, I meant to refer to Winfield. In the future the same thing will
be true of Winfield, will it not?

1306 A. Yes, sir.

Q. In fact, the installation at Winfield will have a larger hydraulic capacity, will it not?

A. It should have, I should think—it is further downstream.

Q. And if it does, it will have a capacity to vary to a wider range of flow?

A. Yes. Of course, these figures that you mention are subject to correction.

Q. That does not matter for this purpose, there may be some variation.

A. Yes.

Q. Colonel Watkins, when the Winfield dam and the Gallipolis Dam, now both under construction, are completed, will the Kanawha River be a canalized river?

A. It will be a river there with pools, locks, and dams, with a 9-foot navigation.

Q. When you have a river that is completely improved for slack water navigation, so that you simply pass from one pool to another, is not that at least sometimes known as a canalized stream?

A. I think so, yes, sir.

Q. And the Kanawha River will be a canalized stream when these dams are completed, will it not?

A. Yes, sir.

Q. Is it not your opinion that waves produced by normal operation of the hydro-electric plant, or the hydro-electric plants, do not interfere with navigation on a fully canalized river?

A. If the projects there in this canalized section with a capacity of 9,000 cubic feet per second, operated in a manner to secure the most economical returns from this system, it would fluctuate the flow enormously; it would fluctuate the pools enormously. The wave going down would cause first, a rise, and a fall away below horizontal, and when the water is let out at the gates or through the turbines, it would soon be that the elevation of the pool would not be up to the crest of the dam.

1307 Q. As a practical matter, it is your opinion that normal operation of hydroelectric plants do not produce any interference with navigation or anything on a canalized stream?

A. I know positively that these dams would have the same effect I have described. When it fell back to the horizontal, it would not be up to the crest of the dam. The flow would be cut off. That would seriously interfere with navigation.

Q. I hold in my hand a report signed by you?

A. Yes, sir.

Q. Dated December 23rd, 1927?

A. Yes, sir.

Q. Addressed to the Chief of Engineers of the United States Army, and I read to you from page 26 of the report as it is printed in House Document No. 185, Seventieth Congress, first session. I read this section.

Q. You will recall that I stated that I would read to you the statement from the report that I previously described?

A. Yes, sir.

Q. Signed by you, as follows: "In a canalized waterway, the fluctuations of stream flow caused by power plants will not interfere with navigation". And I ask you whether or not I have correctly read that sentence from that report.

A. Will you show me the sentence—show me the line?

A. I will point it out to you—This is the sentence here. I will ask that the question be read. (The question is read.) Have I correctly read it?

A. (No answer from witness.)

Q. Did I correctly read it, Colonel?

A. You have read it correctly, but I desire to explain it.

Q. Just a moment.

1308 A. No; I have a right to explain it.

By the COURT, So far the question is whether or not that sentence is in the report, that sentence just read.

A. Yes, sir.

By Mr. JACKSON:

Q. Colonel, in that sentence that I have read from your report to the Chief of Engineers, did you correctly and truthfully state your opinion to your Superior Officer?

A. I did, subject to the conditions under which the report was made. That is what I would like to explain. I can do so very fully.

Q. I am sure of that, but I suggest that you wait until your re-direct examination and your counsel can question you on it.

A. I would like to explain it now.

By the COURT:

Go ahead.

A. This report is in a report—a partial report on the Tennessee River and its tributaries. I was in complete control of designing the project—absolute control. I did design them so they would not interfere with navigation—all of the projects. I had a 10-foot sur-charge on the main stream project. During low-flow, I provided, as you will find in the report, to make the sur-charge elevation 5 feet. In that situation they would not interefere with navigation. The prosecution of these plans was in combination with the development of flood-control and power. The sur-charge elevation, the reserve flood storage elevation was to compensate for the flood storage of the channel displaced by the pool of the dam.

Q. The sur-charge on Bluestone is 30 feet, is it?

A. It is higher than necessary to compensate for the natural
flood storage displaced. It is a flood storage project and
1309 for that reason, they made not only enough to compensate
for additional surcharge storage. So, in view of the designs of the dams on the Tennessee River, my statement is correct. Coming to the Kanawha River, we find dams with designs absolutely different, that lose their head by one oscillation and spill water, which seriously interferes. These projects on the lower Kanawha are absolutely different from the Tennessee River, which I designed when I made the statement.

By Mr. **Jackson**:

Q. The projects on the Tennessee River displace over six million feet of natural storage?

A. For the compensation of the entire system. The total
1310 in my report shows what is displaced, and the main thought
was to provide for a 10-foot storage—some provide greater storage and some less, and the total is compensated.

Q. I direct your attention to a statement appearing on page 9 of the same report.

A. All right.

Q. And I will point it out to you. I direct your attention to this upper one here, on page 9, this sentence here—I will give you the question again—I direct your attention to sentence appearing at the top of page 9 in the same report, in paragraph 24, and read as follows: (Reading) "In canalized projects, when dams and pools are provided, a power project may vary the loads to meet normal demand, without interfering with navigation," and I ask you whether or not I have correctly read that statement from your report.

A. You have correctly read the statement.

Q. Now I ask you further, whether in making that statement to the Chief of Engineers, your Superior Officer, you honestly and fairly stated your opinion in that respect?

A. I did for the reasons I have explained in the other answer; absolutely the same reasons.

Q. I produce what appears to be a photostatic copy of a report on Application for License, Federal Power Project No. 1175, West Virginia, dated February 24th, 1932, and signed by George R. Spalding, Colonel, Corps of Engineers, and ask that it be marked Defendant's Exhibit 525, for identification.

(The foregoing document was marked as indicated.)

Q. (Continuing.) Colonel, I direct your attention to a sentence in paragraph 12, on page 8, of the defendant's exhibit 525, for identification, reading as follows: "The basic design of the dam

at the London site assures dependable 9-foot navigation at the
upper end of the project (foot of Three Island Shoal, 90.57
1311 miles above mouth) with a variation of approximately three
feet below normal pool elevation to absorb natural and
artificial fluctuations in discharge"; and I ask you if that does
not contemplate the use of this 3-foot pondage for power
purposes.

Q. Will you answer the question?

A. It is there in that report. I have not studied it and I don't know the context of it.

Q. And you cannot answer the question?

A. No. sir; I cannot answer it that way. I have not studied the report. If I could see all these things and bring them to a close right here and now, I would be delighted.

Q. But you cannot interpret the sentence?

A. I cannot unless I look at the context; no one can; you cannot possibly do so. My answer here is apparent in the paragraph, if you will read it. This paragraph says: "The United States, through the Secretary of War, specifically retains the right to regulate the pool elevations in the interest of navigation. The basic design of the dam at the London site assures dependable 9-foot navigation at the upper end of the project (foot of Three Island Shoal, 90.57 miles above mouth) with a variation of approximately three feet below normal pool elevation to absorb natural and artificial fluctuations in discharge." I don't know what information they had on hand at the time the report was made, but the hydraulic effect that I mentioned to you is correct. I have simply stated the hydraulic effects which will occur.

Q. You cannot answer my question.

A. The right is reserved there for the Government to regulate. That is the point to the whole thing.

Q. I direct your attention to profile of the Bluestone on Exhibit 120. Is everything shown below the yellow area for power purposes?

A. The red area is supposed to be the reservoir storage area.

Q. It is the draw-down?

A. It is the draw-down. You asked if it was for power purposes. The object is for regulation of stream flow.

Q. It is used for power, is it?

A. Yes, sir, it is used for combined power—stream flow—it has two purposes, one to increase the navigable depth of water supply for operation on the Ohio—for the operation of the Ohio dams, and the other is for the development of power.

Q. The point is—all of the red area is the draw-down?

A. Yes, sir, it is there shown for regulation of the stream flow, if you also want to call that power.

Q. Is it used for power?

A. It is used both for power and navigation and flood-control, but I may add—I think, I beg your pardon, and flood control.

Q. The red is for flood control?

A. Yes, sir, that comes in and helps.

Q. That comes in and helps?

A. Yes, sir, it happens to be down in that particular ruled curve, and I don't know the proportion of the red available for maximum floods.

Q. It is not reserved for floods, is it?

A. No; but with good regulations, you can depend on it. It will always help.

Q. If any reservoir is drawn down for any reason, the part that has been emptied, will be helpful in flood control?

A. Yes, sir.

Q. Turn to page 111 of Exhibit 145—you have it there—House Document No. 91.

A. Page 145?

Q. Page 111 in Exhibit 145.

A. All right.

Q. And referring to that table——

A. Yes, sir.

Q. Tell me whether or not the tail water elevation of the Bluestone is 1370 feet?

A. The lowest elevation is 1490.

Q. Turn to the second column, countour elevation?

A. Oh, I see—1370 is the lowest contour.

Q. That is at the bottom?

A. Yes, sir, that is correct.

Q. That would be at the tail water elevation?

A. I suppose that is. As I recall since, that was the figure there.

Q. Will you turn to page 2 of the Chief of Engineer's report, in Exhibit 145, and state—I should say page 3, near the bottom of the page, and state whether or not under Title, Bluestone Reservoir, paragraph 13, it is not stated that at maximum draw-down, a head of 66 feet would be available during a year of extremely low flow?

A. What page—at maximum draw-down, yes, sir, a head of 66 feet would be available during a year of extremely low flow.

Q. And that would mean that that head of 66 feet—that the elevation of the pool would be 1436 feet, wouldn't it?

A. I would have to check it.

Q. You know it is 1370 plus 66?

A. I know they provide a 30-foot draw-down, as the draw-down for these flows.

Q. You told me that this elevation, at tail water elevation or base elevation is 1370?

A. Yes, sir.

Q. When you have a 66-foot head, all you have to do is add the 66 to 1370 to find what your pool elevation is?

A. No, sir; you apply the 66 feet—maximum draw-down.

Q. And head?

A. And head—the 66 feet would be the head during extremely low flow; at the maximum draw-down the 66 feet would be during extremely low flow.

Q. At maximum draw-down?

A. Yes, sir.

Q. I mean, that if the tail water elevation is 1370 and the head with maximum draw-down is 66 feet, the pool elevation at maximum draw-down would be 1370 plus 66, or 1436, wouldn't it?

A. It would be that, if that is exactly what the plans contemplated. I would have to study the report and see what you are driving at. You say add 66 to 1370?

Q. Yes, that gives 1436.

A. All right. Take it up there.

Q. Will you take your Exhibit 120 and draw a line through your profile Bluestone Reservoir elevation 1436?

A. All right.

Q. Here is a red pencil and a rule?

A. I have a pencil. It was 1436?

Q. Yes, sir.

A. This was a 10-foot elevation here.

Q. Yes, sir.

A. 36 would be up here. That is right.

Q. Mark it here so you can draw it straight.

A. That is close enough; that is about right (witness draws line as requested).

Q. The line on Exhibit 120, which I am indicating, with an arrow, I will mark it Colonel W.—is the one that you just drew, isn't it?

A. Well, don't put my name on it, because you told me to put it there. Suppose we mark it with Mr. Defense Counsel. I have done it under your direction.

Q. Is that line you just drew where the red arrow is?

A. Yes, sir, but let's not call it Colonel Watkins. I did that under your instruction and I haven't studied as to why it is there or what it is doing there. Let me mark it Mr. D. C., is the more appropriate thing.

By Mr. Jackson. We will not mark it at all.

A. I drew it under your instruction.

By the Court. Q. What did the witness say as to the meaning of the figures 66?

By Mr. JACKSON. I understood him to say that at times of maximum draw-down there would be only 66 feet of head at the power plant, which would mean that the water surface would be 66 feet above the tail elevation of 1370 feet.

By the COURT. Does that 66 feet represent dead storage?

By Mr. JACKSON. Yes, sir.

By Mr. JACKSON:

Q. Referring to your exhibit—to Exhibit 120?

A. Yes, sir.

Q. You stated, as I understood you, on your direct examination, that this showed projects authorized. Isn't it a fact that there is no project shown on either Exhibit 119 or 120 that has been authorized, unless it be the Bluestone project.

A. Yes, sir; all of these navigation dams below are authorized.

Q. I am talking about those you colored.

A. Yes, sir, I will explain. If I used the word "authorized," I should have said proposed or laid out in the general plan.

Q. I thought that is what you meant.

A. They were not approved except that work has begun in the Bluestone. We all know that.

Q. By that you meant that these are projects——

A. (Interrupting.) Yes, sir.

Q. (Continued) that had been proposed and described in this report?

A. They were part of the general plan. It is part of the 308 plan, yes, sir. If I said "authorized," I will correct it and say it is part of the project in the 308 report for the general plan.

1312 Q. Colonel Watkins, on your direct examination, you were asked to assume that there was a flow of 760 second feet at Radford?

A. Yes, sir.

Q. And a flow of 1,130 second feet at Kanawha Falls?

A. Yes, sir.

Q. And that the flow at Radford—was entirely cut off for ten days, or something?

A. Yes, sir.

Q. Was that as you computed it?

A. Yes, sir.

Q. There will be left only a flow of 370 feet of so at Kanawha Falls?

A. Yes, sir.

Q. And then you stated what would be the effects upon navigation of the pools of Kanawha River under the conditions in 1927 and I think later, perhaps—under present conditions—and you stated that it would cause some recession on the ponds back in the London and Marmet pools?

A. Yes, sir.

Q. Tell me what becomes of the 370 second feet, so far as the London pool is concerned.

A. Between the time the question was originally asked and the time I was finally allowed to answer it, the lawyers had a long discussion, a great long one—so that in making the computation to determine the effect in the lower river, I should have brought in the regulation of the flow the way it would have been—what would it be. They gave 1116 for regulation the flow and it should be 1230. Have you got a piece of paper?

Q. What I want is, tell me where the 370 second feet went.

A. The part that was left?

Q. Yes.

A. It went on down the river.

Q. How could it go down—how was it lost out of London pool?

1313 A. It simply flowed down like any other flow. That was all the flow left there. In other words, the flow up at the London,—I mean the Radford project was 760, and down on the lower river it was 1130. If you cut off the flow of 760 above, there is only 370 second feet left in the lower river. That is also true if you cut off 12 second feet——

Q. (Interrupting.) We assume 370 feet left coming into the London pool?

A. Yes, sir.

Q. How did it get out of the London pool?

A. Just like any other water—it flowed on down the river.

Q. Do you assume that the gate was open?

A. You have a power plant and it probably went through into the turbines.

Q. You assumed that it went through the power plant, did you?

A. No doubt it would if it was not such a low flow it pitted the turbines—you will pit your turbines.

Q. Assuming the flow was reduced to 370 feet coming into the London Dam or London pool, and assuming there was no roller gates raised?

A. Yes, sir.

Q. And assuming that the power plant was shut down, would London pool lower below its normal level?

A. In the new dams?

Q. Yes.

A. As I looked at it, the leakage from the dam and gates comes to something like 30 or 40 cubic feet per second. The lockage, and for normal—maximum—for normal operation is about 312 to 370. You see the idea.

Q. Isn't it a fact that lockage at London does not exceed 7 second feet?

A. It depends entirely on the commerce—the lockages that go through—the lock.

1314 Q. Don't you know for any commerce using London Dam there, would not be 50 second feet of water used for lockage?

A. I know, as an engineer, what is required for lockage for various amounts of commerce, and for a normal, that is for a reasonably just estimate to determine the amount of water required for lockage, to take care of the lockage is about 50 a day. You could operate and use about twice that a day, but 50 is a reasonable basis, and that is what I took.

Q. Lockages per day?

A. Yes, sir.

Q. If you confined yourself to the actual situation, you would find about three lockages a day?

A. Yes, sir, but when we worked it into this plan and got the water supply for the lock, it used more.

Q. You were asked what would be the effect of the reduction in the flow in the London Dam to 370 feet on conditions today. Did you answer something else?

A. No, sir; I tried to answer you exactly.

Q. I am talking about your direct examination. You were asked what would be the effect today at London pool, or something to that effect, if they reduced the inflow to 370 second feet?

A. Yes, sir.

Q. That lockage today would not equal 35 second feet, would it?

A. That is absolutely immaterial in this case, because the dam operated with a fixed crest. I did not consider that you were going to lower one iota the crest of the dam at the new pools. I said one to two inches, considering the reservoir regulations; it should have been two-tenths of an inch or one to two. There is a situation there—the water at the crest of the dam, it has enough to maintain it at the crest of the dam. If it is awfully low there, you are on the border line and can maintain it at the crest, but not at the upper end.

1315 Q. Isn't it a fact that you have enough water coming into the pool to take care of lockage and leakage and fully maintain the pool?

A. Lockage and leakage and evaporation; yes, sir.

By Mr. Thompson:

Q. What was that—evaporation?

A. Yes, sir.

By Mr. Jackson:

Q. The evaporation is insignificant, isn't it?

A. It amounts to about 4 feet a year.

Q. Wouldn't you say under existing conditions, that the total amount of lockage, leakage, and evaporation at the London pool would not equal 50 second-feet?

A. I could not say that, for the reason that at Hinton down there, from Hinton down there, there is no increase in the flow, and it actually, according to data, appears to dip somewhere in places, due, in summer, to that factor. It drops down and is appreciable. I will say that it is appreciable there; I cannot say what was the amount. I am trying to give you the information you want.

Q. Colonel, I understand you are attached to the General Staff now?

A. Yes; I am on duty in the Military Intelligence Division of the General Staff.

Q. And your duties are to have charge of the Map Room?

A. I am in charge of the Map Room, yes; the Geographic Branch, we call it, of the division.

Q. And that has charge of the accumulation of maps of various countries and the preservation of them?

A. That is correct.

Q. Colonel, am I correct in understanding from your direct testimony that in your opinion there will be no dampening or lessening of the amplitude of the 8,000 or 9,000 second foot
1316 wave which you assume to be released from the Radford
power station and measured at the Glen Lyn Gauging Station between Radford and Glen Lyn or, at least, any dampening will be negligible?

A. No, it will not be negligible. In using the estimate given in my report I considered a wave that left the project approximately like that of the general shape of the natural wave of the river. You, with the Radford project, will at times turn out high narrow ones and wide ones and all other shapes. The estimate of the dampening out which I gave for Glen Lyn and for the lower river was based upon my estimate of approximately, an average, if I may say that, an average for the particular flows which I applied them to.

Q. An average wave, you mean?

A. Yes; that is it. Frankly, there will be times I know, when the discharge that reaches Glen Lyn will be greater than that, due to the piling up of the back of the volume of water over the front. You see if you send out a wide block of water, suppose it jumps right up to 9,000 and goes over for eight or ten hours at that rate, the front part would not waste away but would run down and would form a tongue in advance. In doing that it has to fill up the natural channel of the stream. It could not proceed as fast as this back part of that block. The back part of the block would therefore run up over the front. Now, in the figures I have used throughout, I have used very conservative figures, I have not tried to exaggerate and I simply took this average which I have given.

Q. Perhaps you can give me a little more definite idea of this average wave. What time in the morning did you assume that the typical wave would begin?

A. Let us take——

Q. Please answer that and then we will get along so much more rapidly.

A. All right. In the first place, it will depend just how far from the top down you go because you know the peak
1317 of the load rises in that way. It is on a slope.

Q. What time did you assume the wave will begin in the morning?

A. It will begin sometime in the morning between 4:00 or 5:00, or 6:00, whenever your peak load starts up. It may sometimes start even at 8:00 or 9:00.

Q. Well, shall we say 7:00 as an average?

A. Let us take 7:00 as an average. There is another thing that comes in there. You put in your machines as a block, the first ones that go in. You don't want to put these big machines right at the edge of that load.

Q. I haven't any objection to your telling all that you know, except it is going to delay us a lot. You said it might start somewhere between 4:00 and 6:00 in the morning?

A. I am trying to answer you as definitely as I can because you are never going to be just exactly the same height. Let us take 7 o'clock or 8 o'clock, anywhere along there.

Q. All right, take 7 o'clock. Before that wave started would the bed of the stream be dry or the flow be practically zero?

A. During periods of low flow it would.

Q. Taking 7 as a starting hour, what would be the outflow in second-feet an hour later for your typical wave?

A. Well, your units are four into 75,000 which is about 19,000; is that right?

Q. I think that would be right.

A. That would be put in and a little later on the slope the next one perhaps.

Q. I want to get a typical wave. We started at 7. What would be the output in kilowatts or the outflow in second-feet at 8, an hour later?

A. I haven't your load wave before me.

Q. But you have got a typical wave that you have been
1318 testifying about. Tell us what it would be an hour later in the day.

A. It will come in on the slope. I doubt if you would put in another machine in that time, an hour later. You are starting out with your plant with the 19,000 block machine.

Q. On a typical wave what did you put in at 7?

A. Let me describe it this way.

Q. No, please give it my way.

A. The volume is the thing that counts. The thing that counts is the bulk, the volume of the wave.

Q. Colonel, we are starting this typical wave of yours at 7. What is the output in kilowatts or the outflow in second feet from 7, starting at zero?

A. You desire to at least put in two-thirds of this 19,000.

Q. As one unit?

A. Something like that, to avoid pitting of your machines.

Q. Two-thirds of one unit?

A. Something like that.

Q. An hour later, at 8 o'clock on your typical power wave, how many kilowatts will you produce, or how many second feet of outflow, whichever way you want to state it?

A. Let us work it out this way——

Q. Please answer my question.

A. You have asked me for something and in order to answer I have got to compute it and I will compute it right here. All right, now——

Q. Suppose you compute it and give me your answer.

A. From 4 to 11 is seven hours. I said about 7, so to reach your peak there are four hours left. If you were putting them all in on that day, you will add about one of those an hour.

Q. At 8 o'clock on your typical wave you would have one machine in operation which would be 19,000 kilowatts?

1319 A. Yes.

Q. At the second hour, or 9 o'clock, on your typical wave how many kilowatts are you producing or how many second feet of outflow do your have?

A. I mentioned that you would just about put in one of those per hour if you were putting them all in on this particular day. Mind you, the thing that counts is the volume.

Q. We are going to find out what it is. You have this typical wave in your mind; no one else has, and so you have to tell me about it. At the end of the second hour, 9 o'clock, you have one more unit in?

A. One more and one more and one more.

Q. At 9?

A. At 9 and 10 and 11.

Q. Please let me progress so I will understand it. At 9 o'clock, at the end of the second hour, you have a second unit in, or how many kilowatts?

A. 7, 8, 9 and 10—your peak load doesn't come in until about 11 so that is a little too fast.

Q. You started out with two-thirds of a machine on at 7 and at 8 you had one machine on full. At 9 you had what?

A. At 7 I had one. At somewhat after 8 comes in two.

Q. At 9 how much?

A. Appreciably after 9 is three, and about 11 is four.

Q. Can you fix the third one any closer than appreciably after 9? Would it be 10?

A. No, I can't fix it better than that. If you want me to do it mentally, it is a question of splitting up. I believe your peak is about 11. It will vary.

Q. Before you testified did you ever figure out how many machines you would put in at the commencement of your peak?

A. Well——

Q. Did you?

1320 A. No; but let me explain. It wasn't necessary for the simple reason that I will tell you it is the volume that comes out of there that counts. That is the thing that counts.

Q. On your typical wave you now estimate that you would have four machines in operation by 11; is that right?

A. Yes.

Q. Is that the total capacity?

A. Four machines would all be in by that time.

Q. That is the total capacity at your plant?

A. Yes.

Q. How many machines did you have in operation at 12 on your typical wave?

A. Well, if 11 is the peak there are four machines there and you are not going to get any more because they are all there.

Q. Do you continue all of them at 12?

A. Now, before we go any further let us figure out the volume and see where it goes to. All right. I am trying to give you a typical——

Q. Please let me finish my question. At 1 o'clock or between 12 and 1 have you reduced the number of machines in operation?

A. Before I can answer you you will have to let me figure out the base and the volume and see just about where it goes. I can't answer until I do that, an engineer's means of computation.

Q. When you were giving your picture of this typical wave about which you testified, you did not either figure or estimate how many machines you would have in operation between 12 and 1, did you?

A. I looked at the volume, I tell you. That is what counts and also consider that you are going to put this in there with your other machines. You have got that volume. You can apply your whole hydroelectric machines in filling out that volume.

Mr. **Jackson.** I move to strike out the answer.

1321 By the **Court**:

Q. Doesn't the volume of water being discharged depend on the number of machines in operation?

A. Yes, sir, and the length of time.

Note.—The question was read as follows: When you were giving your picture of this typical wave about which you testified, you did not either figure or estimate how many machines you would have in operation between 12 and 1, did you?

By Mr. **Jackson**:

Q. You know whether you did or not, Colonel?

A. I figured it out mentally. I figured it this way: I figured the base we would have; I figured what the peak would come to and it is a geometrical triangle of somewhat near that. If I multiply one-half of the altitude times the base I get the volume or approximately there, absolutely near enough for our purposes.

Mr. **Jackson.** I move to strike out the answer and ask to have the question read to the witness.

The **Court.** Let it stay in.

Note.—The question was repeated as follows: When you were giving your picture of this typical wave about which you testified, you did not either figure or estimate how many machines you would have in operation between 12 and 1, did you?

By Mr. **Jackson**:

Q. Will you answer that?

A. Your question implies that I have not solved this problem. I have solved it, and what I want to explain is to get down to where we belong as to volume and the general conformity and I can figure it for you here, sitting up in the chair without a piece of paper or anything of the kind, and I would like to do it.

Mr. **Jackson.** I move to strike out the answer and ask to have the question read to the witness again.

The **Court.** He has his own way of answering it, and he says he can't answer it any other way and if you are going to get any answer I think we had better let him answer it his own way and see what we get.

Mr. **Jackson.** My difficulty is I get no answer.

1322 By the **Court**:

Q. Go ahead and answer it the way you want to answer it and let us see how responsive it is.

Mr. **Jackson.** I would like to have the question read.

A. I have it in mind.

Q. (The question was read as follows.) When you were giving your picture of this typical wave about which you testified, you did not either figure or estimate how many machines you would have in operation between 12 and 1, did you?

A. I figured by a mental process of seeing the wave before me. Right now I can work it out and I can give it to you if you will permit me to do so. Yes, I did it mentally, just the picture in my mind. I knew about what it amounted to. Now I can compute that figure and tell you what it was if I may.

By the Court:

Q. Go ahead.

A. All right, sir. As I said, it was the volume. It is the volume that counts. All right; now, the hydraulic capacity of your plant is 9,000 cubic feet per second. All right. The volume of your average wave was 8,000 acre-feet. All right. Now, if the peak of the load is at 9,000 and the total volume is 8,000 acre-feet, 8,000 acre-feet being one-half of 9,000 day second-feet. The base of the wave if it was an absolute triangle would go up to 9,000 cubic feet per second and go down to the base at about the other end of the day. Then block it in so it fits in and you will have it fitting in up there, extending some two or three—say from 11 to 2, about like that, and the other end would bowed in so there you go. Does that answer it? I have tried to give you a picture. I think that describes it.

1323 Q. Now, Colonel, will you tell me on this average typical wave of yours how many machines you had in operation at 2 o'clock?

A. As I said, apparently you still have all four of them in. Of course, I reserve the right to compute and check that if it is necessary because I am now sitting up here computing mentally. I have no paper; I have nothing.

Q. You have been all over that.

A. O. K.

Q. At 3 o'clock how many machines did you have in on this average typical wave?

A. Between 11 and 2 is three hours. At 2 o'clock you would still have apparently, as I see it, four machines in.

Q. At 3 I asked you about, Colonel.

A. Four in at 2 and the other in about 11—I have got to run the line down now from up about 2 down to the base.

Q. Do you regulate your machines according to how you have to run your line, or do you make your line from how you run your machines?

A. It is a matter of mathematics pure and simple, of getting the volume in. It is pure mathematics, running a triangle, and it is a little difficult to sit up here and do it. At 7 in the morning——

Q. 3 in the afternoon we are trying to get.

A. Beginning from this side at 7—at the end of the day, of course, is 7 the next morning. You don't want it that far. You want seven hours back from there. It is going to come down. 3 o'clock will be most all of them in—going to come on down.

Q. At 3 your best judgment is there should be three on or four?

A. Probably still be part of four on.

Q. Three and part of the fourth?

A. Apparently.

1324 Q. Now tell me how many machines will be on at 4 on your typical average wave?

A. May I have a piece of paper?

Q. I am perfectly willing to take just what you develop for your testimony if you can give me the figure.

A. No, you insist on every hour of the whole curve and in order that I can give a reasonable answer, I have told you the block, I have told you what it looks like; now if I must work out every hour, please let me work out every hour.

Q. Tell me what it is, how many machines you have operating on this typical wave?

A. Here is 6 o'clock in the morning.

Q. You started at 7 on this day.

A. I have to draw the various coordinates and lines here and plot a day's wave.

Q. At 4 o'clock, Colonel, how many machines?

A. As I have the wave drawn now, beginning about 7 it runs up in a line to about 11.

Q. We have had all of that. Let us go to 4 o'clock in the afternoon?

A. It comes on over to 2 o'clock and it begins to slope and shape itself down.

Q. How many machines at 4? We have got down to 4 o'clock.

A. Let me put in my four machines. The first one comes out, according to the rough curve I have got here, along about 6.

Q. At 4 o'clock how many machines, Colonel?

A. You still have all four of them in, according to this rough curve.

Q. A while ago you had one partly out at 3. Why was that?

A. That is correct. You probably would have one partly out. It would be a little bit more out at 4.

Q. And at 5 how many machines?

1325 A. Still a little bit more, getting close now to taking that one out if it isn't already out.

Q. And at 6?

A. At 6 that one is out according to this drawing.

Q. Three machines in at 6?

A. Three machines in, according to my drawing.

Q. At 7 P. M. how many machines?

A. At 7 P. M. I still have got three.

Q. And at 8?

A. At 8 o'clock I still have three. No; that would just about come out at 8.

Q. You mean at 8 o'clock?

A. You have got about half of them in.

Q. You would be down to two at 8, you think?

A. Just about at 8 o'clock you are about two.

Q. It drops to two at 8?

A. About that.

Q. And at 9 how many?

A. And at 9 you have got one and a portion in.

Q. Ten?

A. At 10 you are getting close to taking that one out.

Q. Do you mean getting down close to one?

A. Getting down toward one.

Q. And at 11?

A. You are at one, got part of one.

Q. 12 midnight?

A. At 12 the last one is out.

Q. It goes out at 12?

A. Yes; about that.

1326 Q. Isn't it a fact, Colonel, that you arrived at all of those conclusions by constructing a theoretical curve to use a certain volume of water rather than by estimating the number of machines that actually would be in operation from hour to hour on a peak operation and drawing your curve in conformity with the facts?

A. No, that is not a fact. I had a mental picture. I know that you have got more machines. Furthermore, my mental picture has got a whole lot of other groups around here, where you are going to put them in and you can fit this block in just where you please.

Q. At any event, it is a hypothetical curve that you drew from which you have derived the number of machines you have in operation, not based upon any load curve, was it?

A. No; it was based upon—I didn't go into the absolute details of the whole thing. The very minute I think about it I get a picture of your load curve. It is an enormous curve. It will take all the capacity you can get there with your installations during low-flow periods. I know that. I know that those plants go in there. If you want a little more picture, all right; if not, I will shut up.

X Q. I think you have answered me unless you have anything further. Now isn't it a fact that what you did was to construct a curve that would utilize a certain previously selected volume of water in twenty-four hours?

A. No. What I did was to get a fair, reasonable, just basis for an average curve, that would not exaggerate or over-draw for the various flows, your low, regulated, and average annual, and picture to myself what would happen at high. Now with those flows as a reasonable basis to work from, I knew it was the volume that counted when going down the river.

X Q. In your testimony here this afternoon, I understood you to say you took for your wave 8000 acre-feet. Is that the volume of your wave?

A. I think you will find in my statement it was between
1327 8,000 and 9,000 acre-feet.

X Q. That is the volume of one days wave, of your average typical wave?

A. Yes, sir.

X Q. Well now, isn't it a fact that 8,000 acre feet would be equivalent to 4,000 second foot days?

A. That is correct.

X Q. And isn't it a fact the regulated flow during low water at Radford is estimated at 1,230 second feet?

A. That is correct. Not let's go to the average annual.

X Q. And isn't it a fact the average flow as testified to here by the Government's witnesses, the Radford average annual flow is somewhere between 3,200 and 3,300 second feet?

A. That is correct, but before you go any further, I want you to ask me some more questions.

X Q. I intend to.

A. That is the average daily but let's put Saturday and Sunday on it.

X Q. Let me ask you a question. You outlined for me awhile ago this average typical wave you have pictured in your mind in terms of installation, or machinery in operation, beginning at seven o'clock in the morning and ending at twelve o'clock midnight.

A. Yes, sir.

X Q. If it were possible, and if in fact that project, as it is proposed to be constructed, were operated throughout that period, in accordance with the description you gave the hour by hour description of machines in operation, what would be the volume of the resulting daily wave?

A. I can answer you in this way. If it were run a whole day, the base would be one day. Now the volume, and we know the load goes up to 9,000 cubic feet per second, all right, the volume in

a triangle with a base of one whole day, going up to 9,000 cubic feet per second is one-half of 9,000, 4,500. Now a day second foot is one-half of an acre, so you go back to the 9,000 acre feet.
1328 You see the idea. It goes back to a simple triangle, multiplying it out. I knew that without drawing a figure. It wasn't difficult for me in my mind; and the volume is what counts, I tell you.

XQ. Did you know that? You said you knew it before you put anything on paper. Did you know that before you ever made any study, if you did make any study, of the Appalachian load curve?

A. I didn't worry much about it, because I tell you it is the volume now that counts, and you can vary that all you please with these machines.

XQ. You had selected your volume before your investigated the load curve, if you did investigate it?

A. That is what counts in those waves, and the nearer the shape be to the characteristic curve of the river the better it will go down the river.

XQ. And you assumed a rather constant increase in triangle fashion in your typical wave?

A. I described it to you. They will step the machines in.

XQ. Now, I want to take up another phase of this typical wave of yours. In the matter of its dampening out, Colonel Watkins. As I understand your testimony on direct, and as I understand this Government Exhibit #145, the Bluestone report, the water surface of the power pool of the proposed Bluestone reservoir, when the pool is full, would be approximately 1,490 elevation?

A. The normal pool elevation on this chart is 1,490.

XQ. That is about the elevation of the natural and normal level of New River at the Glen Lyn gage, isn't it, or very near to it?

A. It isn't far from it. It is very near it.

XQ. Somewhere around 1,492 or 1,493 probably?

A. Something like that.

XQ. Referring to this average typical wave which you planned or assumed to release at Radford, how long, in your opinion, would it take for this wave to reach Glen Lyn?

A. The time required for the wave to go downstream is
1329 dependent upon two facts; one is the height of discharge of the wave; the second is the stage of the river, assuming this wave, this average wave, which I have estimated for average annual flow, to be released at Radford, before it got to Glen Lyn the stages of the river would probably be somewhat increased. Now roughly estimating, which I reserve the right to check, that

wave ought to go down from Radford, down the river, to the Falls, in two to three days, maybe two and a half to three and a half days, somewhere in there. Now down to Glen Lyn, that is, oh, a day to a day and a half, something like that, or not very far from it.

XQ. Might it be one day?

A. It may reach there in one day. I would have to work it out. I know it is somewhere in there. There have been different waves sent down the river. We can look them up, if you desire. There is a beautiful illustration from your Buck and Byllesby dams. We can look them up, they are official, and if you want something really worth something, let's get them out and see.

XQ. I am trying to find out what is in your mind when you testify. Now how long a period of time would it require to release this typical average power wave from the station?

A. We found on this little one we drew here you started at seven o'clock in the morning and closed at twelve o'clock midnight.

XQ. That would be about seventeen hours?

A. Something like that.

XQ. How long, in your opinion, would it take that seventeen hour wave to pass the Glen Lyn gaging station? Seventeen hours at Radford is the time of it.

A. When it left Radford it was seventeen hours long, and when it passed Glen Lyn it would probably be greater than that. I' wouldn't be far from seventeen.

1330 XQ. Be substantially greater, wouldn't it?

A. Somewhat greater, but not much, because this is so near, the one I have is so near like the wave of the river, there would be very little wastage. I would say that is pretty near the characteristic wave.

XQ. Don't you think it would be at least twenty hours long?

A. I won't fight with you over the matter. You can call it seventeen or twenty, if you wish, somewhere in there.

XQ. Doesn't the increase in the time it requires this wave to pass Glen Lyn of itself show there has been some dampening effect?

A. No.

XQ. That is in your opinion, the duration or time length of the wave might be increased without any dampening effect, is that so?

A. Yes; if you put a wave out that was more of a block, assume it is a block up to 9000 if you wish, and let it extend down at each end, that type of wave would slough off on the front end and the back end would over-run the other, and it would be higher for a time than a maximum discharge when it left the plant.

X Q. We have plenty of trouble with this typical wave, without bringing in another hypothetical one. I want your opinion. Does the fact that the time element, or the duration of the wave in time, has increased at the point lower down the river indicate some dampening out or not?

A. Now, no; for the simple illustration I gave you, instead of dampening out it is higher and on the other hand it is longer than a block.

X Q. How much higher is this typical wave than yours that has become longer in time when it reaches Glen Lyn?

A. I was very nice to you in this case. I didn't assume it was any higher. I was very nice and conservative in my estimate, but some waves will be higher. I have simply taken a fair, honest figure, and not trying to exaggerate it one iota.

1331 By the COURT. You say it will be higher—higher than what?

By the WITNESS. Higher than a wave that is in the form of a block, your Honor, a maximum discharge of 9000 cubic feet per second leaving the plant. Suppose they started in and ran it from eight to three o'clock, a square block, that wave would be higher than 9000 cubic feet before it got to Glen Lyn, because this end sloughs off and goes forward, and as the wave goes down-stream, it can't go faster than it can fill up the natural storage channel of the river; it takes a little time filling that up. The back end of the wave, however, may flow down the river at the rate, depending on this height, which is faster than this end, so it would over-run that, and get higher than when it was discharged from the power project. I know that from my extensive studies of just what happens to a wave when it goes down stream. I have traced them thousands and thousands of miles for many projects and many formations.

X Q. As I understand you, as this wave goes down stream it gets higher in amplitude of volume and stage?

A. This typical wave I have given, I have been careful, and perfectly fair and honest. I started it out so it wouldn't get any higher and I have not tried to make it get higher.

X Q. But nevertheless if you had given just your honest judgment, you would have said it would get higher, according to your statement?

A. If it were a block, yes, sir.

X Q. Will you look at the exhibit placed on the easel, Government Exhibit #132?

A. Yes, sir.

X Q. You see the block waves in the chart?

A. Yes, sir.

X Q. And you see the successive figures as they go up the chart?

1332 A. I am not familiar with the chart. I will have to take a look at it. Who can explain this chart to me? Can you explain it?

X Q. It was introduced by a Government witness. It is a picture of a typical wave. I want you to see if you agree or disagree that that chart shows a substantially accurate picture of what happens to a square wave?

A. Where does it start? May I have someone explain it to me?

X Q. Which is initiated with a 2000 second foot flow, peaking a 2000 second foot flow. Will you tell me, if that is a fair representation of such a wave?

A. That looks like 9000 there.

X Q. That is the top of the peak.

A. Who can tell me what this is, how does it go?

X Q. These are two waves, one following the other, and each of the two waves are shown on the diagrams, Exhibit #132.

A. Which was are they traveling?

X Q. Can't you tell?

A. Here is an arrow.

X Q. Can you tell by looking at the wave?

A. From the general shape this should be the front and this the back end.

X Q. Take the upper diagram which way is that traveling, from left to right, or right to left?

A. That wave has flattened down so I don't recognize it as a typical wave of New River.

X Q. Do you recognize which way it is traveling?

A. Well, with the head there, it must be traveling that way.

X Q. You mean from right to left?

A. From right to left, is what I would guess.

X Q. Coming back to the original question, do you agree that Exhibit #132 is a substantially fair representation of what happens to one of these square waves of 9000 second feet amplitude when it is discharged on to a dry stream bed?

1333 A. Frankly, as a technical engineer, I do not think it would be the proper thing for me to look at the chart and say whether that is intended by it or not, or what conditions is was under. I do notice here are two 9000 and here are two 10,000——

X Q. You notice there are 1000 second foot base flow here, which adds to the two and four thousand here which makes it six?

A. Yes, sir.

X Q. I don't want to spend much time on this, but I wish you would tell me, if in your opinion, Exhibit #132 is a fair and accurate representation of what happens to one of these square boxlike waves with 9000 second feet amplitude projected on to a dry stream bed?

A. From my very long experience and computing many waves I anticipate a wave that starts out when it is a block like this, developed like this, it will more or less continue, if that is the characteristic flow of the stream, and will continue on until you hit part of the channel where there is a great deal of storage, and that spreads out more. That is a well known fact, it is the natural channel storage that widens your wave out, and where there is little it sticks up steep, and you have not got much on the New River, and is why you have a high wave.

X Q. Do you or not think the two upper diagrams are a fair representation of what happens?

A. I can't say. I say it is my idea your typical wave will go along and persist down the river.

X Q. Does that exhibit show the height of the wave becomes higher or lower as it goes down the river?

A. This indicates a 4000 c. f. s. at this point.

X Q. The amplitude of the wave is 2500, isn't it?

A. I would like to have it explained to me.

X Q. You can tell by looking at this chart, Exhibit #132, the height of the wave goes down as it goes down stream?

A. That is what this chart seems to do, but from my long experience I feel confident your wave will go down the stream and persist much more than that.

1334 X Q. And get higher?

A. It isn't exactly an opinion. I practically know it.

X Q. But you think it will get higher?

A. I should say the block, if it was big enough and long enough, it would get decidedly higher, for example, if you sent a wave out with only a maximum of 9,000 cubic feet per second, and it was one day long, it would get a great deal higher.

X Q. In your extensive study of this problem, did you examine the 1930 wave tests made by the defendant in cooperation with the U. S. District Engineer Office, and U. S. Geological Survey and the Federal Power Commission?

A. I did.

X Q. Did those waves get higher as they went down stream?

A. Yes, sir.

X Q. They did?

A. Exactly so, the broad square ones did.

X Q. They got higher between Radford and Glen Lyn?

A. Yes, sir; one box that came out was actually higher and if you had made that block longer, it could have been a lot longer, and still higher. You can look it up. It is there.

By Mr. **Jackson**:

Q. Colonel Watkins, I hand you copies of Government Exhibits 133 to 141, which have been introduced in evidence as records of the experiments made in 1930, and will ask you to point out from anyone of those exhibits, with which you are familiar, any wave which became higher during its passage from Radford to Glen Lyn?

A. It would take a considerable time to locate it, but it is in here, this one does not look like it, that is too sharp.

Q. I think the two exhibits you want to look at are marked 138 and 148.

A. That is not it.

1335 Q. Just look at 138, and 148 and see if you find any?

A. I want one that has a long block on it. If I can find that wave, it is going to go up. This is at Glen Lyn, is it?

Q. I don't know, just look at it.

A. Let us go back up the river a little bit to a point where it goes higher.

By the **Court**:

These waves eminated where?

A. Buck and Byllesby. When it starts out it starts forming a typical wave of the river, and as it proceeds down the river it gets higher.

Q. Now you have been talking about waves getting higher at Glen Lyn. Do you mean waves that originated at the proposed Radford Dam?

A. Yes.

Q. Then you want to get up the river, don't you?

A. Exactly so, that is what I said—Glen Lyn is down too far. If we go up the river and take one of those stations further up it would show it. I have observed it on the record.

By Mr. **Jackson**:

At recess, if you can find what I have been asking you about, will you please call our attention to it. I will not take up the time of the Court to look for it any further.

A. Must I spend my recess looking that up?

Q. If you can find it, I think you had better spend your recess doing that.

A. All right.

Q. It is a fact that when the length of the wave over-all is increased, it shows that the slope on the front and on the back has become somewhat flatter?

A. If it has lengthened that would be true, yes.

Q. When you were testifying on the witness stand before, you ated that the slope at the front and back of your characteristic waves in New River are approximately the same and esti-
336 mated that the slopes are about 10 degrees to 15 degrees from the vertical. Do you remember that?

A. Yes, sir; I remember that. May I state that is a hydro-raph from which I gave you those figures and from a simple ental picture of the actual slope of the hydrograph and it does epend entirely on the scale, that is, the relative scale to the day, nd on the top it may be one and may be ten.

Q. You have been giving all of your testimony about these aves from a mental picture, have you not?

A. Well, that is what an engineer thinks about it, and he thinks bout a hydrograph that has measurements of the wave at a fixed oint and not of a wave that goes up and down the river, and hat is the reason it has been a little difficult for me to work hat out.

Q. Did you really have in mind that this characteristic wave f yours could persist mile after mile with front and back slope s steep as you stated?

A. In view of the fact there is very little channel storage in his river, and with the slope as steep as I had in mind, that it as more or less, without such a great reduction.

Q. When you said you estimated these angles at 10 to 15 de-rees from the vertical, you say you had a mental picture from hich you were working. Is that right?

A. A mental picture of a hydrograph.

Q. A hydrograph is platted with distorted scale, isn't it?

A. Yes, sir; that is what I mentioned, it may be a very istorted scale.

Q. If you have had in your mind a mental picture of a hydro-raph with different horizontal scale, say twice as long, would ot the slope have appeared perhaps 25 or 30 degrees from the ertical in your mental picture?

A. The larger the scale base naturally the wider it would ap-pear on the hydrograph.

337 Q. So that a mental picture from a hydrograph, with distorted scales is a rather unreliable basis for determina-on of slopes of front and back of waves?

A. Not for a good engineer, because the very first thing you sked me about this matter, I said that looked flat, and I looked ight there and it goes from 100,000 to 250,000, and that immedi-tely gave me a picture right there.

Q. Now, Colonel, in your opinion how long would it take, in ours, for your characteristic waves in passing Glen Lyn to increase from its minimum or trough to its maximum of eight or nine thousand second feet?

A. Now let us look at the front slope of our wave—between seven and eleven, from peak to toe, in four hours.

Q. Four hours?

A. Yes, sir; there were four hours. Now if it came down exactly like that, and if the rate of discharge and the rate of travel were exactly the same at which it came out of the plant, then it would go by in about that time.

Q. Wouldn't you think that the rate of travel would be something on the order of perhaps four miles per hour?

A. Let us figure. I said 2½ to three days, say three days or 150 miles, that is 50 miles a day, dividing that by 24, gives you a little over two miles an hour.

Q. Don't you think each wave would travel faster than that in the upper part of the river?

A. Yes; I gave you an answer of 2½ or 2 days.

Q. I want to get the miles per hour. Wouldn't your waves travel on the order of two or three miles an hour?

A. No; the fastest part of travel is through the gorge, there is no question about that.

Q. Colonel, I am talking about the wave at Glen Lyn, wouldn't
it be three or four miles an hour, or three, say?
1328 A. No, sir. There is a peculiar thing about a wave.
Q. All right, would it be 2½ miles an hour?

A. I said roughly, two, a little over two would be my guess of it, that is, of the mass, that is not of the peak, the average of the whole mass, the peak pours over and pours over and rolls over the bottom of the river.

Q. Then during the four hours that it would require for your wave to pass from its trough to the peak of its amplitude at Glen Lyn it would travel something like ten miles, or be something like ten miles long?

A. Something like that; that is not bad.

Q. You said you thought this wave would have an amplitude of stage at Glen Lyn of around five feet, didn't you?

A. That is what I said, over eight thousand cubic second-feet discharge.

Q. If you were to lay off a vertical slope of 5 feet on a basis of 10 miles, what slope would you get?

A. A very flat slope.

Q. And you would get a slope over 89 degrees from the vertical, wouldn't you?

A. You are talking about the waves in the stream and not the waves of the hydrograph?

Q. I am talking about the wave in the stream.

A. That is an entirely different thing.

Q. We have a wave in the stream that is ten miles long?

A. More like 40 or 50 miles.

Q. From the trough to its peak?

A. Something like that.

Q. And 5 feet high, and according to your estimate that gives you a slope of something less than a degree from the horizontal, does it not, or thereabouts?

A. I would have to work that out, but I don't think it 1339 makes any material difference exactly how.

Q. But it would be on that order?

A. It would be a very flat slope.

Q. Very flat?

A. Yes; that is it.

Q. The total length of the wave would be something around 50 miles or better, wouldn't it?

A. You say if it went down three days, it would be about 50 miles—No, it would be three-fourths of 50 miles.

Q. Then it would be 37½ according to your computation?

A. Something like that. That would not be so bad.

Q. Colonel, in your opinion, on what does the extent of these oscillations at the head of the reservoir depend?

A. I will try to repeat my explanation. As the wave enters the reservoir it causes the upper end to tilt above horizontal. Take Bluestone, about five feet and in that position it is acted on by what would be the force of gravity at the head and by the momentum of the movement and with a large volume of water, 8,000 acre feet, which is in that wave.

Q. In a fashion that is more simple to me, am I right in understanding that in your view the extent of such oscillations depends upon the amplitude and stage of the incoming waves?

A. Theoretically yes, because it is oscillation—that is what it amounts to. You get a great oscillation in the upper end of Bluestone because the upper end comes to a feather end, as I have stated before, and you do not get such a big oscillation further down the river because it is deep, it is this upper feather end that is doing the oscillation.

Q. Your so-called characteristic or typical power wave will pass Glen Lyn with an amplitude in volume of about 8,000 second feet?

A. Acre feet.

Q. Acre feet?

1340 A. Yes, sir.

Q. I did not understand it was amplitude in acre feet.

A. You said volume, but you mean acre feet.

Q. No, I mean second feet.

A. You are thinking about the discharge.

Q. I am talking about the amplitude of waves, measured in second feet.

A. You mean in discharge, yes cubic feet per second, something like that.

Q. And amplitude in stage, equal to 5 feet?

A. Yes.

Q. And that the oscillations start from a point 5 feet above normal elevation of reservoir and extends to a point 5 feet below normal elevation. Is that right?

A. Approximately.

Q. That is a swing of about 10 feet?

A. Yes, sir.

Q. Does this oscillation go up and down vertically or does it travel horizontally?

A. I think this will express it The condition of a body of water going in a wave, going into the reservoir, it goes into the reservoir at an appreciable velocity for a mass of that kind, and as it goes down—it does not stop there—and if the stage of the river is up above low flow; the point of rest of the reservoir is not horizontal, it is that governed by the tipping of the reservoir above, so your oscillation is above and below that point of rest line.

Q. The point I want to get at is this: Does the oscillation just move up and down in the upper end of the reservoir, or does it move horizontally along the reservoir?

A. The surface of the water in the upper end moves up and down. The actual volume of water that comes in and 1341 shoves that which is there at the beginning and it comes in and sinks down. The water coming in behind the wave is all cut off, except that below the trough and it comes in slowly, and I think that might help to get the picture. There is a big volume moving this way (indicating) and then the tail end of it is very small in volume, coming in. If it is moving that way, there has got to be something to fill up this space where this volume moves down or out.

Q. Will this 5 foot oscillation travel downstream to the reservoir, or not?

A. It depends on the depth just how far down it would go.

Q. At Bluestone would it travel down through the reservoir?

A. It would affect the entire length, the deeper you get, the less effect you have.

Q. Would it travel to the lower end of the reservoir, or not?

A. The effect would go there, yes, you would get oscillation there.

Q. When oscillation gets down to the lower end of the reservoir, what happens to it?

A. In a dam like Bluestone, where it cannot spill over the top like it does on the lower river, the oscillation going through would rise slightly above that of level and then swing back.

Q. Would it turn around and go back up the reservoir?

A. Yes, sir.

Q. When this wave or oscillation reaches the dam at the lower end of the reservoir, would any change in the stage be reflected in the gauge at the lower end of the reservoir?

A. Yes; that is true.

Q. That is, if this oscillation travels down through the reservoir?

A. Yes, sir.

Q. And is the effect the piling up against the dam at the lower end of the reservoir?

A. Yes, sir.

1342 Q. That condition should and would be reflected in gauge readings above the dam?

A. Yes.

Q. Now what do you mean when you say the gauge readings would be rising above the dam on downstream end of reservoir, and what would happen at the upper end of the reservoir?

A. That depends upon the period of oscillation, if it is exactly one day, if it is less, why the answer would be different and if it is more the answer would be different. Of course, my answer is for only one single day, one wave. I did not try to paint any worse picture than is necessary. I simply took one day. Now you have got five successive days. It is just like you sit a child in a swing and you give it a little push and it goes so far, then it comes back, and you give it another push, and it goes a little further and then it comes back and then you push it until it gets away up.

Q. Is it your opinion that simultaneously with your expected rise in gauge height at the downstream end of the reservoir, there would be a drop in gauge height at the upstream end of the reservoir?

A. It would be lower.

Q. That is, simultaneously with the increasing gauge height at the downstream end of the reservoir?

A. Yes; of course, that depends on the curve of oscillation of reservoir and when this big momentum comes in you can have a picture of that, if it is short oscillation and is not transmitted back up it may be at a different period, but only what you would expect, down at the upper end and up at the lower end would be the logical movement.

Q. In your opinion, would the change in gauge height at the downstream end of the reservoir, and the change in gauge height at the upstream end of the reservoir be the same on the first trip of the oscillation down the reservoir?

A. That is what you would expect.

Q. What do you expect?

A. That is what I think as a general thing, and I have a
1343 wonderful illustration, but I cannot use it, on another
stream. I have a wonderful illustration that gives a perfect picture, for I know what I am talking about, it just simply does that and that is all there is to it.

Q. Then as I understand you, it follows that by means of reading the gauge at the downstream end of reservoir one would get a pretty definite idea of the vertical extent of oscillation, about which you have testified?

A. Yes; you should get a good appreciation, because my experience is that they swing back that way below horizontal. One dam I had in mind, it was almost two feet below horizontal, and there was that much water gone out, it had to do that.

Q. What is your estimate of the period of time it would require for your oscillation on the Bluestone reservoir to travel down to the dam at the downstream end and back?

A. As I stated in my direct testimony, the rate of travel of the rise in stage from the upper end of the pool, is at the rate of 20, 40, to 60 miles an hour, depending on the depth. The length of the pool is about 30 miles long, so I guess it would get down there, that is, the first part of the wave would get down there in about an hour, and as the peak of the wave came up, it would get there in about an hour, so when the bottom of the sinking comes down or really when you are at the lower end about an hour later, you would have the maximum at the lower end.

Q. What did you mean when you said it would take about a day for the oscillation to make the trip down the reservoir and back?

A. You are mixed up there. I said if the period of oscillation were exactly one day. You see the idea. If the period of oscillation were exactly one day, but I didn't say it was that.

Q. In your opinion the period of oscillation is something on the order of half an hour or an hour?

A. Let us not get mixed up about the period of oscillation with the rate of transmission of the rising stage. That is wave
action, that is without changing horizontally, the stage
1344 simply travels there, in other words, an hour after the
point of this wave enters the upper end of Bluestone reservoir, you feel it down at the lower end—you see the point—and then it comes along and an hour after the peak up here gets in, it is down at the lower end.

Q. When does it come back, if it does?

A. It will come back depending upon the period of oscillation of reservoir, I don't know what it will be.

Q. You don't know what that will be?

A. No, sir. When I had this excellent experience, I think it was about three or four hours, or something like that, I am not sure, but we can look it up on the chart.

Q. Is there any change in this oscillation on its first trip down and back?

A. I do not know.

Q. You do not know?

A. No.

Q. Do you know whether there will be any change on its second trip down?

A. Let me explain it this way: I have explained already that if a child gets in a swing and you give it a push it goes so far, then it swings back and you give it another push and it goes further, and then another push until it swings very high. In that case the period of oscillation is identical in harmony with the pushes. It would require a period of oscillation in the reservoir to be at exactly one day. Is that enough? If not, I can tell you what will happen in one day.

Q. Go ahead.

A. If it is not quite one day, each successive wave will go a little further, then reach the maximum and come back, then be almost zero and then later it will go to the maximum.

Q. Do these oscillations gradually dampen and die out?

1345 A. As long as you continue the pushing and pushing every day, no. If it is not the same period of oscillation as the wave that comes in and as I said before, they will start in and get up to the maximum and come back to zero, then up to maximum and then back to zero. You see what I mean?

Q. No; I am not clear as to what you mean by that—do you mean that these oscillations will not gradually dampen and die out?

A. Yes, if no more waves come in.

Q. Am I correct in understanding that you think that no factor other than the head of incoming waves is of material importance in determining the extent of your amplitude of your oscillation?

A. Let us not forget two forces acting upon it, and I will repeat them again, gravity, due to the head of this wave tilted up, plus the momentum, of the mass of the moving volume of the water.

Q. They are reflected in their amplitude at stage, are they not?

A. No, this is a different thing. You have got this head and you have got this volume.

Q. How are these two conditions reflected in the physical characteristics of the waves?

A. In the physical characteristics of the waves?

Q. Yes, sir.

A. Just what do you mean? Will you explain that?

Q. You said there were two forces involved. I want to know how they are reflected in the physical characteristics of these waves?

A. Oh, you can work them out. If there is a certain amount of energy and that energy goes ahead and it does not let it stop, when you get to the point of rest, if it were not for this moving body of water, which is energy after all, when you get to the point of rest, it would stop, but it does not rest when you reach that point, because it is going so fast it just cannot stop,
1346 just like an automobile coasting down one hill, it will coast up a part of another.

Q. Does the stage at which waves move make a difference in the oscillation stage of the incoming wave?

A. It has to do with the velocity of the traveling mass, the height of wave and the velocity.

Q. Suppose you had the same volume in waves but one was coming into one reservoir with a stage of 5 feet and the other one was coming in the identical reservoir with a stage of three feet, would that made any difference?

A. You would have to work out the momentum which is the velocity times the volume, plus the head, with the force of gravity acting on it.

Q. Wouldn't you know just by the mere fact that there is a difference in stage, with the volume the same and the reservoir the same, that there would be a different result or effect?

A. No; that is not necessarily the case. You take one situation, it will be one foot and in the other it would be five feet.

Q. That is true, but I am talking about the effect on the reservoir. Does it make any difference then what the stage is, in determining the extent of oscillation of stage of the incoming waves?

A. My experience is it goes about as far below as it was above.

Q. But if you had two incoming waves, one stage at five feet and the other 2½ feet, you would expect to have a different effect, wouldn't you, or different oscillation?

A. I would expect, if I did not have any other information, the one at 2½ feet would go that far below the point of rest and the one at 5 feet would go 5 feet below the point of rest.

Q. But in your opinion, does it make any difference whether the power wave flows into a relatively small reservoir like the Marmet pool on the Kanawha River or into a relatively large reservoir such as the Bluestone reservoir, as it is proposed to be?

347 A. In my opinion it would make no difference whether it was a small body or a big body of water, when the first ave hit it; when the oscillatory wave hit it, it may make a ifference.

Q. Will you distinguish between the two waves?

A. In a small pool it would be shallow and——

Q. One minute, you described two waves, one the oscillatory ave and the incoming wave, and I want you to distinguish etween the two?

A. The successive waves would perhaps better express it. here you have successive waves coming in, you might not get e same result in a small pool as in a deep one, but the first one get there would be about the same.

Q. I am still not clear what the difference is between the oscil- tory wave and the other kind of wave you mentioned, according your definition?

A. I used two terms.

Q. Please define each.

A. The oscillation at the upper end of the pool——

Q. Is that the oscillatory wave?

A. That is the oscillation of the surface of the pool. Let us t confuse the waves, because the stage received transmitted ack and forth by wave action. That is one thing, that is not ave action, that is oscillation. The oscillation of the pool and e oscillation of the pool back and forth of this surface and hat not. Let us not mix that up with the wave——

Q. Is that what you called the oscillatory wave a while ago?

A. No, I think you misunderstood me.

Q. Didn't you use the term oscillatory wave?

A. Maybe I did, but what I wanted to say was that these ccessive waves which come in each day point into the upper end f the reservoir day after day, day after day, day after day, so you see they are two different things.

348 Q. Incoming waves coming in different days?

A. Yes; I am talking of day after day, day after day, hen the wave comes in.

Q. I understood you to say a moment ago it did not make any ifference in your mind what would be the size of the reservoir to which for instance, a wave of 5 feet stage should be pro- cted. Is that right?

A. Yes.

Q. Colonel, do you think if a 5 foot wave was projected down e Detroit River into Lake Erie, the 5 foot wave would run rough Lake Erie and over Niagara Falls?

A. My answer is if the water went into Lake Erie in a chan- el just like that in the upper end of Bluestone, my answer is yes.

Q. That is, the five foot wave would sweep down Lake Erie 60 miles wide and 250 miles long?

A. One minute, it would sweep down this channel.

Q. Do you mean you would have a 5 foot wave of the same width sweeping across Lake Erie for some 250 miles over to Niagara River?

A. No; but we have this channel at the upper end of the feather edge of Bluestone Pool and it is going that way.

Q. As I understand you, it does not make any difference how big a reservoir is that this wave comes into?

A. Let me tell you——

Q. One minute, if this wave comes in Lake Erie it will make a sweep of 5 feet high through Lake Erie. Is that what you say?

A. It is not physically possible for you to pour a wave into Lake Erie unless it goes in a channel something similar to this one in Bluestone, because you are going to get oscillation in that section just like the sea waves on the shore of Lake Erie.

1349 Q. Then it is your opinion that this 5 foot wave would persist across Lake Erie?

A. No; I didn't say across, I said in this channel. I didn't say all the way across Lake Erie, no, it is in this channel, just as I have explained to you, in the upper end of Bluestone. You have seen a wave oscillating on the beach.

Q. Don't you know if you had an incoming wave into a large reservoir or large lake, that it would dissipate differently than if it came into a small reservoir?

A. Not unless the oscillating effect I have stated that affects it as a channel, etc., in which it enters, and they are oscillating back and forth. That is what it amounts to. If you take the deeper dams on the lower river the same momentum does not make them go so far, does not make them rise so far, and they do not go down so far.

Q. Let me ask you this question: Does the rate of increase in stage at Glen Lyn due to this incoming power wave that you have described, have anything to do with the nature or extent of oscillation?

A. No; as I will repeat again, and as I have repeated over and over again, it is the force acting on this wave, which will tilt it up, and the momentum of the moving mass, and you must remember this is not a wave washing in like a big high foaming wave from the ocean, but it has great length, which extends along about 9 or 10 miles long; you see what it is?

Q. If a sharp crested wave, due to rain, and resulting in increase in gauge height of 5 feet at Glen Lyn appears, do you believe that it would be followed by a lowering of the height of the Bluestone reservoir by 5 feet, or an oscillation of a total amplitude of 10 feet.

A. If it was suddenly cut off, so there was nothing to fill
1350 up this space where this wave goes down it is still traveling
at a nice old speed, when she hits the point of rest. It is the same thing, because if there is no water following along to fill it up, it is going right down. That is just what happens and is the experience I have had with dams, and down they go.

Q. Colonel Watkins, assuming that we have a wave with an amplitude in flow of 8,000 to 9,000 second feet, and in stage an amplitude of five feet, that it entered the upper end of the proposed Bluestone reservoir, when that reservoir was at normal pool level, and that this flow of 8,000 or 9,000 second feet continued at that rate forever. When, if ever, would the upper end of Bluestone pool recede below normal pool level?

A. It would stay up there forever. If the water kept flowing into it, it would stay there, because that is what our gage shows—a discharge of that quantity.

Q. Assuming a wave of that amplitude in second feet and stage continued to flow at a uniform rate for ten hours, and then gradually decreased for five hours, to 5,000 second feet, when, if ever—and then continued at 5,000, when, if ever would the upper end of the pool recede below normal pool level?

A. The wave is coming in 8,000 or 9,000 cubic feet—it makes no difference?

Q. And continues.

A. That represents a certain thing on the gage. That is the point of rest, as long as there is 8,000 going in there.

Q. Suppose at the end of ten hours, it began to decrease gradually and over a period of five hours decreased to 5,000 second feet and continues at that rate?

A. Yes. Now, the point of rest—take five feet—suppose that
was 8,000 and say the point of rest for 5,000 was 2½ feet;
1351 that is the point of rest there. Then the drop cut off due to
the cut off in the flow from eight to five thousand would cause an oscillation as the tail end came into the pool, if you picture that slope as a volume of water that cut off like—like that one is. It comes and sinks into the reservoir, and it ~~would cause~~ it to oscillate the difference between—the total oscillation would be about five feet and from 2½ above the point of rest to 2½ below.

Q. If you had a volume flow of 9,000 second-feet coming into the upper end for ten hours and it gradually decreased slowly over a period of five hours, until it got to 5,000 second-feet, and continued on indefinitely?

A. Yes, sir.

Q. The pool would dip below normal level, would it?

A. It would dip below this 2½ foot stage, which is the point of rest.

Q. When, if at all, would the pool dip below normal level?

A. If the normal point of rest is zero flow or near zero flow. For the 8,000 flow, with a five-foot stage, and if the 5,000 flow gives a 2½ foot stage, and you change from the eight thousand to the 5,000; when that change enters the reservoirs you fall to the stage where you expect the 5,000 to rest, and you go 2½ below it. That dip would be about to the horizontal and would swing back, due to the fact that the point of rest is the 5,000 stage, which is 2½ feet.

Q. It is your opinion that, as the flow into the reservoir was reduced gradually and uniformly over a period of five hours, from a flow of 10,000 second-feet to a flow of 5,000 second-feet, that there would be oscillations below normal pool level?

A. No. I said below the point of rest of this 5,000 second-feet flow. That is the discharge point of rest of 5,000 second-feet to which they reduced it.

Q. As a matter of fact, wouldn't the situation be, as you slowly and gradually reduced to the stage that would have prevailed—strike that—as a matter of fact, wouldn't the situation be that, as
you slowly and gradually reduced the inflow from 10,000
1352 to 5,000, your stage would slowly and gradually reduce to
the stage that would have prevailed to establish a flow of
5,000 second-feet?

A. If you went down very, very slowly, you could possibly—the result would be—no matter how slowly you stopped your rate there approaching 5,000, there would be some sinking below, but within the period of these waves here, which we have here, it is almost a perfect measure about as much below as above, and I have a chart showing both for certain stages, but I cannot show it. It measures it perfectly.

Q. Just as you could reduce gradually from ten to five thousand second-feet, so as not to produce a dip, you could reduce from there to zero so slowly and gradually that you would not produce a dip?

A. It is not within the range of these waves.

Q. It could be done, could it not?

A. No, sir; it is not within the range of the report gotten up by the power company.

Q. I am talking about engineering principles?

A. All right.

Q. Isn't it a fact that, if you cut off from ten thousand to five thousand gradually over a long enough period of time and from ive to Zero, over a long enough period of time, there would e no dip?

A. There will always be a dip when you change from lowering rom Eight to Five Thousand—there will always be a slight ip below it.

Q. No matter how slowly it is?

A. Theoretically there will always be a slight dip when you hange it.

Q. If you decrease that slowly enough, you could not measure hat dip, could you?

A. No, sir; but that is not within the range of reason of the waves.

353 Q. It is one of those things, your attempt to measure the dip under these circumstances—would be like one of hose things where you approach infinity and never reach it?

A. You would be getting away out of the range of our measrements——

Q. Of your knowledge of what?

A. Getting out of the range of anything which we are going to neasure. You come here and send this great wave down and it aises the river away up above normal and as fast as it can go own, it follows on and follows the river on down. It will go own and that is all there is to it. When you start the wave at adford and tried to hold it and spread it out the tail would ome in and you would still get the wave formed in natural shape nd it will sink.

Q. Have you finished, Colonel?

A. Yes, sir.

Q. Well, now, in view of this theoretical discussion of principles that we have been talking about—the effect of a very slow eduction in flow, I want to ask you: Suppose that the flow out f Radford station were not cut off abruptly, but instead were ut off very gradually, so that the wave would gradually grow ess and less in height as it passed Glen Lyn, would that effect he amplitude or stage of oscillation in feet?

A. I will go back to what I have been saying all along—you urn water loose into the river and it is going to form into a typial wave, if you allow it to travel long enough. That will form nto a typical wave if it travels long enough.

Q. Answer my question. Read the question. (The question s read). Answer "Yes" or "No."

A. You asked if it would. I said it would form a typical vave if it goes far enough; you will get the same result. We ave a very good answer in the tests made at Buck and Byllesby.

Q. State whether or not under the assumed conditions in your pinion—the oscillations would be the same or would be

1354 increased or would be reduced, and I am willing to take your answer?

A. My answer is that the wave would probably be practically a typical wave when it reached there.

Q. No matter how slow the cut-off was at Radford, the oscillation would be the same?

A. If it was spread out over two or three places, it would not go into its typical shape until it got to Kanawha Falls. Those tests showed that, whether you turned them in slowly or for long periods of time, by the time they got to Radford, they were just about the typical wave. At Buck or Byllesby, at Radford or at Glen Lyn, you find about the same thing. They are about typical when they get that far, no matter which way you turn them loose.

Q. You stated that the extent of the vertical oscillation at the lower end of the reservoir will be measured by gage readings at the lower end?

A. Yes, sir.

Q. Is it not true also that the vertical extent of your oscillations at the upper end of the pool, would be measured by the gauge at the upper end of the reservoir?

A. I don't get you?

Q. If you have a gauge at the upper end of the reservoir?

A. Yes.

Q. Oscillations should be reflected in that gauge reading, should they not?

A. They should be reflected in the gauge readings; it is measured; that is not only reflected, but it is measured.

Q. You have testified that you are familiar with the so-called wave tests made by the defendant, with the co-operation of the Federal Power Commission, the Chief of Engineers and the Geological Survey, in 1930?

A. Yes.

Q. Did you examine the gauge records made by the representatives of the U. S. Engineers department in connection with
1355 these tests, to ascertain whether there were any important pool oscillations at that time?

A. Where was this?

Q. Sir?

A. Where was this?

Q. At dams 2, 3, 4, 5 and 6 on Kanawha River?

A. No, sir.

Q. You did not examine those?

A. I don't recall that. I do recall that there were rises in the upper end of the pools. If these dams operated—I forget as to—if it was operated at a fixed crest—both old and wicket dams.

Q. Did you find any record of oscillations in these records of wave tests in 1930?

A. The results I saw were the discharge measurements and I forget whether or not there were heights; I forget all the details of it.

Q. Did you find any records of gauge heights made by the engineering office in connection with this 1930 test, which revealed or showed any important oscillations in those pools on the Kanawha River—any of the kind you mentioned?

A. Well, if they showed any effect of the wave there, you know you have it.

Q. Do you understand the question?

1356 A. Yes, sir.

Q. Did you find any gauge readings on these pools that revealed oscillations of the kind you talk about, and I am referring to the records made of the 1930 wave tests?

A. I certainly found data for one of the pools that showed oscillation.

Q. You know what a gauge record is?

A. Yes, sir.

Q. And you know what I mean when I ask you whether or not you found any gauge records made by the Army officials in connection with this 1930 test or tests, and whether they showed any oscillations in the pools on the upper Kanawha; you know what I am talking about?

A. I did not look at the gauge records, because what I wanted to see was the results. That is what I was looking for.

Q. You were so confident there were oscillations revealed in the gauge heights, that you did not trouble to look?

A. The mere fact that there was a discharge, or change in discharge, shows that. The fact that it registered a discharge over the end of the pools shows there was this oscillation; in other words, it could not have been otherwise. There was this change; this persistency in the wave going along.

Q. If there was an oscillation in the pools, it will appear in the gauge records, will it not?

A. It did apparently, or they would not have given us these discharges.

Q. If there were oscillations in the stage there, they will appear in the gauge records?

A. I would like to see these things over there [indicating].

Q. I am talking about the oscillations in the stage?

A. Yes, sir; that is what I am talking about.

Q. If there were oscillations in the stage of these pools on the upper Kanawha, they will appear on the records of the gauges, will they not, Colonel?

1357 A. They will appear on the records of the gauges. And they will show as waves, like anything else. They will show as a wave.

Q. I can see that from the records. In your examination of any records made by the Engineering Department, in connection with the 1930 wave tests, did you find any time when the pools dip below normal pool level?

A. These 1930 tests?

Q. Yes.

A. I did not go into all of the details of this study. I certainly looked into the results in order to see what the general idea was and did not go into details. If I am not mistaken, those tests were made in the higher stages. Maybe I have forgotten that. If so, then there would have been no dip below horizontal, but would be a dip below the point of rest, depending on the discharge.

Q. You say if there was more than low-water flow initially and an abrupt cutting off of the wave up river, it would not produce a dip below pool level?

A. It would not produce a dip below pool level. If for example, when the wave came down, there was a discharge of 12,000 second feet in the pool before the wave approached and then, when the wave came along, and raised it to 15,000, and dipped it to 9,000—up to—I said from 12,000 to 15,000, then when it went back to 12,000, it would not stop at 12,000, but would go to 9,000 and then come back.

Q. I understand that you are responsible for the dashed lines on exhibit 117?

A. Yes, sir.

Q. And the colored areas?

A. Yes, sir.

Q. Do you have—it extends to the upper end of Winfield pool as you show it—what oscillation do you show there?

A. During my direct examination, I said that this chart
1358 [indicating] gave a pictorial view of it and a pictorial view of these oscillations. Now——

Q. Do you mean it is not attempted to be plotted accurately to reflect your estimate?

A. It is not attempted to be plotted accurately or perfectly because I did not have the data to adjust it more and I did not take the trouble to change it because it is for pictorial purposes.

Q. I want to know, taking Winfield pool, what oscillations you estimated there, as revealed on this exhibit?

A. May we have our rating curve?

Q. What do you mean?

A. I mean on here—I said this was pictorial view. You can read it in the record. The object of this is to show the oscillations and that happens to be zero.

Q. You show a certain oscillation above and below the normal pool level?

A. Yes.

Q. What do you estimate the extent of that oscillation to be for the Winfield pool?

A. My estimate is shown on these rating curves.

Q. If you know, tell me?

A. I would rather read it off the curve; not just guess at it.

Q. Is that an exhibit to which you refer?

A. Yes, sir. I suppose so. They were the famous curves turned in here that caused so much attention.

Q. That is Government Exhibit 117–a?

A. I don't know what it is.

Q. We will get the official exhibit and see. (Papers are handed to witness.)

A. Yes; 117–a, it is called, all right. Now, shall I
1359 measure the wave that I assumed was an average wave—
3,300 c. f. s. flow at Radford?

Q. Tell me first what you estimate the extent of the oscillation at the upper end of Winfield pool to be?

A. In my direct statement, I only estimated it as about one foot above and below in general for all dams. I did not go into details of each dam.

Q. You estimated the oscillation to be one foot above and below normal pool levels?

A. That is about the general average—the average annual flow at Radford.

Q. Tell me how and upon what basis you arrived at this swing of one foot?

A. I assumed the discharge of the wave when it arrived at this part of the river at between 6 and 7,000 c. f. s. With 3,000, that would be above and below 12,000 c. f. s.; that is, it gives a difference in discharge—that seems to be .4.

Q. That is 0.4 of a foot?

A. Yes, sir.

Q. That would be the rise?

A. On this curve—the oscillation—that is a rise of about 0.4.

Q. Tell us the route as you go along so we can follow you?

A. That is approximately 0.4 of a foot—no, wait a moment—let me try again. Now, that should read—there is 0.8 and here is 0.6—that is 0.8 of a foot, if I am correct.

Q. Tell us out loud how you got that 0.8?

A. The 6,000 c. f. s. wave is that nice little conservative wave I was talking about that left Radford. I did not try to exaggerate it or overdo it; I did not try to over-persist it. That provided about 70% and it may be higher.

1360 By Mr. **Thompson**:

Q. Where?

A. To the lower level.

Q. Of what?

A. The Radford wave when it gets to the lower river.

1361 By Mr. **Jackson**:

Q. At which place?

A. Winfield.

Q. You are using government exhibit 117a for this purpose?

A. Yes, sir.

Q. What particular curve are you using?

A. I used the London dam. So I gave the result for London instead of Winfield. I thought it looked funny.

Q. Anyway, give the name of the curve appearing on Exhibit 117a?

A. Government Exhibit 117-a is what they call it.

Q. But what curve on there?

A. I am using the one extending from the elevation of the crest of the dam that goes to the slope there.

Q. You are using the one labelled London lower pool with Marmet in place?

A. That is not exactly in the line. That is the one I am using.

Q. That is the one with the broken legend that I read?

A. Yes, sir.

Q. How did you get the oscillation for the Winfield pool?

A. I took the Winfield curve.

Q. That is what one?

A. Just a moment; Look nine in Winfield; 12,000; go up 3,000; go down to 9,000—nine from twelve is about what—that goes up one foot.

Q. You are looking at what exhibit?

A. I am looking at Exhibit 117-D, I believe.

Q. And which curve were you reading from?

A. I was reading from this curve.

Q. From the upper curve which is entitled——

A. "Lower pool minimum elevation."

Q. "Lock No. 9, normal upper pool?"

A. No, that is the normal upper pool of lock No. 9.

Q. But from the upper curve on Exhibit 117-d?

A. Yes.

1362 Q. Don't you know, Colonel, that that curve isn't even for Winfield?

A. This says "Winfield site, average open river," and this says "The lower minimum elevation."

Q. Don't you know that that curve is for the Gallipolis pool?

A. Lock No. 9 and Winfield. It says "Winfield site, average open river." We have another curve that shows the Gallipolis dam.

Q. Then anyway it is your testimony that the upper curve on Exhibit 117–D is the curve for Winfield and, whether it is or not, that is where you got your estimate for the Winfield dam of the swing of oscillations of the Winfield pool; it that right?

A. No, let us not confuse it. These curves are the rating curves at the upper end of the pools below each of the new dams and not the upper end of the pool of the dam. In other words, each measures the fluctuation of the pool of the dam below it. It measures the fluctuation of the upper end of the pool of the dam below the one.

Q. In other words, the upper end of the Gallipolis pool?

A. That is correct.

Q. And you have applied that to the Winfield pool?

A. No, I have applied it to the Winfield dam, that is below the ~~Winfield dam, the oscillations below the Winfield dam.~~

Q. Just to summarize this matter, you got your estimates of amplitude of oscillations in feet above and below normal pool level for all the pools shown on your Exhibit 118 by use of the curves appearing upon some one of the exhibits 117–A to 117–F, inclusive?

A. Those rating curves are the oscillations of the pool below each dam. That is the way they are designated there.

Q. I merely want to know if you got them from reading those rating curves on Government Exhibits 117–A to F, inclusive?

A. Yes.

Q. But that conclusion was coupled with the assumption that the drop below pool level would be the same as the stage above pool level just before the flow began to be reduced; is that right? 1363

A. Yes.

Redirect examination by Mr. **Thompson**:

Q. Colonel, on your cross examination you were asked with respect to the normal operation of the power project at Radford. State from your experience as an engineer and your knowledge of the Radford project whether it would be normal operation to limit the peaking operation of the Radford project plant to less than the installed capacity of the plant?

D

By the **Court**:

Q. Didn't you say that in substance at least a dozen times?

A. Yes, I think I have, sir.

By Mr. **Thompson**:

Q. Colonel, you were asked about the operation of the Bluestone project and I believe that you referred to a 308 report where it showed that it would be operated on a basis of a minimum discharge of 2,000 second feet?

A. Yes.

Q. And you understood all of the time when you were testifying there that this project would be operated under the orders and control of the Federal Government, did you not?

A. That is right.

Q. Do you understand that the regulated flow, or did
1364 you understand when you were testifying, that the regulated flow of 1,230 second-feet to be the hypothetical flow that would result from combining stream flow and draft from storage over the low-water period?

A. That is a hypothetical average low flow, as I have explained. It would go up and down.

Q. It was hypothetical as you understood it to be?

A. Yes; average. That doesn't mean it is going to be continuous.

Q. State whether or not the actual flow would vary from 1,230 second-feet, according to the operation of the power plant, between the limits of zero and 9,000 second-feet?

A. It would, due to peak-load carrying and reservoir operation.

Q. You were asked at some length with regard to the plans that are set forth in the 308 report with respect to the Bluestone. Counsel has attempted to show that the Bluestone and the lower power plans are planned for use as peaking plants. Does this recommendation of the 308 report represent a matured plan or a preliminary recommendation, suggesting a possible plan?

Mr. **Jackson**. I object to the question. It calls for a conclusion to be determined by the Court, and I don't think the witness has any basis for answering the question.

Mr. **Thompson**. He has testified he has studied these plans carefully and he has expanded on them.

Mr. **Jackson**. He doesn't even know their capacity or anything about them.

By the **Court**. He may answer.

A. They are outline plans. They are not supposed to be the final plans at all.

By Mr. **Thompson**:

Q. On your cross-examination you testified with respect to the waves that would come from the Radford project down into the Bluestone. When the water comes down from the Radford project will it not come in a compact body?

A. It will come down in a wave typical of that of New River.

Q. And when it reaches the dam site, that is the pool of the Bluestone, state whether or not it will gradually spread out?

A. It will submerge into the upper end of the pool, so to speak.

1365 Q. In the question of navigation between the Radford project and the pool of the Bluestone project, assuming that the Bluestone is completed, what is it that you consider, the effect of the wave as it enters the Bluestone pool or the wave as it has been dissipated in the Bluestone pool?

Mr. **Jackson**. I object to that. He hasn't testified anything about that subject. There has certainly been no cross-examination about any question of navigation.

Mr. **Thompson**. He testified as to how navigation would be affected in coming down that river or going up the river between Radford and the Bluestone.

The **Court**. He may answer the question.

A. I consider the large mass of moving body of water which sinks into the pool as it goes in and not the whole surface of the pool but the mass that sinks into the upper end.

By Mr. **Thompson**:

Q. You were asked on cross-examination, or you testified about a wave that might increase in volume as it went down the stream and you were asked by counsel if you could show such a situation or condition. During the recess did you locate such a condition, and, if so, where?

A. With the assistance of [indicating Mr. Gerdes]:

Q. I hand you a yellow paper here upon which you made some figures.

A. Yes. According to this the March 12th wave was 5,000 at Ivanhoe and 5,100 at Allisonia. March 13th it was 5,000 at Ivanhoe and 5,200 at Allisonia. I have seen a little better information than that but I don't know just where it appears in the report. It appears in some of the tables also and some of the data that accompanied the report.

Re-cross examination by Mr. **Jackson**:

Q. What is the mileage between Ivanhoe and Allisonia, Colonel?

A. We can get them off the chart.

Q. It is about 24 miles?

Mr. **Thompson**. About 20.

By Mr. Jackson:

Q. About 21 miles?

A. Something like that. If the figure is important I will be glad to get it.

Q. Just approximately is all, and what is the mileage to Radford dam site—46 miles?

A. Can't we take it off of a curve? We have got plenty of profiles and things here. We can take it accurately. Why testify 1366 from memory on something that doesn't amount to a row of beans. Take it off of that.

Q. Is 46 miles about right from Ivanhoe to Radford dam site?

A. 39 miles is seems to be from Ivanhoe Gaging Station. The Radford project is 89 here and 129 at the gaging station on this chart.

Q. And how many miles from Radford dam site to Bluestone or Glen Lyn?

A. To Glen Lyn?

Q. From the Radford dam site?

A. At the upper end here is Glen Lyn, miles 93.9 and Radford is miles 151—57.1 miles, or something about like that.

Q. And will you read from your paper what was the amplitude of the same wave in second-feet at the Radford dam site?

A. I didn't get it from Radford dam site. The wave of Buck and Byllesby on the 12th was 4,350 when it reached Radford. The wave that left Buck and Byllesby on the 13th was 4,400 when it reached Radford in cubic feet per second.

Q. You measured those from the trough or head of the wave or following it?

A. That was from the trough in back of the wave.

Q. And when you measured the waves on the 12th and 13th up at Ivanhoe and Allisonia, did you measure from the trough ahead or back of the wave?

A. Back of the wave. It was measured from the back of the wave and if we had measured it from the front of the wave it would apparently have been somewhat higher.

By the Court. Is it possible to give in a brief answer, in language that would be intelligible to a nontechnical person, what is meant by this report when it speaks of power that may be generated on New River, where it says you may generate 450,000 primary HP and as much as 1,500,000 primary peak HP? What is the difference between them? And it says a 30% load factor. I also would like to know that.

By the Witness. As I understand the report, your Honor, the 451,000 is the prime power that you can secure all time of day and night, and all the year around, due to regulation of the reservoir.

By the **Court.** I thought that was it.

By the **Witness.** That is what that report means. Now then this other power that goes up to 155,000 was drawn off of the duration curve when they worked the problem and took that block of power above that produced by assuming the natural flow, the wheels would take it out of the natural flow, at that height.

By the **Court.** When you speak of primary HP you mean the amount of electricity that can be generated steadily through—that held in the reservoir, supplemented in the stream, the forces being used together you can generate that much HP?

By the **Witness.** That is right, that is you can produce that twenty-four hours a day, day and night.

By the **Court.** What do you mean by load factor?

By the **Witness.** The load factor is the ratio of the average of the power per day to the total of the demand. For instance, if you will remember that chart, where the load varied from approximately one hundred thousand to two hundred and fifty thousand. If you work out the average let us say it would be about one hundred and twenty-five thousand probably, something like that, or a little higher, because I believe the load factor is actually 60% load factor.

By the **Court.** I can see now it is a figure which has a relation between the primary peak HP that can be generated with reference to the primary power that is there?

By the **Witness.** Yes, sir, that figure in the 308 report about the load factor is the proportion of time this duration curve extends across the face, the primary power it is a little different to what we ordinarily call that. That is about what it means or amounts to.

By Mr. **Jackson.** I have already cross-examined the Colonel about that, so I am not going to ask the Court to submit to that again, but it is our understanding he was entirely in error in his interpretation of primary peak HP, and I merely mention that so the Court will understand.

By the **Witness.** Frankly I don't know that term there.

By Mr. **Thompson.** Colonel Watkins has gone over his testimony, and as your Honor knows it has been very technical, and he has a number of corrections to make, and he wants to leave tomorrow. I don't know what to do about it, whether counsel on the other side will agree to the corrections or not.

By Mr. **Jackson.** We would have to see them before we would know that.

By the **Witness.** May I show it to them?

By the **Court.** When I adjourn you may go over it with him.

By Mr. Thompson. May I at this time offer in evidence a document I have had marked for identification Government's Exhibit #191, being the Kanawha Valley Power Company license for project #1175, West Virginia. That includes the London and Marmet dams, and they have been under discussion, and testimony today on them today, and I want to at this time introduce them. This is a subsidiary of the Appalachian Electric Power Company. This is the license to the Kanawha Valley Power Company from the Federal Power Commission.

By Mr. Horn. That isn't a subsidiary of the Appalachian Power Company.

By Mr. Williams. Affiliated.

By Mr. Thompson. I want to present it and offer it in evidence at this time.

Note.—Exhibit filed and marked "Government's Exhibit #191."

1367 John R. Douglass

Direct Examination by Mr. Thompson:

Q. Will you please state your name to the stenographer.

A. John R. Douglass.

Q. Where do you reside?

A. Point Pleasant, West Virginia.

Q. How long have you resided at Point Pleasant, West Virginia?

A. About ten years.

Q. Where did you reside prior to that time?

A. At Buffalo, West Virginia.

Q. Where is Buffalo, West Virginia?

A. On the banks of the Kanawha River.

Q. Have you ever been active in any work on the Ohio River?

A. Yes, sir.

Q. And on the Kanawha River?

A. Yes, sir.

Q. How long or how much of your life have you spent on these rivers?

A. Well I started as clerk on boats, carrying freight and passengers on the Kanawha, between Gallipolis, Ohio and Charleston, West Virginia, when I was a boy, going to school, during vacation periods, commencing in the year 1898, and continued for three seasons.

Q. Then what did you next do?

A. After that I started on the river in 1915 as clerk on freight and passenger boats, between Cincinnati, Ohio and Charleston, West Virginia.

1368 By Mr. Jackson:

Q. That commenced in 1915?

A. Yes, sir; and continued until 1918. During that period I was promoted to purser, who has charge of the finances and business of the boat, and in 1919 I transferred to an excursion boat, operating on the Ohio River with the home point at Point Pleasant, W. Va. The main part of the excursion business was at Pittsburg', Pa., although we made special trips up and down the Ohio River as far south as Cairo. I was purser of that boat up until 1923. I obtained license as first mate and was first mate on the boat standing the captain watch. The next year I obtained my master's license and took charge of the boat as master. I continued as master of the boat until the fall of 1928. During this time, in 1923, I obtained a pilot's license, and in 1929 I left the excursion boat and went into the towing trade, two tow boats, towing barges up and down the river. I have been engaged in that business ever since. I might state that my licenses are Master of Boats, of all tows, on the Ohio River and tributaries, and Pilot's license from Pittsburg' to Cincinnati on the Ohio, and Point Pleasant to Marmet on the Kanawha River, first-class pilot's license.

Q. How many trips would you estimate you have made on the Ohio River from Pittsburgh to Cincinnati, past the confluence of the Kanawha and the Ohio?

A. Well, I would be safe in saying more than a thousand trips, over a stretch of river between Cincinnati and the confluence of the Kanawha.

Q. How many trips would you estimate you have made up the Kanawha?

A. Better than six hundred possibly.

Q. I believe you said you lived at Point Pleasant?

A. Yes, sir.

1369 Q. In the summer season what is the condition of that river, in low-water time, in your early days on the Ohio River, how was that?

A. It got very low and navigation at times was completely suspended.

Q. Prior to the construction of the present series of dams that run to Cairo what was the condition of navigation in dry periods on the Ohio?

A. The River got very low and navigation would also be suspended on there, that goes down as far as Cincinnati. At that time below Cincinnati, I am not in position to state, although I have reason to know it was suspended there also.

By Mr. **Jackson**. May it be understood all this testimony with reference to the Ohio River is received over our objection, with exception allowed in line with previous objections we have made, that there is no issue as to the Ohio River in this case, and particularly that there was no issue embraced within the pleadings in this case as to what was the condition of either the Ohio or Kanawha in earlier days?

By the **Court**. Yes, sir.

Q. Since the construction of that series of dams on the Ohio during low water times, state if anything is necessary to be done to keep water in these pools so there can be navigation?

A. Do you mean during periods of dry season, during low water?

Q. Yes, sir; during low water?

A. It is necessary to caulk the dams to retain the pools at their proper levels.

Q. And is that done every season, or just occasionally?

A. Every season in periods of dry weather, however, if rains extend pretty well over the season sometimes, very little, if any, is done, but practically every season, and numerous times during the season.

Q. If the caulking and needling were not done, what would happen?

A. The drainage of the dam or leakage of the dam would be, these are movable dams on the Ohio River, and a space between each wicket, and the leakage through those places amount to more
than the supply of water coming in, at the head of the pool,
1370 which would be the same as a leaky bucket with a hole in it,
and someone pouring water in it, and not pouring in as much as was going out at the bottom, and eventually all the water would leak out of the bucket.

Q. Do you know where the Gallipolis dam is being constructed?

A. Yes, sir.

Q. Where is that on the Ohio.

A. That is twelve miles below the mouth of the Kanawha River.

Q. Now what is the character of the dams below the Gallipolis dam as to construction?

A. The dams below the Gallipolis dam are wicket type dams, or movable dams. They are lowered during periods of high water, when there is water enough in the river to enable boats to move without dams, or the depth of the river is sufficient that boats or tows will move without the need of dams and when the river gets below that these dams are raised to maintain pools large enough to move tows drawing nine feet of water.

Q. Do you have to caulk and needle these dams?

A. Yes, sir.

Q. What will happen when the Gallipolis dam is constructed, as to whether you will have to caulk and needle the dams below?

By Mr. Jackson. I object to the question, the witness is a pilot, and has not charge of these dams, and isn't an expert on construction or operation of dams; that has been covered by engineers.

By the Court. I see no objection to letting him answer.

By Mr. Jackson. Exception.

A. The condition of the dams below the Gallipolis dam when completed will be the same as they were before the dam was built, and then unquestionably they will have to be caulked.

Q. And if they are not caulked will that interfere? I mean interfere with navigation.

A. The leakage will be the same and the pools will draw below the nine-foot depth, which we are supposed to have. That is navigable depth.

1371 Q. State whether or not from your experience on that river all the water that you can obtain or that can flow down into that river, that does flow down into that river naturally, is necessary for navigation during low water periods?

A. Absolutely. We need every drop we can get there in periods of very dry weather. When there has been rain fall, extended throughout the year, it doesn't mean so much, but in periods of extreme drought and lots of boats and tows moving, it is necessary to keep these dams absolutely tight, and even then sometimes the pools get what we call thin on the upper end.

Q. When you are navigating a boat up and down the Ohio or the Kanawha, how do you determine as to the cargo, the size of the cargo you shall take, and as to whether you shall advance up or down the river?

A. Well, if we are loading cargo to go downstream on the Kanawha, we look at the Government reports, showing the gage at Kanawha Falls, the amount of rain fall at Ivanhoe, Radford, and Kanawha Falls. If there is a little extra water in the river, probably they will be running a few wickets on their weir dams, passing some extra water, we may load to as much as seven feet, although six feet in the Kanawha River is the depth we are supposed to have, but this extra water we have going through will allow us as much as seven feet, but if the pools are down to what we call flat pool, that is the normal pool, and the gages for the points up the river don't show rainfall, and the river rising, we would be very careful not to load beyond six feet; and if the gage at Kanawha Falls reads zero and it has been dry for an extended point of time, and the pools are drained down, we have had to load less than six feet.

Q. Do you also have gages you read on the Ohio?

A. Yes, sir.

1372 Q. And do you read the gages at dams 25 and 26?

A. Yes, sir; we read the gages at each particular dam, as we go along, we read them religiously. These on the Ohio River, there is a bulletin board posted on the power house of the lock which sets up on top of the bank and that shows when the dams are up, shows the gage at normal pool, shows whether the pool immediately below is carrying a little extra water coming in which would naturally make the upper end of the pool a little higher, and if nothing has happened this pool is a few tenths low. Whether this pool will be under the regular pool level or not that all shows on this bulletin board, and we look for that as we come into each lock, so we will know the conditions.

Q. You follow this bulletin board information as to gaging depths very carefully?

A. Yes, sir.

Q. Have you ever found any of these gaging reports of the Government on the Ohio or Kanawha to mislead you?

A. No, sir.

Q. Do you know what the volume of commerce on the Ohio River is passing the confluence of the Kanawha and Ohio?

By Mr. JACKSON. I object to that, if it is material there are official reports of the Chief of Engineers that show just what that is. The witness could not make anything more than a guess, and that is objectionable, because if material there are statistics appearing in the reports of the Chief of Engineers that show just what that is.

By Mr. THOMPSON. I desire to show whether this business is increasing.

By Mr. JACKSON. It will be reflected in the annual statistics if it is.

By Mr. THOMPSON. I am surprised counsel wants to rely on any Government statistics.

By the COURT. I imagine it would be an estimate.

By Mr. THOMPSON. It is, yes, sir.

By Mr. JACKSON. Exception.

A. I could not say as to the amount of tonnage moving there. I could enumerate quite a number of boats or barges which are operating on the river, but I doubt if I could off-hand call to mind all of them, although I am familiar with those that work over that stretch of the river.

Q. State if that commerce is on the increase or decrease?

A. Yes, sir; every available pilot is operating between Pittsburg' and Louisville, which represents practically the same thing as a division on a railroad. There are some pilots with license

extending from Pittsburg' to New Orleans, but most of the
1373 men operate on the through boats only from Pittsburgh to Louisville. All of the pilots operating between Pittsburgh and Louisville are at work, and are very hard to get. I had to go out as relief on a boat the day before I came up here on a boat on the way from Louisville to Pittsburg', and I got on the boat in the morning at eight o'clock, and went up the river that day to assist the crew up as far as I could to get back here the day I was supposed to arrive here.

Q. What is the condition of commerce on the Kanawha as to increase or decrease, if you know?

By Mr. Jackson. Same objection and exception.

A. I could not answer as to tonnage, but all the boats, about all the boats, on Kanawha, are working and all the river men are working, and there is undoubtedly an increase in tonnage.

Q. I believe you stated that you took notice of the rain fall up at Ivanhoe and Radford, is that correct?

A. Yes, sir.

Q. Where do you get notice of that?

A. We get that from the Government Reports from the U. S. Engineer Office at Point Pleasant. There is a copy of this report at each lock.

Q. Is that given each day?

A. That is given daily. If we are not where we can contact with the Government office at Point Pleasant, we call the nearest lock and ask for it.

Q. Is the question as to whether there is a rain fall at Ivanhoe and Radford a matter that influences you one way or the other as to going up and down the river?

A. Very much.

Q. Will you give an illustration of how much and in what way?

1374 A. If we were up-bound——

Q. This is on the Kanawha?

A. Yes, sir; on the Kanawha, it makes more difference on the Kanawha naturally than it does on the Ohio, but it makes a difference on both rivers, that is if you are on the Ohio below the mouth of the Kanawha. If you are up-bound on the Kanawha River and you saw by the report that you were due to get a rise out of Kanawha River, which would mean the throwing off of the dams, you would be apt to cut your tow in half, and if it looked like the rain fall would mean that they would have to throw some wickets——

Q. What do you mean by have to throw some wickets?

A. Lower them so they would pass the extra water, and make current on the river, you would have to cut down your tow materially, whatever current you meet impedes your progress and adds to the time in delivering your tow to its destination.

Q. Have you ever noticed the reports at Ivanhoe and Radford and then cut your tow?

A. Yes, sir.

Q. Frequently?

A. Yes, sir.

Q. And what does that mean in cost to you?

A. That means added time and expense of having the tow you have had to tie up hiring someone to take care of that while you are gone with the rest of the tow.

Q. Suppose it is a low-water condition?

A. A dry season?

Q. A dry season and you get word of a rain at Radford or Ivanhoe, let us say an inch, what effect would that have on you?

A. That would have the same effect—you would have to cut your town down materially.

1375 Q. You were referring to coming up stream. Now supposing you were coming downstream, what would the condition be?

A. Coming downstream you would have an extra current there, but not enough water to add to the depth of your tow, and you would have to navigate more cautiously owing to the current downstream. There are some very narrow channels down the river, usually at the head of these pools, and the bottom of the river is rough, and you have to be very careful in getting into those places, or you are liable to sink a barge or damage one to a very bad extent.

Q. Do you have any boulders in the pools of the London and Marmet dams?

A. Yes, sir.

Q. How is the channel in the London and Marmet dams marked, if at all, Mr. Douglass?

A. The critical places are marked with buoys.

Q. You speak of these tows, describe to the Court the size of the tows on the Ohio, that go past the confluence of the Kanawha and Ohio?

A. The size of tows on the Ohio River varies to the size of the boat towing it and the number of barges to the size of the barges being towed. I might state the standard coal barge on the Kanawha River is 135 x 26 feet, and is 9 feet depth. The standard coal barge on the Ohio river is 26 feet wide by 175 feet long and eleven feet depth. The standard Ohio river tonnage barge they call it, that is a covered barge they use in moving fabricated steel and other cargoes that need to be covered, to protect them from storms, these barges are 35 feet wide, 132 feet long and 11 feet depth.

Q. What do they draw in depth when loaded?

1376 A. When they are loaded on pool stage to draw 9 feet, I am getting at the number of barges now in the tow, these tows will run from about six barges to fourteen and sixteen barges of either the 132 foot barges or the 175 foot barges.

Q. And what do these barges carry?

A. On the Ohio River they carry manufactured steel products, pipe, construction steel, nails, tin-ware, glass, matches, etc.

Q. What do they carry on the Kanawha River?

A. On the Kanawha River the downstream tonnage consists almost entirely of coal. Upstream it is gasoline, sand, gravel and builders' supplies of all kinds.

Q. What is the number of boats you carry in the tow on the Kanawha, or barges?

A. Six barges is considered a Kanawha River tow, although they tow more than that at times. It has been demonstrated that six barges is the most economical tow to handle on Kanawha River.

Q. What is the maximum draw you can risk on the Kanawha?

A. Six feet, that is flat pool water.

Q. When a tug is drawing the barge upstream and you have a draw of 6 feet, what is the actual depth you effect on the river?

A. Well upstream against current you will have better than seven feet.

Q. What would it be on the Ohio where you have a draw of 9 feet?

A. A draw of nine feet up there if there was current you would displace about 10½ feet.

Q. Have you ever noticed on the Ohio, contiguous to the confluence of the Ohio and Kanawha dredging being done at the back end of the pools?

1377 A. Shall I add to the answer of the question I just made the reason that is the case?

Q. Yes.

A. In moving barges through the water current coming against them, the water pushes up against the head of the boat and it sorter acts as a dam that pushed the water away from it, is why boats proceeding upstream will draw more water than a boat going downstream.

Q. (Question read.)

A. You mean the upper end?

Q. The upper end of the pools?

A. Yes, sir.

Q. Have you seen that on pool 25?

A. Yes, sir.

Q. Pool 26?

A. Yes, sir.

Q. And the other pools down the river, that is pools behind the dams, 26 and so on, down the river?

A. Yes, sir.

Q. State if that is a frequent occurrence, that is, the dredging behind or in the back end or upper end of these pools?

A. Yes, sir.

Q. Have you ever seen any dredging done at the upper end of the pools behind the dams on the Kanawha?

A. Yes, sir; more frequently on the Kanawha than the Ohio.

Q. And where?

A. Below lock 11, Kanawha River, and below lock 10 on the Kanawha River; and below lock 9 on the Kanawha River below Lock 7 on the Kanawha River; below lock 6 on the Kanawha River; below the Marmet Dam on Kanawha River, and below the London Dam on the Kanawha River.

1378 Q. How recently have you seen dredging being done below the London Dam and the Marmet Dam?

A. I saw dredging done below the London Dam the month of June 1935, and below the Marmet dam in the month of June 1936.

Q. Do you happen to know how high the silt had risen in the pool just below the Marmet dam at the time this dredging took place?

By Mr. **Jackson**. I object to that. Nothing in the evidence to show the silt had arisen at all.

Q. What was the cause of the dredging below the Marmet dam, if you know?

By Mr. **Jackson**. I don't see how he can know, unless by hearsay.

A. Partly because of silt deposited between the guide walls to the lower approach to the Marmet dam, and to improve the channel in the stretch below the approach to the dam, they widened the channel a little point about a half mile, or hardly so much, below the dam. They were widening the channel on the point below it.

By Mr. **Jackson**:

Q. When was that?

A. This year, during the months extending from April 18th until June 28th.

Q. What was the depth of the silt there just below the dam site?

A. Well, I could answer it this way: the pool between Lock No. 6 and the Marmet Dam is supposed to be of a depth of 6 feet at present, and I saw two boats with coal drawing 6 feet stuck in the entrance to the lock and had to be flooded out with the valve from the lock to get them off this stuff.

Q. When was that about?

A. This was sometime in the month of June; I could not give you the exact date.

Q. How many barges did these boats have?

A. The steamer "Holley" had 6 barges—they were loaded with coal; the steamer "J. C. Robb" had 6 barges loaded with coal; the Diesel boat "Victor" had three loaded with coal. This was not all at the same time—it was different times. 1379

Q. And it was about the month of June?

A. Yes, sir; but it did not happen on the same day.

Q. You said that you had seen them dredging just below the dam—the London Dam?

A. Yes, sir.

Q. What was the occasion of their dredging there?

A. They were removing silt—the silt deposit at the entrance to the lock; on the lower side of the Dam.

By Mr. **Jackson**:

Q. In June 1936?

A. Yes, sir.

By Mr. **Thompson**:

Q. Did you have occasion to find out, or do you know how high the silt had risen from the floor of the channel there?

A. At London?

Q. Yes?

A. No, sir.

Q. What was the reason for the dredging of the silt, do you know?

A. The boats were having difficulty getting through there.

Q. What were those boats drawing?

A. Those boats usually draw in—9 or 10 feet. Those pools re higher there and the coal moving through there does not go elow Marmet pool.

Q. And do you know what those boats were drawing?

A. No, sir; I did not see those boats.

Q. They were boats that were used in the 9-foot channel?

A. Yes, sir.

By Mr. **Jackson**:

Q. What 9 foot channel?

By Mr. **Thompson**:

Q. Between Marmet and London Dams.

A. Yes, sir.

1380 By Mr. **Thompson**:

Q. Do you know what the term "oscillation" means with respect to water in the pools?

A. Yes, sir.

Q. Did you ever see any oscillation in a pool?

A. Well, I have seen the water come and go real fast and fast enough to make it pretty tough for me piloting.

Q. Where was that?

A. Right under the Marmet Dam.

Q. What was the occasion?

A. I was working on a boat, working immediately below Marmet Dam. I was making a trip through the lock about every hour.

By Mr. **Jackson**:

Q. When was this?

A. This was from April 18th, 1936, up until June 28th, 1936. I was making a trip through the lock about every hour, and it made it very difficult for me to catch myself going in and out of the lock. One time I would go in and there would not be any reaction there and the next time I would come up and go in and not expect any reaction, and there would be lot of reaction there, and sometimes it would hit the lock wall and break the lines, and so forth. I have noticed a variation of as much as 2 feet, extending over a period of 2 or 3 hours. In places where I would stop to turn my boat around, I might turn around this trip and not have any trouble and then be gone an hour and come back and hit the dam turning the boat around. I have had that to occur. It is rather dangerous hitting the rough bottom—you are liable to knock a hole in your boat and sometimes sink it. If you knock a hole in them, it means a trip to the ways or docks. It is very expensive.

1381 Q. State whether or not you have ever tied up at night and had experience with these oscillations or in a fog?

A. Yes, sir; in 1935, I was working just above Winfield Lock, and had a fleet tied up to the shore, consisting of 3 barges loaded with coal that we were using for fuel and a supply barge—the barges drawing about 4 feet. We were only working from 4 o'clock in the morning until eight o'clock at night. Of course, we were tied up after 8 o'clock at night. Very frequently we would get up in the morning and our tow would be stuck, owing to the river having risen suddenly and fallen suddenly during the night. These shores are not straight up and down. They differ as to contour and, as the river comes up, your boats will slide in against the shore. The problem is to first determine the shape of the shore and if the shore is flat, they can get just so far, and if it is steeper, they can go in so far on the same amount of water. If the river falls, the inside edge is on the bottom and they are liable to be damaged if you are caught out on a log or rock, especially a wooden barge is liable to get a hole in it, and with the boat lying tipped up on its edge, if the wind was to rise and cause wind-swells, it gets the water sloshed up in the boat, and it will sink, or you will have to pull it to the shore and aim to keep it afloat, and that all takes time to do that, when you could be busy doing something else.

Q. Do you know where the oscillations that you refer to comes from?

A. That period it was dry weather and it must have come from the Radford Dam.

Q. You mean Marmet or Radford?

By Mr. Jackson. He told you where it came from. I object to that.

By Mr. Thompson:

Q. You say it came from Radford Dam. There is no dam at Radford.

By Mr. Jackson. I object to quarreling with your own witness.

By Mr. Thompson. I am not quarreling with him.

1382 Q. Do you wish to correct that statement, Captain Douglass?

A. Yes, sir.

Q. What dam do you refer to?

A. It must have come from the Marmet Dam or the dams above it.

By the Court:

Q. Do you know the height of the Marmet and London Dams?

A. The locks there are 360 feet long and they are 56 feet wide. There are two locks at each dam and both the locks are the same size.

By Mr. Thompson:

Q. Give the names of the firms that operate barges up and down the Kanawha River and the number of barges they have.

A. Yes, sir; about the largest operator on the river is the Hatfield-Campbell Creek Coal Company; they have 5 tow boats and about 200 barges; the Raymond City Coal Company have 2 tow boats and about 50 barges; the Kanawha River Company have 3 steam boats and one Diesel boat; all of the boats that I mentioned are steam boats and one Diesel boat and about 60 barges.

Q. 60 barges?

A. Yes, sir. The Ohio River Coal Company has one steamboat and about 6 barges; the Ohio River Dredging Company have one boat and about 6 barges; the boat is longer, because they operate 6 barges up and down the river; Captain C. C. Stone has one steam boat, one gasoline boat, one gasoline barge, and three coal barges; there are two sand and gravel companies at Charleston—we will combine them—two different companies—they have 4 tow boats and about 50 barges; the Standard Oil Company 1 tow boat and 6 barges; and a man named
1383 Shearer—I forget his initials—4 Diesel boats and about 10 barges; the two sand and gravel companies at Huntington operate 2 tow boats up the river at different times—we will say that they use 16 barges. That is most of the boats and barges used on the river. There are a few small ones possibly and some gasoline boats, and so forth.

Q. Are these companies active on the river, moving traffic constantly?

A. Yes, sir.

Q. How far up the river is 9 foot navigation at the present time?

A. It starts at Lock No. 6 and extends to the mouth of Loop Creek on Kanawha River.

By the COURT:

Q. It extends where?

A. Loop Creek.

By Mr. THOMPSON:

Q. Where is that with reference to Kanawha Falls?

A. It is about 3 miles below Kanawha Falls.

Q. As to a navigator, what is the most necessary conditions on the river for navigation?

A. An even amount of water.

Q. An even flow?

A. An even flow—stage of water.

Q. And sudden rushes of a quantity of water or cutting it off is the most troublesome, isn't it?

By Mr. JACKSON. We object to that as leading.

By the COURT. Yes; but he may as well answer.

By the WITNESS. May I answer?

By Mr. THOMPSON. Yes.

A. It adds to your difficulties, not only in navigating, but also as to loading. If you know you are only going to have 9 feet, you only load to nine feet. If you were sure you would have as much continuously as 10 or 11 feet, you could load to that, and you could move the extra tonnage at about the same price.

1384 Cross examination by Mr. JACKSON:

Q. If the Government would provide you with 15-foot channel, instead of a 9-foot channel, you could move a larger load?

A. Yes, sir; what I mean by 10 feet is open river. We didn't have that at the locks—the pool stage.

Q. That is, the deeper the navigable depth, the larger the loads that you could move?

A. Yes, sir.

Q. And within certain limits, the larger load you could move more cheaply per unit—it can be moved more cheaply per unit?

A. Yes, sir.

Q. And I suppose the navigators generally like for the Government to make the channel as deep as they will, don't they?

A. Naturally, yes, sir.

Q. That is a matter of personal interest with them?

A. Yes, sir.

Q. What is the name of the company for which you work?

A. The last company I worked for was the Union Barge Line. I am in the employ of the Government.

Q. Oh, you are in the employ of the Government?

A. Yes, sir.

Q. I didn't understand that you made that statement in your remarks about your experience. When did you enter the employment of the Government?

A. In 1929.

1385 Q. And you have been in the employ of the Government ever since, have you?

A. With the exception of one year.

Q. What year was that?

A. Well, from November 1933 until February 1935.

Q. Now, before you went into the employ of the Government, you were in the employ of the Union Barge Lines?

A. No, sir.

Q. What company were you with then?

A. Before I was with the Government, I was with the Excursion Line of boats from Pittsburg' with the Ohio and Mississippi Ferry Transit Company of Evansville, Indiana, and the last people I worked for—I will have to sort of lead up to this to get where I did start working for the Government.

Q. Maybe I can help you—now, from 1923 to 1929, you were with this company that ran an excursion steamer up and down the Ohio River?

A. Yes, sir.

Q. Was that the "Homer Smith?"

A. Yes, sir.

Q. And it plied between Pittsburg' and down river points?

A. Yes; we were not running separate excursions.

Q. And in 1929, you say you left the excursion business and went into the towing trade?

A. Yes, sir.

Q. What you mean is you went into the Government's employ?

A. No, sir.

Q. Did you go into the Government's employ in 1929?

A. Yes, sir; but I went to work for the Ohio and Mississippi Transit Company at Evansville, Indiana, towing from Evansville to Pittsburgh, after leaving the "Homer Smith."

1386 Q. How long were you in the towing trade before going into the employ of the Government?

A. I was only there the latter part of August, I believe, 1929.

Q. And you left the "Homer Smith" sometimes in the Spring or Summer of 1929?

A. No, sir, I left the "Homer Smith" in October 1928.

Q. And you commenced that towing business about what time in 1929?

A. About March.

Q. So that your experience in towing—in the towing business was, or towing trade, as you call it, was from March until October 1929?

A. Up until I went into the Government service.

Q. That was August 1929?

A. Yes, sir.

Q. When you went into the towing business, you were getting most of your loads at Pittsburgh, were you?

A. At that time; during the time I was with the Ohio and Mississippi Transit Company, it all originated at Pittsburgh.

Q. It all originated at Pittsburgh?

A. Yes, sir.

Q. So, that your loads in each instance, were picked up at Pittsburgh and taken down the Ohio to Evansville, or to some intermediate point?

A. To Evansville where we turned it over to others.

Q. When did you get your pilot's license—in 1929?

A. No, sir, I got my first issue of a pilot's license in 1926, I believe.

Q. Now, your pilot's license entitled you to act as a pilot on the Ohio River from Pittsburg'?

1387 A. They do.

Q. What?

A. The first issue of a pilot's license that I got only went as far as Rochester, Pennsylvania.

Q. From Pittsburgh to Rochester, Pennsylvania?

A. Yes, sir.

Q. How far is that?

A. About 30 miles.

Q. And eventually you worked up to the point where you got a pilot's license from Evansville to Cincinnati?

A. Yes, sir, and to Marmet on the Kanawha.

Q. You could not, however, act as a pilot below Cincinnati?

A. No, sir, and I am not yet.

Q. I understand. Your license on the Kanawha authorizes you to act as a pilot up the Kanawha as far as Marmet?

A. Yes, sir.

Q. You never obtained any extension of that license?

A. Yes, sir.

Q. So, today and at all times, you were not authorized to act as a pilot further up the Kanawha than Marmet?

A. Yes, sir; I said yes. Can I make an explanation of that?

Q. Not now, you can in a moment. To the extent, if at all, you undertook to act as a pilot into the Marmet and London pools, you were not piloting, except that you were working for the Government?

A. Yes, sir.

Q. And the Government does not observe the restrictions which are imposed on its licensees for pilots, when working for the Government?

1388 A. There are occasions when they work a man over a piece of river that he don't have a license for, if they feel that he knows the river.

Q. Well, in all your past experience as a pilot, you never navigated the Kanawha River further than Marmet?

A. No, sir.

Q. So it was not on the basis of your past navigating on the Kanawha River as a pilot that the Government concluded that you were an experienced and competent pilot through the upper waters?

A. Yes, we—I worked there with a dredging boat with another man and took the boat up and back, and in working over the pools, they considered that I had enough experience.

Q. And they gave you a trial?

A. They considered that it was safe to entrust me with the boat.

Q. That was not on the basis of your past experience as an operator and pilot?

A. Yes, sir.

By Mr. **Thompson**:

Q. It was?

A. Yes, sir; I had made trips with another man up there with a dredging boat and had worked over the critical points while dredging, and with the experience I had, they thought it was safe to entrust me with the boat.

By Mr. **Jackson**:

Q. You said on direct examination that you went in the towing trade in 1929 and had been in that business ever since. Is the Government in the towing trade on Kanawha River?

A. We do towing.

Q. What did you say?

A. With the Government's tow boat. I don't tow for anybody else. We tow for the Government.

1389 Q. The more correct statement would be that the Government has been engaged in construction work on the Kanawha River?

A. Yes, sir; but we tow equipment. We do the same work in moving. It don't matter if the barge is loaded with building material or with matches, if it is drawing 6 feet of water, it takes as much skill to get it up and down the river, as if it was feathers.

Q. I will not argue that with you, but the fact is that what towing you have done since you have been in the employ of the Government has been in connection with the Government's construction work?

A. And general maintenance and repair work. I beg your pardon—the summer that I was not working for the Government, I was working for the construction company and towing sand and gravel up as far as Winfield; the boat was drawing 6 barges of sand and gravel. I was about to forget that.

Q. I am glad you remembered that. How far downstream is that from London and Marmet?

A. It is about 40 miles below Marmet.

Q. I understood you to say that the navigator is interested in being able to rely upon the expected navigable depths in the channel?

A. Yes, sir.

Q. And is it a fact that, as long as the pool above and the dam is full, there will be the expected or project navigable depth above the dam in that particular pool?

A. No, sir.

Q. Why not?

A. If there has been extra water coming into that pool and it is suddenly cut off, the head of the pool will thin down.
1390 It will build back up, but for the time being it will thin

down. I had experience with that on the Ohio and the Kanawha Rivers.

Q. As long as the pool is maintained, so that there prevails the project or expected navigable depth throughout its length, then the condition is satisfactory for navigation, is it?

A. Yes, sir; absolutely.

Q. So that the only question, from the standpoint of navigation, within at least reasonable limits, is being able to rely upon the finding of expected or project depth throughout the pool?

A. Yes, sir.

Q. You spoke something of the possibility of disadvantage through a rapid change in pool levels, which I presume would be accompanied by a rapid change in current velocity. Is that right?

A. Yes, sir.

Q. Suppose that a pool gradually rises above project level at an elevation—I mean at a rate of—oh, say, one-half of a foot an hour. Would that gradual rise of navigable depth have any particular effect on navigation?

A. Yes. In certain stretches of the river, it would not have much effect.

Q. Well, take——

A. (Interrupting.) But stretches where the channel was narrow, it would add materially to the current and to the difficulty of navigating the tow and keeping your boat in the channel. These channels, are not all straight. Some of them are crooked. That is why the current adds so much to your work.

Q. Take a pool such as London or Marmet, would a slow rise in the stage above the normal level of the pool have any appreciable effect?

1391 By Mr. Thompson:

Q. What is a slow rise?

By Mr. Jackson:

Q. Say, at the rate of half a foot an hour?

A. Well, at the rate of half a foot an hour, it would bother me considerably at the mouth of Paint Creek.

Q. Where is Paint Creek?

A. It comes in about 3 miles below London Dam.

Q. You could not observe any rise if you were on a barge in a pool such as Marmet or London—you could not detect a rise as slow as half a foot an hour, could you?

A. You could not tell how fast it was rising, but you could soon find out that something was playing the devil.

Q. How?

A. Your boat would flop around and you could not make any time up the stream.

Q. There would be an appreciable difference in the current. You have that in mind?

A. Yes, sir.

Q. Naturally, in all rivers there are numerous changes in the stage, are there not?

A. Yes, sir.

Q. Some of these are quite slow and some are rapid.

A. Yes, sir.

Q. That is the normal and usual conditions that you encountered in the navigation of any river?

A. Yes, sir.

Q. And any competent pilot has no difficulty in navigating under these conditions, does he?

A. Sometimes it adds to our difficulties, but we navigate under those conditions.

Q. No competent pilot regards it as any particular difficulty or problem to meet a slow rise in the stage of any river, does he?

1392 A. He may not admit it, but he can say to himself that he wishes it was not there.

Q. It would be simpler if it was a perfectly still pool?

A. It would not be so much work, and he would be sure of what he was doing.

Q. Do you know what the velocity flow is of London and Marmet pools?

A. No, sir; I have seen it in Marmet pool so strong that it was all I could do to tow one derrick boat with the boat rated up to 500 horsepower.

Q. To tow it where?

A. Upstream.

Q. Where was it in the pool?

A. I was towing—I moved it there—We started at Marriette, Ohio, and moved the tow and derrick boat into the old Lock No. 3, just below the mouth of Paint Creek, where they were going to do some work moving some stuff from the edge of the channel.

Q. Were there any oscillations there at the time?

A. No, sir; this was due to natural heights.

Q. It was due to flood?

A. Yes, sir—no, sir; it was a natural rise—not due to flood.

Q. Give the date of that?

A. About May 1935.

Q. You were towing that up there to work?

A. Towing it to old Lock No. 3.

Q. Was old Lock 3 in place?

A. No, sir; it had been removed, but we were going there to work at this channel above old Lock No. 3.

1393 Q. Did you to as far as Marmet?

A. Lock 3 is in the Marmet pool above Marmet. We came all the way up the river.

Q. Was Marmet Dam completed?

A. Yes, sir.

By the COURT:

Q. You said that, due to a rise of half an hour, that you would have a great deal of trouble in the river and mentioned the mouth of Paint Creek. What is the reason you would have trouble there?

A. It is a narrow place in the river and, due to the shape of the channel, the current runs crosswise in the river there. It comes in at that point on the opposite side of the river and veers across the river in the mouth of Paint Creek and there is a bar below Paint Creek and it shoves you towards the bar and you have to stay off that bar and this tow is pretty heavy, you know.

Q. What is the shape of this bar?

A. It is down stream diagonally across the shape of the river bed. When your speed upstream is retarded, it impairs your steerage.

By Mr. JACKSON:

Q. What is the current of Marmet and London pools at low water flow?

A. I don't know.

Q. Tell me what the difference would be in the current of London and Marmet pools in low water flow conditions by the gradual rise not exceeding half a mile an hour?

A. Not exceeding half a mile an hour?

Q. I mean half a foot per hour?

A. I could not state it—what difference that would make, I cannot say—how many miles per hour.

1394 Q. Do you think it would make one-fourth of a mile per hour?

A. Yes; I would think it would make more than that.

Q. You don't know that it would make that much, do you?

A. I feel sure it would make that much, but we would not in navigation judge that by miles per hour. We judge it by force—how much force it will be against the boats and what effect it is.

Q. But I want some check on your judgment.

A. I am sorry.

Q. I am asking you to give me something definite to check on. What is the greatest velocities against which you navigate in Kanawha River?

A. Eight miles an hour.

Q. Where is that?

A. It occurs at different points on the river. You encounter it at the mouth of the River and you encounter it at Knobs Shoals and Red House, just below Lock 6, and at Hawks' Chute.

Q. Does the change from one to one and a half miles an hour bother you?

A. Yes, sir; materially.

Q. How about from one to one and a fourth?

A. You will readily notice a change of a mile an hour.

Q. But I asked you about a change from one to one and a half an hour?

A. Yes, sir; you will notice changes from one mile to a mile and a half an hour.

Q. And from one mile an hour to one and a fourth miles an hour?

A. When it gets to a change of a quarter of a mile an hour, it is not very distinguishable. You can feel it, but it does not make a great deal of difference.

1395 Q. It requires a man looking for trouble pretty hard to detect a difference between a mile an hour and a mile and a quarter an hour.

A. In starting the boat, you usually meet a certain amount of current, and after a bit, you have to pull your rudders over a mile further.

Q. When you go up and down the river, do you find the current uniform throughout the length of the river?

A. No, sir.

Q. It varies from section to section?

A. Yes, sir.

Q. Under all conditions, it varies from section to section?

A. Yes, sir.

Q. And any competent pilot has got to take that into consideration in navigating any river?

A. Yes, sir.

Q. What do you mean by oscillations?

A. Sloshing back and forth, I take to be the meaning of the word.

Q. Captain Douglass, you were sitting here in Court listening to the testimony of Colonel Watkins, yesterday—I mean Friday.

A. Yes, sir.

Q. Did you know anything about oscillations before you heard him testify?

A. Yes, sir.

Q. You understood then, just like Colonel Watkins explained them, before he testified?

A. Certainly.

Q. And you used, from time to time, to go down the river and say, "We are striking oscillations at pool No. 6"?

A. We never used the word "oscillations."

1396 Q. What did you use?

A. We used "Rise" and "Fall."

Q. You strike a rise and fall in any river trip that you ever made, do you?

A. Yes, sir.

Q. For any length?

A. Yes, sir, but these falls and rises that I was speaking of were due to the rapid cut off in the dam at Marmet.

Q. Did you ever observe oscillations in the Ohio River?

A. No, sir.

Q. You never observed oscillations in the Ohio?

A. I never noticed any sudden falls in the—I beg pardon; that was the wrong answer. I have noticed them on the Ohio due to running traps in the Ohio, and they would suddenly shut them off and cause the same condition.

Q. Running bear trap dams, you mean?

A. Yes, sir.

Q. So your experience throughout your operations on the Kanawha River is that there were oscillations on the river?

A. I had experienced the sudden rises and falls. I did not call them oscillations in our terms.

Q. You don't know whether they were oscillations or not, do you?

A. No, sir; I could not say they were oscillations. All I could say, they were sudden rises and falls.

Q. They were changes there in the stages that you observed on the river?

A. They were unnatural changes in the river.

Q. You know they were unnatural changes?

A. Yes, sir.

Q. Did you observe unnatural changes in the stages throughout your experience on the Kanawha?

1397 A. Yes, sir.

Q. And that began in 1898?

A. Yes, sir; they used to run splashes from the head of Kanawha to Cincinnati.

Q. On the Kanawha River, you observed what you thought were innatural fluctuations on the river?

A. Yes, sir.

Q. When was the first time you navigated up the Kanawha River?

A. I learned the Kanawha River the first season I was a package boy or clerk, just when I was a kid.

Q. In 1898?

A. Yes, sir.

Q. And from 1898 on, you observed the annual fluctuations or stages of the river?

A. Yes, sir; when they would be doing something with the dams above there.

Q. Those unnatural fluctuations you observed may have been caused by the operation of the dam.

Q. From 1898 on you observed not merely the natural fluctuations at the mouth of the river, but you observed the unnatural fluctuations and stage up the Kanawha River?

A. I think they would be doing something with the dam above

Q. Oh, these unnatural fluctuations that you observed, were, or may have been caused by the operation of the dam.

A. They were caused by the operation of the dam.

Q. That is, those were the navigation dams you are talking about now?

A. Yes, sir.

Q. You said on your direct examination that there were certain wicket dams on the Ohio River?

1398 A. Yes, sir.

Q. And there have been wicket dams on the Kanawha, haven't there?

A. Very few.

Q. There were even more a few years ago. Is that right?

A. Yes; there was only one more, no—two more.

Q. Did you ever know of a wicket dam that did not have to be caulked from time to time or needled, during low water seasons?

A. No, sir.

Q. Isn't the very theory of a wicket dam that it will be caulked and needled during low water season?

A. I am not engineer enough to know a whole lot about the theory of them, but in working out they are all needled and caulked.

Q. So that if someone told you that there was a slack system of navigation on the river, which locks and wicket dams, you would expect that from time to time these wicket dams would have to be needled and caulked during low water, wouldn't you?

A. Yes, sir.

Q. There is nothing unusual about that, is there?

A. Not in extreme dry weather.

Q. Furthermore, you would expect, if those wicket dams were not needled caulked during low water flow, the pools would fall below normal pool level, wouldn't you?

A. They undoubtedly would.

Q. You also said that you had observed dredging in the upper end of navigation pools, did you not?

A. Yes, sir.

Q. You have observed that yourself on the river, haven't you?

A. Yes, sir.

1399 Q. And from your experience on the river, you would know that any suggestion that a navigation pool might be maintained indefinitely without dredging it at the upper end, would be ridiculous, wouldn't it?

A. Yes, sir.

Q. And did you ever see any dredging in the upper end of pools, back of the dams on the Ohio River upstream?

A. You mean at the upper end of pool?

Q. That is right.

A. Yes, sir.

Q. You have seen dredging at the upper end of every pool on the Ohio River, above the mouth of Kanawha up to Pittsburgh, haven't you?

A. Practically every one of them.

Q. That is nothing more than normal maintenance condition you would expect to find on any navigation project that was made up of locks and dams or slack water, isn't it?

A. Yes; but I might add it happens oftener in the Kanawha than in the Ohio.

Q. And of course, it will happen oftener on some other river if it carries more silt?

A. Yes, sir.

Q. The question of how much dredging has to be done from time to time, is in general the function of the silt carrying capacity of the stream, isn't it?

A. Yes, sir.

Q. The depth available to navigation at the head of the pool on a slack water development, depends on how deep you want to dredge the upper end of pool, doesn't it?

A. Yes; how deep they want to dredge it, or the height they build their dams.

1400 Q. The depth at the upper end of pool is dependent on how much they desire to dredge the upper end, for given height of dam?

A. They are usually built—I am not an engineer, and I don't want to go into this technically, but they usually build their dam, and they figure it is cheaper to do some dredging on the upper end of pool than it is to build the dam higher and naturally the water being thin at the upper end of pool and they have to have some deposit there and they have to dredge.

Q. If they built the dam higher, they would have to dredge as soon as the silt has gone far enough. Is that right?

A. Yes, sir.

Q. And from that time on it will become a maintenance proposition any way?

A. Yes, sir.

Q. Mr. Douglas, you testified that when you were navigating on the Kanawha River, you observed rainfall records at Ivanhoe. Is that right?

A. Yes, sir; we took the records for Ivanhoe, Radford, and Kanawha Falls.

Q. Can you tell me of one such instance where you were loading and where you were going?

A. We were going upstream with a tow?

Q. From where?

A. From Marietta, Ohio—wait a minute—I will go back to 1934.

Q. But I do not want any of these government operations.

A. That is what I am getting at.

Q. I want you to tell me of one of these instances when you were navigating the river, not for the Government, but as a
private operation before 1929, where you loaded and where
1401 you were going when you observed these rainfall records
at Ivanhoe. You said Marietta. Do you want to change
that?

A. Yes; I am going back to when I was working for the railroad contracting company, hauling sand and gravel.

Q. Now when was that?

A. This was in the summer of 1934.

Q. But I want you to go back to 1929, when you were in private operations.

By Mr. Thompson:

A. He said he was in private operations then.

By Mr. Jackson:

A. I am asking him to go back of 1929.

Q. Give me an illustration before you went with the Government?

A. I was not working on the Kanawha River before 1929, I did not have a license to pilot up there.

Q. You did not have a license to pilot up there before 1929?

A. No, sir.

Q. Then you never had a license to pilot on the Kanawha River until you went with the Government after 1929. Is that right?

A. Yes, sir.

Q. And you do not know of any instance, prior to the time when you went with the Government in 1929, that you ever in originating a cargo anywhere on the Kanawha River, observed the gauge heights at Ivanhoe, do you?

A. No, sir; not myself. I know of other people that have, of my own knowledge.

Q. Were you on the boat?

A. Yes, sir.

Q. Tell me one of those. I would be more liberal—give me one instance in 1929, before you went with the Government, of a trip where you observed the Ivanhoe gauge, the trip being on the Kanawha River, and tell me where the trip originated and where you were going?

1402 A. Wait a minute. I did not understand you to say Ivanhoe gauge, I meant the rainfall on the head of Kanawha River and the gauge at Kanawha Falls.

Q. You selected and talked about the Ivanhoe gauge, I did not.

A. As far as the habit of speaking of those gauges up there, that is a later thing, but going back to 1929, I would not be sure about what gauges we observed up there other than Kanawha Falls.

Q. Do you think that prior to the time that you were with the Government and heard so much about these gauges that you examined any reports of rainfall records above Kanawha Falls when you were loading on the Kanawha?

A. Yes; I think Radford was taken in then, and I was not navigating then and I did not check those things closely like now. I would hear a pilot talking about those things, but not being a pilot then, I did not pay close attention to what was being done or said at that time.

Q. Suppose you were loading a tow at Charleston to take it up as far as Lock #6, how long would it take to go up there or to make the trip?

A. From Charleston to Lock #6 is only three miles and it is downstream.

Q. How far above Charleston is the Marmet dam?

A. It is about nine miles.

Q. How long would it take you to take your tow there before the London and Marmet were built, that is, when you were operating from Charleston up to Lock #2.

A. I wasn't up that far prior to 1898 on a tow, but I have been up there myself.

Q. When you were sailing on Kanawha River, about how many hours did you make?

1403 By Mr. **Thompson**:

Q. Do you mean up or down the stream?

By Mr. **Jackson**:

A. He can tell me.

A. We will take both ways.

Q. All right then.

A. It depends on the stage of the river, but a boat was considered fast that would average seven or eight miles an hour upstream.

Q. I am talking about a tow. That wouldn't go that fast, would it?

A. No, sir. It depends on the size of your tow upstream and also downstream as to what speed you would make, two to four miles an hour.

Q. Upstream or downstream, which?

A. About the same downstream, but that includes your lockage, and pool of water.

Q. Pool of water, you mean by that, water not moving?

A. The dams are up.

Q. What current are you assuming for that?

A. It would practically be dead current.

Q. Dead water?

A. Yes, sir.

Q. Suppose there was a current?

A. That would decrease your speed upstream. At places it would add to your speed downstream, and at other places it would take away your speed downstream.

Q. Going downstream, you would have to slow up?

A. Yes, sir.

Q. You couldn't take full advantage of the current?

A. That is right.

Q. When you were navigating on Kanawha River, and you saw there was an inch of rainfall up above Ivanhoe, what change 1404 in the gauge did you assume that would make on the Kanawha River, if you did assume any?

A. It would make some change in the gauge on the Kanawha River.

Q. How much?

A. About a foot.

Q. You assumed that would make a difference of about a foot?

A. Yes, sir.

Q. What did you know of the lag between the rainfall above Ivanhoe and that in the river at Charleston?

A. This would necessarily mean rain extending from Ivanhoe on down the river, not only at Ivanhoe but all over the watershed. Without that it wouldn't mean very much.

Q. You would assume rain over the entire watershed?

A. Yes, sir; at Ivanhoe, Radford, and Kanawha Falls and all down through there.

Q. You didn't know anything about the lag between whatever rainfall there might be above Ivanhoe, and down by Charleston, did you?

By Mr. **Thompson**:

Q. Do you understand what he means by the word "lag"?

A. I do not.

By Mr. **Jackson**:

Q. Well, how long would it take for a rainfall above Ivanhoe to appear in the river below Charleston?

A. We figured about 18 hours.

Q. You now figure, or you did figure that when you were navigating on the Kanawha River?

A. When we were navigating on the Kanawha River, about 18 hours from the time of the rainfall.

Q. That is, if it was low water, it was your assumption that rain falling above Ivanhoe would appear in the river below Charleston in 18 hours?

1405 A. If the rain had extended all over the whole watershed, there would be an appreciable rise there in that time.

Q. If it rained at Charleston that water would appear in the river almost immediately?

A. From the time the water fell at Ivanhoe until it gets to Charleston, I couldn't tell you.

Q. And the fact is, that when you were navigating the river, you didn't have any idea about that, did you?

A. No, sir; we didn't take that into consideration.

Q. You did not take into consideration the question of water falling up above Ivanhoe as distinguished from all over the valley?

A. We took it into consideration, inasmuch as we had a rise in the river.

Q. It would tend to prolong any rise that occurred by reason of a general rain over the river. Is that right?

A. Yes, sir; it would add to it.

Q. You did not take into consideration the rainfall that was localized at and above Ivanhoe?

A. No, sir.

Q. You ceased navigating on the Ohio River, in 1929, didn't you?

A. Yes, sir.

Q. Were all the dams on the Ohio River constructed then, between Pittsburgh and Louisville?

A. Between Pittsburgh and Louisville?

Q. Yes, sir.

A. Yes, sir.

Q. And you acted as a pilot as far as Cincinnati?

A. That is all—no, I was Master.

1406 Q. As Master as far as Cincinnati?

A. I was Master as far as Evansville.

Q. Didn't you act as the Pilot at all there?

A. No, sir.

Q. You never have acted as a pilot on the Ohio River since you obtained your Pilot license: Is that right?

A. Yes, sir.

Q. Not on a commercial barge line?

A. Yes, sir.

Q. When?

A. I was piloting for the Union Sand & Gravel Company when I went to work for the Government, and I have piloted for the Ohio River Dredging Company, Keystone Sand & Gravel Company, and Dravo Contracting Company.

Q. On the Ohio River?

A. Yes, sir.

Q. But that is from Pittsburgh to Cincinnati?

A. No, I never have piloted a boat through from one continuous trip from Pittsburgh to Cincinnati.

Q. Then on what section of the Ohio have you piloted?

A. Most of my piloting was confined between say Ashland, Kentucky, to Moundsville, West Virginia. I do make and have made trips into Pittsburgh and Cincinnati, but that only occurs about once every year or once every two years.

Q. When you observed these rains on the Kanawha River, if they were of any size, you knew you were going to have to let the wickets down probably?

A. Yes, sir.

Q. And the result of that was you had to cut your tow in two?

A. Yes, sir.

1407 Q. And that increased your expense and loss of time. If there had been any way of preventing that greater increase so you would not have to cut your tow, it would have been better, wouldn't it?

A. Yes, sir; anything that would cut down the current of the river would be an advantage to moving the tow upstream.

Q. In your experience on these rivers, how much cushion did you allow below the loaded barge?

A. We worked down sometimes less than a foot, but a 9 foot barge, we like to have two feet.

Q. You would like to have a two foot cushion?

A. Yes, sir.

Q. That is, cushion when they are standing still?

A. Yes, sir.

Q. As I understand you the squat of a tow boat or barge in motion upstream is somewhere around a foot?

A. Yes, sir.

Q. And that will vary?

A. Yes, sir, it will vary.

Q. With the load?

A. And the amount of current. It will be more in swift current?

Q. And with the speed?

A. Yes, sir.

Q. And where you have a project that has certain controlling depths you frequently will navigate those controlling sections with a smaller cushion than you would if that were a uniform depth throughout the navigable channel. Is that right?

A. Yes, sir; but at some of these Ohio points in the pool you have less cushion there always, no matter what the depth is.

1408 Q. That is assumed, but what I mean to say is this: A navigator in whose judgment a two-foot cushion would be desirable, would load so that the cushion might be less than two feet, for short distances, of controlling depths, whereas he would not load to that small a cushion if there were no deeper water throughout the entire channel?

A. That is right.

Q. So that is in common experience in practicable navigation that you have a channel with certain relatively short controlling depths, isn't it?

A. Yes, sir.

Q. And it is common practice in that navigation to load your ship or barge so that for those short controlling depths there will be less cushion than you would otherwise be willing to navigate with?

A. Yes, sir.

Q. And the controlling depth in a waterway that is created by slack water navigation, depends on what plans may be adopted by the Government for that project, doesn't it?

A. Yes, sir.

Q. And whatever they are, navigation has to accom'odate itself to them?

A. Yes, sir; to those conditions.

Q. Now when you were navigating ~~on~~ the Kanawha River, there was only a six-foot project. Is that right?

A. Yes, sir; that is right.

Q. In the part of Kanawha River where you navigated, all the dams were wicket dams. Is that right?

A. I have navigated the length of the river as I stated before, with the Government, but all the dams below Marmet are wicket dams.

1409 Q. I am trying to get at your practical commercial experience before you went to the Government.

A. I see.

Q. During your experience before you went to the Government, there were only wicket dams in the part of the Kanawha where you navigated. Is that right?

A. Yes, sir.

Q. And those wickets were from time to time raised and lowered?

A. Yes, sir.

Q. And their raising and lowering from time to time created changes in pool height. Is that right?

A. The raising and lowering contributed to maintain the height.

Q. And while they were adjusting those, were there changes?

A. You have extra water coming down and you lower some of the wickets to maintain pool level above. At a certain stage this water coming in will give you extra water in the head of the next pool below, you will have more water there than you would have if the wickets had remained up.

Q. And from time to time during this period these wicket dams leaked, didn't they?

A. They always leaked.

Q. And oftentimes they leaked more water out than was coming in at the upper end of Pools, didn't they?

A. In dry weather they always did.

Q. And the result of that was that the pools frequently fell below project depths, didn't they?

A. Sometimes they fell below that depth, even when caulked.

Q. Because there was still more leakage going through the dam than water flowing to the dam. Is that right?

1410 A. That would cause it to fall, yes, sir; with less water coming in than going out, but those dams were caulked as tight as they could get them.

Q. Of course, but you had nothing to do with needling and caulking, did you?

A. No, sir.

Q. I suppose at times when the pools are below project depth, you sometimes had difficulties in navigation. Is that right?

A. Yes, sir.

Q. I believe you said you saw some work being done below Marmet dam in 1935. Is that right.?

A. Yes, sir.

Q. What pool is below Marmet dam?

A. #6 pool.

Q. Maintained by #6 dam?

A. Yes, sir.

Q. Originally the #6 dam was designed to provide a 6 foot project, wasn't it?

A. Yes, sir.

Q. Isn't it a fact that the work which you saw done below Marmet Dam in 1935, was part of the construction work of Marmet?

A. No, sir.

Q. Were they, or not, cutting a channel to the lock on Marmet?

A. The work which I spoke of was removing silt between the guide walls at the lower approach to the lock. They did channel work with a dredge there, and widened and improved the channel both years.

Q. It was necessary, was it not, to do dredging and excavation in order to adapt upper end of old Lock #6 pool to the 9 foot project contemplated by the new dam?

1411 A. Yes. The entrance to this lock was built to accommodate a 9 foot stage and that was completed by the contractor and turned over to the Government. This work that we did, was done after it had been turned over to the Government.

Q. Is the depth now between Dam #6 and Marmet Dam, a six or nine foot controlling depth?

A. Yes, sir.

Q. Which is it?

A. Nine feet between Lock #6 and Marmet.

Q. And that is a changed condition from that which existed prior to this new improvement, is it not?

A. Yes, sir.

Q. You also made some statement about the question of anchoring barges. Does not good practice, on such a river as the Kanawha require that when a barge or tow is anchored it shall be sparred out?

A. It does, but whether that condition depends upon circumstances.

Q. Wouldn't you call it pretty rotten boating for any man to anchor his tow or barge along the river, like the Kanawha or Ohio, without sparring it out?

A. That is a reflection a little bit on my practice, but for your information I will say that this tow was sparred out at one end and the other end was pulled in to the bank to enable the boat to get up to the barge, and the fleet was tied up to meet conditions as they were.

Q. That is, on the construction project?

A. Yes, sir.

Q. Would not good practice in the matter of commercial navi-
gation on the Kanawha or Ohio, laying aside any con-
1412 struction project, dictate that if any tow boats or barges
are anchored, they should be sparred up?

A. If they were going to stay there any length of time, or if you are going to tie up a night or in a fog, you do not carry spars and rigging and things like that, to push your tow out in the river, if you had landed for either an accident, a fog or any other reason.

Q. And if you do tie up under conditions you have assumed, you have tow boats there with a watchman on the tow boat?

A. Yes, sir.

Q. That is because you have had to make an unusual anchorage during a fog, isn't it?

A. Will you read that question.

(Question read to witness.)

A. If we had to make an unusual anchorage in the fog, we are liable to land any place.

Q. And that is the reason you have your tow boat with your men on it throughout the night, isn't it?

A. Yes, sir; you do, at other places, too, that is not the only place you have a tow boat, but your tow boat will be there with men on it, because the watchman is not a licensed man and he cannot handle the tow boat.

Q. Isn't it a fact that on any river you will spar out your boats when you anchor, when you are going to stay for any considerable length of time?

A. Yes, sir; but there are places in nearly all rivers where it is not necessary to spar out.

Q. You mean where there might be a vertical channel?

A. Yes, sir; but in most places you are supposed to spar out.

Q. Now, you named a lot of companies which you said had a
number of tow boats and barges, or rather according to
1413 what you have stated, and I want to ask how high up on
the Kanawha River do those companies operate?

A. The Hatfield-Campbell Company operate from Reed, West Virginia, which is about 3½ miles below Marmet. They operate from different points between Reed and the mouth of the river.

Q. I don't care about your going into details about that. Just give me the names.

A. The Raymond City Company, operate from Raymond City——

Q. Raymond City; where is that?

A. Raymond City is 25 miles below Charleston.

Q. Just proceed and tell me the different operations?

A. The Kanawha River Towing Company operate from Cedar Grove on out to Cincinnati.

Q. Can you locate that by some other better known land mark?

A. Cedar Grove is either nine or twelve miles above Marmet, I am not positive which. The Ohio River Dredging Company, operating from Harwood, which is about a mile below the mouth of Lout Creek. The Ohio River Coal Company, I am not positive whether they are operating from Longacre or from Cedar Grove. I think it is Longacre.

By Mr. Williams:

Q. Where is Longacre?

A. That is about a mile and a half below Lout Creek.

By Mr. Jackson;

Q. All right, just go ahead.

A. And this man Shear, who is towing coal in the London and Marmet Pools. I think all of his coal is loaded at Longacre, but I am not positive about that.

Q. Is there any of them that operate above Marmet dam?

A. Yes, sir.

Q. Which ones?

A. The Kanawha River Towing Company and Ohio River Dredging Company.

1414 Q. Are they carriers, or not?

A. They are towing coal.

Q. And they tow coal from where to where?

A. The Kanawha River Towing Company is towing coal from Cedar Grove to say, Cincinnati. I was going to give you the name of the landing at the Lower end of Cincinnati, but I have forgotten it. The Ohio River Dredging Company is towing coal from Harwood to Ironton, Ohio. The Ohio River Coal Company is towing coal from whatever point it is they load up there, to Portsmouth, Ohio. In addition to that, these sand and gravel companies are towing gravel up the river to different points along the river.

Q. But they are always towing for construction, are they not?

A. Yes.

Q. Is that Government construction work?

A. Not always Government work; there is some private construction.

Q. There is very little private construction going on up the river, now, isn't there?

A. Very little, but once in a while they will have a few barges going up there.

Q. Can you tell me how much water is required for a lockage at dam No. 27, on the Ohio River?

A. No; I cannot tell you how much water is required but I can tell you how large the lock chamber is and the width of it.

Q. I think I can tell you that myself.

A. I never had that question come up before, and I don't know.

Q. Then you don't know what the lockage requirements daily are for Lock #27, do you?

1415 A. No, sir. That would depend on the amount of traffic and the amount of lockages they would have to make.

Q. You don't know what it is?

A. No, sir.

Q. Or what the traffic is?

A. No, sir.

Q. If you have enough water there to maintain the pool, that is, to provide for lockage and leakage, that is enough, whatever it is.

A. Yes, sir; and that is as far as we are interested.

Redirect examination by Mr. Thompson:

Q. Mr. Douglas, when you went into the Government service in 1929, did you do any towing for the Government on the Kanawha River?

A. Yes, sir.

Q. What kind of towing did you do?

A. We towed dredges, barges, scows, and equipment.

Q. Is towing for the Government different from towing for any other people or persons?

A. Not a bit different from towing for anybody else, in towing boats with the same draft.

Q. How often were you towing for the Government?

A. All the time.

Q. And you were going up the Kanawha River?

A. Part of the time. We were working up the Kanawha River when we were working with a dredge boat and we were working over the river more often than anybody else, because we were loading scows as far as we could load them.

1416 Q. What were those scows loaded with?

A. With sand and gravel.

Q. Did you tow any in the London Pool and the Marmet Pool?

A. I have not towed but very few scows in the London Pool since London has been built. I towed several there before London was built.

Q. Did you run any boats in the London and Marmet pools?

A. I have only made a few trips up there since the London dam has been built.

Q. When you ran your scows up what amount of water did they draw?

A. Six feet.

Q. And you moved those around in the upper end of the pools, did you?

A. Yes, sir.

Q. I believe you said you received some licenses from the Government as a Pilot and Master?

A. Yes, sir.

Q. Is there anything extraordinary about a person working for the Government receiving a license from the Government?

A. No, sir.

Q. Are his qualifications the same as those of a person who is not working for the Government?

A. They must be.

Q. Have you got your licenses here?

A. I have.

Q. Let me see them, please.

(Witness produces said licenses.)

By Mr. Jackson. I do not see the relevancy of this evidence.

By the Court:

Q. About three-fourths of the examination of each side has been entirely irrelevant, but as long as you are attacking the qualification of this witness, I think he has a right to go into it.

1417 A. I might state that I have to pass the same examination to obtain a license that anybody else does, and when I took my examination for a license, I was not in the employ of the Government, except for the Pilot's license on the Kanawha River.

By Mr. Thompson:

Q. I would like to have this license marked Government Exhibit 157 for identification.

(Said license is marked "Government Exhibit 157" for identification.)

(Said license is here introduced in evidence and is marked "Government Exhibit 157.")

By Mr. Thompson:

Q. I show you Government Exhibit 157 and will ask you if you know what that is?

A. Yes, sir, that is my license as Master and Pilot.

Q. Where?

A. On the Ohio and Kanawha Rivers.

By Mr. **Thompson**:

Q. Will you explain the difference between running a boat up the river and drawing a tow, or pulling a tow, if that is a proper expression to use, so far as getting through a narrow channel, such as you have said there was on the Kanawha?

A. You mean the difference between going up with a steamboat by itself and the act of towing a tow?

Q. Yes, sir.

A. There is a marked difference. You have much more power for the amount of weight that you have on the loose boat, and the boat would not be as heavy as your tow, it don't meet as much current, and is much easier to handle in these narrow, swift places, and you make more speed with a loose boat than a tow, with whatever amount of weight of tow, and whatever you add to that retards your speed just that much.

Q. Is there any swing back and forth out of line, due to towing?

1418 A. You mean the current sometimes runs from one side to the other?

Q. Does the tow get out of line with the boat?

A. No, sir.

Q. I mean the barges?

A. The boat is chained fast to the pole and they are maintained rigid with the tow.

Q. That is, when they are pushed, is it?

A. Yes, sir.

Q. Don't you pull them at all?

A. Not at all.

Q. Counsel asked you if it wasn't a fact that there were different changes in flow on these rivers. Do you or do you not take those into account?

A. Yes; I understood that to mean that the current would vary at different points on the river, some places due to narrow channel, and so forth. Even on pool waters there will be a noticeable difference in current.

Q. And as a navigator you know about these different currents, do you not?

A. You know they are there and where they are and where to meet them when you get to them.

Q. Are they or are they not caused by artificial movements of water down the river?

A. Not always.

Q. They are there permanently, are they?

A. They are there permanently, the natural flow of the pool water in some places.

Q. Do I understand you to say that, in answer to counsel on cross-examination, below the Marmet there were two types of work going on, one the clearing of this bar or dredging at
1419 a bar down below the dam some distance and the other work was work that was where you were dredging silt just below the dam itself; is that correct?

A. That is correct. The work consisted of widening of the existing channel below the approach to the lock. The removing of the silt was in the approach to the lock itself.

Q. And that was entirely separate work from the work——

A. Entirely separate. It was clear up inside of the walls that had been built of the locks. There were two long walls projecting beyond the locks at each end and this was between the two walls at the lower end of the lock.

Q. Counsel asked you if it wasn't a usual thing for silt to be deposited and I understood you to say "yes; at the upper ends of these pools."

A. It does on the upper end of pools and critical bars pile up naturally, slowly. They do in all the pools.

Q. Is there or is there not then a need, when they do build up with a silt in this way for all of the water you can possibly get from above in order to get over them?

By Mr. Jackson:

Q. I object to that. He has already gone over it indirect.

By Mr. Thompson:

A. I did not ask that question before.

The Court:

Q. The answer to it is so obvious to anybody, even to a court, that it is a mere waste of time to ask it.

A. Certainly.

By Mr. Thompson:

Q. You say you had some kind of experience so far as running aground is concerned or where you had to split your load in 1934 when you were working for the Government. Will you please state what that was?

A. This was when I was working for the Dravo Contracting Company.

By Mr. Thompson:

Q. And you were not working for the Government?

1420 A. Not working for the Government in 1934 and '35. I was working for the Dravo Contracting Company, towing sand and gravel from Goslin Bar which is just above Dam 23 on the Ohio River and that is about 42 miles above the mouth of the Kanawha River to the dam that was building at Winfield. We came in with six barges en route to the dam and the Kanawha River was running out and the shore boss decided we would lose too much time to take these six barges to Winfield and instead of taking the barges on to Winfield, he tied all six of them up at Point Pleasant, and took a tow of empties back to the digger up Goslin Bar and left them lay there until the river run down to move them.

Q. Where is Goslin Bar?

A. That, as I say, is just above 23 which is about 42 miles above the mouth of the Kanawha River on the Ohio.

By Mr. Thompson:

Q. This license is very short and we would like, if you will permit, to read it into the record.

By Mr. Williams:

A. This is Government Exhibit 157. "File No. L-1938. Serial No. 12260. Issue No. 2, 4. License to Master of Steam and Motor Vessels.

"This is to certify that John R. Douglass has given satisfactory evidence to the undersigned United States Local Inspectors, Steamboat Inspection Service for the District of Point Pleasant, West Virginia, that he can safely be entrusted with the duties and responsibilities of Master of Steam and Motor Vessels of all gross tons upon the waters of Mississippi River and tributaries, also first class pilot from Lock No. 1, Monongahela River, to Cincinnati, Ohio, on the Ohio River, Alleghany River to
1421 Lock No. 1 and Great Kanawha River from Point Pleasant, West Virginia, to Marmet, West Virginia, and is hereby licensed to act as such master and pilot for the term of five years from this date.

"Given under our hands this 20th day of March, 1934."

(Signed) Harry H. Pullem,
U. S. Local Inspector of Hulls.
John W. Lozier,
U. S. Local Inspector of Boilers."

Recross examination by Mr. Jackson:

Q. On your redirect you told about an incident where you brought six barges to a certain point on the Kanawha River in 1934?

By Mr. Thompson:

Q. He said Ohio.

A. I brought them down the Ohio to Point Pleasant. They were en route to Winfield, but the Kanawha River was running out and we left the tow there and took empties back up to the digger because it would have taken too much time to take the tow up.

By Mr. **Jackson**:

Q. The sand and gravel had been gotten up on the Ohio above the mouth of the Kanawha?

A. Yes.

Q. You brought it down to the mouth of the Kanawha?

A. Yes, supposed to deliver it to the dam that was being built at Winfield.

Q. When you say the river was running out, you mean there was a lot of water coming out?

1422 A. Yes.

Q. And it was because there was so much water coming out that you decided to leave your tow at Point Pleasant and take some empties back to the place where the sand and gravel was being obtained?

A. Yes.

Q. Isn't it a fact that 90 percent of the traffic on the Kanawha River is downstream, somewhere in that vicinity?

A. I couldn't tell you what percentage it is, but it way more downstream than upstream.

1423

Capt. C. Stone

Direct examination by Mr. **Thompson**:

Q. Please give your name to the stenographer, Mr. Stone.

A. Capt. C. Stone.

Q. Where do you reside?

A. Point Pleasant, West Virginia.

Q. What is your occupation?

A. Operator and navigator of steamboats.

Q. Where were you born?

A. Point Pleasant, West Virginia.

Q. Are you employed by the Government?

A. No, sir.

Q. Are you a licensed pilot on the Ohio River?

A. Yes, sir.

Q. Are you a licensed pilot on the Kanawha River?

A. Yes, sir.

Q. When did you become a licensed pilot on the Ohio?

A. I became a licensed pilot in 1933.

1424 Q. Had you been running boats on that river before you became a licensed pilot?

A. I had been running a towboat in the general towboat business three years prior to that time.

Q. Where did you say your residence was?

A. Point Pleasant, West Virginia.

Q. Was that where you were born?

A. Yes, sir.

Q. What business was your father in when you were a boy?

A. My father was a ferry man at Point Pleasant.

Q. Where did the ferry cross?

A. From Point Pleasant to Henderson on the Kanawha River and from Point Pleasant to Kenova on the Ohio River.

Q. He ran two ferries, did he?

A. Yes, sir.

Q. Did you work with him on the ferries?

A. Yes, sir.

Q. What was the depth of the Ohio in the early days when you were a boy?

Mr. Jackson. May we have our objection noted to the testimony about the Ohio River as not within the pleadings and have it show the exception?

The Court. Yes.

A. The depths of the Ohio varied in seasons of the year.

By Mr. Thompson:

Q. At low water?

A. At low water it got down to as low as four feet.

Q. Did you ever wade it?

A. Oh, yes, many a time.

By the Court:

Q. How old a man are you now?

A. Forty-three years old.

By Mr. Thompson:

Q. Where did you wade it?

1425 A. There at Point Pleasant to Kenova.

Q. How long have you been a licensed pilot on the Kanawha River?

A. Since 1933.

Q. Have you ever owned a boat of your own?

A. Yes, sir.

Q. Where did it run?

A. I operated the ferry from 1915 to 1931 by a steamboat.

Q. That is the ferry on the Kanawha?

A. Yes, sir. After the establishment of a bridge at Point Pleasant, I have been engaged since that time in the general contract towboat business.

Q. What are the duties of a pilot or master?

A. The duties of a pilot or the duties of the master is to have complete control of vessel. He examines the papers of the boat to see that they are in lawful duty and gives orders as to the operation and navigation of the vessel.

Q. And are his duties different from those of the pilot?

A. No, the duties of the pilot is to keep the boat in navigable waters and avoid bars and careful manipulations are under his supervision.

Q. You said you owned a boat, did you not?

A. Yes, sir.

Q. Did you have any tows, any scows?

A. Yes.

Q. Do you own them now?

A. Yes.

Q. Do you operate them now?

A. Yes.

Q. Where?

1426 A. At Point Pleasant on the Kanawha River. I operate out of Point Pleasant up the Kanawha and up and down the Ohio, unlimited district.

Q. What is the name of your boat?

A. Steamer "Tu-Endi-We."

Q. Do you own any other type of boat?

A. I own a gas boat of 100 horsepower named the "Eclipse."

Q. What is the capacity of that boat in the carrying of oil?

A. That is a towboat.

Q. I mean the barge?

A. One of the barges is what you call an oil barge. That carries 4,000 barrels of oil.

Q. Have you any coal barges?

A. Yes; I have three.

Q. And where do they operate?

A. They operate in connection with my towing on the Kanawha and Ohio.

Q. Please state to the court on what parts of the Ohio you have operated?

A. I operate from Freedom, Pennsylvania, to Ironton, Ohio.

Q. Where is Ironton, Ohio with regard to the confluence of the Kanawha and Ohio?

A. Ironton from the mouth of the Kanawha is 65 miles below the mouth of the Kanawha.

Q. Where do you operate your steamboat—from Longacre or Ironton?

A. And I have operated also from Point Pleasant as far as navigation on the Kanawha. I am unlimited.

Q. How far does navigation go, in your experience, on the Kanawha River?

1427 A. Since the construction of the London dam navigation can be had as far as Loop Creek.

Q. Have you ever seen any navigation beyond Loop Creek?

A. No.

Q. Did you ever see any other boats running up beyond Loop Creek?

A. No.

Q. I am not speaking of barges or steamboats. Did you ever see any boats going up above Loop Creek?

A. No; I never personally seen no boats go up there.

Q. I don't mean up Loop Creek but up the river?

A. No; not up the Kanawha.

Q. What is the capacity of your coal barges?

A. Three coal barges of one hundred tons each.

Q. What depth do you need in towing a full barge up the Kanawha River?

A. The Government allows us a depth of six feet in pool water.

Q. How much do you need?

A. Well, for safe navigation we should have at least seven.

Q. And as a result what do you do with your boats with regard to loading?

A. We load them to a draft of six feet in ordinary pool river.

Q. What does a loaded barge draw?

A. A loaded barge can be put down to nine feet.

Q. Where?

A. In the Ohio River.

Q. I mean the Kanawha?

A. You can load it to nine feet in the Kanawha.

1428 Q. What will happen?

A. You will stick it or you will wreck it.

Q. What do you usually load a barge?

A. Not over six feet.

Q. How much clearance do you have to have over critical bars when barges are loaded full?

A. At six feet draft we should have at least a foot clearance.

Q. Why is that?

A. So that we can manage the operation of our barges, so we can steer them.

Q. Do you have any difficulty steering the barges?

A. Oft times.

Q. Why is that?

A. On account of shallow water. The barges will pull out of their course. They will want to go to one side of the channel or the other. Oft times we have that condition.

Q. State to the court whether you ever had any difficulty in low water time in the Kanawha River operating your barges?

A. You are assuming pool stage?

Q. No, I am just assuming low water?

A. Yes, I have encountered trouble within recent years.

Q. What was that?

A. I had a six foot barge of gasoline to be delivered from Point Pleasant to Snow Hill, West Virginia, which is approximately six miles below the Marmet dam and that is, of course, in No. 6 pool. I managed to land the barge to the gasoline dock to where I was going to pump the gasoline up the hill into the tanks, and in order to do that I was compelled by the insurance company to get the steamboat 150 feet away from the barge before attempting to start pumping. That necessitated my taking the boat up the bank and tying it to the shore, then
1429 running a steam line over to the bank and then back to the gasoline barge in order to get to this pump. We got our piping all made secure and ready to pump at six o'clock in the evening in November of 1934. I don't know exactly the date of that, but about midnight the watchman woke me and told me the boat was sinking and I got up immediately and we had to disconnect the steam line and back the light steamboat off the rocks as the pool had went down and left me on from a two-foot difference.

Q. What caused this difference, if you know?

A. It was by the closing of some obstruction from the Marmet dam.

Q. When was the Marmet dam finished?

A. I think about in the year 1933 or '34. I will recall that fact. It was completed in '35.

Q. Then I understood you to say this was caused by shutting down the Marmet dam?

A. This was after the completion of the Marmet dam. To be exact about the date I won't make any attempt to give them.

Q. Was the Marmet dam operating at that time?

A. Yes, we were locking through the Marmet dam.

Q. State whether or not you have had any difficulties when you would tie up at night on the river?

A. Yes, I have met with difficulties in tying up. You see steamboats run, some of them, with a double crew and some with a single crew. Those operating under a single crew are restricted from running more than thirteen hours during the day under penalty of the law. Therefore we have got to go to the bank and tie up. Well, during the night time the changes in the river will either raise or fall. It has been more noticeable since construction of the Marmet dam than before but that is felt more in the

event that you are closer to the dam up at the upper e
1430 of the pool. You won't notice that wave so much at t
head of the dam but you will notice it at the head of t
pool where the water is the flattest and thinnest. I have h
occasion to have my boats stuck on the bank—my barges stu
on the bank, running a single crew, by that very change.

Q. Since the construction of the Marmet dam?

A. Yes, since the construction of the Marmet dam.

Q. Where did that occur?

A. It happened at Levi in 1935.

By the **Court**:

Q. Levi is on the pool of the Marmet dam?

A. It is on the pool of No. 6 dam immediately below Marm dam.

By Mr. **Thompson**:

Q. When you are operating a boat on the Kanawha and yo enter a lock, what is your custom with respect to finding out t condition of the pool?

A. Well, when we are navigating the Kanawha River we g the gages as we enter each and every lock. There is a gage mar written on the Kanawha River. It is on boards and it starts zero and comes up. We know by reading those gages whether are going to have water enough to enter that lock or, in oth words, to enter the locks above. They most generally alway give us a record to go by.

Q. Do you always look at those gage readings?

A. Yes, sir.

Q. Is there any other information which is furnished you?

A. Why, we can look at the bulletin board on the bank.

Q. Do you look at the bulletin board?

A. Yes, sir.

Q. What does the bulletin board tell you?

A. The bulletin board on the Kanawha Rives gives us the co dition at Kanawha Falls and all pilots on the Kanawha Riv reckon the Kanawha River pools by the Falls gage.

1431 Q. Do you follow that yourself, those bulletins, carefully

A. Yes, sir.

Q. Have you ever been misled by those bulletins?

A. No, sir.

Q. Do you ever get any information as to the conditions up t river at Radford and Ivanhoe?

A. Yes, sir.

Q. Please tell the court about that?

A. At Point Pleasant at the local United States Governme office they furnish the river interests a bulletin each morning the condition of the Kanawha and Ohio Rivers as regards to the rainfall, the precipitation, and as to the gages at various points.

Q. Do they give you any information as to New River?

A. Oh, yes.

Q. As to conditions up there?

A. Yes, sir.

Q. Where.

A. From Radford, Ivanhoe and Hinton. Now, I may also relate that it has been within the last six months that the river interests has demanded that the Government give us a report from Ivanhoe and Radford. It is very essential to the river interests.

Q. Do they give it to you?

A. Yes, sir.

Q. What is the character of the information they give you?

A. They give us the precipitation.

Q. Where?

A. At Ivanhoe and Radford and also at Hinton and they give us the gages.

Q. Supposing that it shows a precipitation at Ivanhoe and Radford, how does that enter into your calculations with regard to navigation?

1432 A. With precipitation at Ivanhoe and Radford we expect a raise on the Kanawha River if the precipitation is in the neighborhood of an inch.

Q. And does that enter as a factor in your moving your commerce?

A. We expect to encounter a current.

Q. Have you ever encountered currents under such conditions?

A. We most generally get all of our currents from New River District. There are exceptions but we look for our currents from the New River district.

Q. What happens when you go against that current? What is your calculation? What do you do, if anything?

A. When we are coming upstream with a loaded cargo on our barges, the Kanawha River has not been entirely eradicated from chutes and dikes in the pools, even though the improved water stages the Government is trying to maintain for us. If we run up into these dikes and there is a raise from the head of the river, we are meeting with cross-currents and we are meeting with currents that impede our progress. It requires more power and the result is we have got to go to the bank and leave half of our tow and go with what we can go through these places with. The same thing will occur, you may illustrate, if you are going up a high grade on a railroad, they have got to have more engines or have got to cut off less cars. There is no difference.

By the COURT:

Q. How high does the river get before you have to suspend navigation?

A. Well, most generally the water has to get up over the banks to where it would be disasterous to houses on the side of the river banks, flooded districts, when we most generally have to stop
navigation and then also there as some crafts on the
1433 river that are built—the structures are too high to clear
the bridges such as Charleston and Montgomery and Point Pleasant.

By Mr. THOMPSON:

Q. Did you ever have any trouble getting your gasoline boat up the river because of the London or Marmet dams, the operation of the power projects there?

A. No.

Q. Do you recall any time when the turbines at the Marmet dam have been cut off?

A. Well, that incident I spoke of in November. That was an incident that happened.

Q. When they cut off the turbines?

A. That was a condition in November of 1935, I believe, of a roller being shut down. The roller shut down the dam, but I wish to relate an incident that happened to me in this year, March of this year, due to the effect of a turbine being shut off. I disrecall the hour of the day.

Q. What time of the year was it?

A. This was in May of this year, 1936.

Q. The turbine in what dam, what project?

A. Supposed to have started in the London dam and then the Marmet dam had to take care of that wave that the London dam throwed on us and they opened up their turbines and resulted in what happened to me again.

Q. What did happen to you?

A. I went in the same port with a barge of gasoline drawing six feet. There wasn't enough water at that time to get in this port, into this dock. There was only five and one-half feet, so it necessitated that we had to lay our pipe line across the space of water and other light structures and craft in order to go ahead and pump out. I had to follow the same routine in getting my
steamer above the gasoline barge again and it throwed us
1434 far out in the river—the contour of the banks on the
Kanawha River at places are so flat and rocky that it held me still out in the river and we lost about four hours time, and

then the river was so low when we went in there at that time and the next morning the water was up considerably higher.

Q. Do you understand what is meant by the word "oscillations"?

A. Yes.

Q. What is your interpretation of the word "oscillations"?

A. My interpretation of the word "oscillations" is dividing and illustrating like the pendulum of a clock. It is a swing.

Q. Have you ever noticed any swings in the flow of the river below the Marmet dam since the Marmet project has been operating?

A. Yes. If you will allow me to use a different term—

Q. Use your own term.

A. I will say it was sort of a wave.

Q. Did that wave affect you in any way or affect navigation in any way that you know of?

A. This incident that I recall in May come from a wave. I investigated it to find out what caused it.

Q. In times of low water on the Kanawha, do you need all of the flow that is possible that comes from any source that enters that river?

A. Yes, sir.

Q. Have you ever observed the caulking and needling of the dams on that river?

A. Yes, sir.

Q. What would happen in low water time if they didn't caulk and needle these dams?

A. We would lose our navigable water.

Q. And what would happen then?

A. Commerce would be shut down.

1435 Q. What is the condition on the Ohio so far as caulking and needling is concerned with respect to navigation?

A. The same thing exists.

Q. Have you observed any sediment depositing in the upper ends of these pools on the Kanawha?

A. At Marmet dam I have observed it immediately below the dam, yes, sir.

Q. Have you gone up above the dam?

A. Yes, sir.

Q. Have you observed any deposit in the back end of that pool?

A. No, not at London, I haven't.

Q. I don't mean at London; I mean below London?

A. No, I haven't noticed it up at the upper end.

Q. Have you noticed any dredging going on at London and Marmet dams?

A. Personally I have never seen it but I know of it by records and bulletins.

Cross-examination by Mr. Jackson:

Q. Capt. Stone, I think you said the first instance when you had difficulty in unloading your oil barge below Marmet in 1934 was caused by the closing of a roller gate at Marmet; is that right?

A. Yes.

By Mr. Thompson:

Q. I think he corrected that to '35.

A. You mentioned '35?

By Mr. Jackson:

Q. No, '34.

A. It was in November '35.

Q. You also said that in 1935 you had some difficulty with an anchored barge or boat grounding at Levi, West Virginia; is that right?

1436 A. Yes.

Q. What time in '35 would you say that was?

A. That was in October 1935.

Q. Was that caused by shutting off a power wheel at Marmet?

A. No; that was caused by a roller in '35. In '36 was when the turbines give me trouble.

Q. That is both of these instances in '35 were caused by the closing of a roller at Marmet?

A. Yes.

Q. A roller gate?

A. Yes. There is a reason for that. The turbines wasn't completed before that time.

Q. You are right about that. Was your boat and barge sparred out at Levi, West Virginia?

A. No.

Q. You just pulled in by the bank and tied up?

A. Yes.

Q. I understood you to say that due to the insistence of rivermen the Government in the last six months has been furnishing rainfall or weather data at Point Pleasant dealing with rainfall up at Ivanhoe and on the headwaters of the New River—up in that territory?

A. Yes.

Q. Did you discover that they were furnishing that data within the last six months?

A. No; they have furnished us reports from that district years and years before that time, but it seems as though there was a period there that they quit furnishing us. Why it was we don't know, and then the rivermen at Point Pleasant got busy and were trying to investigate why it was, but we got a river report again.

1437 Q. As I understand you, when you got a river report or weather report that indicated rainfall up the river, you anticipated an increase in current?

A. Yes.

Q. If you were going to go up the river?

A. Naturally.

Q. And that made it necessary to reduce your load?

A. Yes.

Q. You also stated that you had a further difficulty at this gasoline dock at Snow Hill. Give me the date of that?

A. That was in May of this year.

Q. Can you give me the day?

A. No; I can't. I could by looking on my log book on the boat, but I haven't it with me.

Q. Would you mind transmitting that information to Mr. Thompson or Mr. Williams?

A. When I go home?

Q. Yes.

A. Yes; I will be glad to.

Q. And do you remember now the time of day when you went there to anchor?

A. Yes. Most generally we got in there at noon.

Q. Did you get in at noon on that day or some other time?

A. That day.

Q. Is that the American Gas and Oil Dock?

A. Yes.

Q. And is that a dock that is on a sloping, shallow part of the pool?

A. It is out of the channel, yes. It is not in the channel. You understand no landings are in the channel. All docks are off to the side.

1438 Q. I understand that, but it is a shallow part of the pool where the bottom is both shallow and gradually sloping?

A. That is natural upon the Kanawha River.

Q. Some places, I assume are different from others in that respect?

A. That would be in the channel then.

Q. You mean all landings are shallow and on sloping ground?

A. Yes; unless companies have dredged them out.

Q. I understand from Mr. Douglass that some were not. That was the basis of my question. Have you ever seen what you call oscillations in Pool No. 6 before the construction of the Marmet dam?

A. No.

Q. You never saw any before that?

A. No.

Q. Did you ever see any oscillations, as you call them, at any pool other than the one to which you have referred?

A. No; but now may I interrupt you a second and say that I have noticed a sudden raise in the river due to rainfalls and cloudbursts on the head of the Kanawha. I won't mislead you to believe that I haven't registered or noticed the rise and fall in the Kanawha River but that come from natural conditions.

Q. Those sudden rises can come from comparatively small creeks along the Kanawha, can't they?

A. Yes.

Q. That is something natural that may happen any time?

A. Especially on the Kanawha River because the Kanawha River will register a drop of water so quick.

1439 Redirect examination by Mr. THOMPSON:

Q. What is the most essential factor for a navigator to know on the Kanawha River in moving commerce?

A. The most essential fact to move commerce on the Kanawha River at the present day is to know the gages, to know the river gages.

Q. What kind of a river?

A. Yes, we must have a full pool to move six foot commerce on the Kanawha River. That is very essential.

Recross examination by Mr. JACKSON:

Q. You did say that when the depth was shallow it made steering somewhat more difficult?

A. Yes.

Q. Does a little rise in the water help that?

A. No; a rise in the water really makes it worse.

Q. That is the difficulty in steering that comes from low water is made worse by an addition to that?

A. Yes; it depends on the little rise. You speak of a little rise—a big rise we are all right, but you take a little rise on top of shallow water, it doubles that much more interfering.

Q. Could you give me some rough definition of a little rise and a big rise?

A. You take a rise of 6/10 of a foot in Elk chute, if you know where Elk chute is, and you will be bothered considerably. Elk chute is considered one of the worst chutes we have on Kanawha River and by the building of the Winfield dam, it is not going to help Elk chute a great deal because it is too close to behind Marmet dam.

1440 Q. It is between Marmet and Winfield?

A. Between Winfield and Marmet dam.

Q. Have you completed your estimation of what you mean by a small rise and large rise?

A. Yes; I think I have.

1510 H. G. Gerdes, recalled on behalf of the United States.

Direct examination by Mr. Thompson:

Q. Mr. Gerdes, are you acquainted with the pool behind the London Dam?

A. I am.

Q. In what way have you become acquainted with it?

A. On July 22nd I made a boat trip through that pool.

Q. What kind of a boat did you use?

A. I took the Engineer Department Survey Boat, equipped with an outboard motor, smaller than the one I used before.

Q. Where did you start from?

A. Below the London Dam.

Q. What was the length of this boat?

A. 16 feet.

Q. What kind of an outboard motor did you have?

A. It was a Johnson Sea Horse—24 horse power motor.

Q. And how far up the pool behind the London Dam did you go?

A. I traveled up the entire length of the pool, passed a shoal near the head, near Boonesboro and proceeded then upstream to a point immediately beneath the Kanawha Falls Dam.

Q. Did you get out of the boat?

A. We had to get out and pull the boat through part of this shoal near Boonesboro because the water was muddy, and the propeller struck the shoal spots a number of times and after trying to feel our way along, we decided to pull the boat through a part of that shoal.

Q. How far did you pull the boat through that shoal?

A. A distance of somewhere between one-eighth and a quarter of a mile.

Q. What was the depth that the motor was drawing?

A. Approximately three feet.

Q. And after you got over that shoal, you got as far as a point immediately beneath the Kanawha Falls Dam?

A. Yes, sir.

1511 Q. Have you any acquaintance behind the dam at Kanawha Falls?

A. Yes, sir.

Q. Please state what that acquaintance is?

A. On the same day I launched this boat in the so-called Glen Ferris pool immediately above the dam and travelled upstream through its entire length.

Q. How far upstream did you go?

A. Approximately three miles.

Q. And where did that take you to?

A. That took us up through a minor rapid below the Hawk's Next Power House, to a point between a quarter and half a mile above Hawk's Nest Power House.

Q. Have you any acquaintance with the Hawks Nest Pool?

A. I have.

Q. Please state how?

A. I took this same boat, launched it, in the Hawks Nest Pool, at Hawks Nest, travelled up the river approximately two miles to the head of the pool, then turned and ran down through the length of the pool to the Hawks Nest Dam and then back to the point of beginning. The total length of the Hawks Nest pool that was traversed was approximately three miles.

Q. Do you know whether the gates of the Hawks Nest Dam were up at the time?

A. There were no gates in place at the time, the water level was at the fixed crest of the dam.

Q. How high will these gates raise the water level when in place?

A. Approximately 20 feet.

Q. And how far upstream do you estimate that that will make the pool?

A. That should be good for at least half a mile, or possibly a mile of pool.

Q. What is the condition of the channel and stream flow in what is termed the gorge, where the Hawks Nest Dam is located?

A. You mean below the dam?

1512 Q. Above the dam and below?

A. The gorge, so-called, below the Hawks Nest Dam at the time I visited it, was practically dry, the entire flow of the river being diverted through the power plant tunnel to the power house. Above the dam the valley floor is occupied by the pool which forms a really excellent navigable lake some three miles long.

Q. Are you familiar with the report of Chief Justice Marshall, on his navigation of New River, from Hinton to Kanawha Falls?

A. No, sir; I am not.

Q. Are you familiar with the Moore—and Briggs report?

A. Yes, sir; I am.

Q. Did you have any difficulties in navigating that pool?

A. I did not.

By The Court:

Q. With reference to the Hawks Nest Dam, does not that water return to New River somewhere?

A. It does, at a point, I believe about four miles below.

Q. The portion of the river that you referred to as being comparatively dry was between the Hawks Nest Dam and the Power House?

A. Yes, sir; that is correct, that is the section of the river that was being bypassed.

Q. I hand you, marked for identification, what purports to be an album of photographs marked Government Exhibit 183, and will ask you if you know what that is.

A. This is an album which contains——

Q. What is it?

A. This is an album containing 20 photographs, being views of pools, shoals, rapids and dams on Kanawha River and New River, between London Locks, West Virginia, and Hawks Nest, West Virginia, taken July 22, 1936.

1513 Q. Were you present when these photographs were taken?

A. I was.

By Mr. Thompson. I now desire to offer in evidence Government Exhibit 183, which has been marked for identification Government Exhibit 18[illegible].

By Mr. Jackson. We have no objection to it except to its relevancy.

(Said exhibit is here filed, marked Government Exhibit 183.)

By Mr. Thompson:

Q. I call your attention to the photographs and ask you to explain them as you go along.

The first one, what is that?

A. The first one is a photograph of the survey boat which I employed leaving London Lock, and bound upstream.

Q. Now what is the second photograph?

A. The second photograph is a view looking upstream of the shoal in the river near Boonesboro.

Q. That is in West Virginia?

A. Yes, sir.

Q. Now turn to the second page. What is the photograph No. 3 there?

A. Photograph No. 3 shows the pool below Kanawha Falls Dam, beneath the Toll Bridge at Boonesboro, just above the shoal shown in the preceding photograph.

Q. Now what is Photograph No. 4?

A. The fourth photograph shows the upper end of pool below Kanawha Falls, looking upstream, at the Glen Ferris Dam.

Q. And that is known also as Kanawha Falls?

A. That Glen Ferris Dam is sometimes known as the Kanawha Falls dam. It is a low structure on the crest of the falls.

Q. Now what is photograph No. 5?

A. Photograph No. 5 is another view of the pool below Kanawha Falls dam, looking towards shore, at the Electro-Metallurgical Company, Kanawha Falls Power Plant.

Q. What is Photograph No. 6?

A. Photograph No. 6, shows the upper end of this pool immediately beneath the Kanawha Falls Dam.

Q. What did you do when you arrived at that point?

A. We travelled a short distance downstream then took the boat out, brought it around and launched it again in the pool above the dam.

1514 Q. In other words, you portaged it there?

A. Yes, sir.

Q. Now turn to page No. 3, what is Photograph No. 7?

A. Photograph No. 7 is a view of the spot just previously described looking upstream, and showing Kanawha Falls Dam.

Q. Now describe Photograph No. 8?

A. Photograph No. 8 shows a boat in the pool above Kanawha Falls Dam. The dam itself may be seen in the middle portion of the picture.

Q. Now turn to the next page and describe what Photograph No. 9 is?

A. Photograph No. 9 shows a boat near the head of Kanawha Falls pool, the boat is approximately in the middle of the photograph, entering the rapids below the Hawks Nest power plant.

Q. Now what is Photograph No. 10?

A. Photograph No. 10 is a view just a few feet further upstream showing the boat in the same rapids, with Hawks Nest Power Plant shown behind it.

Q. The Hawks Nest project turns the water in at the dam through a tunnel running approximately three miles long, doesn't it?

A. That is correct.

Q. And it cuts the water off from the riverbed for a distance of how many miles?

A. Between four and five miles.

Q. You have already described Photographs 9 and 10, have you not?

A. Yes, sir.

ow turn to the next page and state what Photograph No.

hotograph No. 11 shows the boat traveling upstream in
ids below the Hawks Nest Power Plant.

that the tail race going to the Hawks Nest Power Plant?

at is immediately below the tail race, and might be con-
a part of the tail race of the Hawks Nest Power
Plant.

Q. Now explain Photograph No. 12.

A. Photograph No. 12 shows the boat emerging at the
the same rapids.

d you have any difficulty in that rapids?

one whatever.

ow turn to the next page and explain what Photograph
s.

hotograph No. 13 shows the boat traveling in the pool
e Hawks Nest Power Plant.

ow explain what Photograph No. 14 is.

hotograph No. 14 is a view taken from the corner of the
Nest Power House, looking upstream, showing the survey
raversing the same pool above the Hawks Nest Power

ou are now in the pool or up in what is known as the

s, sir.

nd above the Hawks Nest Dam itself?

ot above the dam, but immediately above the power plant.

at is right. Now turn to Page on which photograph No.
d explain that.

. In regard to photograph No. 14, that shows a view of
r?

s, sir.

fore the water utilized by the power plant has been
l. Is that correct?

shows a portion of the river between the dam and the
lant, immediately upstream from the power plant, and
er is visible in the photograph is slack water in the tail
other words, while the picture is looking upstream, there
w downstream because that was simply slack water from
all of the power plant.

y Mr. Jackson:

ove the Hawks Nest Pool?

hompson. No; below the Hawks Nest Pool. I said above
corrected me. The title says part of the pool at the
Nest Power Plant.

1516 Mr. **Jackson**. Are you talking about photograph No. 13 or No. 14?

A. No. 14.

Q. The legend below says, Pool Above Hawks Nest Power Plant?

A. That is correct, it is only a few feet above, upstream from it.

Q. Is it a part of the pool behind the dam?

Mr. **Thompson**. It is not a part of the pool that is behind the dam, it is the back water from the tail race to the Power Plant, as I understand it. Is that correct, Mr. Gerdes?

A. Yes, sir. Perhaps I had better explain that. Photograph No. 13, in it you will observe the power house, and photograph 14 was taken from the right hand corner of the Power House looking upstream.

Q. Looking in the same direction as the view shown in Photograph No. 13?

A. That is correct, in other words, photograph No. 14 shows part of the same pool as is shown in Photograph No. 13.

Q. Now, turn to the next page and explain Photograph No. 15?

A. Photograph No. 15 shows the greater part of the Hawks Nest Dam Pool. This view was taken from the Hawks Nest itself looking upstream.

Q. You mean from the dam itself?

A. No; from the lookout point above the dam, known as Hawks Nest.

Q. Now explain Photograph No. 16?

A. No. 16 shows a part or portion of the Hawks Nest Dam pool looking upstream.

By the **Court**:

Q. Photograph No. 15 is looking upstream also, is it not?

A. Yes, sir.

Q. Is that a highway or railroad bridge?

A. That is a railroad bridge. It connects the branch line of the C. & O. on the bank in the left of the picture with the main line, which is on the right of the photograph.

By Mr. **Thompson**:

Q. And is Photograph No. 15, a picture of what is known as the Gorge?

A. Yes, sir.

1517 Q. Now turn to the next page and explain what Photograph No. 17 is?

A. Photograph No. 17 is a view at the upper end of Hawks Nest Dam Pool.

Q. And that is still in the gorge, is it?

A. Yes, sir.

Q. Now what is Photograph No. 18?

A. Photograph No. 18 is a view from the same point, near the upper end of Hawks Nest Dam Pool looking downstream.

Q. Now turn to the next page and explain what Photograph No. 19 is?

A. Photograph No. 19 is a photograph taken from the boat in the Hawks Nest Pool at the dam, looking downstream towards the dam.

Q. Now please explain what photograph No. 20 is?

A. No. 20 is a photograph taken the same day looking at the Hawks Nest Dam from the downstream side.

Q. Now turn to the next page?

A. That is the last photograph.

By the Court:

Q. What part of the project do you call that tunnel which carries the water to the power plant?

A. In what sense?

Q. You would not call it the fore-bay, would you? You know that term is sometimes used, don't you?

A. Yes, sir; the word fore-bay is applied to the place where water is impounded for delivery into the pipe. Ordinarily in hydroelectric engineering that tunnel section is simply called a tunnel.

The Hawks Nest Power Plant has a surge tank at the head of the penstock, both located on a hillside, several hundred feet back of the plant. That surge tank is a steel tank which takes the place of what on other projects is a pond within
1518 earthen or a concrete embankment known as a fore-bay.
In the Federal Power Commission classification of accounts, for instance, the tunnel would be treated as a tunnel, as one of the intake works.

By Mr. Thompson:

Q. When you were last on the witness stand, Mr. Jackson asked you for the river flow at Bull Falls when you ran your boat up the falls. Have you that data now?

A. I have.

Q. Will you please present it to the Court?

A. I have here a blueprint of the automatic recording gauge chart giving the hydrograph of the New River near Hinton for period July 21 to July 30th. A boat trip over Bull Falls was made on July 27 at 7 p. m. I find that at that time the power waves coming down the river from Buck and Byllesby were traveling through that section of the river at a speed of 2.6 miles per hour, which means that the same point on the wave would pass by this gauge, which is 7.7 miles downstream, three hours later.

Following that the stream flow at this gauge at 10 p. m., three hours later, for July 27th, was 2,120 cubic feet per second, which is somewhat less than it had been when I was on the river previously.

By Mr. Jackson:

Q. Was that 2307?

A. It was 2120.

By Mr. Thompson:

Q. I hand you the chart——

A. This is a copy of a chart furnished Colonel Scheidenhelm. I don't think it is necessary to offer it here unless you want it.

Mr. Jackson. I want you to produce it.

By Mr. Thompson:

Q. I show you, marked for identification Government's Exhibit No. 184, with statement in the lower corner, right, as follows: "State Line in vicinity of Round Bottom Branch." Do you know what that exhibit represents?

A. I do.

Q. What is that exhibit?

A. It consists of an aerial mosaic of three photographs
1519 placed in adjacent positions to form a map of New River
and its banks in the vicinity of Round Bottom Branch.

Q. Who prepared that, do you know?

A. This was prepared in the United States Engineers' office in Hinton, West Virginia.

Q. Can you, of your own knowledge, identify the locations on that map?

A. I can and I have.

Q. State whether or not that map was prepared under your direction?

A. It was prepared under my direction; yes.

Q. I offer Government's Exhibit No. 184 in evidence.

By Mr. Jackson. For what purpose is it offered in evidence, in the first place?

By Mr. Thompson. To show the location of Round Bottom, Round Bottom Creek and the State line dividing the State of Virginia and the State of West Virginia.

By Mr. Jackson. We object to the competency of the Exhibit. There is no proof that this witness is competent to lay out State lines between Virginia and West Virginia. He did not make it.

There is no magic in someone saying that they directed that something be done. I could do that myself.

By Mr. Thompson. I asked if he could identify the locations on the map and he said that he could, and he also replied that he had made a comparison of the map.

Q. What kind of comparison did you make?

A. I compared—as to the photographs, I compared them with the river and its banks, as I know them from having traversed them and the data on the exhibit was placed on there at my direction and from material prepared by myself.

Q. What is the stream that is in that picture?

A. New River.

Q. And which way is it flowing, from the right, let's say [indicating]?

A. It is flowing towards the right.

Q. It is flowing towards the right?

A. Yes, sir.

Q. Who put the red lines on there [indicating]?

A. Draughtsmen—at my request.

Q. Did you check those red lines?

A. Yes, sir.

Q. What do the red lines indicate?

A. The red lines indicate the position of the Virginia and the West Virginia state line.

1520 Q. And where did you get the information as to the position of the Virginia and the West Virginia state line?

A. From several sources.

Q. What were they?

A. (Witness produces papers.) I have here an abstract of a survey, establishing the dividing line between Giles county, Virginia, and Mercer County, West Virginia, pursuant to an Act of the General Assembly of Virginia, passed March 5th, 1841. The description of this—a portion of this survey, is as follows:

"Beginning at said Falls"—meaning Wyley's Falls—"and running South 28½ degrees, West 28 poles," etc.

That correctly describes the straight red line in the left portion of the Exhibit. I may add that this was an Act of the General Assembly of Virginia, separating Giles and Mercer Counties. Later on Mercer County went with West Virginia.

By Mr. Abbot:

Q. That survey is recorded in Giles County, Virginia, is it not?

A. (Witness examines papers.) Yes, sir; it is recorded in the County Court of Giles County, Virginia, June 6th, 1848.

By Mr. Thompson:

Q. You may continue.

A. I have here some excerpts from an Act establishing the county of Summers out of parts of the counties of Mercer, Monroe, Greenbrier, and Fayette.

By Mr. Abbot. We object to any Act of the Legislature or any act or action taken under such acts, inasmuch as it is after the fact—Giles County and its lines were established long before Summers County was. That is an Act of the West Virginia Legislature, and it would have no effect on the lines between Virginia and West Virginia.

By the Witness. It may appear, if I may continue, that it will have some effect.

By the Court. Does it indicate where the line was? Is there any denial of the accuracy of it?

By Mr. Abbot. It is entirely inaccurate, we think.

By Mr. Jackson. If you compare the map shown in Colonel Allstaeder's report, which the Government offered, you will see that it is entirely different from that shown on this map.

By the Court. What height was this picture taken from?

A. From a height of approximately ten thousand (10,000) feet.

By Mr. Thompson:

Q. I hand you, marked for identification, United States Geological Survey Quadrangle Sheet, marked for identification Government's exhibit No. 185. What is that?

A. It is United States Geological Survey, quadrangle sheet of Peterstown.

Q. Does it show the State line between the State of Virginia and the state of West Virginia?

A. It does, yes, sir.

Q. Have you compared that with the line—the red line that you have drawn on this Government's Exhibit No. 184 for identification?

1521 A. I have.

Q. State whether or not the red line on Government's Exhibit No. 184, for identification, is in line with the dividing line of the State, as shown by the Geological Survey map?

A. The United States Geological Survey map is drawn on a scale of one inch to a mile and naturally does not show as great detail as the map offered as Government's exhibit for identification No. 184. However, as to the degree of accuracy with which the line can be read on the quadrangle sheet, the two are in correspondence.

By Mr. Abbot. Do I understand, Mr. Thompson, that you are offering that sheet in evidence?

By Mr. **Thompson**. Yes, sir. I offer Government's exhibit marked for identification No. 185 at this time.

By Mr. **Abbot**. We object to it, so far as the State line is shown on it, because the United States Geographical Survey have neither the power nor authority to establish State lines, and it is not the best evidance of the State line.

By Mr. **Thompson**. We are showing the sources from which he got the information and plotted the line.

By Mr. **Abbot**. We question the sources.

By Mr. **Thompson**. Q. Have you any other sources from which you gathered data upon which you based your line?

By Mr. **Abbot**. Did you rule on our objection, your Honor?

By the **Court**. I will allow it to go in, with his explanation of how he came to make it that way.

By Mr. **Jackson**. The photograph is not offered in evidence as yet.

By Mr. **Thompson**. I have it in for identification—we offered the United States Geological Survey sheet and they objected to it.

By the **Court**. I will admit it.

By Mr. **Abbot**. We EXCEPT to the ruling of the Court, for reasons stated.

By Mr. **Thompson**:

Q. Have you any other sources from which you gathered data with respect to this State line?

A. A little back, I was reading excerpts from which they established the County of Summers, and it was objected to. May I proceed with that?

By Mr. **Thompson**. (Addressing the Court.) Counsel on the other side objected to his reading excerpts and Your Honor did not rule on it.

By the **Court**. Go ahead.

Mr. **Abbot**. We EXCEPT to the ruling of the Court for reasons stated.

By the **Witness**. These [indicating papers] are excerpts from an Act establishing the County of Summers, out of parts of Mercer County, Monroe County, Greenbrier County and Fayette County——

By Mr. **Jackson**:

Q. An Act of what authority?

A. This is an Act of the Legislature of West Virginia [indicating].

By Mr. **Thompson**:

Q. What is the date of it?

A. February 28th, 1871 (reading): "Be it enacted by the legislature of West Virginia: 1. So much of the Counties of Monroe,

Mercer, Greenbrier, and Fayette as is included within the following boundary lines to wit: Beginning at the mouth of Roundbottom Branch on New River in Monroe County; thence crossing said river and running north 47½ degrees west 5,430 poles through the county of Mercer, etc." I am indicating from the Exhibit No. 184. That description I have read refers to the black circle on the lower side of New River at the point where the red line indicating the State boundary crosses it. I will continue: "Thence (reading) crossing said river and running North 47½ degrees, West, 5400 odd feet through the county of Mercer." That description that I have read establishes that part of the red line indicating the State line across the river. I also want
to call attention to the fact that in that description that
1522 I read, Round Botton Branch is clearly named as the
stream entering the river, from the East.

Q. Where is that located on this photograph [indicating]?

A. That is on the lower portion of the photograph with reference to New River. I make this distinction because the stream entering New River from the upper portion of the photograph on the opposite bank, is also known as Round Bottom Branch.

Q. The Round Bottom Branch that you refer to is on the lower side of the river?

A. Yes, sir.

Q. And it follows what?

A. It follows the State line on that side of the river.

Q. Is it the State line?

A. That I cannot say.

Q. Continue. Look at the photograph again and indicate how Round Bottom Branch and the lower side of the river is indicated in the picture, and state it to the Court?

A. Round Bottom Branch entering the river at the right bank, which is the lower part of the photograph, appears in the photograph as following the red line, which is shown as the State line.

Q. Continue.

A. I have here a plat and description of a parcel of real estate, designated as Parcel No. 88, which was purchased by the Appalachian Electric Power Company for the Bluestone development, from Clarence E. Morgan, and which shows on the deed the State boundary between Virginia and West Virginia.

By Mr. JACKSON. We object to what it shows unless it is in evidence and proved to be competent evidence to be received.

By Mr. THOMPSON. I thought you wanted the sources?

By Mr. JACKSON. We do not want it from incompetent sources, however.

By Mr. **Thompson**:

Q. I hand you two photostatic sheets fastened together, and marked for identification as Government's Exhibit No. 186, and ask you do you know what that is?

A. I do.

Q. What is it?

A. That is a map and a deed description of a parcel of land on New River on the right bank adjacent to the boundary line between the State of Virginia and of West Virginia. This

1523 parcel, referring to Exhibit——

Q. Which exhibit?

A. Exhibit No. 184—is located to the left of and adjacent to the black circle on the East Bank of the river at the point where the State line crosses it—the State line shown crossing the river.

By Mr. **Jackson**. You are talking about this exhibit [indicating]?

A. No, sir; I am referring to Exhibit 186.

By Mr. **Jackson**. We object to this referring to what is shown on the Exhibit until it is offered in evidence and the Court says it is competent evidence.

By the **Court**. What is Exhibit No. 186?

A. Photostatic sheets of a piece of real estate and deed description in the deeds. It is a piece of real estate acquired by the Appalachian Electric Power Company for the Bluestone development at the time they thought they would build it.

By Mr. **Abbot**. We still think so.

By Mr. **Jackson**. Is it offered in evidence; if so, for what purpose?

By Mr. **Thompson**. We offered it in evidence for the purpose of giving the sources of information which we show in the plotted lines.

By the **Witness**. The State lines on Exhibit 184, for identification——

By Mr. **Jackson**. I don't know of any process by which incompetent evidence can be introduced in a case by showing the sources of an exhibit that they are trying to get in evidence.

By Mr. **Thompson**. We differ with you that it is incompetent evidence.

By the **Court**. What is the objection?

By Mr. **Jackson**. The only competency of a map prepared in the manner of the one under inquiry would have, would be on the theory of admission. The Appalachian Electric Power Company, no more than the Geological Survey, is charged with the duty or power of fixing or determining boundaries between Virginia and West Virginia.

By Mr. THOMPSON. It may be an admission on your part.

By Mr. JACKSON. I am coming to that. The Appalachian Electric Company could not, for its own purposes, determine the location of a State line. That may be something put on there casually, just as lots of information is put on a map in the purchase of lands, and to say that it is an admission that is admissible as evidence in a judicial proceeding, would be going far beyond any possible rule.

By the COURT. Where there seems to be no available way to prove where a State line is, it must be proved in a variety of ways.

By Mr. JACKSON. The witness does not know how the map was prepared. It may have been done by a draftsman who was merely filling out the edges of a map. Now, can they offer this kind of material as evidence and throw upon us the burden of ferreting out from what sources it came.

By the COURT. I do not know that I catch your objection. But it is not an infrequent thing, in this country, and in a great many sections, to get into a dispute as to where a State or County line is, and if there is no ready and available record of it, they introduce old deeds showing State lines, and introduce old people to come in and say 'this was in my day considered to be the State line—Jim Jones lived there and paid taxes and voted in West Virginia', etc. All the data that you can get is produced to show the State line. That is the only way frequently to prove State and county lines.

By Mr. JACKSON. I just want to make our position clear: I do not think that State lines can be established by reference to casual and fugitive reports of private individuals or by reference to ancient deeds or to other evidence not infrequently wrong, when there appears that there are sources that are determinative and would establish and define what the State line is. They would have to show that no such Statutes existed, before laying the ground for such evidence, and, where it appears by their own evidence, as it does, by reference to Virginia Statute of 1841, that there is better evidence, that evidence, I think, would be controlling over any private paper or map.

By the COURT. They are not trying to establish a State line, but trying to show where it was recognized to be established. If you have anything to deny that, all you have to do is produce it.

By Mr. JACKSON. I only state that the witness referred to the Act of 1841, which defined the line.

By the COURT. The situation is this—Virginia and West Virginia parted company under terms that were not amicable and probably each of them questioned the right of the other to pass on the line between them. There is, I know, on the North part of the Shenandoah, there is a considerable portion of land there in neither State at this time. Both states claim it and both states have it listed for taxation.

By the **Witness**. May I make a statement?

By the **Court**. (Continuing.) This is because the States have never agreed on where the line was.

The objection is overruled, and the Defendant, by counsel, EXCEPTS to the ruling of the Court for reasons stated.

By Mr. **Thompson**:

Q. In connection with exhibit No. 186——

A. May I say that, faced with the difficulty you have described, I have already gone over the procedure you mentioned, in finding parcels of land situated adjacent to what I thought was the State line, where taxes were paid and deeds are of record and taxes are paid over a number of years, as giving common consent as to what was the State line and this is a border parcel——

By Mr. **Abbot**. We object to that and move to strike the answer as hearsay evidence.

The objection is overruled and the defendant excepts to the ruling of the Court.

By Mr. **Thompson**:

Q. Where is this parcel of land, referred to in Government's Exhibit 186, located, so far as the line of Virginia and West Virginia is concerned?

A. It is located on the right bank of New River, in Virginia, adjacent to the West Virginia State line, which there crosses the river from West to East, traveling downward up the Creek known as Round Bottom Branch, in Exhibit 184,—Exhibit 186 which is a plat and description, shows that this parcel of land was purchased by the Franklin Real Estate Company from Clarence E. Morgan, April. 1931, and the description of the deed states, among other things "All that certain tract of land on the right bank of New River, in Giles County, Virginia, in Pearisburg District, Giles County, Virginia."

Q. Have you any other data upon which you drew your conclusions as to where the State line was?

A. I have a similar map and tract of land and deed description on the left bank of the New River, adjacent to the river.

Q. What do you mean the "left bank?"

A. The left bank is the left bank facing down stream—the upper side of this Exhibit 184.

1524 Q. The upper side of the stream facing down stream?

A. The left bank facing down stream, is the upper bank in Exhibit 184, as the picture is looked at. This parcel of land was purchased by the Franklin Real Estate Company, subsidiary of the Appalachian Electric Power Company.

By Mr. **Abbot.** If that is offered in evidence, we make the same objections to it and I assume the same ruling and we except.

By the **Court.** Yes, sir.

The defendant excepts to the ruling of the Court, for reasons stated.

A. It was purchased from Annie Dickinson, March, 1930, and the deed says: "All that certain tract of land on the West side of New River, in East River District, Mercer County, West Virginia." The map of the tract shows the boundary line between Virginia and West Virginia, shown in Exhibit 184, meeting New River at Wyley's Falls, and down stream along the left bank of the River between East River District of Mercer County, West Virginia, and Pearisburg District, Giles county, in the State of Virginia.

By Mr. **Thompson.** I don't know if we have offered this marked for identification [indicating]? Have we introduced it?

A. No, sir.

Q. You testified as to the two photostatic sheets, marked for identification as Government Exhibit 187?

A. Yes, sir.

By Mr. **Thompson.** I offer as Government's Exhibit No. 187, in evidence.

Counsel for the defendant makes the same objection heretofore made, which is overruled, and defendant excepts for reasons stated.

(Exhibit 188, being Key Property Map of A. E. P. Co. for Bluestone Development, was offered in evidence and Defendant objected thereto.)

Q. You may proceed.

A. This map locates and identifies the parcels of land——

Mr. **Abbot.** If that is let in, your Honor, we make the same objection and except for the reasons we gave.

A. (Continuing.) This map locates and identifies the parcels of land just previously described in the vicinity of Round Bottom, being the Clarence E. Morgan tract, noted as No. 88 on the exhibit, and the Annie Dickinson tract—the number is indistinguishable here, also introduced as an exhibit. It also shows the State line between West Virginia and Virginia touching New River at Wylie's Falls, thence downstream along the left bank to Round Bottom, thence crossing the river in an easterly direction and going back up Round Bottom Branch.

By Mr. Thompson:

Q. That Annie Dickinson tract was Government Exhibit 187?

A. Yes, sir; and the parcel number which I was trying to distinguish was no. 192.

By the Court:

Q. You say that exhibit shows the State line. How does it show it—by you or someone else having marked it on there?

A. No, sir; this is the State line as it was placed on this drawing at the time it was prepared.

By Mr. Thompson:

Q. By whom?

1525 A. By the employee of the Appalachian Electric Power Company, the real estate department, who made up this map and both from that fact and from everything which I have been able to locate while trying to identify the State line, it shows the State line as it is locally accepted.

Mr. Abbot. We object to the local acceptation of the state line as having any bearing whatever on it. He is not competent to tell about it. It is hearsay, as far as he is concerned.

The Court. I over-rule the objection.

Mr. Abbot. We except.

A. I may also say that inquiry was made from the County Clerks of the Counties of Giles and Mercer and this state line corresponds with their best knowledge.

Mr. Thompson. That is hearsay. I withdraw that.

Mr. Jackson. We move to strike it out as hearsay.

By Mr. Thompson:

Q. Where is the Round Bottom Branch on the west side with respect to the State of West Virginia?

A. Round Bottom Branch is entirely within the State of West Virginia.

Q. And that is indicated by what on this photograph?

A. The creek is indicated by the legend "Round Bottom Branch" written along its course.

Q. And the black line is the line by which you indicate it?

A. No, the black line is intended to represent the dividing line between Mercer County and Summers County, West Virginia.

Q. I don't understand you then with regard to the creek?

A. This is the creek.

Q. What is the creek?

A. The creek is shown on the aerial photograph. The water course may be distinguished entering the map at the north and following down approximately along the county line and entering the river immediately adjacent to the county line.

Q. And where it enters the river in what state is it, according to your photograph?

A. The creek enters the river or the creek, I would say, is entirely in the State of West Virginia, the state line, at that point being the bank of New River. As soon as the water is discharged—that is not correct. The waters of New River adjacent to Round Bottom and upstream from the point where the creek enters are in Virginia as shown on this map. Round Bottom itself is the area of land of light tint shown between the thin white line which indicates the county road and the river bank which lies just below it.

1526 Q. What does the red line indicate that is apparently on the border of the river, on the left bank?

A. The red line indicates that while that portion of the land of Round Bottom which lies upstream from Round Bottom Creek is in the State of West Virginia, the river bordering on it in the State of Virginia.

Q. So that if you were loading a barge or boat or bateau on the bank of the land which you have described, you would be in West Virginia; is that correct?

A. That is correct.

Q. And when you pushed that boat out into the stream you would be in Virginia?

A. That is correct.

Mr. **Thompson**. I am not sure whether I have offered Government Exhibit No. 184 in evidence.

Mr. **Jackson**. I thought it was withheld when it was offered before.

Mr. **Thompson**. I thought I had offered it in evidence, but if not, I will do it now.

Mr. **Jackson**. We make the same objection and I assume the court will make the same ruling?

The **Court**. Yes.

Mr. **Jackson**. We note our exception.

Cross-examination by Mr. **Jackson**:

Q. Mr. Gerdes, on what date was it that you made this last expedition on New River?

A. July 22nd.

Q. Of this year?

A. That is right.

Q. And you made that in a boat about sixteen feet long?

A. Correct.

Q. Four feet wide?

A. Five feet wide.

Q. And how many men were in the boat?

A. Four.

Q. You started this trip at London dam?

A. That is right.

Q. And what time of day was that?

A. About eight o'clock in the morning.

Q. You found out that you could navigate this craft successfully through the pool above London dam?

1527 A. That is right.

Q. Until you got up as far as Booneville?

A. Boonesboro.

Q. That was up where the pool was beginning to get shallow, was it?

A. That is right.

Q. And at that point you got out and dragged the boat through the shoal there, as I understand you?

A. At that point we made part of the shoal with the boat and after striking the propeller a number of times on the bottom we decided the most rapid way of getting through would be to pull the boat along for a distance until we came to a point where there was more clearance and we thought we could trust the motor again.

Q. You thought that was the most prudent way to get through the shoals, didn't you, under the circumstances you found there?

A. I would use the word "expeditious."

Q. It was a question of speed with you rather than prudence, was it?

A. I think all of my acts were motivated with due regard for prudence.

Q. You were not going anywhere in a special hurry at that time?

A. I don't understand what you mean by "special hurry."

Q. You had no engagements you were trying to keep?

A. I had regard for the fact I was trying to accomplish an objective and I didn't stop and look around. If that is what you mean.

Q. As a matter of fact do you think you would save any time worth mentioning between dragging the boat through the shoals and guiding it through, driven by its own power?

A. You are inquiring for the reason?

Q. I want to know if the reason you dragged the boat through those shoals was because you deemed it the prudent thing to do?

A. I thought it was the most practical thing to do.

Q. When you say it was the most expeditious thing to do, do you mean you could walk through the shoals dragging the motor boat quicker?

1528 A. I could pull the boat through the shoals without using the motor faster than I could run around trying to find an opening, to find the real one. Intending to make only one trip. I didn't deem it proper to make a survey of the channel. I took a good look at the channel and when I made a bad guess I went back.

Q. You were having trouble finding a place to get through?

A. Yes; and not finding it in a short time I went ahead through a place fairly suitable, though it might not have been the best.

Q. And dragged the boat a quarter of a mile?

A. Between an eighth and a quarter.

Q. Then you got up to Kanawha Falls?

A. That is right.

Q. And you dragged the boat around Kanawha Falls, is that right?

A. We carried the boat around Kanawha Falls.

Q. Then you launched it on the pool above the dam?

A. Yes, sir.

Q. You found it was possible to navigate a sixteen foot motor boat by that pool?

A. Yes; that is right.

Q. And you traveled with a sixteen foot motor boat about three miles?

A. That is right.

Q. I understood you to say that you then arrived at a rapids below the Hawk's Nest pool?

A. That is right.

Q. And then between that rapids and Hawk's Nest is there another natural pool?

A. Do you refer to the Hawk's Nest Power Plant?

Q. Yes.

A. That is right.

Q. This pool you came up in below Hawk's Nest is what is called the Glen Farris pool ordinarily, or at times?

A. I believe so.

1529 Q. And after you got to Hawk's Nest how did you get the boat any farther upstream, did you carry it again?

A. To what point do you refer by Hawk's Nest?

Q. To this natural pool below the Hawk's Nest Power Plant, how did you get from there?

A. We ran down the river again, out over the rapids, and down through the Glen Ferris pool and took the boat ashore above the Gauley bridge.

Q. How did you get it to Hawk's Nest?

A. On a trailer.

Q. How far was that?

A. A few miles.

Q. Six or eight miles?

A. I think so.

Q. So you hauled the boat on a trailer six or eight miles and launched it again?

A. That was the practical thing to do.

Q. And on the Hawk's Nest pool you found it possible to navigate this sixteen foot motor boat about three miles?

A. That is right.

Q. And then at the upper end of the pool it became too shallow to go any farther?

A. I didn't try. My orders were to navigate the Hawk's Nest pool.

Q. The purpose of this expedition was to establish the fact that in the London pool and pool back of the Glen Ferris dam and the pool back of the Hawk's Nest dam, it is possible to navigate a sixteen foot motor boat, is that right?

A. I don't see why you should limit it to that, limit the navigation to a sixteen foot motor boat.

Q. That is what you had?

A. Yes; but a fifty foot boat would have done just as well.

1530 Q. Been a little heavier to carry at carrying places, wouldn't it?

A. We are speaking of the navigation.

Q. I am asking you now about the carrying places?

A. A fifty foot motor boat would be heavier to carry than a sixteen foot motor boat.

Q. Have to have a larger crew?

A. To navigate or carry it?

Q. To carry it?

A. I think it would all depend—more men to carry it.

Q. You have given the whole extent of all the navigating you did on July 22nd down on the Kanawha and New Rivers?

A. I think so.

Q. What time of day was it when you got up to the head of Hawk's Nest?

A. To what point do you refer?

Q. What time of day was it when you finished this experiment in navigation?

A. What do you call experiment in navigation?

Q. Just answer my question.

A. I considered I made an actual trip.

Q. If you don't understand the question I will ask you another. What time of day did you finish whatever navigating you did July 22, 1936 on the Kanawha and New Rivers?

A. At half past five we took the boat out at the Hawk's Nest.

Q. That was the end of your navigating that day?

A. That is right.

Q. Did you go back to London?

A. I did not.

Q. What did you do with the boat?

A. Went back to Hinton.

Q. Take the boat with you?

A. That is right.

Q. How did you take it?

1531 A. On a trailer.

Q. How many miles was it from where you took the boat out to Hinton?

A. I don't remember.

Q. What was the speed of this boat in slack water?

A. Why, the cruising speed was approximately six miles per hour.

Q. How many miles was it from where you started at London up to Hawk's Nest?

A. You speak of miles according to what definition?

Q. Miles by river, if you know?

A. You mean miles traveled by the river?

Q. The length of the river between those points?

A. I haven't got that.

Q. You testified about the water flow at the time you made this other trip at Bulls Falls on the evening of July 27th, and said you found the current at Hinton was 2.6 miles per hour.

A. The 2.6 figure referred to the speed of the propagated power wave.

Q. Where?

A. In that stretch of the river.

Q. Where did you get that figure?

A. I calculated it myself.

Q. From what?

A. From the time that the same power wave passed two gaging stations on the river. [Witness referred to notes.]

Q. You don't remember what you calculated it from?

A. I don't try to remember all the details of this business. [After referring to notes.] That 2.6 miles per hour was the velocity of a power wave traveling over the stretch on New River between Glyn Lyn and Pack Ferry, gages.

Q. You determined that by taking the time interval between certain gage heights at Glen Lyn and Pack's Ferry?

1532 A. I might say I determined it by determining the time interval between the passage of the same wave crest between Glen Lyn and Pack's Ferry.

Q. Who told you what it was?

A. I identified it from the gage charts.

Q. Did it say on the gage charts it was from Byllesby dam?

A. No other places up there it could have been from.

Q. That was an assumption on your part?

A. An assumption derived from my experience as a hydraulic engineer.

Redirect examination by Mr. **Thompson**:

Q. You testified you got the boat out, and to use the normal expression, you portaged it around from the Glen Lyn or Glen Ferris pool up to the pool of the Hawk's Nest?

A. Yes, sir.

Q. Why did you take that boat out and portage it?

A. Because there was no water in the river between those points and no way to get the boat up there.

Q. Where does the water go?

A. Through the tunnel and Hawk's Nest power plant.

Q. That is practically dry for a stretch of five miles?

A. The river is practically dry between the Hawk's Nest dam and Hawk's Nest power plant.

Q. And this tunnel carries 9000 second feet, doesn't it?

A. That tunnel will carry 9000 second feet.

Q. So when you portaged it that was because there was no water in the river?

A. That is correct.

Further cross-examination by Mr. **Abbot**:

Q. Will you kindly take Exhibit 184, Mr. Gerdes, and indicate where is located on that exhibit the mouth of Round Bottom Branch which flows into New River on the west bank which is the left bank as you face downstream?

1533 By the **Court**:

Q. Counsel on both sides refer to the right and left bank of the river. Is the accepted terminology that the left bank or right bank always means in the direction in which the stream is flowing? When you speak of the left bank of a river, does it follow that the left bank means the left bank facing in the direction in which the stream is flowing?

A. That is correct. It is the accepted practice among engineers to speak of the right and left bank of the river when the viewer places himself in a position facing downstream. The mouth of Round Bottom Branch, as shown on the original of Exhibit 184, appears at a point approximately ⅛ inch, or better stated, 50 feet upstream from the corner of the state line at the left bank of New River, which corner is also the corner common to the counties of Mercer and Summers, West Virginia.

By Mr. Abbot:

Q. What you refer to as the corner of the state line is the point where you say the state line, crossing the river from east to west, strikes the west bank of the river?

A. That is correct.

Q. And the distance you gave is what you scaled from the map?

A. That is correct.

Q. And that was platted from photographs, as I understand?

A. That is correct. No, I beg your pardon. That is not correct. That point was established from the descriptions which I read you yesterday.

Q. The point that you speak of now is where the supposed state line (by you) strikes the west bank of the river, is it not?

A. That is correct.

Q. You weren't talking about the mouth of the Round Bottom Creek on the left bank of the river?

A. To what point in my testimony do you refer?

Q. The last answer that you made?

A. I am still not very definite on just what you refer to.

1534 Q. I refer to the distance of the mouth of Round Bottom Branch on the left bank of the river above the point where you say the state line strikes the left bank crossing from the opposite side of the river?

A. If I may restate that, as shown by this map, the mouth of Round Bottom Branch is approximately 50 feet upstream from the common corner of the state line and Mercer County and Summers County, West Virginia.

Q. As shown on that map or mosaic?

A. As shown on Government Exhibit 184.

Q. How far did you say that was on the scale in inches?

A. Approximately an eighth of an inch.

Q. Would that not be 80 feet rather than 50?

A. No; because you are looking at a reduced scale map. It is an eighth of an inch on the original, approximately 50 feet.

Q. The visual scale would be no different on the reduced map, would it?

A. You mean the picture or ratio scale shown on the sheet?

Q. Yes.

A. No, that would be correct on your copy also.

Q. Doesn't that give you 80 feet rather than 50?

A. If you wish me to scale it—I took it off by eye. I will say 50 feet.

Q. That is what you compute by scaling it on the map?

A. That is right.

Q. I hand you the Dublin, Virginia-West Virginia sheet of the Geological Survey, marked for identification Defendant's Exhibit

No. 518, and will ask you to describe where the state line is in the section about which you have been testifying to as is shown on that map?

A. On the Dublin sheet of the United States Geological Survey which was surveyed in 1884, the state line is shown intersecting New River at Wylie Falls and then proceeding upstream in the middle of the river a distance of approximately a mile, then leaving the river and proceeding in a general easterly direction. I may add that this map was surveyed in 1884 which, if I recall the date of the other map correctly, is 30 or 40 years previously.

By Mr. **Thompson**:

1535 Q. Later, you mean?

A. The Dublin sheet was surveyed 30 years prior to the Peterstown sheet. The Dublin sheet is on a scale of 1 over 125,000 or 2 miles to the inch, and being made 40 years earlier, was made during a period when the requirements of mapping were not nearly as exacting as they were later. This fact is well known to engineers. The scale on the Dublin sheet is two miles to the inch. The scale on the Peterstown sheet is one mile to the inch. The Peterstown sheet is 30 years later in time and is in every way a more accurate, more detailed map.

Mr. **Abbot**. If your Honor pleases, I desire to move to strike out the argumentative portion of the witness' answer.

A. I am stating a fact well known to all engineers.

The **Court**. I will let it stay in.

Mr. **Abbot**. We except to your Honor's ruling.

By Mr. **Abbot**:

Q. Mr. Gerdes, I will ask you to file with your testimony Defendant's Exhibit No. 518 about which you have just testified.

Note.—This sheet was filed in evidence, marked Defendant's Exhibit No. 518.

Q. Mr. Gerdes, I will ask you to look at a map entitled "Scarborough's New Census Map of Virginia, West Virginia, Maryland, Delaware and District of Columbia," published by the Scarborough Company, Indianapolis, Indiana, which is marked for identification Defendant's Exhibit No. 519, and observe the point on New River where the state line between West Virginia and Virginia purports to strike it. Do you find that point on the exhibit?

A. Not yet.

Q. Are you looking for it?

A. Yes; I am searching diligently for it.

Q. Do you find that point, Mr. Gerdes?

A. Yes, sir.

Q. Does not the state line as shown on that map in and around the section in controversy generally conform to the line as shown on Defendant's Exhibit No. 518?

A. I would say that this map, which is a generalized map on a scale of one inch equals eight miles, is so generalized, due to the necessity of covering four states on one sheet of paper, that it could not be expected to show this detail. As a matter of
1536 fact, it is impossible from this map to form any judgment
as to the exact or even relative position of the state line in the vicinity of Wylie Falls and Round Bottom.

Mr. Abbot. I ask that that answer be stricken out as being argumentative and unresponsive and I ask the reporter to read the question again and I would like for him to answer it.

Q. (The question was read.)

A. It is impossible to state whether or not the state line shown shown on this map, Exhibit 519, conforms to the state line shown on Defendant's Exhibit No. 518 because of the scale of the map, Defendant's Exhibit No. 519, which does not permit showing the detail which would be necessary to make an answer to that question.

Q. Is it not a fact, Mr. Gerdes, that on Defendant's Exhibit No. 518 the state line from the left——

A. You are speaking of the Dublin sheet now?

Q. Yes; Defendant's Exhibit No. 518—strikes Wylies Falls and then immediately proceeds upstream to a point about a mile and then continuing in that general direction towards Peterstown and that on the Peterstown sheet which you introduced on yesterday the state line from the left strikes the river at Wylies Falls, and then proceeds down the river for about a mile and a half and then takes a general course towards Peterstown up the river?

A. May I have those two sheets and compare them and have the question read?

Q. (The question was read.)

A. That is correct. My general comment as to the accuracy of the two sheets from an engineering standpoint has been noted earlier. The Dublin sheet antedates the Peterstown sheet by some thirty years and, as is well known to engineers, was not made to the same standard of accuracy.

Mr. Abbot. Again I move to strike out his general comment as being unresponsive, irrelevant, and immaterial.

The Court. Let the answer stay in. Have you ever gotten an answer?

Mr. Abbot. Yes, sir, I got the answer but he made a little argument.

By Mr. **Abbot**:

Q. Does the line as shown on Defendant's Exhibit No. 519, and by that I mean the state line, proceed down the river in any particular after it strikes the river on that map?

A. This map is very generalized and it is not possible from it to form any firm opinion as to the exact location of the state line in the microscopic portion of the map to which the question refers.

Q. I don't want your opinion, Mr. Gerdes; I want you to state the facts that I asked you. Does or does not the state line as shown on that map strike Wylies Falls and not go downstream at all?

A. Well, sir, in the first place Wylies Falls are not shown on this map.

1537 Q. It is not?

A. You can show it to me if you can find it.

By Mr. **Thompson**:

Q. Where is the river?

A. I have been trying to find it. It seems to be this line between the two railroads.

By Mr. **Abbot**:

Q. You say the map does not show Wylies Falls?

A. No, sir; it does not.

Q. Is it or is it not a fact that when the state line strikes the river from the left bank or the right bank, either, it does not go down the stream at all?

Mr. **Thompson**:

Q. Are you asking him now to testify with respect to this map?

Mr. **Abbot**:

A. Yes.

A. Well, sir; I cannot answer your question. The most that can be shown from this map is that there appears to be an area where Giles, Mercer, Summers and Monroe Counties come somewhat close to each other and which I take to be in the general vicinity with which we have been concerned. That is the most you can get out of this map.

Q. That is the most you can get out of it?

A. Yes, sir.

Q. Is it a fact that according to the Peterstown sheets and the Dublin sheets, both of which are in evidence, the line on the Dublin sheet leaves the right bank of the river approximately two and one-half miles above where the line leaves the right bank of the river on the Peterstown sheet?

A. May I have the sheets and compare them and check that before I answer? May I have the question read?

Q. (The question was read.)

A. May I ask Mr. Abbot in what manner you are measuring this two and one-half miles? Is that a straight line along the river?

Q. Along the river?

A. By scaling the two quadrangles I find that the state
1538 line, as shown on the Dublin sheet, dated 1884, is shown
leaving the river on the right bank at a point approximately two and one-half miles upstream from the position shown for the state line leaving the river on the right bank on the Peterstown sheet dated 1913 and 1923.

Mr. Gerdes, I direct your attention to a map entitled "The Middle Atlantic Group, comprising Virginia, West Virginia, Maryland, Delaware and the District of Columbia," published by the National Survey Company, copyrighted 1916, marked for identification Defendant's Exhibit No. 520, and will ask you to observe on that map the point where the state line between Virginia and West Virginia crosses New River.

Q. Do you observe that point, Mr. Gerdes?

A. To which point do you refer now?

Q. In this section that we are talking about where the state line between Virginia and West Virginia crosses New River?

A. Yes, sir; I observed that point.

Q. Does not the state line in the section mentioned conform to that as shown on the Dublin sheet, Defendant's Exhibit No. 518.

A. Sir, I will say that this map is a so-called commercial map, treating generally such things as population, statistics, and railroad lines and distances between principal cities, and the scale is one inch equals ten miles and it is impossible to determine with any degree of positiveness just what the exact relation of the state line is in the vicinity referred to by counsel.

By the Court:

Q. You mean by that you cannot answer Mr. Abbot's question?

A. That is correct.

By Mr. Abbot:

Q. Mr. Gerdes, isn't it perfectly plain on this map that the line from the left strikes the river (the state line I am talking about) and then proceeds in a direction towards Peterstown and not down the river?

A. Well, sir, the portion of the map to which you are directing my attention consists of apparently three lines on a space of 1/32 of an inch, the actual distance shown on the map, and I am not willing to say just which of those three lines represents the state line and which represents the bank of the river.

Q. You mean to say you are not willing to say that is the state line going down below the "D" in "Elgood" and striking the river?

A. You are not pointing to the state line. You are not pointing to the line with the two dots.

1539 Q. Isn't that the state line?

A. That is the state line [indicating].

Q. You are willing to say that is the state line, aren't you?

A. Just a minute now. Let me check it. I am afraid I will have to look at that map right side up to get the county names.

Q. I wish you would. It would save a lot of time.

A. Will you show me again, Mr. Abbot, just what you are referring to.

Q. I am referring to the state line. It is perfectly apparent to me.

A. What is it you wish to know about that line?

Q. It is a fact that it does not go down the river after it strikes New River from the left, isn't it?

A. Well, I am not sure I know just what you are driving at.

Q. What I am driving at is to demonstrate the fact that the state line on that map, defendant's Exhibit No. 520, corresponds generally to the state line as shown on the Dublin sheet or Defendant's Exhibit 518?

A. Well, sir, I regard it impossible to make any definite determination as to the state line on this map. All that can be said about the state line on this map is that it lies between the states of Virginia and West Virginia, as I have already said.

Q. In what respect is it inconsistent with the line as shown on the Dublin sheet?

A. Well, to the extent to which it shows the state line which is to a very generalized degree; that is, to the degree of accuracy as to which it shows the state line to a generalized degree it is not inconsistent.

Q. It doesn't take a scale to show whether a line after it hits a river goes downstream or upstream, does it?

A. That is a general question?

Q. Yes.

A. I would not say that it did.

1540 Q. Mr. Gerdes, I direct your attention to Defendant's Exhibit #521, marked for identification, which appears to be the latest official survey of Virginia, Maryland, Delaware and the District of Columbia, indexed with population according to 1930 census, published by the National Map Company, Indianapolis, Indiana, and will ask you to look at this map, at the point where the state line between Virginia and West Virginia crosses New River.

A. I am looking at it.

Q. Will you please state whether the line is shown on that map does not generally conform to that shown on the Dublin sheet, or Defendant's Exhibit #518?

A. Would you define "generally" as a term meaning within one or two miles?

Q. In a way consistent with the Dublin sheet?

A. Unfortunately on this map the river doesn't appear to be shown at the point where the state line is in the vicinity you mentioned. There is a town name written across it. You will notice the name "Rich Creek" is written here and a portion of the river omitted.

Q. Can you answer my question?

A. I would like to ask you to define a little more closely what you mean by "consistent."

Q. What I mean, Mr. Gerdes, is the line as shown on that map, is in general conformity, I don't mean of course by scale and in minute detail, but in general conformity with the line shown on the Dublin sheet; in other words, it strikes the river from the left, and then goes up the river?

A. Well I could not say that from this map, all I could say is going from west to east the state line crosses New River.

Q. Would you be good enough to state, Mr. Gerdes, in what respect it is generally inconsistent with the Dublin sheet?

1541 A. It is inconsistent in that in the vicinity to which you have directed my attention there is not sufficient detail shown on the map, #521, to enable one to express a definite opinion. May I say or have the record show this last map is another general population and railroad distance map.

Q. Now, Mr. Gerdes, I direct your attention to Defendant's Exhibit #522, marked for identification, which is Rand McNally standard map of Virginia, pasted in a pamphlet copyrighted in 1935, and entitled "Rand McNally Pocket Maps for Virginia for tourists, travelers, shippers, general commercial and business reference."

By Mr. **Aiken**. What is the scale?

By Mr. **Abbot**. 13.7 miles to 1 inch, statute miles.

Q. I direct your attention to that map at the point where the state line crosses New River, and will ask you if the state line as shown on that exhibit does not generally conform to that, as shown on Defendant's Exhibit #518, which is the Dublin sheet?

A. This map, which is another generalized map, intended for commercial use, determining populations and railroad distances, the scale of which is approximately 14 miles to the inch, about all at could be said with respect to the state line in vicinities to nich you directed my attention is it crosses the river or at least think that line which is crossed by the state line is the river, isn't very definitely odentified on this map, perhaps I should t even make that definite a statement, but I am trying to assist u. I think even that statement is drawing on my recollection of evious maps in my endeavor to assist you.

Q. In other words on this map you will go to the extent of lping us in saying the line strikes the river and crosses it, and es not go down stream?

A. No, sir; I would not say that. All I would say is the state e—well from this map I don't think it could, I don't think could say the state line crosses the river, since the river is not identified on the map.

42 Q. Not even to help us?

A. Has this map got a date on it?

Q. It was copyrighted in 1935.

A. May I state to assist you, Mr. Abbot, from my knowledge an engineer and of maps and making them, these maps are mpiled from a previous map of the same sort or the U. S. eological Survey quadrangle, and it is quite natural that the aps compiled from the Dublin sheet should resemble that sheet d those compiled from the Peterstown sheet would resemble at sheet.

Q. So this does resemble the Dublin sheet?

A. I didn't say so. I don't know which sheet it was compiled om, but if you introduce fifty maps all compiled from one urce, you might as well go back to the same source, which I lieve you will agree was the Dublin or Peterstown sheet of the S. Geological Survey.

Q. Will you point out where on this map we are fal'ing about, the locality we are talking about, it is generally inconsistent th the Dublin sheet, in so far as the state line is shown?

A. With respect to the area we have been discussing, it is imssible from this map, Exhibit #522, to form any conclusion as the consistency or inconsistency with the Dublin sheet.

Q. I direct your attention, Mr. Gerdes, to Defendant's Exhibit 523, marked for identification, entitled "Commonwealth of Virnia, State Highway System, and connections, copyrighted mmonwealth of Virginia, State Highway Commission, July, 36," and will ask you to state whether or not the state line as own on that map crosses New River, where it crosses New ver? Where it crosses New River conforms generally to that shown on Defendant's Exhibit #518, the Dublin sheet?

A. In response to that I will say New River does not appear to be identified on this map by name and the scale of the map is one inch equals sixteen miles in this case, and it is impossible to form any definite conclusion as to the position of the state line in the vicinity to which we are referring. I call your attention 1543 to the fact this is a generalized map undoubtedly compiled from one of the two basic maps of the U. S. Geological Survey.

Q. It has the virtue of not being a commercial map?

A. It is a tourist highway map, showing the highways principally.

Q. You have no difficulty in locating New River on this map at the point in question, have you?

A. You have shown it to me on so many different maps it is becoming easier to look at that part of the State of Virginia.

Q. Do you not see where New River is on the map?

A. I gather that this blue line situated near Pearisburg and Narrows and between the two lines of railroad shown, is intended to represent New River. I will note it proceeds down to the state line and then stops.

Q. And the state line is the end of it?

A. From this map it might be the end of it or it might run either way along the state line.

Q. And from that point where it strikes the state line the state line takes a general course toward Peterstown, does it not?

A. Well I will say the state line after leaving the blue line, which I take to represent New River describes a path, curved path, and the next point recognizable on the map proceeding in an eastern direction is Peterstown.

Q. And the curve is in that direction?

A. The state line runs in the direction of Peterstown.

Q. And the line approaching the river from the left doesn't proceed down the river at all, but crosses it, does it not?

A. That can't be said from this map.

Q. I direct your attention to Defendant's Exhibit #524, marked for identification, which is a map of Giles County, showing primary and secondary highways, with a graph scale, Com- 1544 monwealth of Virginia, Department of Highways, Division of Surveys and plans, Richmond, Virginia, June 1, 1932 revised; July 1, 1933 revised; July 1, 1934 revised; and revised July 1, 1935. I direct your attention to the location on that map of the state line, where it crosses New River, and will ask you whether that does not generally conform to the state line as shown on the Dublin sheet, or Defendant's Exhibit #518?

Court. What is the scale of this map?

Mr. Abbot. It is a graph scale. I don't know what it is, a line vith some divisions on it.

Witness. It is approximately 1 inch equals 2½ miles.

Court. Is the scale shown on the map?

Witness. No, sir; I scaled it. I believe this map to be a photographic reproduction of a larger map.

Q. Doesn't it generally conform, Mr. Gerdes?

A. I would say that insofar as the natural features are concerned, this is primarily a highway map; and in so far as the iver is concerned it appears to be more of a diagram than a nap, and it doesn't appear to conform to the Dublin sheet.

Q. The line, however, strikes the river from the left and then proceeds toward Peterstown, does it not, and not down the river?

A. When you are proceeding from left to right it crosses that way, and in the opposite direction the opposite is true.

Q. And doesn't go down the river after it strikes the line, loes it?

A. The map is not at all accurate, being more of a diagram than a map, and no conclusions can be drawn from it.

Q. Mr. Gerdes, I direct your attention to Government Exhibit #46, which is the Alstaetter report, which is a preliminary examination of New River from Radford, Virginia, to Hinton, West Virginia, made by Alstaetter, an officer of the Corps of Engineers, and was made to the Chief of Engineers, U. S. Army, November 21, 1912, which is accompanied by a map of New River from Hinton, West Virginia, to Radford, Virginia, approved November 21, 1912, F. M. Alstaetter, Major, Corps of
Engineers, and will ask you if that does not show the
1545 state line in conformity with the line as shown on the
Dublin sheet, or Defendant's Exhibit #518?

A. Yes, sir; this map with the Alstaetter report, Exhibit #46, appears in the vicinity under discussion to have been reproduced from the Dublin quadrangle of the U. S. Geological Survey, and it conforms with it in the vicinity of Round Bottom or Wiley's Falls.

Q. Now, Mr. Gerdes, I hand you Government Exhibit #119, "Kanawha River and tributaries, proposed improvements," on one sheet, scale 1 inch equals 7 miles, U. S. Engineer Office, Huntington, West Virginia, submitted by Harry Pockras, principal ngineer, approved by John Conklin, Corps of Engineers, transmitted without a date December, 1935, U. S. Engineer Office, Huntington, West Virginia, which purports to show various projects built and unbuilt on New River and its tributaries, and vill ask you what that shows as to the state line where it crosses he river?

A. I will say the state line as shown by this map approaches the river on the side of the left bank, and that approximately five miles of the state line where one might expect it to leave the river on the right bank has been omitted, so that I cannot say this map enables any conclusion to be drawn as to the state line in the vicinity of Glyn Lyn.

Q. There is just a gap there?

A. Yes, sir. The scale of this map is 1 inch equals 7 miles.

Q. I take it, Mr. Gerdes, when you made your investigation about the state line you had before you the Dublin sheet, Alstaetter map and Government Exhibit #119, did you not?

A. What is Exhibit #119?

Q. The last map I showed you, showing the improvements on the river, and showing a gap where the line ought to be.

A. May I see that last exhibit again? [Exhibit was handed to the witness.] No.

1546 Redirect examination by Mr. Thompson:

Q. Will you please take Exhibit #519 marked for identification for the Defendant, and look at it a moment? In the preparation of the Government's Exhibit #184 and the marking of the red lines showing the state line, and the lines showing the Round Bottom Creek, what, if any, Geological Survey data did you follow?

A. No answer.

Q. May be I can make that clearer. Did you follow the Dublin or Peterstown sheet?

A. I did not follow either sheet. I established it from what I thought were more basic sources. I checked my work with the latest U. S. Geological Surveys available, which is the Peterstown sheet, and found it in agreement.

Q. Taking Exhibit #519 marked for identification by the Defendant, what is the scale on there?

A. The scale of this map is approximately eight miles to the inch.

Q. Is it possible from the scale on that map and data on that map to give or have any judgment as to the direction of the state line with respect to the New River, that is the state line between Virginia and West Virginia.

A. It is not possible to give any definite judgment.

Q. Look at Defendant's Exhibit #520, marked for identification. What is the scale on that map. First, Exhibit #519 was made by whom?

A. #519 shows on its face it was published by the Scarborough Company, Indianapolis, Indiana.

Q. Is that a commercial map?

A. Yes, sir; of the kind commonly made and sold for use primarily, I believe, by the public generally, and business executives, in determining how their salesmen are getting along in the territory.

Q. Referring to Exhibit #520, what is the scale there?

A. The scale of this map is approximately 10 miles to the inch.

Q. Is it possible to identify with any accuracy whatever what the direction of the state line is dividing Virginia and 1547 West Virginia, with respect to New River, at Round Bottom?

A. It is not.

Q. Who made that map, if you know?

A. It shows on its face it was published by the National Survey Company, copyrighted 1916.

Q. And is that a commercial map?

A. Yes, sir; that is a commercial map of several states.

Q. How many states are represented on there?

A. Four states, and the District of Columbia.

Q. Now with reference to Defendant's Exhibit #521, marked for identification, what is the scale there?

A. This is eight miles to 1 inch.

Q. Is that a commercial map?

A. It is.

Q. How many states are represented on it?

A. This shows three states and the District of Columbia.

Q. Is it possible to identify with any accuracy whatsoever the relationship of the state line dividing Virginia and West Virginia, with respect to New River at Round Bottom?

A. It is not.

Q. Now with reference to Defendant's Exhibit #522, marked for identification, what kind of map is that? What is the scale of that map?

A. This map shows a scale of approximately 14 miles to one inch.

Q. Is it possible to identify with any accuracy the relationship of the state line dividing Virginia and West Virginia, with respect to New River River at Round Bottom, from that map?

A. It is not.

Q. Now with reference to Defendant's Exhibit #523, being the Highway Division Map of the Commonwealth of Virginia. That is a map as I understood put out by the Highway Commission for the use of travelers in the State?

A. It is. It is rather diagram'atic.

Q. What is the scale there?

1548 A. Approximately 16 miles to 1 inch.

Q. Can you determine with any accuracy from that scale and from that map the relationship of the state line between Virginia and West Virginia, with respect to New River at Round Bottom?

A. I cannot.

Q. There was another Exhibit, Defendant's Exhibit #524, marked for identification, a map of Giles County. What is the scale of that map?

A. Approximately 2½ miles to 1 inch.

Q. What kind of map is that?

Mr. Thompson. I understood him to say he thought it was a reduced photographic map.

Q. Is that true or not?

A. I believe so.

Q. And I believe you have given the scale there?

A. I have.

Q. Are you able by that map to identify with any certainty the relationship between the dividing line between Virginia and West Virginia along New River at Round Bottom?

A. I am not.

Recross-examination by Mr. Abbot:

Q. You testified about the small scale of these maps. It doesn't make any difference what the scale is in enabling you to tell whether a line goes in one direction or another, does it?

A. That may or may not be true.

Q. When may it not be true?

A. When the data on the map is so crowded it is not possible to say definitely what is represented by a certain line.

Q. In other words, where you can't follow the line?

A. That would be one case.

Q. That would not have anything to do with the scale of the map, but simply be you could not pick it out?

1549 A. Well, you asked me the question in a rather awkward way.

Q. I am awkward, but you will straighten me out I know.

A. Yes, sir, if I may say on maps where the scale is a considerable number of miles to the inch, the term applied by engineers and geographers to designate small features on those maps is known as "generalizing." That is, as maps cover more and more territory, details are suppressed more and more, and on those maps you have shown me, the details which are the ones we have been trying to decide here were practically suppressed, and while on a map showing a small distance a line will have ups and downs, on a generalized map maker will just draw a stated line, and the thickness of the straight line on the map will more than cover the detail we are trying to tell here.

Q. There are no details suppressed on the Alstaetter map, Government Exhibit #46, are there?

A. What is the scale?

Q. At any rate, in answer to my question as to whether or not a scale is necessary to know whether a line takes one direction or another, your answer is the data or the detail of the line are suppressed, that the line is shown incorrectly, and therefore you can't tell which direction the line goes?

A. I would say on a general map the details of the line are not incorrectly shown, they are suppressed. That is very well understood by map makers. It becomes a physical impossibility to show minor details in the line on a map. The thickness of the line may cover up many of these things.

Q. And what we are to believe from your testimony with reference to these maps is the detail between, for a distance of some 2½ miles, along that river, is covered up by the line showing the state line crossing the river?

A. No, sir; I would not have you understand that.

Q. What are we to understand?

(Examination terminated.)

1550 CAPTAIN PHILLIP C. ELSEY

Direct examination by Mr. McCLERNAN:

Q. Please state your name?

A. Phillip C. Elsey.

Q. Where do you live and what is your occupation?

A. 3515 Mooney Avenue, Hyde Park, Cincinnati.

Q. What is your occupation?

A. Manager of River Transportation.

Q. For whom?

A. The Raymond City Coal and Transportation Corporation.

Q. Where is the office of that company?

A. 3220 Carew Building, Cincinnati, Ohio.

Q. What are your duties?

A. Manager of River Transportation, and the operation of two steel steamer boats, 24 steel barges, three derrick boats, three pump boats, and two floats.

Q. What experience have you had in the operation of tow boats and barges on rivers?

A. 26 years' continuous operation, on the Monongahela, Alleghany, Ohio, and tributaries of the Mississippi River and tributary of the Ohio River, continuous operation.

In the year 1912 I received my first class pilot paper.

In the year 1913, I received my Master Paper.

In the year 1920, I was promoted to Assistant Master of Transportation of the Jones and Laughlin ~~Steel~~ Corporation, Pittsburgh, one of the largest corporations on inland waterways.

In the year 1925 I was again promoted to Master of Transportation of the same company, with ten steamers and approximately 300 barges, also million dollar Marine Way, which is a dock for lifting boats and barges.

In the year 1928 I resigned from this company and went in business for myself, acquiring two tow boats and five barges.

In that same year, 1928, I received one of the largest contracts
that was ever given by United States Engineers, which
1551 were to be delivered from a point near Pittsburgh to Cairo,
St. Louis, Memphis and other ports. After a successful delivery of these forty barges, which were the largest barges that ever floated the Ohio River, the Mississippi and tributaries successfully in the year 1929. In 1930, I was hit by the depression known as the depression of 1929, but it did not hit me until March, 1930. I sold these boats due to the fact that I could see no further business under the circumstances.

In the latter part of the year, 1930, I was engaged in contract piloting. In contract piloting I was paid by the mile, delivering some of the largest boats ever taken out of Pittsburgh, and also some of the smallest. I did that up until 1934.

By Mr. Jackson:

Q. You continued in that from 1930 to 1934?

A. Yes, sir; in contract piloting.

In the early part of the year, or say about April, Mr. Ben E. Tate, of Cincinnati, contracted me to get up a transportation cost for the purpose of boating coal from Raymond City, West Virginia, about thirty seven miles up the Kanawha River, to a point in Cincinnati, or below Cincinnati, North Bend, Ohio, a total distance of two hundred and sixty miles. I gave him these costs and he decided then to hire me as manager of River Transportation and form this line, starting July 1, 1935, with the boats that I have given previously.

Q. Did you operate afterwards?

A. We have operated to July 31st, completing the first year—to the expectations and as given to him on my program.

By Mr. Jackson:

From July, 1935?

A. Yes, sir; to July 31st, 1936.

By Mr. McClernan:

Q. What waters are covered by your Master's license?

A. The waters covered by my Master's license are all inland waterways and the Mississippi River and its tributaries.

1552 Q. What waterways are covered by your pilot's license?

A. The waterways covered by my Pilot's license are the entire length of the navigable Monongahela River; the navigable length of the Alleghany River and the entire length of the Ohio River; that is all. That was the Pilot's license?

Q. Yes, sir. What experience have you had on the Kanawha River?

A. My experience on the Kanawha River has been two trips as far as Pratt, as Master, and two trips to Charleston, and various trips in the past year on my—on our own steamers.

Q. Where is Pratt, West Virginia?

A. Pratt, West Virginia, is about 82 miles.

Q. From where?

A. From the mouth of the river—Point Pleasant.

Q. And Raymond City?

A. Raymond City is about 37 miles from the mouth—Point Pleasant.

By Mr. **Jackson**:

Q. How far?

A. About 37 miles; maybe 38; the Government figures vary over the years in different surveys.

By Mr. **McClernan**:

Q. Where is Raymond City?

A. Where is Raymond City?

Q. I mean with reference to the locks and dams in the Kanawha River?

A. Raymond City is about 2 or 2½ miles above Lock No. 8.

Q. In the course of your duties as Manager of Transportation, have you had occasion to keep track of rainfall in the New River and Kanawha River watersheds?

A. Yes, sir. That is the main and essential part of my business, due to the fact that I have to load my barges and navigate my boats accordingly.

Q. How do you do that?

A. By communications by telephone to the United States Weather Bureau; river reports; Government locks and dams and WLW radio station—12:15 P. M.—and also in direct telephone calls to the stations along the water banks. 1553

Q. Do you have occasion to keep track of stream gaging records on the New River and Kanawha River?

A. Yes, sir; morning and evening.

Q. How do you do that?

A. By assistants at the locks and telephone communications and telegrams, and I also do it myself when out on the road.

Q. What transportation operations does your Company engage in on the Kanawha River?

A. Hauling coal.

Q. Between what points?

A. Between Raymond City, West Virginia; North Bend, and sometimes to Louisville, depending entirely upon the sales organization.

By Mr. McClernan:

Q. In the course of your duties, have you had occasion to observe the rise and falls—or any rise and fall in the stages of the water on the Kanawha River?

A. Yes; we do daily; sometimes hourly.

Q. Have you observed any connection between these rises and falls in the stage and differences in gage readings higher upstream and rain-falls on other occasions—other differences in run-off up-stream?

A. Yes, sir, we do. We observe this due to the fact that conditions have been such that we have noticed there hasn't been any rainfall whatsoever in any tributaries in the Kanawha River down to the London dam.

By Mr. Jackson:

Q. Since when; can you fix the date?

A. A matter of record will show that, yes, sir. A matter of record will show the dates.

By Mr. Jackson:

I did not mean to interrupt, but I thought you could tell the dates. It would be very helpful.

A. No, sir; I cannot recall that, no, sir. In intermediate points there between London Dam and Marmet Dam, there was no rainfall—at the same time, below Marmet Dam, to a point 67 miles down the river, which is the mouth of the River, the
1554 river as raised was 3 feet and 4 inches, diminishing—in other words, 3 feet would be below the dam and then at the mouth of the river——

By Mr. McClernan:

Q. What dam?

A. Either dam—London or Marmet, to the mouth of the river, would diminish 3 feet to——

Q. (Interrupting.) You do not understand my question. You started to tell us where the 3 foot difference was?

A. That 3 foot difference was below Marmet dam and then diminished from 3 feet to the mouth of the river 3 or 4 inches.

Q. Are you able to say, Captain Elsey, from your experience in keeping track of stream stages and rainfalls and other causes of variation of run-off, what caused these variations in height you mentioned?

A. We have investigated and found them due to the fact—there was not any rainfalls whatsoever, which I have stated—we found it was an artificial wave from the Marmet dam, and, in some incidents from the London dam.

Q. Are these fluctuations in flow of any particular importance to your company in its transportation?

A. Very much so, due to the fact that we load our barges at the mines, but the draughts according to the stages of water at the Kanawha Falls, London Dam, Marmet dam, Lock 6, Lock 7—Lock 6 and Lock 8—and, in doing so, we only allow a very small margin to run on.

Q. I do not understand the last part of your answer: "We only allow a very small margin to run on."

A. We only allow, say two or three inches under our barges, due to the fact that they are steel barges.

Q. Is it necessary for your company to use all available water that it possibly can?

A. Yes, sir.

By Mr. McClernan:

Q. How do you determine how deeply you can load your barges?

A. By the Kanawha Falls mark and the stage at Lock No. 6.

Q. You say "stage."

A. Gage—that means the depth of the water.

1555 Q. How do you determine that depth of water?

A. By the lower gage at Lock 6.

Q. Is that a Government gage?

A. Yes, sir.

Q. What happens if you have an unexpected fall in the stage of the water?

A. Our boat is navigating down the river—or navigating—and the boat grounds itself and becomes stuck—the boat and the tow—and we are delayed. We have to go and find out the cause of it, and in finding out and investigating the cause, we found it was an artificial wave—the water had been shut off and the boat had grounded.

Q. Does that mean anything to your company in Dollars and Cents?

A. Yes, sir.

Q. In what way?

A. It delays the boat and the time it takes and requires the men on the job to go to the Government officials to find out the cause of it, and they have in turn to call the dams and maybe go through six or eight hands, and in that time—maybe one of the officials will be away and you don't get the proper information, and it passes from one hand to another and all the time this——

Q. (Interrupting). What I am getting at is this—I beg your pardon—it is the matter of—can you give us an estimate in Dollars and Cents, what it would be?

A. It may run—it depends on how long the boat is stuck. It costs us $15.00 an hour for a boat laying there with the tow, and we may have to get another boat to pull it off and that may be $7.50 to $15.00 an hour, and as high, sometimes, as $30.00 an hour.

1556 Q. During your experience on the Kanawha River, tell us how many times such things have happened?

A. About a half a dozen times in the last year with our company.

Q. Do you know whether or not it happened to anyone else?

A. Yes, sir.

By Mr. McClernan:

Q. When barges go aground, do you have anything to do with it personally?

1557 A. Yes, sir; that is one of my main positions—to go to the scene immediately and see that the boat will not lose any more time than possible and see what or who is at fault.

Q. Did you do that on these half dozen times that you have mentioned?

A. Yes, sir.

Q. Are these groundings that you have mentioned dangerous to property and lives?

A. Yes, sir; they are dangerous due to the fact that, in coming down the river, at say a speed of four or five miles an hour, the boat meets or hits an obstruction in the river and the men working on the boat may be throwed over-board and a steam pipe may break and scald a lot of people, besides the damages to the steel barges, and maybe probably sink the boat.

Q. When you say it may sink, are you talking about a steel barge?

A. Yes, sir—a steel boat—it depends on the location as to whether or not we hit rocks or sand.

Q. Would it have any effect during the time of high water, say in times of winter?

A. Yes, sir; one of the objections to the artificial waves is due to the fact that we do not know when they are coming, and in the winter months, the river freezes over and the power dam will shoot water down unbeknownst to the Government——

By Mr. Jackson. We object to that answer and move to strike t from the record. He cannot know anything about that.

By Mr. McClernan. He does know a great deal about it.

By Mr. Jackson. How does he know it was "unbeknownst" to he Government?

By the Court. Go ahead.

To which action of the Court in overruling said objection, the lefendant excepts, for reasons stated.

By Mr. McClernan. I will ask that the question and the answer be read. (Question and answer are read.)

A. (Continuing.) All right,—unbeknownst to the operator, nd in doing so—it is done repeatedly—and the first thing, we ave a gorge of ice in some narrow strip of the river.

Q. What do you mean by that?

A. A gorge of ice in the evening and all through the day, hrough the 24 hour period, the river freezes, and then the next norning or evening, at some time, the river will rise and breaks hat ice, and when it breaks, the ice starts moving and keeps iling and piling down until it finally creates a gorge.

Q. Have you seen these things happen and observed them yourself?

A. Yes, sir.

Q. Where and when?

A. Last winter.

Q. In the Kanawha River?

1558 A. In the Kanawha, at Buffalo.

Q. Captain Elsey, when these ice gorges formed in the iver, state whether or not there was a power plant on the river?

A. They form in the same place but not like they do on artifiial waves, due to the fact that the Government is in constant ouch at all times and keep extra men for the surveying of the iver, and they notify all boats coming up there to run through nd break certain gorges. Gorges and artificial waves form durng the night unbeknownst, unless it is under Government conrol, so that the United States Engineers know if the water is eing released.

By Mr. Jackson. We move to strike the last statement from he record. I have great respect for Government control, but I lo not believe it will prevent freezes.

A. I did not say it could prevent freezes. I said the flow.

By Mr. Jackson. All right.

By the Court. It may stay in the record.

By Mr. McClernan:

Q. When did these freezes begin that you have mentioned, so ar as your observation went?

A. They began along—the biggest part of our trouble—along the latter part of December—from December on until—I beg your pardon, is that still under the question of winter?

Q. Either one.

A. We have been having this trouble, off and on, until about the middle of December up until the present time.

Q. Do you know when the power plant at the London dam began to produce power?

A. I just don't know the exact dates.

Q. Can you give us that approximately?

A. I believe in the latter part of December.

Q. In 1935?

A. In 1935.

A. No, sir, not whatsoever.

By Mr. **Thompson**:

Q. You have testified to six instances where you had trouble running aground. Please detail those six instances, stating where they were and approximately when they occurred? 1559

A. I cannot recall the dates off-hand, but it was in the middle of December, below Lock and dam 10.

By Mr. **Jackson**:

Q. Of what year?

A. In 1935.

By Mr. **Jackson**:

Q. Below where?

A. Below Lock 10.

By Mr. **Thompson**:

Q. Proceed.

A. The second one was below Lock 10.

By Mr. **Jackson**:

Q. I beg your pardon. The first was at the——

A. I beg your pardon; the first was at the—the second was at Lock 10; the first one was at Lock 8.

By Mr. **Jackson**:

Q. You say the first one was December, 1935?

A. No, sir. Cross that out [addressing the Court reporter]. We was making a crossing from Plymouth to Bear Creek.

By Mr. **Thompson**:

Q. Start again.

A. Cross out everything and we will start over. [Addressing Court reporter.] The first grounding was below Lock 8, making a cross-over at Plymouth Bear Creek.

Q. When?

A. In December—the latter part of December, in the year 1935.

Q. When was the next one?

A. The next one was below Lock 10—the following trip thereafter would be at—would be about seven or eight days thereafter. The next one was at Lock 10.

Q. Was that the fourth or the third?

A. The third.

Q. When was the fourth?

A. The third below Lock 10.

By Mr. **Jackson**:

Q. When was that?

A. I do not recall.

By Mr. **Thompson**:

Q. Can you give the approximate date?

A. Say in January.

1560 Q. In January, 1936?

A. Yes, sir.

Q. When was the fourth?

A. The fourth one was in April.

Q. Where was that?

A. Below Lock 11.

Q. When was the fifth or where?

A. Below Lock No. 11.

Q. And at what time?

A. That was about three months ago—May.

Q. When was the sixth?

A. The sixth was just recently—it was below Lock 10.

Q. And about how long ago?

A. About July—around July 1st.

Q. Were you towing boats at that time or scows?

A. Towing barges.

Q. What happened to the barges?

A. They went aground.

Q. In each instance?

A. Yes, sir.

Q. How close to the dams did they go?

A. It was, in the first instance, about two miles below; the balance of the instances about twelve hundred feet.

Q. Were you present on each one of these occasions, Captain Esley?

A. Yes, sir.

Q. How long did it take you to get off the bar or whatever you were on?

A. In the first instance, it was about an hour and a half, due to the fact that we had water from the Government from Dam 8.

Q. How did you get water from the Government—what do you mean by that?

A. We got John Carpenter at Point Pleasant, who is the assistant, and he got in touch with the Lock Master and the Lock Master threw the wicket.

1561 Q. Do you know that?

A. Yes, sir.

Q. You know it yourself, do you?

A. Yes, sir.

Q. How about the second one—how long did it take you to get off?

A. The second one was two or three hours, and we had to be pulled off by the boat Julius Fleishmann.

Q. How about the third—how long were you there then?

A. I think that took us a couple of hours; it took a couple of hours to take that off.

Q. How about the fourth?

A. Not over an hour in the other three cases.

Cross-examination by Mr. Jackson:

Q. You say it was in 1928 that you received the large contract from the Federal Barge Lines?

A. Yes, sir.

Q. Have you had any business relations with them since then?

A. No, sir.

Q. In 1930, I think you said, you sold your boats; is that right?

A. Yes, sir.

Q. Did you buy any again or not?

A. No, sir.

Q. You said something about being Manager of Transportation for the coal lines?

A. Yes, sir.

Q. From July 1st to 30th, 1935, to July 31st, 1936—am I right in understanding you to say that you are no longer Manager of this transportation service?

A. No, I am manager.

Q. You said something about July 31st, and I thought perhaps you had terminated your connection with them?

A. No, sir.

1562 Q. Now, you said, I believe, that you have a pilot's license for the navigation of a portion of the Monongahela

River, and the Alleghany River, and the Ohio River and perhaps the Mississippi?

A. Not pilot's; no, sir.

Q. You do not have a Pilot's license for the Kanawha River, do you?

A. No, sir.

Q. You, of course, have never acted as a pilot on the Kanawha River, have you?

A. I have acted as a pilot.

Q. Without a license?

A. Yes, sir; due to the fact that I am a Master.

Q. You still acted as a Pilot?

A. Yes, sir.

Q. Captain Elsey, before you entered the employ of the coal company for which you now work, when did you navigate the Kanawha River, if at all?

A. Since 1930—from 1930 up to—off and on—up to 1935.

Q. That is when you were engaged in——

A. Contracting work.

Q. Operating boats of your own or contracting with shippers?

A. When I had my own boats and also after I sold my own boats, from 1930 to 1934, I towed on the Kanawha River under contract piloting.

Q. You acted as a contract pilot?

A. Yes, sir; but in contract piloting in the Kanawha River then, I acted as a cub. May I put in a question there? When piloting in the river, when I have a Master's certificate, I am allowed to pilot any river, as long as there is another pilot aboard with the boat, if his piloting route is extended over that river—I can pilot that boat.

Q. You mean that you were undertaking to act as a pilot merely because you were a Master?

A. Yes, sir.

Q. But you would be required to have on board a pilot who is licensed on that river?

A. Yes, sir.

1563 Q. And when you were engaged in contract piloting, as I understand you, you had with you a licensed pilot operating boats on the Ohio River?

A. Yes, sir.

Q. As I understand you, when you were running your own boats, most of your work was taking cargoes from Pittsburgh down stream?

A. Yes, sir.

Q. And that is the work that you had on the Ohio before you became employed by the present coal company?

A. Yes, sir.

Q. And such work as you had was occasional trips while you had boats and occasional trips when you were acting as contract pilot?

A. We had very little contract piloting with my own boat. I was not a contract pilot then.

Q. I understand; but I was including both in the question.

A. No, sir. I was a contract pilot until 1930, when I sold my steamers. I was only manager of my own line and acting as Master on that boat, and piloted when I went up the tributaries of the Ohio.

Q. The point I am getting at is this—it is not a question about your license, but how much navigating you did on the Kanawha River before you were employed by your present employer?

A. I stated two trips to Pratt.

Q. And where is Pratt?

A. It is 82 miles above the mouth of the river to Point Pleasant.

Q. Near what point on the river is that?

A. Two miles this side of London dam.

Q. That is down stream?

By the COURT. You say this side.

A. This side; the side of the river is determined by the flow of the current—down stream.

By Mr. JACKSON:

Q. What did you carry on these two trips?

A. Gasoline.

1564 Q. Were there any other trips that you made on the Kanawha?

A. Yes, sir; there were two trips for the Charles Ward Engineering Works, bringing their boats down 57 miles under another pilot.

Q. Under another pilot?

A. Yes, sir.

Q. And that 57 miles was from where?

A. From Charleston to the mouth.

Q. That is the extent of the navigating that you did on the Kanawha River before entering your present employment?

A. Yes, sir.

Q. The last two trips were not round trips, were they?

A. No; just one way trips.

Q. Just going down stream?

A. Yes, sir.

Q. Down stream.

A. Yes, sir.

Q. Since you have been working for your present employer, you have been interested in hauling coal, have you?

A. Yes, sir.

Q. And you haul that from how far up the Kanawha River?

A. It is 37 miles, I think; the Government book gives it now as 38 miles, I think.

Q. That is 20 miles below Charleston, downstream?

A. Nineteen miles about, to be exact.

Q. Your operation was to load the coal at Raymond City and take it to North Bend, near Cincinnati?

A. Yes, sir.

Q. And you loaded that in what pool?

A. Loaded in Number 8 pool.

Q. Did you navigate above No. 8 pool at all in that operation?

A. No, sir.

Q. That is as high as you ever went?

A. Yes, sir.

1565 Q. And that now—the channel from No. 8 pool to the mouth of the Kanawha River, is controlled by the old project plant—old wicket dams?

A. Yes, sir; controlled by 8, 9, 10, and 11.

Q. I mean old wicket dam, designed to provide a six foot channel?

A. To provide a six foot channel before the Government had allotted money for these dams and it is now to be made a 9 foot channel.

Q. Yes. But the channel you operated in still is the old channel?

A. No, sir; it is not—we are not.

Q. You are not?

A. No, sir; due to the fact that there has been some dredging in the Kanawha River to exceed the channel more than six feet.

Q. It is your testimony that, according to your information, the Government project, through pool 8, and through pools 9, 10, and 11, is more than six feet?

A. Yes, sir.

Q. How much more?

A. We are now loading to 6 feet and five and have been all through this drought.

Q. Six feet and five inches?

A. Yes, sir.

Q. Do you know the project depth in the Government improvements in the Ohio river above Cincinnati?

A. The Government improvements?

Q. Yes, sir.

A. I don't understand what you mean.

Q. Isn't it a fact that the Government has used a nine foot channel in the Ohio river above Cincinnati?

A. They have used such, but we do not—they did not maintain it at all times.

Q. That is the depth that project calls for, is it not?

A. Yes, sir, that is the project.

Q. It calls for a deeper depth than the old Kanawha project calls for?

1566 A. No, sir, I will not say that now, due to the fact that the Government is now putting the Kanawha River to a 9 foot depth.

Q. Yes; but I am talking about conditions before the present improvement is made?

A. Yes, sir; but wasn't that completed at the time we are talking about over one year?

Q. Is it your testimony that the Government has completed a nine foot channel on the Kanawha?

A. Not completed, but they are taking steps at all times to complete it.

Q. You don't claim that the Government has completed a nine foot channel in the Kanawha in 1935, in the lower part of it?

A. In certain stages of the water, yes, sir.

Q. Is your testimony based on your wide knowledge of this navigable channel that the Government projects in the lower Kanawha River, that is to say, nine feet during 1935 and 1936?

A. Depending on the stage. When you put the question to me, you must——

Q. I am asking you what the Government project is?

A. It depends entirely on the stage of the water.

Q. That is your understanding of the Government project?

A. Yes, sir.

Q. You were trying to load your barges as heavily as you could to get them down the river, were you?

A. I was trying to load them to the stage I thought was safe to navigate the Kanawha River, due to the fact of the improvements that the Government has done up until the present time and the new improved nine foot channel.

Q. I am sure you were. But the point is, naturally, you wanted to get as heavy a load down the Kanawha River as you could?

A. Only what would be safe to bring down under ordinary conditions.

Q. Did you want to load your boat as heavily as you could or not?

A. No.

Q. Is that why you loaded it to within two or three inches of the bottom?

1567 A. No, I loaded it two or three inches of the bottom due to the fact that I knew that was a comfortable stage for me to work on.

Q. How much lower could you have loaded it?

A. How much lower could I have loaded it?

Q. Yes.

A. I didn't like to go over six feet five, depending entirely upon the stage of water.

Q. How much nearer the bottom could you have loaded it than two or three inches?

A. Well, I don't like to go above two or three inches due to the fact that these are steel barges.

Q. You loaded the barge so that it would have as small a cushion between the bottom of the boat and the channel as you possibly could, didn't you?

A. No, sir; I did not.

Q. How much deeper could you have loaded it?

A. Under the circumstances I should have loaded that barge to the draft of water that is below the lock. In other words, if the lock sill had an eight foot seven mark I should be able to take eight feet three inches.

Q. Captain, you understand me. How much heavier could you have loaded your barge than to a draft which left you a clearance of only two or three inches?

A. That is something that cannot be stated due to the fact of the Government improvements now to make this nine foot channel, that there are excavations going on throughout the river that causes us to load according to what I gave in my statement, to the draft marks at Kanawha and below Lock No. 6.

Q. I understand you to say that you loaded so that you had a clearance of two or three inches; is that a fact?

A. According to that gage at No. 6.

Q. Then you don't know what clearance you had; is that right?

A. We have at several places because we gage as we go along.

Q. But all you did is read the gage and assuming the 1568 gage to be right, you think you had a clearance of two or three inches?

A. Two or three inches in some places.

Q. Don't you know that you couldn't possibly load a boat so heavy that it would have less clearance than two or three inches over the bottom of the stream?

A. That depends entirely upon the reaction of the water in the pool that we are in.

Q. Then it is your judgment as a navigator that you could load a boat practically and safely so that the clearance would be less than two inches?

A. I have taken them that the barge had drawed six inches more water than was in the river.

Q. And did you have any trouble grounding then?

A. Yes, sir.

Q. Were you surprised?

A. No, sir.

Q. Is that good navigating?

A. Yes, sir.

Q. I am glad to get your view on that. What was the clearance under this barge that had two or three inches in the Kanawha when you got down into the Ohio towards Cincinnati?

A. What was the clearance?

Q. Yes, under it?

A. Well, that depends entirely. When you state that you must state at a certain point.

Q. Was it more or less?

A. It was more.

Q. Substantially more, wasn't it?

A. Yes.

Q. And, as a matter of fact, if the channel in the Kanawha had been deeper you could have loaded your barge to a substantially deeper draft and taken it down the Ohio to Cincinnati, couldn't you?

A. Depending entirely. We have to govern that due to the
distance that we have to run over. 260 miles is a great
1569 distance to carry coal under the circumstances and with
projects being built the way they are. We may lose in
that a foot and we may allow a foot to six inches to go on.

Q. You say you may lose a foot of draft, you mean?

A. We may lose a foot of draft due to a condition such as a rainfall and the lowering of a bear trap and the rainfall not produce sufficient water in the river to justify what they had pulled off on a bear trap.

Q. Then, as I understand you, as a practical matter, when you are navigating a stream for any considerable distance such as between Raymond City and Cincinnati, you have to allow for possible or probable variations in stage of a foot or a foot and a half?

A. On the Kanawha River?

Q. On the Ohio?

A. On the Ohio River we allow, depending upon conditions as they exist.

Q. Well, I am asking you whether you do for a trip of that ength have to allow for possible variations of a foot or a foot nd a half on the Ohio River?

A. We do not have to, no, sir.

Q. Do you?

A. No, sir.

Q. What did you mean a minute ago when you told me that ou had to consider that?

A. Due to the fact that we have eleven dams in the Ohio iver and we have four dams in the Kanawha River, we may ecide to load a certain depth at the mine and at the same time e will have a rainfall over that particular point and in that articular point that is my position to watch so that I can get s great a draft as possible. I may miss that and start out with hat draft and by the time I get there conditions doesn't exist s I thought for. Therefore the barges come down on a lighter raft or greater draft, as it may be.

Q. And if it is a greater draft than you calculated, you will robably go around?

A. No, due to the fact that we are not loading beyond the project.

570 Q. You think that if you loaded within two or three inches of the bottom and you had miscalculated the rise rom the rain that you would be likely to go aground?

A. Not necessarily.

Q. You say you loaded to six feet five inches in the Kanawha?

A. Yes.

Q. Did you ever load to nine feet down in the Ohio pools?

A. In the Ohio pool?

Q. Yes.

A. May I correct that question? We loaded to nine feet ut not at the same stage that we are loading at a six foot raft. In other words, depending entirely upon the conditions.

Q. For purely local traffic on the Ohio River do you load for ss than nine feet?

A. For purely local?

Q. Local traffic?

A. We load our barges at North Bend to eight feet six, that from North Bend down.

Q. Did you ever have any experience of any groundings on e Ohio River?

A. I have in my career, yes, sir. I have grounded many a me but not due to the fact of unskillfulness.

Q. I am sure of that.

A. But due to the fact that we had a storm and wind and the rrent velocity from a bear trap causing a side current.

Q. Did you ever ground because of a low stage on the Ohio River?

A. Yes; we have grounded in a low stage of the Ohio River.

Q. Did you ever experience grounding in the Kanawha River before December, 1935?

A. No, sir.

Q. Did you ever discuss with anyone when the power plants at London and Marmet started operations before you took the stand to testify?

A. No, sir, I hadn't.

Q. You hadn't thought about that, had you?

1571 A. I didn't think it was necessary.

Q. You detailed a series of groundings which I will designate as grounding No. 1, and so forth, in the order that you stated them. Can you tell me just when Grounding No. 1 occurred?

A. No, sir; I can't.

Q. Did you keep any record of it?

A. We have a record on the boat.

Q. Will you supply the date of that grounding?

A. Yes, sir.

Q. And I understood that that happened below Lock No. 8?

A. Yes, sir.

Q. What time of day?

A. I believe that was about 7:15. It may be an hour one way or the other.

Q. In the morning or evening?

A. Evening.

Q. And you were taking a cargo between Plymouth and Bear Creek; is that right?

A. No, we were taking our cargo from Raymond City to North Bend. Upon leaving Lock No. 8 coming into the bend at Plymouth and making the crossing, which the channel crosses from Plymouth to Bear Creek, we grounded.

Q. You were not making any landing at Bear Creek? That was merely a point going down the river?

A. We made the landing but not purposely.

Q. Do you know how heavily you had loaded your tow?

A. I don't recall that. That will be on the record on the boat.

Q. What kind of a tow was it?

A. Steel boat with eight barges.

Q. One towboat?

A. Yes.

Q. What was the draft of those barges?

A. I am telling you I don't know that.

Q. I don't mean what draft you had them loaded but
1572 what draft will they draw fully loaded?

A. Fully loaded, we have loaded them to nine feet three.

Q. What freeboard does that leave?

A. That gives us—eleven feet makes one foot nine.

Q. What size are they, how long?

A. 175 by 26 by 11. The weight of them is 171 tons light.

Q. Grounding No. 2 was below what lock?

A. Lock No. 10.

Q. And can you fix the date more accurately than that?

A. No, I can't.

Q. Did I understand you to say that was about a week later?

A. Yes, on the following trip, I believe on the following trip. It may have been the second trip.

Q. And on No. 1 grounding you are going to furnish the draft, as I understand, to which you loaded your barges?

A. We have that record; yes.

Q. Bring me the original record, will you?

A. Yes, sir.

Q. Going back to Grounding No. 2, what kind of a tow did you have there?

A. Same kind of a tow, eight barges.

Q. You were going from Raymond City to Cincinnati?

A. That is right.

Q. Can you tell me how deeply they were loaded?

A. No, sir.

Q. Will you furnish the record showing the date and how deeply loaded those barges were?

A. Yes, sir.

Q. And at that time you said you were pulled off?

A. By the "Julius Fleischman."

Q. What time of day was that?

A. 10:30 at night, eastern standard time, I believe.

Q. Have you refreshed your recollection on that lately?

1573 A. No, I just can't get the time. That will show on the log of the boat.

Q. And Grounding No. 3; that was below what lock?

A. No. 10.

Q. And the same kind of a tow?

A. Yes, sir.

Q. Going down stream to Cincinnati from Raymond City?

A. Yes, sir.

Q. Can you fix more definitely the date of that?

A. No, sir.

Q. You said you thought it was when?

A. January.

Q. 1936?

A. '36, yes.

Q. What time of day?

A. Well, now, I just can't recall that.

Q. Will you furnish the record of that?

A. Yes; I will furnish the record for all of this.

Q. And that will include the draft?

A. Yes, sir.

Q. You can't now recall it?

A. No, sir.

Q. Referring to your groundings 4, 5, and 6, can you state any more definitely the dates of those groundings?

A. No, sir, I will furnish that.

Q. Will you furnish those exact dates and also the draft?

A. Yes, sir.

Q. And the time of day?

A. Yes, sir.

Q. As I understand it, these last three trips were also ones of your regular tows of coal from Raymond City down to Cincinnati?

A. Yes, sir. It may vary. There is one particular time I know that we only had six barges and a tow of seven but the log will show that.

1574 Q. Groundings Nos. 4 and 5 were below Lock 11?

A. Yes, sir.

Q. And No. 6 was below 10?

A. That is right.

Q. And they occurred just after you had left the lock, did they?

A. Yes, sir.

Q. Had you locked through in each of those instances?

A. Yes, sir.

Q. And were you out of the channel when you got there?

A. No, sir.

Q. You are sure of that?

A. Couldn't get out of the channel.

Q. You could run into the side, couldn't you?

A. No.

Q. Too wide there?

A. The channel is very narrow and you only have room to get that many barges out, due to the fact—the cause of the sticking was the water falling rapidly.

Q. You stated that you had noticed some fluctuations in some of these pool levels?

A. Yes, sir.

Q. You said that that might very well sink a boat. Do you know of any boats that have been sunk?

A. No, I don't know of any boats that have been sunk.

Q. You also stated that you had seen some groundings other than the ones which you described of your own. Will you state when and where you saw those groundings?

A. I saw a grounding of the "Halley" leaving Lock No. 6.

Q. With six barges?

A. Yes. I don't recall the date of that whatsoever because I just happened to be passing and wanted to say hello to the Captain of the boat and happened to be there at that particular time.

Q. Who was he?

A. Loyal Wright.

1575 Q. When was it, about the month? Can you fix that?

A. If I remember, it was along—I had occasion to go to St. Albans, driving, and in coming over that road I had seen smoke from this boat and had gone to the river. I will have to check up and get the date on that, on my trip to St. Albans.

Q. Was it winter or summer?

A. No; it was in the summer.

Q. This summer?

A. Yes, 1936.

Q. You can't remember what month?

A. No; I just don't recall the month.

Q. And is that the only occasion you now recall where you actually saw a grounding?

A. Well, I believe that that is the only incident that I could state that I actually saw with my own eyes of a boat coming out of the lock and stopping. I have seen boats aground—stopped and watched the maneuverability of them that would make me believe they were aground, but, of course, not seeing them I couldn't make that statement.

Q. Did you ever have the wickets drop suddenly on the Kanawha when you were navigating?

A. Yes, sir; we have. We have had a wicket drop.

Q. When the wickets are dropped, does that affect the navigable depth?

A. Yes; it increases the depth at the foot of the lock materially, but further down not to amount to anything.

Q. It decreases it above the lock?

A. Decreases it above; yes.

Q. And did you ever see a grounding by reason of that?

A. No, sir; I hadn't, due to the fact that in a wicket dropping the Government is right there on the job and as quickly as possible put in some boards to caulk that wicket whenever it may fall or pull it back up in position.

Q. In your experience didn't the Government from time to time lower the wickets on the dam?

1576 A. Oh, yes; that was due to the fact of a freshet.

Q. You spoke about ice last winter. Was that a pretty severe winter on the Kanawha?

A. Yes, sir; very severe winter.

Q. There was an unusual amount of ice on all streams, wasn't there?

A. Yes, sir.

Q. Did you ever navigate in winter on the Kanawha before?

A. No, sir.

Q. And you made a statement that you saw three feet difference below the Marmet dam, didn't you?

A. I didn't say I saw it.

Q. What did you say?

A. I said I received the Government reports of the river being from three feet and then showing a gage of three inches to four inches at the mouth.

Q. You mean you received a Government report that showed that the gage was three feet different from what?

A. Three feet higher than it was the day before at the time that I had received my marks from the previous day.

Q. And will you give the date of that?

A. I haven't got the date of that; no, sir.

Q. Will your records show it?

A. Yes, sir; the United States Government records will show that.

Q. Do you have the record?

A. I don't have that record unless I can get the proper date.

Q. Will you find it the same way you found it before and send us the date?

A. Yes, sir; I will try to locate it.

Q. And then you said you noticed four to two inches on the gages farther down the river?

A. Yes; Point Pleasant, Dam No. 11 right above Point Pleasant.

Q. That is compared with the three feet at Marmet?

1577 A. Yes, sir.

Q. And you never experienced any difficulties from fluctuations in the Kanawha before London and Marmet were constructed, as I understood you to say?

A. No; not that way. I would like to explain that. Due to the fact that the fluctuations would depend upon rainfall and the manipulation, due to the fact that there wasn't any rainfall over that vicinity, this was very pronounced then that the water must be from the Marmet dam or the London dam, due to the fact of no other rainfall.

Q. Will you give me the month when there was no rainfall?

A. Well, the Government has the report of that.

Q. Can you tell me the month?

A. I can tell by my reports; yes.

Q. Will you look that up and let us have it?

A. Yes, sure.

Q. And to make just a short statement, as I understand, everything you have said in this last long answer is that you didn't experience any difficulties from these fluctuations in the Kanawha before the construction of London and Marmet; is that right?

A. Yes, due to the fact of the drought and the rainfall that we didn't have.

Redirect examination by Mr. Thompson:

Q. I believe you stated that the Ohio had established a channel of nine feet, under cross-examination, but did not keep it. What do you mean by that?

A. I meant by that that due to the fact of the drought that we have had it was almost impossible for the Ohio River to maintain a nine foot stage due to the fact that some of the water had gotten away from various pools and wasn't replenished.

Q. Did they have to caulk and needle on those dams, do you know?

A. Yes, sir.

Q. You stated that on one occasion, I believe it was, that you
loaded six inches more than there was water in the river
1578 at the time. What was that occasion?

A. Due to the fact that we knew that there was a rain about to exist coming over the country and that it would hit there by the time that we had given orders for these barges to be loaded.

Q. You had heard that this rain was coming?

A. Yes, sir, and we check up with the Government and due to my long experience I can usually tell about some of the weather and some of the rain that we may have.

Q. When you ran aground at these places that you have described as one, two, three, four, five, and six, did you get in touch with the London and Marmet dam keepers?

A. Yes; I did.

Q. Did you check with them with regard to what had happened?

A. Yes, sir; I did, but I don't know who was the man I was talking to. He told me they had stopped the water at Marmet dam.

Q. And how did you get in touch with him?

A. I had to get in touch with John Carpenter at Point Pleasant and John Carpenter at Point Pleasant, in turn, got in touch with the Marmet dam which I assume was the Lock Master and reported back.

Q. And did you check on that later?

A. Yes, sir, and we called up the Marmet dam and they said that they had shut the turbines off.

Mr. JACKSON. I move to strike out all of this last hearsay.

By the COURT:

I think it is hearsay.

A. I said I called the Lock Master.

By the COURT:

Q. You yourself talked with the Lock Master or John Carpenter?

A. I said John Carpenter had talked to him and then he come back and he asked me the question and I went back to the Lock Master and called.

Q. You went?

A. Yes, sir.

By Mr. JACKSON:

Q. Where?

A. At Marmet dam.

Mr. JACKSON. I still move to strike it out as hearsay.

A. Why would that be hearsay?

Mr. JACKSON. I don't understand that the Government can make testimony.

(Counsel for Plaintiff offered in evidence Exhibit No. 189, being a copy of the Report made by the Commission appointed pursuant to the Act of February 14, 1811 of the Commonwealth of Virginia of which Commission John Marshall was Chairman, and Exhibit No. 189A, being a copy of the map accompanying the said report. These exhibits were objected to by counsel for Defendant on the grounds that they were irrelevant because they deal only with the lower end of New River and not with the part thereof involved in Defendant's project, and that they were prepared by a Commission which was not competent to give expert testimony on the subject.

Counsel for Plaintiff offered in evidence Exhibit No. 190, being a series of photostats of originals of 35 maps under one cover and entitled "New River Survey, 1873 and 1878.")

1579 P. A. GRAGNON

Direct examination by Mr. THOMPSON:

Q. Please state your name to the reporter.

A. P. A. Gragnon. My residence is Hinton and I am a Civil Engineer.

Q. What is your present occupation?

A. I am at present in charge of all survey work in obtaining of engineering data for the Hinton suboffice of the Huntington Engineering District.

Q. How long have you been in your present employment?

A. Approximately six years.

Q. In what capacity?

A. Originally as chief of field party and then later in charge of obtaining engineering data and survey work for the Hinton sub-office.

By Mr. JACKSON:

Q. In the sub-office of the District Engineer?

A. No, I have been employed by the Government for six years.

By Mr. THOMPSON:

Q. Have you any survey parties under you?

A. Yes, sir.

Q. How many?

A. A varied number, between six and twelve.

Q. And what are they doing just at this time?

A. We are completing the surveys on the New River in connection with the proposed Bluestone reservoir.

Q. And what territory have you covered in that survey?

A. The territory from the Bluestone dam site up stream to Narrows, Virginia.

Q. How many miles is that by river, if you know?

A. Between 35 and 36 miles.

Q. And is the Narrows included in the pool of the Bluestone reservoir?

A. It is.

1580 Q. You say you have six field parties?

A. Yes, we have six at present. At one time though we had as many as twelve.

Q. How many are in a party?

A. Between five and twelve men to a party.

Q. In this work of surveying on the New River, have you yourself been present?

A. I have.

Q. In what capacity?

A. Well, part of my duty is to supervise the field parties at work and in this way I have had to be in the field quite often with the parties.

Q. As I understand you, you say your survey has included a distance from the Narrows, in Virginia, to Hinton, West Virginia?

A. No, sir; that is through the Bluestone dam site, about two miles above Hinton.

Q. In your survey work in that stretch that you have described, how often have you in a mile crossed that river?

A. About five times a mile, an average of that.

Q. And how have you crossed the river?

A. By a boat.

Q. What kind of a boat?

A. A regulation Government survey boat, about sixteen feet long, five feet wide and drawing eight to ten inches of water when loaded with a party.

Q. And what does the party consist of?

A. Five or six men and survey equipment.

Q. And do I understand you to say you have crossed the river back and forth from the Narrows down to the face of the reservoir?

A. We have, sir; in this way: We are taking cross sections of
the New River valley at half mile intervals. As one sec-
1581 tion is completed the boat is then rowed or poled down-
stream or up-stream, as the case may be, to the next section and the boat is also used when this cross section is being run.

Q. How many boats have you got in operation in this work?

A. We have had three, sir.

Q. Did I ask you how many times you crossed in a mile?

A. Yes, sir.

Q. Have you had any trouble in this stretch in going upstream or down-stream with your boat?

A. No, sir; we haven't.

Q. Do you know where Shumate's Falls is?

A. Yes, sir; it is about two miles below Glen Lyn on the New River, just a little above Dr. Shumate's residence there.

Q. Is that within the State of Virginia?

A. That is within the State of Virginia.

Q. Have you had any trouble going through Shumate's Falls?

A. No, sir; we haven't.

Q. Have you ever made any trips from Hinton to the Narrows and back again in a boat?

A. I have.

Q. When did you do that?

A. From July 19th to 21st, 1936.

Q. Was it the same kind of a boat you have described?

A. It was.

Q. How many men did you have in it?

A. Five.

Q. Did you have any motor attached to the boat?

A. We did.

Q. What was the type of the motor?

A. It was an outboard motor.

1582 Q. Did I ask you how much draft this boat drew?

A. You did not.

Q. What does the boat draw when loaded?

A. This boat in operation, with the outboard motor attached to the stern and with this crew of five men and the equipment we had, drew between 2½ and 3 feet of water while operating at four or five miles an hour, its maximum speed.

Q. On your trip where did you start from?

A. We started from Hinton, the highway bridge at Hinton, and went to Narrows.

Q. And then did you return?

A. We did.

Q. How long were you in making the trip?

A. The upstream trip took one full day and from 7:30 the next morning until 2:20 that afternoon.

Q. And of the men that you had on this boat, did any of them know the channel of the stream?

A. One man had boated along the river several years ago but only for a short stretch between Hinton and the mouth of Bluestone.

Q. And no farther up?

A. No farther up.

Q. How about the other men?

A. No, sir.

Q. Did you have to portage that boat at any time?

A. We did not.

Q. On the trip up or down?

A. We did not.

Q. Did you have to portage any of the materials in the boat up or down?

A. No, sir; we did not.

1583 Q. Did you get out of the boat at any time on that trip?

A. We did.

Q. State where you got out of the boat?

A. We got out of the boat at the Narrows or Peter Mountain Falls.

Q. Did you ever take a trip on the river from the Narrows t Allisonia?

A. Yes, sir.

Q. When?

A. I will have to look that up. I am not quite sure of th date—between July 9th and July 13th.

Q. And did you have the same type of boat as described?

A. We did.

Q. The same type of motor?

A. We did.

Q. And drawing the same depth?

A. Yes, sir.

Q. How many men did you have in the boat?

A. Four.

Q. And how long did it take you to go from the Narrows t Allisonia and return?

A. About four days.

Q. Did you stop over night?

A. We did.

Q. You didn't run the boat during the night?

A. We did not.

Q. How long were you going upstream to Allisonia?

A. We were four days going upstream. I may have misunderstood you, Mr. Thompson. I understood your previous questio to have stated that.

By Mr. JACKSON:

Q. Both ways?

A. The round trips took about five and one-half days.

By Mr. THOMPSON:

1584 Q. What is the distance from the Narrows to Allisoni and return?

A. That distance is approximately 144 miles.

Q. I believe you said you went upstream four days?

A. Yes, sir.

Q. What time did it take you coming downstream?

A. A day and a half.

Q. Did you have to portage your boat at any place on the rive going upstream?

A. We did not.

Q. Did you have to portage your boat at any place comin downstream?

A. We did not.

Q. Did you have to portage any of the materials in your boat

A. No, sir.

Q. Either way?

A. We did not.

Q. Did you get out of the boat at all?

A. We did.

Q. Why did you get out of the boat?

A. At these places where we got out of the boat we were unfamiliar with the channel and in some cases also the water was muddy and using this boat drawing 2½ or 3 feet of water, we struck shoals and rather than go on blindly, trying to find our way through, we decided it would be easier to tow the boat through by hand through a shallow place.

Q. Coming downstream how many times did you get out of the boat?

A. Once.

Q. Where did you get out of the boat?

A. At Walker Mountain Falls.

Q. On both of your trips, including the stretch from Hinton to the Narrows and from the Narrows to Allisonia, how many times did you, coming downstream, get out of the boat?

1585 A. Twice.

Q. Where were they?

A. Once, as I mentioned before, at Walker Mountain Falls and the second time at the Narrows, or Peter Mountain Falls.

Q. Did you get back in the boat?

A. At Walker Mountain Falls we got out and looked over the channel, got back in the boat and rowed through it. At the Narrows we stayed out and helped the boat down the falls and got into the boat again and continued our journey.

Q. Why did you get out and stay out and help the boat down the falls at the Narrows?

A. On our upstream trip we hadn't looked over the channel to a very great extent and weren't sure of it and rather than attempt the trip down through the channel, it was quicker and probably easier to lower it through the falls in the same position we had brought it up.

Q. Did you have anybody on the boat going from the Narrows to Allisonia that knew the channel?

A. No, sir.

Q. And had any of those men been over that trip that you know of?

A. No, sir; they hadn't.

Q. Do you know the stage of the river as to flow or height at the time that you made the trip from Hinton to the Narrows?

A. It was about normal summer low water.

Q. How do you know that?

A. Why, by our gage reading at the Hinton office.

Q. Do you know the flow or stage from the Narrows to Allisonia on the trip you made at that time?

A. No, sir; I don't but from our Hinton office readings which I looked into after the trip, the stage was very low, that is, it was about normal summer low water.

1586 Q. In bringing the boat downstream you said you got out at a place—did I understand you to say Peter Mountain Falls?

A. Yes, sir.

Q. And what other place was it you said you got out?

A. Walker Mountain Falls.

Q. And at Walker Mountain you got back in and rowed through?

A. We did.

Q. On this trip what was the length of the combined trips—the two trips?

A. About 220 miles.

Q. What stretch of the 220 miles did you get out of the boat and pull it or push it through the water?

A. Between a mile and a mile and a quarter.

Q. Was that going upstream?

A. That was on both trips, upstream and downstream.

Q. How much coming downstream did you get out—what length, would you say?

A. Probably 200 feet.

Q. Why did you use the boat that you did use?

A. It was the only one available at the time. It is the only one the Government has on hand.

Q. And all of the Government boats are limited to a sixteen foot length?

By the COURT:

Q. What was the length of this boat?

A. Sixteen feet.

By Mr. THOMPSON:

Q. Could you have navigated a longer boat through that trip?

A. We could have.

Q. On your way on these two trips did you see other boats on the river?

1587 A. We did. We saw quite a few boats.

Q. And what was the character of these boats?

A. The majority of them appeared to be flat bottomed boats tied to the bank behind several of the farm houses. There were several ferries also and in three cases that I remember of now we saw two motor boats.

Q. You say you saw a row boat or flat bottom boats? Are they what you term row boats?

A. I think so.

Q. Did you see any of them on the river?

A. We did.

Q. And where were they going?

A. They were going across and some up-stream and some down-stream.

Q. What would you say from your observation as to the number of boats on that river—row boats?

A. We counted fifty boats between Hinton and Narrows, Virginia, and in my opinion, on an average, that is about the ruling number of boats on the river for a stretch of that length and the river is used quite a bit by the people living on its banks.

Q. State whether, in your opinion, from your experience on the river and your experience as a boat man, whether this New River in the stretch which you have described, from Hinton to Allisonia is susceptible of navigation by small motor boats and other boats of shallow draft.

Mr. Jackson. I object to the competency of the witness to express any opinion as to navigability. I think he has no qualifications as a navigation expert.

The Court. He may answer it.

A. Yes, it is susceptible of navigation.

Mr. Jackson. I note an exception.

By Mr. Thompson:

Q. Mr. Gragnon, have you read the testimony here of Mr. Gerdes in which he testified that he made a trip through Bull Falls on July 27th?

A. I have.

Q. Were you present on that trip?

A. I was.

Q. I hand you, marked for identification, Government Exhibit 192, being a photogrophic album apparently and ask you if you know what it is?

A. Yes, sir; I do.

1588 Q. What is that?

A. It is an album containing pictures which we made on that trip between Hinton and Narrows.

Q. On what dates?

A. Between the 19th and 21st.

Q. Of what year?

A. 1936.

Q. And what month?

A. July.

Q. On the first page there is some typewritten statement. What is that?

A. That is the table of contents showing photograph number and the appropriate title for each photograph.

Q. Were you present when these photographs were taken?

A. I was.

Mr. **Thompson**. I offer this album, marked for identification Government Exhibit 192, in evidence.

Mr. **Jackson**. I object to it because it contains the repeated practice of the Government of offering an exhibit to which they have added argumentative statements. For instance, they show on photograph No. 2: "Showing improved navigation chute one mile above mouth of Bluestone River, looking up-stream," a highly improper method of presenting photographic evidence. They should identify the place but they have no right whatever to write characterizations into such an exhibit and offer it in evidence. I object to it unless those are all stricken out.

Mr. **Thompson**. Your Honor, we will identify each one of these photographs.

Mr. **Jackson**. That is no justification for writing out an argument and putting it in an exhibit and introducing it in evidence.

The **Court**. It is justifiable to indicate the point at which the photograph was taken and the direction in which the camera was pointing, but there ought not to be any comments on the photographs.

Mr. **Thompson**. May we have the record show that these comments are stricken and we now offer the document in evidence.

Mr. **Jackson**. Will you have them physically stricken?

Mr. **Thompson**. We will take a pencil and run through them and blot them out.

By Mr. **Thompson**:

Q. I hand you Government Exhibit 192 and ask you, on the first page, what is No. 1 photograph?

A. No. 1 is a photograph of the boat we used on the trip with the members of the party in it.

Q. In the foreground there seems to be something of wooden material. What is that?

A. That is a ferry boat, sir.

Q. What is No. 2?

A. No. 2 is a scene taken up-stream about a mile above the mouth of the Bluestone River. That is in a rather shallow part of the river. Just in the center of it, though, is where our channel was, the channel we followed on our trip.

Q. On the right hand side in the center?

A. Against the right bank, yes, sir; approximately in the center of the picture.

Q. Turn to the next page and photograph No. 3, what is that?

1589 A. That is a photograph of the same shallow part of the river.

Q. Go ahead.

A. Photograph No. 3 is a photograph of the same portion of the river as photograph No. 2 except that it is shown about a half mile up-stream from there and also showing the channel through which we ran the boat.

Q. And where is that channel indicated in the picture?

A. About in the center of the picture, between the right bank of the river and the island shown here.

Q. Photograph No. 4; what does that indicate?

A. That photograph was taken just after photograph No. 3 was taken, looking down-stream from that same position.

By Mr. Jackson:

Q. In No. 3 was that photograph taken which way?

A. Looking upstream.

Q. What do you mean by the right bank?

A. That is the right bank looking upstream, going on the up-stream trip. If you prefer having me refer to the right and left bank as you go downstream, I can do it.

Q. I was only trying to get it straight. Engineers here had said you always spoke of the right or left bank looking downstream and I wanted to know if you followed that nomenclature or not.

By Mr. Thompson:

Q. No. 5?

A. No. 5 is still a part of that same channel.

Q. What is No. 6?

A. No. 6 is a pool above that shallow place in the river.

Q. And at what point?

A. It is known as Landcraft's Eddy. I don't know any other name for it. That is the local name. It isn't shown on any map.

Q. Turn to picture No. 7. What is that?

A. That is also a view of a pool just above the Bertha school house.

Q. How far is that up from Hinton?

1590 A. It is about six and one-half to seven miles upstream from Hinton.

Q. What about picture No. 8?

A. No. 8 is the pool below Bull Falls rapids.

Q. How far below Bull Falls rapids is it, would you say?

A. Just below, approximately a thousand or twelve hundred feet.

Q. Turn to the next one.

A. No. 9 is a picture of Bull Falls.

Q. Where is Bull Falls in that picture?

A. Bull Falls is shown extending across the river. It is marked probably by a few black rocks and a white line.

Q. Where did you bring your boat through on Bull Falls?

A. Near the left of the picture, against the right bank, looking down-stream.

Q. And it is on the left bank looking at the picture?

A. Yes, sir; it is.

Q. What is picture No. 10?

A. Picture No. 10 is the pool just below Bull Falls, looking downstream.

Q. What do we see in the foreground of that picture?

A. The motor.

Q. What is picture No. 13?

A. That is the pool above Warford's Ferry and between that point and Indian Creek.

Q. And about how far is that up from Hinton?

A. Approximately twelve miles.

Q. I am told I skipped photographs 11 and 12. Will you please testify with respect to photograph No. 11?

A. Photograph No. 11 is a photograph of the pool above Warford's old ferry, looking upstream from that point.

Q. And what is 12?

1591 A. 12 is the pool below the mouth of Indian Creek. That was taken from a point about a mile below the mouth of Indian Creek, looking upstream.

Q. I believe you have testified to 13, did you?

A. Yes, sir; I have.

Q. Then have you testified as to 14?

A. 14 is a picture taken just at the mouth of Indian Creek or slightly above it.

Q. Looking at the picture, on which side does Indian Creek come in?

A. On the left side of the picture.

Q. And where is the channel, or where did you come with your boat on the river in this picture?

A. Approximately in the center of the picture and showing near the right bank of the stream a series of rock ledges above the water. Just to the right, facing the picture, of these ledges, is the channel which we followed on our trip.

Q. When you say the right bank, do you mean the right bank as you look at the picture or the right bank as you come upstream?

A. The right bank looking downstream.

Q. What is picture No. 15?

A. Picture No. 15 is the shoals at the mouth of Indian Creek or slightly above it.

Q. And what is the black stretch in the middle there?

A. That is the small sand or gravel bar.

Q. What is picture 16?

A. 16 is a picture of the same shoals at the mouth of Indian Creek.

Q. Which direction are you looking in taking that photograph?

A. You are looking upstream, sir, and the channel we followed lies between the island about in the center of the photograph and the right bank of the river, that is the right bank of the river looking downstream.

Q. But the left bank looking at the photograph?

1592 A. Yes, sir.

Q. 17?

A. 17 is what is called Harvey Falls. That is taken from the boat as we approached them.

Q. And where is the channel on 17?

A. The channel is just about in the left center of the photograph. There is a stretch of apparently open water there.

Q. How about 18?

A. 18 is a pool above Harvey Falls.

Q. Have reference to 19?

A. 19 were some minor rapids that we traversed just below Anderson Falls.

Q. And there appear to be some rocks in the background of that picture?

A. Yes, sir.

Q. Where is the channel in that picture?

A. I don't believe the channel is visible in this picture.

Q. It isn't?

A. I don't believe it is.

Q. Where would the channel be?

A. It would be farther to the left of the photograph.

Q. Looking at the photograph?

A. Yes.

Q. And what about 20?

A. 20 is the pool just below Anderson Falls and above this rapids shown in photograph 19.

Q. What is 21?

A. 21 is a picture of Wylie Chute, the chute used by the old boats in navigation through Wylie Falls.

Q. And where is the channel there?

Mr. JACKSON. I move to strike that out. The witness can't know about that.

By Mr. THOMPSON:

Q. Is there an old channel there?

A. It is.

Q. And where is the old channel?

1593 A. This is a photograph of it looking downstream. It is on the extreme right bank.

Q. And that would be looking upstream from this photograph?

A. Yes, sir; it is.

Q. And where did you say that channel was?

A. It is on the extreme right bank looking downstream.

Q. 22; what is that?

A. That is the pool just around the bend in the river from Shumate's Falls.

Q. How is that photograph taken—looking upstream?

A. Looking upstream, sir.

Q. What is 23?

A. 23 is a photograph taken from the same position that 22 was taken except that it is looking downstream.

Q. I notice on the left hand side of that picture some lights and shadows. What does that indicate, on the left hand side looking at the photograph?

A. Those are ripples from the motion of the boat.

Q. Waves?

A. Waves, yes.

Q. And 24?

A. 24 is a view of Shumate's Falls.

Q. Where is your channel at Shumate's Falls?

A. The channel in this photograph appears—it isn't very plain. It isn't very apparent in this photograph, sir, but it is behind these two rocks approximately in the center of the photograph and it goes diagonally through the falls, to the best of my knowledge.

Q. Are we looking upstream in that picture?

A. We are.

Q. And looking upstream how do you approach the channel?

A. We would swing around near the right bank, that is the right bank looking downstream.

1594 Q. But the left bank looking at this picture?

A. Yes, sir; and the channel comes through diagonally across—has a bend in it.

Q. You approach up to where we see those rocks and then turn to the right; is that it?

A. Yes, sir, that is it.

Q. What is picture 25?

A. This is a panorama of Shumate's Falls.

Q. Where is the channel in Shumate's Falls in that picture?

A. The channel comes through in here. It would be pretty hard to describe so the Court can follow it.

Q. Do the best you can. You are looking upstream or downstream?

A. That is taken from the left bank of the river facing downstream, and in this photograph the channel runs past a series of rocks as shown on the first picture of the panorama, just beyond it and between those rocks and the others in the background and then on up through there. It is hard to pick out.

Q. I notice two groups of rocks in the first picture of the panorama and they are a little to the right hand side of the picture as you look at the picture?

A. They are on the extreme right.

Q. Where did your boat go with respect to those two groups of rocks?

A. The channel was so crooked that we decided it best not to attempt it and no one knew the channel, in the second place, so we towed the boat up by hand through the shallow part, just against the left bank.

Q. Against the left bank?

A. Yes.

Q. Looking at the picture, which bank was it?

A. It is the bank in the foreground.

Q. So, looking at the picture, it is the right bank, is it not?

1595 A. No, sir; I believe not. I believe that bank would be called the bank in the foreground.

Q. I don't believe I follow you on that.

A. You see this is the bank I am speaking of.

Q. You say "this" and that doesn't indicate anything to the Court.

A. The bank at the lower part of the photograph. That is the left bank of the river looking downstream.

Q. But this particular photograph I am asking you about, is that picture taken downstream?

A. No, the stream is running upstream from left to right.

Q. So you are going upstream?

A. Yes.

Q. On which side of the river?

By the COURT:

Q. The stream is running from left to right?

A. Running upstream from left to right.

By Mr. THOMPSON:

Q. Where did you push the boat through there?

A. Just against the left bank of the stream looking downstream.

Q. Looking at the picture?

A. Just beyond these rocks shown in the foreground, just below those grass-covered rocks.

Q. So that is on the right hand side of the picture?

A. Yes, sir.

Q. Looking at 26, what is that?

A. That is the pool just below Peter Mountain Falls, taken from a point just a short way above the mouth of Rich Creek.

Q. What is that black spot in the right hand corner?

A. That is part of the outboard motor.

Q. What is picture 27?

A. Picture 27 is a view of Peter Mountain Falls taken from below them

Q. I believe you made a trip from the Narrows to Allisonia?

A. Yes, sir.

1596 Q. I hand you an album of photographs, marked for identification Government Exhibit 193, and ask you if you know what that is?

A. Yes, sir; I do.

Q. What is it?

A. The album contains a series of photographs taken between Narrows and Allisonia.

Q. And Narrows is in Virginia?

A. It is.

Q. Allisonia is in Virginia?

A. Yes, sir.

Q. And the views are on what river?

A. On New River.

Q. What is the typing, the page of typing, the first page, in this Government Exhibit #193, marked for identification?

A. It is a detail of the contents, giving certain photograph numbers.

Q. Were you present when these photographs were taken?

A. I was.

Q. What was the occasion for the taking of these photographs?

A. They were made during a reconnaissance of New River, between Narrows and Allisonia, between July 9th and July 13th, 1936, on our upstream trip.

Q. I believe you said you were present when they were taken?

A. I was.

(Exhibit 193 offered in evidence and defendant reserved the right to object to any descriptive matter appearing with said exhibit.)

Q. Please have reference to photograph #1 and tell us what that is?

A. #1 is a photograph of the river, showing the boat in approximately the center, operating under motor-power through the pool below the Pearisburg station of the N. & W.

Q. Do you know what that black marker is in the center of the picture?

A. I do.

Q. What is that?

A. That is the boat we used in our reconnaissance.

1597 Q. Looking at #2 the picture in the upper right corner, what is that?

A. A different view taken at the same place, also showing the same boat in operation.

Q. What is view or photograph #3?

A. A view of the rapids about three-quarters of a mile above the Ripplemead Highway bridge.

Q. Is the boat visible in that picture?

A. It is not.

Q. What is the picture in the lower right hand corner?

A. A picture of the boat in a pool just below the Pembroke rapids.

Q. When you speak of "the boat" do you mean your boat?

A. Yes, sir.

Q. What is photograph #5?

A. #5 is a view of part of Sifford's Falls and Shoals and approximately in the center of the photograph is a boat, in which several men were fishing at the time this photograph was taken.

Q. That is not your boat?

A. No, sir.

Q. What is the picture in the upper right hand corner?

A. A photograph of the boat being pulled through part of Sifford's Falls.

By Mr. **Jackson**:

Q. Your boat you mean?

A. Yes, sir, our boat.

By Mr. **Thompson**:

Q. What is the picture in the lower left hand corner, #7?

A. That is a photograph of the pool in below the Whitethorne Ferry.

Q. Where is the Whitethorne Ferry with relation to Narrows and Radford?

A. It is above Narrows and below Radford.

Q. Now with reference to the picture in the lower right hand corner, #8, what is that?

A. A view of the same pool. That was quite an extensive pool, as I remember.

1598 Q. Is there a ferry there?

A. There is.

Q. Turn to the next page, and look at the picture in the upper left corner, #9, what is that?

A. A view of a pool below Radford.

Q. How far below Radford?

A. Just at the outskirts of East Radford.

Q. Picture #10, what is that?

A. That is also a part of that pool below Radford, the highway bridge is visible in the back ground there.

Q. What is the picture in the lower left hand corner?

A. Why that is a picture of us pulling the boat through one of the shallow pools below Radford. We had just broken the pin on the propeller, that is a safety pin on the propeller, and were holding the boat against the current while the pin was being changed.

Q. Are you standing in the boat?

A. We are.

Q. The next picture, in the lower right-hand corner, what is that?

A. A picture of the rapids at Ingles Ferry.

Q. That is picture #12?

A. Yes, sir.

Q. What is the next picture?

A. That picture was taken from below the mouth of Little River looking upstream toward the A. E. P. dam site.

Q. That is the Appalachian Electric Power Company, the defendant here?

A. Yes, sir.

Q. I note what appears to be a bridge in the upper left hand corner, what is that?

A. A railroad bridge.

Q. And what is it spanning?

A. Little River.

Q. That is the entrance of Little River?

A. It is.

1599 Q. What is the picture in the upper right hand corner?

A. A picture taken from the right bank of New River, looking down-stream, a little below the mouth of Little River, looking toward the right abutment of the A. E. P. Company dam site.

What do you mean by that?

The proposed dam at Radford.

What they call the Radford dam?

It is.

In the foreground what do you see in that picture?

A motor boat.

Was that your motor boat?

It was not.

What else do you see in the foreground?

Three more boats.

Have reference now to the picture in the lower left hand r, #15, what is that?

The aggregate plant at the Radford dam site.

What do you mean by aggregate?

Where the stone is crushed and sorted.

What for?

For concrete abutments or ballast, or whatever they use .

Have reference now to picture #16, and tell us what is?

That is a view of the right abutment of the Radford dam

State with relation to the river, where that is located?

That is the right bank of the river, looking down-stream.

Is that picture taken of the front of the coffer dam?

That is a little downstream from the coffer dam.

Turn to the next page, picture #17, in the upper left hand r; what is that?

A view of the same dam site showing the coffer dam in oximately the center of the photograph.

That is the coffer dam of the Appalachian Electric Power Company?

A. It is.

Q. I notice a shadow in the corner, what is that?

Probably someone's head in the way.

In the boat?

Yes, sir.

In your boat?

Yes, sir.

Now Photograph numbered 18, what is that?

A view of the coffer dam taken from the river, about on, parently on the center line of the proposed dam.

Have reference now to Photograph #19, what is that?

That is the pool above the dam site at Radford.

Have reference to the right-hand corner photograph #20?

That is a pool about two miles below Linkous Ferry.

Q. Where is Linkous Ferry with respect to the Appalachian Electric Power Company or Radford project?

A. It is above it.

Q. Turn to the next page in the upper left-hand corner, what is that?

A. The shoals taken just above Linkous Ferry, the camera was on the right bank of the stream, looking downstream at the time the picture was taken.

Q. There seems to be a series of rocks in the background of that picture, what does that indicate?

A. That is a rapids.

Q. Look at photograph #22, the picture in the upper right hand corner, what is that?

A. Also a rapids about one mile below Cox's Ferry.

Q. Is that a picture above the Radford project?

A. It is, sir.

Q. How about Photograph #23?

1601 A. Photograph #23 is a pool above the rapids shown on #22.

Q. And what is #24 in the lower right hand corner?

A. Also a part of the rapids shown in #22.

Q. These pictures you are referring to now, since you have been speaking about the Radford project, are they or not below Allisonia?

A. They are below Allisonia.

Q. Turn to the next page, the upper left hand corner, #25?

A. A pool just below the Hiawassee bridge.

Q. The boat in the left foreground is that you boat?

A. It is.

Q. What is the picture on the upper right hand corner, #26?

A. Part of a pool just below Allisonia, the town of Allisonia is in the background.

Q. #27, what is that, on the lower left hand corner?

A. A picture of our boat tied up on the right bank of the New River at Allisonia, that is the right bank of New River, looking downstream.

Q. I see figures down in the river; what are they?

A. Swimmers, sir.

Q. What is the next view?

A. A view taken at Allisonia on the right bank also.

Q. Turn to the next page, upper left hand corner, #29; what is that?

A. A view taken directly from the boat as we shot the rapids, on our down-stream trip, the rapids one mile below Cox's Ferry.

Q. Where did you go through the rapids in that picture?

A. The picture is taken directly from the bow of the boat. We went through as shown there.

Q. Now Photograph #30, where was that taken?

A. A pool one-half mile above Linkous Ferry.

Q. And the lower left hand corner, Photograph #31; what is that?

A. A picture of the rapids just above Linkous Ferry. 1602 This picture was also taken from the boat while we were going through those rapids.

Q. #32, in the right hand corner, what is that picture?

A. That is a view of the pool just above the Radford dam site. This picture was taken on our down-stream trip.

Q. Turn to the next page. Now photograph #33, in the upper left hand corner, what is that?

A. That is the pool one mile below Radford.

Q. On your down-stream trip?

A. Yes, sir.

Q. What is #34 in the upper right hand corner?

A. A view taken of the Little Pepper Falls, looking down stream above there.

Q. And #35, lower left hand corner, what is that picture?

A. A view of Little Pepper Falls, after we had gone through the Falls, looking up-stream toward the falls.

Q. Where is the Falls in that picture?

A. The Falls extend all the way across the photograph, about the center of it.

Q. Center background?

A. Yes, sir.

Q. What is the picture in the lower right hand corner, #36?

A. #36 is a view, partial view, of Barnett Falls.

Q. Did your boat go through that Falls?

A. We did.

Q. Did your—Turn to the next page, upper left hand corner, #37, what is that?

A. A pool below Barnett Falls.

Q. And the next picture in the upper right hand corner, what is that?

A. The rapids above the Pembroke highway bridge.

Q. And you went through those rapids?

A. We did.

1603 Cross-examination by Mr. Jackson:

Q. Mr. Gragnon, I notice as Exhibit #193 you have produced some thirty-seven photographs; is that right?

A. I don't know the actual number.

Q. Will you take the exhibit so you will be able to follow me?

A. Yes, sir.

Q. Now is that right?

A. This shows thirty-eight.

Q. Thirty-eight is right, I beg your pardon. Now I notice in the course of your testimony that those photographs, at least twenty-four, are pictures of pools, is that right?

A. Yes, sir.

Q. And did you take twenty-four photographs of pools because you regarded those as photographs of critical points on the river?

A. No, sir, I tried to cover a certain portion of the river and the pools formed a great portion of the river. There were more taken on the pools.

Q. When you came to a good pool you took that pool?

A. Several view of it.

Q. I notice in particular when you got to the pool at the Radford dam site you took some eight, or more photographs of the pool, didn't you?

A. Why I believe not. I believe most were taken of the abutments and the quarry.

Q. Will you look at your pictures Nos. 15 to 19, and tell me, in so far as those pictures show, any part of the river, they are not a part of the Radford pool?

A. They are, yes, sir.

Q. Will you look at your picture #32 and tell me if that is part of the Radford pool?

A. It is.

Q. I mean the Radford dam site pool, you understand to what I refer?

A. Yes, sir.

1604 Q. Will you turn and look at your picture #17, in Exhibit #192?

A. Yes, sir.

Q. That, as I understand shows a picture of Harvey Falls rapid?

A. Yes, sir.

Q. That rapid as I look at the picture is in the extreme background, isn't it?

A. Extreme background of the river.

Q. As far as it shows the river?

A. Yes, sir.

Q. Now if you were farther away from that rapid, it would look still smaller, in the photograph?

A. In the photograph it wouldn't.

Q. You could not have gotten any farther away without getting it entirely out of the picture?

A. We could not have gotten farther away and included the whole rapid in the picture.

Q. Could you have gotten any farther away from that rapid and still have had it show in the picture at all?

A. Why, yes, we could have.

Q. Look at the picture carefully before you answer. I want you to measure your words on that.

A. I have.

Q. Do you still adhere to that answer?

A. We could have gotten still farther away and had the picture of the Falls.

Q. It would have been a very small distance further away, wouldn't it?

Q. Do you think you could have gone one hundred yards away and gotten the Falls in the picture?

A. That I can't answer, the bend in the river might have prevented our seeing it. I don't know.

1605 Q. Why didn't you take the photograph closer?

A. We could not have included the Falls in the photograph if taken closer.

Q. Why didn't you take it closer up, a closer up view of the Falls, and show part of it?

A. I don't remember the reason.

Q. You have no idea why you didn't do that?

A. No, I have not.

Q. Will you look at your #19 in the same Exhibit #192, and your #27, and tell me whether or not in each instance the Falls shown in the picture is not in the extreme background so far as the river is shown?

A. They are as close in to the camera as they could be at the time they were taken so they would be included.

Q. Are they in each instance in the extreme background of the picture?

A. They are.

Q. And if they had been taken from a position closer they would look substantially different, wouldn't they?

A. I don't know they would.

Q. That is your best judgment?

A. Some of the detail would have been more apparent, but they would have looked quite the same.

(Exhibit 526 marked for identification.)

Q. I show you photograph marked #526 for identification, and ask if you can identify that?

A. Not positively, but I think it is a part of the Shumate Falls.

Q. That is your best judgment?

A. Yes, sir.

Q. That is based on your intimate study of the river?

A. No, sir, on my visits once or twice to Shumate Falls.

Q. That is any knowledge you have about these Falls on the river is confined to what you gained or remember from one or two trips?

1606 A. That portion of it is, yes, sir.

Q. Which portion?

A. Shumate Falls.

Q. Just Shumate Falls?

A. Yes, sir.

Q. You have always kept away from that except this one trip?

A. No, sir, I haven't. It just happened to be away from the road.

Q. The parts of the river you are familiar with are the parts you can see from the highway?

A. Yes, sir, because most of my travel has been by automobile.

Q. You traveled by automobile when working in connection with this surveying project?

A. Not all of it.

Q. But most of it, as I understand?

A. Yes, sir.

Q. To refresh your recollection, I will ask you if that isn't a picture of Harvey Falls?

A. I refuse to identify it.

Q. Don't you know the road runs right along the river at Harvey Falls?

A. That is a picture taken from down-stream, and I have always seen it from the side.

Q. You have never seen it from the river?

A. Except for these two occasions.

Q. You are testifying about what you learned on these two occasions and didn't you offer a picture taken down-stream?

A. By referring to my notes I could identify it, but I don't feel I could identify that definitely without some means of identification.

Q. Could you refer to your picture of Harvey Falls, what number is it?

A. I may be able to find it.

Q. You have an index and I am sure that must be helpful. Now will you tell me whether or not that was taken from

1607 below Harvey Falls, your picture #17, in Exhibit #192?

A. It was.

Q. And this Exhibit #526 is taken down-stream from the Falls, isn't it?

A. This photograph doesn't cover the entire falls.

Q. In your opinion does your photograph #17 and exhibit #526 exhibit a comparable condition?

A. I don't know. I don't know they are the same falls. I wouldn't answer that.

Q. Do you think that #526 compares with your #17, showing a picture of Harvey Falls taken reasonably close to Harvey Falls, and as far away as one can get?

A. I don't know that is Harvey Falls.

Q. I can't refresh your recollection on that so you can remember it?

A. No, sir.

Q. Now, Mr. Gragnon, you have before you your Exhibit #193, haven't you?

A. Yes, I have.

Q. Will you look at your picture #21 in your Exhibit #193 and tell me whether or not the Falls are in the extreme background of the picture?

A. They are to the same extent, the whole falls to be included in the photograph would have to be taken from that distance.

Q. Whether they had to be or not, we won't argue that, but it is a fact that in all cases you took these photographs so that the falls or rapids were in the extreme background of the picture, in so far as it shows the river at all?

A. No, sir, not in all cases.

Q. You made some exceptions to that?

A. We have, you may look at photograph #26 in the same exhibit.

Q. That does look appreciably different. I will agree with you.

1608 A. And # 22 in the same exhibit.

Q. This #36 what does that show? Isn't there a rock ledge about two or three feet high?

A. No, not that high, about two feet high.

Q. At least two feet would you say?

A. Yes, sir.

Q. How high are Barnett's Falls from top to bottom?

A. Between a foot and a half to two feet.

Q. That is your best judgment?

A. That is my opinion. There are a series of several falls but a foot and a half to two feet should cover all of it.

Q. You are now taking a falls known as Barnett Falls.

A. No, sir, there are some other rapids above that.

Q. Mr. Gragnon, how long have you lived at Hinton?

A. Since November, 1935.

Q. And where did you live before that?

A. In Ohio.

Q. In what part?

A. I moved quite frequently in Ohio. I covered the territory or Ohio river through a narrow strip of the Miskingum District.

Q. Were you working for the Government in the Muskingum District?

A. I was.

Q. For how long?

A. Approximately two years.

Q. What was your college?

A. In Louisiana.

Q. What college?

A. Southwestern.

Q. What degree did you receive?

A. I did not complete my civil engineering course.

1609 Q. How old are you?

A. Twenty-six.

Q. You said this boat was about sixteen feet long?

A. It was.

Q. And about how wide?

A. About five feet.

Q. And about what speed did it have?

A. We had no way of measuring it accurately but my best judgment was between four and five miles an hour at maximum speed.

Q. What kind of motor did it have on it?

A. Johnson out-board.

Q. How many horse power?

A. Twenty-four that is the motor we used on the trip between Narrows and Allisonia was twenty-four horse power, and the motor we used between Hinton and Harrows as a motor of lower horse power, which we could not determine what horse power it was, it wasn't marked.

Q. You had a smaller motor between Hinton and Narrows?

A. Yes, sir.

Q. And you put in a larger motor above Narrows?

A. No, sir, the larger motor was too strong—we made the trip from Narrows to Allisonia and then changed over.

Q. The larger motor was too large for the size of the boat?

A. Yes, it was.

Q. You said you thought it would make how many miles per hour speed?

A. Between four and five miles.

Q. Four and a half be a fair average?

A. I wouldn't say. I just estimate it was between four and five miles an hour.

Q. You went up-stream from Hinton to Narrows?

1610 A. We did.

Q. How long did that take you?

A. We took about ~~one full~~ day, about ten hours on the first day and from 7:30 the next morning until 2:20 that same afternoon. A little over a day and a half.

Q. About ten hours the first day and seven hours the second day?

A. That is right, I guess.

Q. About seventeen hours?

A. Yes, sir.

Q. Do you know how far it is by river from Hinton to Narrows?

A. About thirty-eight miles.

Q. Only thirty-six, isn't it?

A. No, sir, I think it is about thirty-eight.

Q. I understood you to say thirty-five or thirty-six?

A. That is from Bluestone to Narrows.

Q. Where did you leave from?

A. We left from the highway bridge at Hinton.

Q. Above or below Hinton?

A. Right at Hinton.

Q. You didn't leave from the C. C. C. Camp?

A. We stayed there over night one night, yes, sir.

Q. When you were taking this trip up the river, didn't you start from the C. C. C. Camp?

A. We stayed there over night. Probably I should qualify my statement. A portion of the trip between Hinton and the C. C. C. Camp was made on July 8th.

Q. What distance is that?

A. Probably four to five miles. I don't know exactly.

Q. And how long did you take on that trip?

A. About an hour and a half or two hours.

Q. You could have walked in less time, couldn't you?

1611 A. I don't know we could have.

Q. That was on July 8th?

A. Yes, sir.

Q. Did you stay there all night?

A. Yes, sir.

Q. And what time of day was it when you left Hinton, on the day you went to the C. C. C. Camp?

A. About three-thirty in the afternoon.

Q. Why did you not go any farther?

A. We thought that was sufficient for that day. We weren't going to put any over-time in.

Q. Getting late when you got in the camp?

A. No, sir; about five or five-thirty.

Q. Did you start again next morning?

A. We did.

Q. What time?

A. I will refer to my log. We left the C. C. C. Camp next morning at seven-twenty.

Q. And you traveled all that day?

A. We traveled to the mouth of the Bluestone river and arrived there at eight-thirty.

Q. Got to Bluestone at eighty-thirty P. M.?

A. Yes, sir.

Q. And did you stay there for the night?

A. No, we did not. Under instructions from my superior officer I loaded the boat on a truck and drove to Narrows and put it on the river and continued my trip there.

Q. You took the boat out of the river at Bluestone?

A. Yes, sir.

Q. How far was that up-stream from the C. C. C. Camp?

1612 A. Probably a mile.

Q. And then you went by truck to Narrows?

A. Yes, sir.

Q. Why did you do that?

A. I didn't question my superior officer. He gave the instructions.

Q. Who was your superior officer?

A. N. F. Dortch, Engineer in charge of the Bluestone project.

Q. Is that the trip you made?

A. No, sir.

Q. When you went to Narrows what did you do?

A. Started our trip to Allisonia.

Q. And that was on what day?

A. That was on July 9, 1936.

Q. And you proceeded then the next morning on your trip?

A. We left the Narrows that day at 12:50 P. M. on our trip.

Q. Well did you launch your boat above or below Peters Mountain Falls?

A. Above at Peters Highway bridge.

Q. And after launching the boat above the Falls your started at 12:30 or 12:50 P. M.?

A. 12:50 P. M.

Q. What date?

A. July 9, 1936.

Q. Where did you stop then?

A. That day we stopped at some rapids, I think known as the Henley French rapids opposite Curve, Va., a flag stop on the N. & W. We stopped there that night at 7:30.

Q. How many miles did you make?

A. I don't know. I would have no way of estimating it.

Q. Stop below the rapids?

A. Just below.

Q. Why did you stop below?

A. It was a good place to camp, a nice sandy beach,

1613 and we camped there over night.

Q. What did you do then?

A. We spent the night there.

Q. Where did you go next?

A. At 6:45 A. M., on the 10th, we left there and arrived at the lower end of Sifford's Falls at 7:30 P. M.

Q. Lower end of Sifford's Falls?

A. Yes, sir.

Q. You stopped below the Falls?

A. That is over night.

Q. Was that because it was a good place to camp again?

A. Yes, sir.

Q. That was on the 10th?

A. Yes, sir.

Q. Now go ahead and tell me where you next proceeded?

A. On the 11th we left Sifford's Falls at 6:50 A. M., and arrived at Radford at 8:30 P. M.

Q. Were you traveling continuously?

A. We were not that day. The truck driver misunderstood us and our dinner was about three hours late. We waited about three hours for dinner.

Q. The truck driver was following you with supplies?

A. He met us at intermediate points on the river where ever he could.

Q. Why didn't you carry your supplies with you?

A. Four men and the equipment we had, at the time, was quite a bit of supplies in the boat.

Q. How many miles was it from Narrows to Allisonia, about seventy-five?

A. Allisonia was approximately seventy-two or seventy-three miles.

Q. If you were able to proceed without any delays your boat would have covered that distance in about sixteen hours, wouldn't it?

1614 A. What distance?

Q. Seventy-two miles?

A. No, I wouldn't say that.

Q. You all get to Radford on the 11th, what did you then do?

A. On the morning of the 12th we left Radford at 7:00 A. M., and arrived at Lowman's Ferry 6:30 P. M., and on the 13th we left Lowman's Ferry 7:30 A. M., and arrived at Allisonia 2:30 P. M.

Q. Left when?

A. 7:30 A. M.

Q. And arrived when?

A. 2:30 P. M.

Q. You left the Narrows on the 9th and arrived at Allisonia on the 13th?

A. That is correct.

Q. And it took all or a part of five days for the trip, that is the 9th, 10th, 11th, 12th and 13th, all or a part of those days?

A. Yes, sir.

Q. You say that distance is about seventy-two or seventy-three miles?

A. Yes, it is.

Q. Your boat would cover seventy-two or seventy-three miles in about sixteen hours, wouldn't it?

A. That is if we weren't going against the current, and if we were familiar with the channel, we might do it. I don't know how much mileage we covered dodging in and out looking for the deep water, but quite a bit.

Q. You lost quite a bit of time dodging about looking for a channel?

A. Yes, sir.

Q. And suffered a good deal of trouble from swift currents?

A. We did not.

1615 Q. Did it slow you up some?

A. Some, yes, sir.

Q. But not substantially?

A. No, sir.

Q. So the time lost was not due to any degree of the swiftness of the current?

A. The current over-all not just over the rapids.

Q. Was Mr. Gerdes with you on this trip?

A. He was not. I beg your pardon, on the trip, that portion of the trip, of the Hinton-Narrows trip, between the C. C. C. Camp and return to the C. C. C. Camp he was.

Q. What day was that?

A. He was with me on the 19th and 20th of July, 1936.

Q. On the 19th of July, 1936 did you have any trouble at Bulls Falls?

A. No, sir, we did not.

Q. Did you pull the boat through?

A. We did.

Q. Did you pull the boat through at Harvey's Bridge on the 19th?

A. We did.

Q. Did you do it at Wiley's Falls?

A. We did not.

Q. You do not agree with Mr. Gerdes on that?

A. We pulled it through on the 20th.

Q. Did you pull it through Shumate's Falls?

A. We did.

Q. And at McDaniel's Bridge?

A. I am sorry I do not know where that is.

Q. Did you at Peters Mountain Falls?

A. We did.

Q. This was the trip you told about on direct making it from Hinton to Narrows?

1616 A. It is.

Q. I believe you said you didn't get out of the boat except a couple of times?

A. I made that statement but I probably misunderstood the question, because I didn't mean it that way.

Q. Did you get out of the boat going from Narrows up toward Allisonia?

A. We did.

Q. Did you get out at Barnett's Falls?

A. We did get out at Barnett's Falls.

Q. And from the Narrows up to Allisonia, going upstream, can you tell me how many times you got out?

A. I can.

Q. Just begin at the Narrows and tell me the first place you got out going up the stream?

A. Between Narrows and Ripplemead we got out six times. I want to qualify my statement here, on our first days journey. I want to state that we were unfamiliar with the operation of the boat and the motor.

Q. You had operated it from Hinton, hadn't you?

A. That was two hours at most.

Q. Didn't you have in your party these men that you say have been under you, going back and forth across these points doing surveying work?

A. No, sir, there was probably only one man who was at all experienced with the river, and I doubt whether he had boated on the river before that between the mouth of Bluestone and Hinton.

Q. I thought you told us on direct examination you had men who had been going back and forth across the pools of this river in connection with surveying work?

A. That is between the Highway Bridge at Narrows and Hinton.

Q. And they had used a boat before?

A. Yes, sir, but we were speaking of the trip above the narrows.

1617 Q. Now tell me the next time you got out?

A. Six times. I want to qualify that statement, that was the first time that any of us had operated an outboard motor. One of the men had some experience several years ago, but we had no experience in estimating the depth of the water in the channel by the eye.

Q. Mr. Gerdes was with you, was he not?

A. Not on that trip. We, of course, estimated it and one time we decided we could not make it with the boat on account of shoals or the water was too swift or some reason or other we could not do it and we waded around near the bank. Later we came back down through this same place without any trouble at all.

Q. You mean going downstream?

A. Yes, sir, with the motor in operation.

Q. If you have made your explanation about getting out of the boat on this stretch, now tell me how many times you got out of the boat on the next stretch, from Hiawassee to Pembroke?

A. You mean from Ripplemead?

Q. Yes, from Rippelmead to Pembroke.

A. We didn't get out of the boat but once and that was at Walker's Creek Bar, and we helped it over one ledge by getting out and lightening the boat and then poled it up the rest of the way.

Q. Didn't you pole it up to Snidow's?

A. No, sir.

Q. But you poled the boat at all of these other places, didn't you?

A. No, sir, there was any number of them that we went up by motor.

Q. Tell me how many times you got out, going up to Pembroke?

A. From Pembroke to Allisonia we got out four times.

Q. How many times did you pole the boat?

A. Six times.

Q. Now I show you this exhibit marked No. 515 for identification and will ask you if you know what that is?

1618 A. Yes, that is Peters Mountain Falls.

Q. Did you go upstream to that falls at any time?

A. We did.

Q. Without poling the boat or getting out of the boat?

A. No, we poled the boat through there.

Q. Every time?

A. Yes, sir.

Q. Did you go down the stream to Peters Mountain Falls without getting out of the boat?

A. I did not, but several of my party did.

By Mr. Jackson. I move the Court to strike out that evidence as hearsay.

A. It is not hearsay, they went out under my instructions.

Q. Now, how did you happen to make this trip from Hinton to the Narrows?

A. I don't understand your question. How did I happen to make it?

Q. Yes.

A, What do you mean?

Q. Were you directed to make the trip?

A. I was.

Q. Were you directed to make the trip for the purpose of testifying about it in this lawsuit?

A. I was not.

Q. Do you know that was not the purpose?

A. I did not know at the time, no, sir.

Q. You didn't know what the purpose was?

A. No, sir. The orders I received were to make a reconnais'ance, of the New River, paying particular attention to the shoals and banks and rock ledges along there for the purpose of replenishing the store of knowledge of New River. That was signed by the Chief of Engineers. Those are the only instructions I received.

Q. You say those instructions were from the Chief of Engineers?

A. Yes, sir.

Q. Who was that?

A. It was signed by Col. Edgerton.

1619 Q. And that is the reason you made the trip up above the Narrows to Allisonia?

A. Yes, sir.

Q. You have been living at Hinton since when?

A. Since November of last year.

Q. You never made a trip from Hinton to the Narrows before?

A. Not all the way, no, sir.

Q. And of course, you never made a trip from the Narrows to Allisonia before?

A. No, sir.

Q. I meant to ask you whether I was right in understanding from Picture 27 in your exhibit 193, that this outboard motor is hinged so that it could be raised?

A. Yes, they are a hinged that way.

Q. Did you tilt it from time to time?

A. No, we did not, but upon striking an object or something like that, it would tilt to a certain extent.

Q. That is, it would hit bottom at times and then it would tilt.

A. Not that I remember, it did not hit the bottom, but it would hit a boulder probably which we could not see under the muddy waters.

Q. When you got out to pole the boat through the falls, it would tilt up then?

A. No, it wouldn't hold up in that position.

By Mr. Jackson. I think among the maps offered by the Government, they did not include all of the maps, that were with some of these reports. I hold here in my hand a map dated November 21, 1912, reconnaissance map of New River from Hinton, West Virginia, to Radford Virginia, compiled under the direction of Major F. W. Alstaetter, Corps of Engineers, United States Army, from surveys made by the Engineering Department in 1872 and by the United States Geological Surveys, 1884-1885 and 1886, and will ask to have it marked Exhibit 527 for identification.

(Map is marked Exhibit 527 for identification.)

Q. Now I show you this exhibit marked 527 for identification, and point out to you the designation "Barnett's Falls" on the profile, and will ask you whether or not that does not show practically a sheer drop of six and six tenths feet?

A. Just a minute, I want to examine the scale. That is a very distorted scale as most profiles are plotted to, and in that case it would show almost a sheer drop.

1620 Q. You notice the figures 1693.66 and 1700.26 elevation, don't you?

A. Yes, sir.

Q. And that shows a drop of 6.6 feet. Am I right about that?

A. Yes, sir, it does.

Re-direct examination by Mr. Thompson:

Q. I now refer you to Exhibit marked for identification 527 by the defendant, to this reference which Mr. Jackson has made, what he calls almost a sheer drop, and ask you on that scale if that were platted as to actual distance, what that drop would cover in space, as to feet or miles?

A. That scale is distorted approximately 20 to 1 on the horizontal and two inches would equal one mile, on the vertical scale, one inch equals ten miles.

Q. So that if that were on the river, as it actually is, what stretch of the river would this so-called vertical drop, as counsel describes it, what distance would that cover on the river?

A. Mr. Thompson, I am sure there is an error here. That scale should be one inch equals ten feet instead of ten miles.

Q. Which is right, just state which is right?

A. One inch equals ten feet, instead of one inch equals ten miles, as shown on the print.

Q. And you have got how many inches there?

A. Approximately ¾ of an inch.

Q. And how much would this drop be that they speak of as a vertical drop?

A. It is still 6.6 drop, but it is spread out over a greater distance than is shown on here. If you will give me time, I can figure that out.

Q. Just take your time and do so?

A. That would be approximately 500 feet rather than a sheer drop.

Q. In other words it is a drop of that distance in a stretch of 500 feet?

1621 A. Yes, sir, that is right.

Q. Counsel for the defendant attempted to show in his cross-examination of you here that you were taking all these pictures from a distance, apparently drawing an inference that you were afraid to take them close up. Now let us look at Exhibit 192 and Picture No. 25, and I will ask you if it was possible to take that situation and that picture closer up?

A. I believe not.

Q. And that picture shows all the rocks that are in the river?

A. It does.

Q. I now refer you to the same exhibit, Wylies Falls picture. Could you have taken that any closer and showed the falls?

A. We could have, but it would not include the chute, as it is shown in there.

Q. That does show waves, doesn't it?

A. Yes, sir, it does.

Q. I now refer you to picture 19 in the same exhibit, and will ask you whether you could have taken Anderson's Falls there any closer than you did?

A. We could not have done it and included all of the falls.

Q. I show you picture No. 3 in the same exhibit and ask you if that shows rough water?

A. It does.

Q. Very rough?

A. Rather rough.

Q. Could you have taken that picture any closer; where was that taken from?

A. That was taken from the bow of the boat, about 2 feet above the water surface.

Q. How far was the water away from the camera when you took that picture?

1622 A. Well, not over 3 feet.

Q. I refer you now to Government Exhibit 193, and to the picture in the upper left hand corner, called Sifford's Falls. How far away was the camera from Sifford's Falls when you took that picture?

A. About 30 or 40 feet from the bank.

Q. And the bank was 30 or 40 feet away from the falls?

A. In that case the falls extend right to the bank line.

Q. I call your attention to picture No. 29 in the same exhibit and ask you what that is?

A. That is a view of some of the rapids that we encountered on our trip.

Q. That shows waves, doesn't it?

A. Yes, sir.

Q. How close was your camera when you took that picture?

A. Within two or three feet of the water surface.

Q. What rapids were these?

A. Just below Clark's Ferry.

Q. I show you another picture in the lower left hand corner and will ask you what that is?

A. It is a view of some more rapids.

Q. How close was your camera to the water when you took that picture?

A. Within two or three feet of the water.

Q. What did you say the distance was from Allisonia to Hinton?

A. Approximately 110 miles.

Q. And how long did it take you to come down from Allisonia to Hinton?

A. From Allisonia to the Narrows the trip took a day and a half and from the Narrows into Hinton, about nine hours.

Q. So that was two days and one-third approximately, or less than one-third, a little over two days?

A. About that.

1623 Q. Had you known the channel you could have come faster?

Objection overruled. Exception

A. We could have, yes, sir, if we had been more familiar with the channel, we could have come down quicker.

Q. Counsel for the defendant asked you about what conditions you were confronted with going upstream, and I would like to ask you whether you had a protected propeller going upstream?

A. We did not.

Q. I believe you said that the propeller was two feet deep?

A. Between two and three feet deep.

Q. And some of the shoals you went over would not draw two feet?

A. They would not.

Q. And then you had to investigate it?

A. Yes, sir.

Q. And didn't that take time?

A. It did.

Q. As I understood you in your cross-examination you said you had not had experience with the motor. Is that right?

A. That is right.

Q. Did you have any trouble in learning about the running of this motor?

A. We did have quite a bit of trouble.

Q. And did that take time?

A. It did.

Q. I believe you said you were with Mr. Gerdes when he made the test over Bulls Falls?

A. I was.

Q. And at that time you had a protected motor, didn't you?

A. Yes, sir.

Q. Did you have any trouble going over Bulls Falls, in making that test?

1624 A. None whatsoever.

Q. If the channel of this river were marked by buoys or flags, could you have made this trip faster?

A. We could have.

Q. Both going and coming?

A. Both ways.

By Mr. Jackson:

Q. One question. When you took your pictures from your boat you took them two or three feet from the water surface in all cases, didn't you?

A. Not in all cases.

Q. When you took them from the boat you took them very close to the water, didn't you?

A. In some cases the man would be standing up in the boat and at that time he was higher.

1625 John D. Fitch

Direct examination by Mr. Thompson:

Q. Where do you reside?

A. 35 Montgomery Avenue, Kensington, Maryland.

Q. What is your business?

A. I am an engineer in the employ of the Federal Power Commission.

Q. What work do you do for the Federal Power Commission

A. My work has been largely in connection with power studie system load studies, investigation of potential undeveloped wate power and existing hydro electric projects.

Q. Have you read the transcript of the testimony presente before the court by Mr. Charles H. Pierce on July 23, 1936?

A. I have.

Q. Do you recall what that testimony shows as to the relativ mean daily flow as measured at the Caperton gauge on Ne River?

Q. Do you remember what the figures were?

A. I do.

By Mr. Thompson:

Q. I hand you, marked for identification, Government Exhibi 194, and will ask you if you know what that is?

A. That is a blueprint of the chart from the automatic record ing gauge at Caperton, West Virginia, for the period Augus 8th to August 21st, inclusive, 1930.

Q. I will ask you to look at that blueprint and state if ther is any indication of any rise along about the date, August 1 1930?

A. On August 15th this record shows a slight rise in th stage at this gauge.

Q. What did the gauge show on August 15, 1930, at the Caper ton gauge?

A. It is impossible to answer the question in tha
1626 form. The gauge is a continuous record of the stage o
water.

Q. Do you know what the gauge shows on that day?

A. I can read it from this chart as to any particular hour.

Q. Give it to us as of August 15, 1930.

By the Court. At what hour of that day?

By Mr. Thompson:

Q. What does that show as the lowest flow on that day Augus 15, 1930?

A. Now is that the question?

Q. Yes sir.

A. The lowest stage for that day—I would have to refer to the rating table.

Q. Just refer to that.

A. (Witness refers to said table.) It shows a stage of 1.84 feet.

Q. Do you recall what the testimony shows as the minimum flow of that day, by Mr. Pierce?

A. At which gauge?

Q. At the Caperton gauge.

A. There is no testimony as to the minimum flow at the Caperton gauge on that day, but by inference it was shown that the flow at the Caperton gauge could not have been less than a flow of 826 cubic feet per second, which was recorded on that gauge on September 10, 1930, as being the minimum flow for that water year.

Q. How much was it?

A. 826 cubic feet per second.

Q. What was the flow, if you remember the testimony, at Kanawha Falls on that same day, August 15, 1930?

A. The minimum recorded flow at Kanawha Falls on August 15, 1930, was 640 cubic feet per second.

Q. Making a difference between the two of what?

A. 186 cubic feet per second.

By the **Court**:

Q. That is, if you assume that the flow at Caperton was 826?

1627 A. That is correct. It is that much or more.

Q. You say it is that much or more?

A. That is right.

By Mr. **Thompson**:

Q. Have you examined the Water Supply Paper and the United States Geological Survey in which the flows you have just mentioned, are recorded?

A. I have.

Q. State whether or not the flows as stated by Mr. Pierce in his testimony agree with those reported in the Water Supply Paper?

A. They do.

Q. From your examination of the Water Supply Papers in which are recorded the flows at those two points for the month of August, 1930, did you find where the recorded mean daily flow at Caperton exceeded the recorded mean daily flow at Kanawha Falls on the same day?

A. I did; there were six such days, in addition to August 15th.

Q. What did you find as to the relationship of the mean flow for the entire month of August 1930, at the two gauges?

A. I found that the recorded mean flow for August, 1930, at the Caperton gauge was 1450 cubic feet per second, and that the recorded mean flow for the same month at the Kanawha Falls gauge was 1520 cubic feet per second, or 5 percent greater than the flow at Caperton.

Q. State whether or not you have examined the graphs or chart showing water stages recorded by continuous recording gauges at Caperton and Kanawha Falls during August 8, 1930, to August 21, 1930, inclusive?

A. I have.

Q. How did the trend and variation of stage, as shown by the two charts, compare in general?

1628 A. The trend in variation of stage are in general conformity if one allows a lag to account for the time required for the water to flow from the upper to the lower gauging station.

Q. State whether or not there is any decided exception to this general conformity?

A. There is.

Q. When did that occur?

A. It occurred on August 15, 1930.

Q. I hand you, marked for identification, Government Exhibit 195, and will ask you to look at that and state what it is, if you know?

A. This is a chart from the recording gauge at the Kanawha Falls gauge in the Kanawha River for the period July 30th to August 24th, inclusive, 1930.

Q. Please look at that chart and state whether there is any decided change at any point shown on that chart?

A. There is a decided change shown on the chart and it occurs on August 15th.

Q. Is there any change on August 12th, 13th, or 14th of a decided nature?

A. There is no similar change, no sir.

Q. Look at the 16th and 17th, is there any decided change on those dates?

A. No change similar to that on the 15th.

Q. What kind of a change is there on the 15th?

A. The gauge record shows a fairly constant stage of minus .48 feet, from 6 a. m. to 1 p. m., at which time the stage drops off suddenly, reaching a low of minus 0.95 feet at 3:00 p. m., when it again rises and is at minus 0.48 feet again at 5 p. m., after which it continues to rise and is at minus 0.39 feet at midnight August 15th.

Q. What does the reading of that gauge indicate to you?

A. It indicates a sudden stoppage of the flow passing the Kanawha Falls gauge.

1629 Q. Do you know where the Kanawha Falls gauge and the Caperton gauge are located?

A. Yes, sir.

Q. Where is the Kanawha Falls gauge located in connection with the Electro Metallurgical Power project?

A. The gauge is located downstream from that power project.

Q. Where is the Kanawha Falls power plant of the Electro Metallurgical Corporation located with reference to the Caperton gauge and the Kanawha Falls gauge?

A. The Kanawha Falls plant of the Electro Metallurgical Company is located upstream from the Kanawha Falls gauge and downstream from the Caperton gauge.

Q. That being so, does the flow coming from the Caperton gauge pass through the Kanawha Falls plant before being recorded at the Kanawha Falls gauge?

A. It either passes through the plant or over the dam.

Q. From that what conclusion do you draw as to this particular drop as is indicated on this gauging chart?

A. From the fact there is no corresponding drop at the Caperton gauge, I conclude that the flow was re-regulated between its passing the Caperton gauge and passing the Kanawha Falls gauge.

Q. And where would that occur?

A. At the Kanawha Falls plant of the Electro Metallurgical Corporation.

Q. Is there any other hypothesis upon which you could base such a conclusion?

A. None whatever.

By Witness. I personally received them from one of my superiors here in Roanoke and I have seen the letters of transmittal which accompanied these gauge charts.

By Mr. Thompson:

Q. Does that indicate it is an original?

1630 A. This chart here indicates that it is an original, the other, of course, is a blueprint of the original.

(Exhibit 195 offered in evidence.)

Cross examination by Mr. Jackson:

Q. Mr. Fitch, with what did you compute the lag between Caperton gauge and Kanawha Falls gauge?

A. I did it by inspection and comparing the two charts.

Q. And what is your judgment as to the variation?

A. It varied from 12 to 6 hours.

Q. Do you know what that variation depends upon?

A. Why, it is not the same at all times.

Q. Yes, but why?

A. I can see two reasons—the first is the stage of the water, whether or not it is a high or low flow, and secondly, the fact that the water may not be released from the Kanawha Falls plant simultaneously with its receipt at that plant.

Q. As the stage gets higher, does it travel faster or slower?

A. As the stage gets higher, it travels faster.

Q. How far is the Kanawha Falls power plant of the Electro-Metallurgical Company upstream from the Kanawha Falls gauge?

A. About three-quarters of a mile.

Q. Do you know what the lag is between the flow at Kanawha Falls power plant and below to the Kanawha Falls gauge?

A. No, sir.

Q. Would you think perhaps it would be 15 minutes?

A. It is hard to answer that without referring to find out whether or not the control of Kanawha Falls gauge extends closer to the Kanawha Falls plant than the location of the gauge.

1631 Q. Referring to this Exhibit No. 195, which you have offered with dip to 640 second feet in stage corresponding to 640 second feet?

A. Yes, sir.

Q. That is substantially an instantaneous measurement?

A. The low point is instantaneous reading, yes, sir.

Q. It is an instantaneous condition?

A. Yes, sir.

Q. As a matter of fact, the elapse of time between the commencement of that dip and when the gauge rises to a point higher than it is where the dip initiated, is very short, isn't it?

A. I scaled that off and found that the rise to the same stage is approximately 4 hours for the complete cycle, from the same elevation to the same elevation again.

Q. What is the average flow for that shown by estimates?

A. The average flow at Kanawha Falls was 1070 cubic feet per second.

Q. That was an estimated flow?

A. It is estimated from the chart, of course. All reported flows in the Water Supply Papers are computed from the charts.

Q. They are all estimates made by some kind—by applying some kind of rating curve?

A. Yes, sir.

Q. Did you, in your examination of these gauge records, make any study of the twenty-one gauge reading?

A. You mean the 1921 gauge reading?

Q. Yes, sir.

A. No, sir; I limited my study to this particular case which came up in the previous testimony.

1632 Redirect examination by Mr. **Thompson**:

Q. Mr. Fitch, Mr. Jackson used the word "estimated" with respect to the discharges. Were they estimated or computed?

A. They were computed.

Recross-examination by Mr. **Jackson**:

Q. You say "computed"—you simply mean that you took a rating curve and applied that rating curve to the gauge height?

A. Yes, sir.

Q. That part of it is computation?

A. Yes, sir.

Q. The rating curve itself was produced by taking a certain number of measurements and drawing a smooth curve through it?

A. Am I to testify as an expert on gauges, or from my own knowledge?

Q. What you know about it. You told Mr. Thompson something about it.

A. It is a common procedure in stream gauging work to do this.

Q. That smooth curve is drawn as a matter of judgment, is it?

A. Yes, sir.

Q. You find the measurements scattered all over the paper, some on one side and some on the other?

A. At times, I suppose, some of the series of measurements will show a better conformation to the smooth curve than others.

Q. When you find few or no measurements at either end of the curve, the curve is extended by judgment, isn't it?

A. Yes, sir; I have seen that often.

Q. You know, from your experience, that the accuracy of individual measurements plotted on the chart are themselves subject to factors of error?

A. Yes, sir; I presume so.

1633 **ROGER B. McWHORTER**

Direct examination by Mr. **Gatchell**:

Q. Mr. McWhorter, please state your name, your present occupation and your residence.

A. My name is Roger B. McWhorter, I am an engineer, and I reside in Washington, D. C.

Q. Are you a graduate engineer, and if so, of what college?

A. I am a graduate of the Alabama Polytechnic Institute of Auburn, Alabama, class of 1909. The University or rather the Alabama Polytechnic Institute conferred two degrees upon me—namely, Bachelor of Science in Civil Engineering, and the professional degree of civil engineer.

By Mr. JACKSON:

Q. That was in 1909?

A. In 1909 was the Bachelor of Science degree and in 1913 was the professional degree of civil engineer.

By Mr. GATCHELL:

Q. What experience have you had in your profession?

A. Before graduation I worked on the construction of the Colbert Shoals Canal, on the Tennessee River, about 30 miles down stream from Muscle Shoals.

After graduation, in June 1909, I entered the Service of the United States Engineer Department on the construction of the Hales Bar Dam, hydroelectric plant, and navigation lock, on the Tennessee River, about 33 miles down stream from Chattanooga, Tennessee. The Hales Bar water power project was one of the larger of the earlier developments and the dam created slack water navigation for a distance of about 39 miles, or to a point 6 miles above Chattanooga, and this improved the section of the Tennessee River most difficult of navigation, with the possible exception of——

By Mr. GATCHELL:

Q. Will you proceed?

1634 A. I was on the construction at the Hales Bar project for a period of four and a half years, or until the project was completed in December 1913.

Immediately thereafter, I took charge of a survey and investigation of the Tennessee River from Hales Bar Dam, Tennessee, to the Guntersville Dam site in Alabama, for the purpose of obtaining information to formulate an improvement of the Tennessee River for slack water navigation in that 82 mile reach. The Guntersville Dam, just at the down stream end of this reach, is now under construction.

Q. What did you do after that?

A. I was on this particular work—this survey and investigation of the Tennessee River from Hales Bar to Guntersville from December 1913 to November 1914, about half that time being in the field—somewhat over half, and the remainder in the office working out the results of the survey.

From November 1914 to April 1915, I was stationed—I was in charge of the engineer depot at Chattanooga, Tennessee; in charge of the construction of floating equipment, particularly, a dipper dredge, derrick boats, barges, dump scows and other river equipment for the improvement and maintenance of the Tennessee River.

In April 1915, I went to Muscle Shoals in charge of a survey and investigation of that particular reach of the Tennessee River which now embraces the reservoirs of the Wilson Dam and the Wheeler Dam, including surveys at the sites of these two dams, both of which have since been constructed by the United States, at the sites selected in 1915 and 1916. I was at Muscle Shoals on that preliminary work for a period of about 14 months, and, in addition to directing the field work, I collaborated with other engineers on an extended study of the power possibilities of Muscle Shoals section of the Tennessee River. The result of that survey and investigation was published in House Document No. 1210, Sixty-fourth Congress, first session.

1635 In May 1916, I accepted employment in the engineering department of the Miami Conservancy District on flood control work in the Miami River basin in southwestern Ohio. I served successively as Assistant Engineer, Assistant Division Engineer, and finally as Division Engineer, in charge of one of the principal divisions of that work. I remained with the Miami Conservancy District until the project was completed in May 1923, a period of almost 7 years exactly.

On May 1st, 1923, I accepted an appointment from the United States Engineering Department, as General Superintendent of construction at the Wilson Dam, a large hydroelectric plant or development on the Tennessee River near Florence, Alabama.

By Mr. JACKSON:

Q. That was in May 1923.

A. May 1st, 1923.

By Mr. GATCHELL:

Q. Proceed.

A. (Continuing.) The Wilson Dam is at the lower end of the Muscle Shoals reach of the Tennessee River, about 94 feet high, and backs water up to the tail water of the Wheeler Dam, which is just now being completed. I remained at the Wilson Dam as general superintendent of construction until the power plant was substantially completed in April 1925.

On April 18th, 1925, I went to Detroit, Michigan, as principal engineer assistant to the American section of the Joint Board of Engineers, appointed by the governments of the United States and Canada to make an investigation and prepare a report on the improvement of the St. Lawrence River for navigation and power. I remained with the American section of the Joint

Board of Engineers for 18 months, in charge of the preparation of project plans, both for power and navigation on the international section of the river, of the St. Lawrence River, extending from the outlet of Lake Ontario to Cornwall, Ontario, a distance of 115 miles. Various alternative schemes for the development of power in this international section of the river were prepared, detailed estimates were made, and in each case provision was made for an installation in excess of 2,000,000 horsepower.

1636 Q. Before you get to that, was that report published?

A. The report of the Joint Board of Engineers was published along about November 16th, 1926, or I believe possibly in 1927.

Q. Who published it?

A. Both Governments published it. The Canadian Government published it in full, including the appendices, and the American Government published the body of it, but put the appendices in mimeograph form.

In October 1926, I was appointed Consulting Engineer to the Orleans Levee District and the City of New Orleans to make studies and prepare tentative plans for spillways on the lower Mississippi River for the reduction of flood heights along the levees and in front of New Orleans. In that capacity, I cooperated continuously with the Federal Spillway Board, a body of engineers created by appointment of the Secretary of War, pursuant to an Act of Congress, which Board made a report to Congress on spillways for the lower Mississippi, including a recommendation for the spillways.

A, (Continuing.) On December 1st, 1928, I accepted appointment from the United States Engineer Department, as principal engineer in the second New Orleans District, on the execution of the flood control project, adopted by Congress by Act of May 15th, 1928, I remained in that position in charge of the construction of the Bonnet Carre spillway and levees throughout the Second New Orleans District, until September 1st, 1930, at which time I was transferred to Cleveland, Ohio, as principal engineer in the Great Lakes Division of the United States Engineer Department.

By Mr. Gatchell:

Q. What did you do after leaving New Orleans?

A. I went to Cleveland, Ohio, as principal engineer of the Great Lakes Division, United States Engineer Department.

Q. What did your do—what were, in general, your duties in that position?

1637 A. My duties related to the improvement of the Great Lakes and their connecting channels for navigation and further studies of the St. Lawrence River, with a view to its improvement for navigation and power development.

Q. After you left that position, what did you do?

A. On May 29th, 1931, I was appointed Chief Engineer of the Federal Power Commission, and I assumed the duties of that position June 27th, 1931.

Q. Are you a member of any engineering societies?

A. I am a member of the American Society of Civil Engineers and of the Society of American Military Engineers, and I am also a member of the Washington Engineering Society.

Q. Do you hold any commissions?

A. I am a Lieutenant-Colonel in the Engineer Reserve Corps, U. S. Army.

Q. What are your duties of Chief Engineer of the Federal Power Commission?

A. As Chief Engineer of the Federal Power Commission, I am in charge of the Commission's Bureau of engineering, which handles all engineering activities of the Commission.

I direct the examination of declarations of intention to construct water power projects and of applications for Preliminary permits and licenses for water power projects on navigable waters or affecting navigable waters and public lands and reservations of the United States.

Q. Have you, as chief Engineer of the Federal Power Commission, participated since coming with the Commission, in investigations of the effect of hydroelectric projects and their operation on the navigable capacity of navigable waters of the United States.

A. Yes, sir.

Q. How many such investigations have you conducted?

A. I cannot state exactly, but quite a good many.

Q. Would you say as many as one hundred?

A. I don't think that many.

1638 Q. About how many would you estimate?

A. Possibly thirty or forty.

Q. Are you familiar with the New River and the Kanawha River in Virginia and West Virginia?

A. Yes, sir.

Q. To and from what points?

A. I am familiar with New River from the mouth of Wilson Creek to the mouth of New River at its confluence with the Gauley River, a distance of 252 miles.

I am familiar with the Kanawha River from its source at the confluence of the New River and the Gauley River to its mouth at Point Pleasant, West Virginia, a distance of 97 miles.

Q. How did you acquire your familiarity with New River and Kanawha River?

A. By a study of numerous official reports, both State and Federal, and by field examinations, which I have made of the New River and Kanawha River, during the past five years.

Q. What reports have you studied?

A. First, I studied the report of the John Marshall Commission, covering the survey and expedition of that commission, made in 1812. The Marshall Commission navigated New River——

By Mr. Gatchell:

Q. Just state by name the reports.

A. Secondly, the report of Thomas Moore, covering a survey and navigation of the New River in 1819, by himself and his associate, Issac Briggs.

By Mr. Jackson:

Q. Is that the Moore and Briggs report that we have had reference to here?

A. Yes, sir.

By Mr. Gatchell:

Q. What other reports have you studied?

A. The report of the Chief of Engineers for 1873, containing the report of Major W. P. Craighill, and the separate reports of Major Craighill's subordinates.

Next, I studied the report of the Chief of Engineers for 1879, containing the report of Major W. P. Craighill and
1639 separate reports of his subordinates—Captain Cuyler and and Mr. Scott, and also the report of William Proctor Smith, on his survey and investigation of New River from the Mouth of Wilson Creek to the Lead Mines.

When I mentioned the Craighill report of 1872–73, I meant also to mention the report of his subordinate, N. H. Hutton, covering Hutton's survey and investigation of New River, of the 128 mile stretch from the Lead Mines to the Mouth of the Greenbrier River.

Next after the report of the Chief of Engineers in 1879, I examined the various annual reports of the Chief of Engineers of the United States Army from 1879 to 1890, inclusive, describing navigation improvements made on the New River by the United States during that period.

Next, I examined the report of the Chief of Engineers for 1891, which contains a report by Major W. P. Craighill relating to New River.

Next, I examined the report of the Chief of Engineers for the year 1913, which contains the report of Major F. W. Altstaetter, of a preliminary examination and report on the New River between Hinton and Radford.

Next, I examined the War Department report on the Kanawha River, West Virginia, Virginia and North Carolina, prepared and submitted to Congress pursuant to the provisions of the Rivers and Harbors Act, of January 21st, 1927; and of the Mississippi Flood Control Act of May 15th, 1928; and in accordance with House Document No. 308, Sixty-ninth Congress, first session.

By Mr. JACKSON:

Q. Is that an exhibit?

A. I think it is Government Exhibit 145; that is my recollection. This report and similar reports and various other reports on various other rivers in the country are called 308 reports, because they were made in accordance with House Document 308.

I also have examined the various official reports of the Chief of Engineers, War Department, to the Federal Power Commission, on Declarations of Intention, and applications for preliminary permits and licenses for water power projects in the Kanawha River Basin. 1640 I have also read the transcript of each and every hearing held by the Federal Power Commission and its authorized representative on Declarations of Intention and applications for Preliminary permits and licenses for power projects in the Kanawha River basin.

1641 By Mr. GATCHELL:

Q. You told me that you had made a number of field trips over New River and Kanawha River in the past five years. What were those trips?

A. To acquire an intimate knowledge of these two streams and of the existing structures thereon.

Q. To what extent and how many times and in what places did you personally inspect New River?

A. I have made three trips over New River, from the Mouth of Wilson Creek to the mouth of Gauley River and down Kanawha River to its mouth at Point Pleansant, West Virginia.

I have made numerous other trips to different sections of the river, particularly to the Buck and Byllesby plants, above Ivanhoe—to the Radford Dam site; to the village of Radford, to Glen Lyn, to Narrows, and to the town of Gauley Bridge, the City of Charleston, and various other points on the river.

I have inspected the New River at the mouth of Wilson Creek; at the Fields Dam about two miles below the mouth of Wilson Creek; at numerous points between Fields Dam and Fries, Virginia; at the Washington Mills Dam, just above Fries; at the Buck power plant and the Byllesby power plant, several times; at Foster's Falls; at Allisonia; at the Norfolk and Western bridge at Hiwassee; at the Radford Dam site several times, and on numerous occasions inspected stretches of the river between Radford and Point Pleasant.

Q. Have you used any ferries on the river?

A. I have; I believe I have seen most of the ferries and have crossed the river on several of them.

Q. What is the depth of water that obtains at so-called low water in the stretch of the New River between Allisonia, Virginia, and Hinton, West Virginia.

A. From Allisonia, Virginia, to Hinton, West Virginia, 111 miles, a depth of 2 feet obtains for about 98 per cent of that distance. The total distance over which the depth is less than 2 feet is less than two miles; about 1½ miles of this is at Sifford's Shoals, and over short distances at four other points, one of which is just above the head of Sifford's Shoals. 1642

Q. How did you obtain the information about the depth of water at various shoals between Radford and Wyley's Falls?

A. The depth at all shoals between Radford, Virginia, and Wyley's Falls were measured recently under my direction and I personally observed the river at each and every one of these shoals. I assigned a competent engineer to this work and gave him specific instructions to go to each one of these shoals and obtain information as to the width of the navigable chute, and the depth of that chute—the minimum depth of the chute and the maximum velocity of the current in the chute.

I instructed him, in other words, to obtain information as to the most adverse condition at each one of these shoals.

Mr. Gatchell. Your Honor, at the close of this morning's session I asked two questions which I understood your Honor to say were not permissible. I asked the witness first to state whether or not, in his opinion, New River had navigable capacity in its natural condition and then whether it was susceptible of navigation.

The Court. My reason for sustaining the objection was because I didn't think that was a subject for expert opinion. That is what this law suit is about largely and that is what the Court has to decide.

Mr. Gatchell. Will your Honor allow us an exception.

1643 Q. Mr. McWhorter, I show you a profile marked for identification Government Exhibit No. 196, entitled "Profile of New River, North Carolina, West Virginia and Virginia," and ask you if you recognize this chart?

A. I do.

Q. Was it prepared under your direction?

A. It was.

Q. And what does it purport to show?

A. Government Exhibit No. 196 shows a profile of New River in six sections. The section at the bottom of the sheet shows New River from its mouth up to a point 35 miles above its mouth. The next section above shows the river from mile 35 to mile 80. The third section from the bottom shows a profile of New River from mile 80 to mile 125. The fourth section up from the bottom shows a profile of New River from mile 125 to mile 170. The fifth section up from the bottom shows a profile of New River from mile 170 to mile 215. The section at the top of the sheet shows a profile of New River from mile 215 to mile 252 at the mouth of Wilson Creek.

Q. Where was the information obtained from which you had this chart prepared?

A. In order that it may be understood perhaps I had better explain first about the scales.

Q. Let me ask then as a preliminary—is this large chart on the easel exactly similar to the smaller chart introduced as Government exhibit, for identification, No. 196?

A. It is. The smaller charts are photographic reductions of the large chart, with the coloring added.

Q. Would you care to use the large chart to explain where you secured the information from which this chart was prepared?

1644 A. The horizontal scale of this profile is one inch to the mile on the large chart and probably about a third of an inch to the mile on the small one. There are two vertical scales, one showing the elevations above mean sea level and the other showing the depths. On the large chart the elevations above sea level are to a scale of twenty feet to the inch. The depths of water are shown to a scale of four feet to the inch on the large chart. The depths shown in yellow were taken from the maps prepared from the Craighill surveys of 1872, 1874 and 1878.

By Mr. **Jackson**:

Q. Those dates refer to the reports in which they are published?

A. They refer to the years in which the surveys were made. I think you will find that the information is published in the reports for the fiscal year next following.

Q. You couldn't identify them by exhibits conveniently?

A. I don't know whether those particular maps are in evidence.

A. The depths shown in red represent the two foot depth below ordinary low water provided by the improvements made by the United States in the 26½ mile stretch extending up-stream from the steamboat landing at Hinton, West Virginia, to the head of Wylie Falls, and extending from the New River bridge near Radford, Virginia, up-stream for a distance of 29¼ miles to a point about two miles up-stream from Allisonia, and shows also the eight mile section of river improved by the United States, extending up-stream from Ivanhoe Furnace for a distance of eight miles.

Mr. Gatchell. We offer this exhibit 196 in evidence.

By the Witness (continuing). It will be observed at certain points along the profile no coloring appears to indicate the depths. The reason for that is that I have no information as to the depths at those places. I knew from observation and from official reports that certain depths existed there but I did not know what those depths were so I showed none.

By Mr. Gatchell:

Q. I show you a map entitled "Railroads" and showing New
River and Kanawhs River from the Ohio up to the North
1645 Carolina line, marked for identification Government Ex-
hibit 197 and ask you if that was prepared under your
direction?

A. It was.

Q. And what does it purport to show?

A. It shows the railroads as they now exist along and in the vicinity of the New and Kanawha Rivers, with the exception of numerous spur lines, short industrial tracks and spur tracks. It shows the railroads that are listed in the upper right hand corner of the exhibit.

Q. And from what sources did you secure the information from which this map was prepared?

A. The railroads were first put on this map from maps prepared by the United States Geological Survey, the various quadrangles in the New and Kanawha River valley, and from the State maps prepared by the Geological Survey. We then went to the Interstate Commerce Commission and verified all of this information and made certain that the locations of the railroads as shown on this map were correct.

Q. In the upper right hand corner the legend gives the year of acquisition and the period of construction of the several railroads shown on the map. Where did you secure that information?

A. That information was secured at the offices of the Interstate Commerce Commission.

Mr. Gatchell. I offer Government Exhibit 197 in evidence.

Mr. Jackson. I should like to object to it on the ground that it is immaterial and also upon the ground that the witness has testified it is based upon information obtained at the Interstate Commerce Commission which obviously is not the best source of information. We don't even know what that is.

The **Court**. Objection overruled.

Mr. **Jackson**. Exception noted.

By Mr. **Gatchell**:

Q. Mr. McWhorter, on Exhibit 197 is New River shown in its exact proportion?

A. No.

Q. Is it intended to be an accurate representation of the width of New River?

A. It is not.

Q. Are the locations of the railroads accurately shown?

A. They are.

Q. I show you Government Exhibit No. 198 for identification, entitled "New River, Virginia and West Virginia, Navigation Improvements between Hinton and Wilson Creek, 1877 to 1889," and ask you if that was prepared under your direction? 1646

A. It was.

Q. And what does it purport to show?

A. It shows the navigation improvements made by the United States on New River during the period from 1877 to 1890. It shows these improvements both on the map and on the profile, showing separately each of the three reaches improved by the United States.

Q. And from what sources did you obtain the information from which this map was prepared?

A. From official reports of the Chief of Engineers, War Department.

Q. And are those the official reports to which you have previously referred?

A. They are.

Mr. **Gatchell**. I offer Government Exhibit 198 in evidence.

Mr. **Jackson**. Do you offer that exhibit for any purpose in connection with the location of the State line?

Mr. **Gatchell**. No, your Honor, we haven't attempted to offer this map for any other purpose than showing the locations of the improvements made in the river.

Mr. **Jackson**. Is the same situation true with respect to Exhibit 197?

Mr. **Gatchell**. Exhibit 197, the railroad map, has the same situation. It is not offered for anything except with respect to the railroads.

Mr. Jackson. If it is offered for the purpose of showing the State line, I move to strike it out.

Mr. Gatchell. It does not have any relevancy with respect to the State line.

Mr. Jackson. The same is true with respect to profile map, Exhibit 196?

Mr. Gatchell. The same is true with respect to the profile map, 196.

By Mr. Gatchell:

Q. Mr. McWhorter, have you examined the Declaration of Intention filed by the New River Development Company, Government Exhibit No. 88, covering this Radford project and assigned to the Appalachian Electric Power Company on August 30, 1926, as shown in Government Exhibit 89?

A. I have.

Q. Will you describe the project which the Appalachian Electric Power Company proposes to construct under this declaration?

A. The Appalachian Electric Power Company proposed to construct a water power development on the New River about seven miles above Radford, Virginia, and about one mile above the mouth of Little River. The dam was to be of sufficient height to create a maximum power head of about 110 feet and a reservoir extending up-stream to the vicinity of the railroad bridge at Hiawassa. 1647

By Mr. Jackson:

Q. Is this the Declaration you are talking about?

A. Yes. The surface area of the reservoir at elevation 1840, which was to be the maximum normal level of the reservoir, was stated to be 4000 acres and the usable storage in a draw-down of ten feet was stated to be 40,000 acre feet. The declarant proposed to install 60,000 kilowatts in four units of 15,000 kilowatts each. The power house and sub-station were to be on the right side of the river, looking down-stream, of course.

By Mr. Gatchell:

Q. Have you examined the Application for License filed September 4, 1926?

A. I have.

Q. Is the project which was proposed to be constructed under that application as shown by the maps and plans filed with the Application for License, the same as that proposed for construction under the Declaration of Intention?

Mr. Jackson. May I ask if that is an exhibit?

Mr. GATCHELL:

That is Government Exhibit 90–A.

A. The project covered by the Application for License filed September 4, 1926, was substantially the same as that covered by the Declaration of Intention No. 86, filed by the New River Development Company, but the Appalachian Electric Power Company, by letter dated October 16, 1930, filed amended maps making substantial changes in the project and thus amending their application before the Federal Power Commission for a license for the project.

Q. Have they made any further amendment of this application since October, 1930?

A. They have not, and, to the best of my knowledge and belief, the company now proposes to build the project in accordance with those amended plans filed in October, 1930, and
1648 as set forth in the Bill of Complaint and Answer in this proceeding.

Q. Have you seen any topographic maps of the reservoir area of this proposed reservoir?

A. None except the topographic maps of the United States Geological Survey.

By Mr. GATCHELL:

Q. Will you describe the project as shown on the revised plans?

A. The dam is to be located, according to the revised plans, in and across New River at a point a little more than one-half mile above the mouth of Little River. The dam will be about 130 feet high above rock foundation, it will be about 1100 feet long and will create a reservoir about 21½ miles long with a total or gross storage in excess of 200,000 acre feet, and utilizable storage, in a draw-down of 27 feet, of about 100,000 acre feet. The power house will be constructed integrally with the dam on the right side of the river and will have an installation of 104,000 horsepower in four units of 26,000 horsepower each. The transmission line to which the power from this plant will be delivered is on the right bank of the river and can be reached in a distance of about 800 feet southerly from the power plant.

By the COURT:

Q. What were the substantial changes in the plans made in the amendment filed in 1930 over the original plan submitted in 1926?

A. The more substantial changes were the re-location of the dam at a point about half a mile down-stream, the increase in the height of the dam to elevation 1846 instead of 1840, the increase in the installation from 80,000 horsepower to 104,000 horsepower, and the change of the type of the dam from an over-fall dam with a spill-way section on the left side of the river, to a dam with gates continuously across the stream from the end 1649 of the power house to the left bank of the river.

Q. You refer to a spillway; what does that term mean?

A. That is the provision made for passing excess waters.

Q. Through the dam?

A. Over the dam—flood waters.

By Mr. Gatchell:

Q. The spillway is located on the crest of the dam?

A. The concrete dam constitutes the spillway, there being a number of sections of spillway between piers, a gate between two piers, all the way across the river.

Q. That is a series of gates?

A. A series of gates surmounting the spillway and which, in turn, are surmounted by the operating bridge from which the gates are lifted. The gates in this project are vertical lift gates 27½ feet high.

Q. And do you know the opening underneath the gates when raised?

A. 27½ feet. The crest of the masonry spillway is at elevation 1818½. The maximum level of the reservoir is at 1846 or 27½ feet higher, and when the gates are lifted they can be lifted high enough to get above that maximum elevation of the pool at least five feet, and leave the spillway clear to discharge the greatest possible floods.

Q. Was there any change in the storage capacity?

A. The storage capacity was substantially increased, principally by reason of the fact that the surface of the reservoir was raised six feet and, to a lesser extent, due to the fact that the dam was moved a short distance down-stream.

Q. And was there any difference in the utilizable storage?

A. Yes, there was a very substantial difference in the utilizable storage. The Declaration of Intention declared that in a draw-down of ten feet the project would provide utilizable storage of 40,000 acre feet. Of course, they could have arranged 1650 for a greater draw-down and a greater utilizable capacity but they did not and, under the Application for License as amended, they provide for a draw-down of 27 feet, about, and for utilizable storage of 100,000 acre feet.

Q. Has the construction of this project proceeded to such a stage that it would be impossible to provide for an additional draw-down beyond the 27 feet set forth in the plans?

A. No.

Q. You gave the discharge of water required to operate this plant at its greatest capacity at 104,000 horsepower?

A. I don't believe I did.

Q. Will you give us that?

A. The discharge necessary to operate this installation of 104,000 horsepower at a net head of 110 feet and at gate opening of best efficiency would be approximately 9000 cubic feet per second—perhaps just a little more. At higher heads and greater gate openings the amount of water could be greater than 9000 second feet, ranging up to 10,000 or perhaps a little higher.

Q. When would that maximum hydraulic capacity of the turbines be reached?

A. The extreme maximum hydraulic capacity would obtain at the maximum head of 116 feet and full gate opening.

Q. And under what conditions of stream flow would the maximum discharge occur through these turbines?

A. It would occur at any time the entire installations were operated to capacity.

Q. Would this Radford power plant operate independently, or as a part of a power system?

A. The Radford project is being constructed to operate as a part of the power system of the Appalachian Electric Power Company.

Q. Do you know the names and capacities of the steam-electric and hydro-electric plants in that system?

1651 A. I do.

Q. Will you give them to us?

A. The steam-electric plants included in the Appalachian Electric Power Company's system are: The Cabin Creek, West Virginia plant, with an installed capacity of 116,000 KW. The Glen Lyn plant—these are all steam plants—with an installed capacity of 80,000 KW. The Logan, West Virginia, plant with an installed capacity of 44,000 KW. The Kenova, West Virginia, plant with a capacity of 40,000 KW. That is near Huntington, West Virginia. The Hazard, Kentucky, plant with an installation of 19,500 KW. The Roanoke, Virginia, plant with an installation of 13,750 KW. The Kingsport, Tennessee, plant with an installation of 10,000 KW. There is a plant in Charleston, West Virginia, that has an installed capacity of 7,750 KW but it is my understanding that plant has been laid aside.

Q. Did you say 7,700?

A. 7,750. That plant is no longer in operation, as a part of the system, if I understand correctly.

The total of those seven steam plants, the total installation, is 323,000 KW.

By Mr. JACKSON. Omitting the last one?

By the WITNESS. Omitting the Charleston plant.

A. (Continuing.) The Appalachian Electric Power Company has four hydroelectric plants, to my knowledge. These being: The Byllesby, Virginia, plant with an installation of 21,600 KW. The Buck, Virginia, plant on New River, as is the Byllesby plant, with an installation of 7,740 KW. The Reusens plant on the James River, near Lynchburg, Virginia, with an installation of 12,500 KW. The Niagara plant, on the Roanoke River near this city, with an installation of 2,760 KW.

The total installation for those four plants being about 45,000 KW.

1652 The Kanawha Valley Power Company, an affiliate of the Appalachian Electric Power Company, has two hydroelectric plants on the Kanawha River, at the Marmet and London navigation dams. These two plants have an installation of about 15,000 KW each.

The Kanawha Valley Power Company now has under construction a 20,000 KW hydroelectric plant at the Winfield navigation dam, about thirty-six miles downstream from Marmet, and as I understand, the Appalachian Electric Power Company is now constructing a 40,000 KW steam-electric extension to its Logan, West Virginia, plant.

Q. Are the company's existing hydroelectric plants run of the river or storage plants?

A. The company reports them all as being run of river plants. They are not, however, strictly run of river plants, since some of them, at least the Byllesby and Buck plants, operate on a variable load, causing wide fluctuations in the flow of the river below them. Their reservoirs are small and provide only pondage for daily and possibly a little weekly regulation, and they are of the class that are usually and commonly referred to as run of river plants.

Q. Now would this Radford project be a run of the river project or a storage project?

A. It would be a storage type project.

By the COURT. What is a run of the river plant?

By the WITNESS. Strictly speaking, sir, they would pass the water exactly as it comes, as fast, but no faster than it comes.

Q. That is, they would not hold back the water when they had plenty to use later when the supply was low?

A. They would not impound any water at all, except that necessary to fill the ponds when they are first constructed.

1653 Q. Will the Radford project be a run of the river project or storage project?

A. It will be a storage project.

Q. What is the usual, customary, and economical manner of operating such a storage project?

A. The usual manner of operating a project like the Radford project in a utility system, in an electric system, having a general utility load, is to operate the hydroelectric project having storage on the peak of the power load. Ability to so operate is one of the principal advantages of a project of this type; unless such a project could operate in that manner in a great number of cases most of them would be economically infeasible.

Q. Would this Radford project be economically feasible if it was not operated as a peak load plant?

A. It would not. It would not be constructed unless it were to be, or could be operated for carrying peak loads. It would not be economically feasible on any other basis.

Q. I show you a chart, marked for Identification Gov- 1654 ernment's Exhibit #199, entitled "Load curve of the Appalachian Electric Power Company, for the week ending November 3, 1935," and ask you if that was prepared under your direction?

A. It was.

Q. What does it purport to show?

A. It shows the power load, load of the system for the week ended November 3, 1935, and is typical of power systems having a general utility load. The curve has sharp peaks and shows that during certain hours of the day the load was much greater than the minimum load or the average load.

Q. In what manner could the Radford Project be advantageously and economically operated in connection with a load of this kind?

A. The Radford project could be operated on the peak of the load; that is, so as to carry a part of the load during the hours of the day when the load is greatest; operated during periods of relatively short time duration; by which I mean the project, that the installation would be operating a part of each day, and would be closed down a part of each day, and that the installation would be closed down or at least not generating over week ends, for periods of two or three days at a time, two days usually and three days when holidays happened to fall on Fridays or Mondays. Also, that during periods of extremely low flow or even periods of moderate flow, the plant might be closed down for periods longer than three days.

Q. Is this the economical, customary manner of operating a plant of this kind, under similar circumstances?

A. It is.

By Mr. **Jackson**. We move to strike out the answer. There is no proof the witness ever operated a power system in his life.

By Mr. GATCHELL. He is the Chief Engineer of the Federal Power Commission, in charge of utility systems throughout the country.

By the COURT. He may answer.

By Mr. JACKSON. Exception.

A. It is. Hydroelectric plants of this type are invariably operated to carry peak loads. That is, I believe, universally true, but certainly true in a power system like the system of the Appalachian Electric Power Company.

The system of the Appalachian Electric Power Company is essentially a steam-electric system, and a hydroelectric project of this particular type will be extremely valuable on that system. A few years hence it will be greatly more valuable than it would be if it were completed today. The reason for that is that this system load is certain to grow, and as it grows these peaks will become more elongated.

1655 To illustrate that, the twenty-four hours of the day will, of course, remain the same, but the peak, the part of the load above the base load, will grow higher. That is, more kilowatts measured in heights along the kilowatt scale; therefore, the peaks will be sharper, and a project like the Radford project will be more valuable in the system.

Q. By that do you mean they are constructing this plant for their future requirements?

A. Absolutely.

By Mr. JACKSON. I object to that. He can't possibly answer the question.

A. (Continuing.) They would not need this project in their system with the installation they have now—they would not need it—and I see no reason why they would be constructing it unless they were looking to the future. I don't mean by that that if this project were constructed they wouldn't utilize its output, for they would; they would simply shut down steam plants and utilize this output.

Q. Would the operation of this project in the manner you have described affect or in any way modify the natural flow of New River?

A. It would. The operation of this project would cause great fluctuations in the flow of the stream below the dam and power house.

Q. Will you tell us how the economical operation of this plant in connection with the load curve of this system would affect the discharge through the Radford plant, in your opinion?

A. The Radford project, by reason of its storage, is ideally adapted to operate carrying peak loads. That means, of course, a variable operation, ranging from no load at all for part of the day to the maximum load that can be carried for part of the day, varying loads for part of the day, which method of operation would cause fluctuations in discharge below the dam ranging from zero flow to the hydraulic capacity of the installation, which would be at least 9000 cubic feet per second. 1656

Q. What phase of the usual method of operating such a storage project would cause the most serious or adverse effects on the flow of the rivers below Radford?

By Mr. JACKSON. I object to the form of the question, because I don't think it is intelligible.

By the COURT. He means what is it, in the operation of the plant, that will cause the most serious disadvantage.

By Mr. JACKSON. The question I had in mind—I didn't understand what disadvantage.

By the COURT. He wants him to point out the most serious disadvantage.

By Mr. JACKSON. He might point out a field he knows nothing about. I think the question should point out to what field he is to direct his answer.

By the COURT. He may answer.

By Mr. JACKSON. Exception.

A. The complete shutting off of the flow of the river at the Radford dam would cause the most serious, adverse effect on the flow of the New River, Kanawha and Ohio Rivers, below the Radford dam. The shutting off of the flow [interrupted].

By Mr. JACKSON. I move to strike out the statement—that the flow of the Kanawha and Ohio would be affected, there is no proof he has any competency to pass on that. It has been gone into by other witnesses.

By the COURT. Overruled.

By Mr. JACKSON. Exception.

A. (Continuing.) The shutting off of the flow for two or three days at a time, or for longer periods, would cause the most adverse effects.

Q. Between what limits would it be reasonable to expect the flow of the river just below the dam to fluctuate as a result of operating the power plant?

A. The flow of the river just below the dam will vary from zero flow to 9,000 second-feet flow as a result of the operation of the power plant.

Q. Will you just tell us, in your opinion, during what periods of time the Radford reservoir would be shut down if they operated this project in the most economical manner?

A. It would be the rule, and not the exception, that this plant would be shut down over week ends, during periods of low and moderate flow of water. At all times when the flow of the river is in excess of the hydraulic capacity of the installation, and when the reservoir is full, this plant would operate continuously; otherwise, it would be an economic waste, because the water would run to waste, but at times when the flow is low, or when a moderate flow prevails, the plant would, as a rule, be shut down over the week ends, and it might be shut down for longer periods, and doubtless would be.

Q. Will you state, if you know, what would be the effect
1657 of such a shut down on the navigable capacity of New River?

By Mr. Jackson. I object to the question, because it assumes New River has a navigable capacity.

By the Court. He may answer.

By Mr. Jackson. Exception.

A. The shutting off of the water at the Radford dam and impounding of the water in the Radford reservoir, would render navigation impossible on the New River, because the river would no longer have depths sufficient to carry any kind of craft.

Q. What would be the effect on the navigable capacity of the Kanawha River, in your opinion?

A. With the Kanawha River in its present condition, the shutting off of water at the Radford dam for periods of two or three days at a time, or for longer, would render navigation impossible between the Marmet dam, about ten miles above Charleston, West Virginia, and wicket dam #11 down near the mouth of the Kanawha River, because the pools behind the wicket dams could not possibly be maintained in times of extreme low water. I mean I desire the record to show that my testimony is, that navigation would be impossible on the Kanawha River in the reach I mention, during extreme low flow periods, if water should be impounded in the Radford reservoir over week ends.

Q. What effect would the impounding of the entire flow at the Radford project have upon navigable depths in the Kanawha River after completion of the Gallipolis and Winfield dams?

A. The impounding of the entire flow of New River for periods of two or three days or for longer periods at Radford, would reduce the navigable depths in the upper ends of the several navigation pools, and would increase the cost of operation of the navigation dams, increase the cost to the United States for operation of the navigation dams.

Q. Those are the new dams you are talking about.

A. Yes, sir; that is right.

By Mr. Gatchell:

Q. Just how would it increase the cost of operating the dams on the Kanawha River?

A. The pools provided by these dams on the Kanawha River and by the Gallipolis dam on the Ohio River are at fixed levels with the exception of the London Pool which has a small
1658 amount of pondage, with draw-down of three feet from elevation 614 to elevation 611. To maintain these pools at their normal level under varying flows, requires their almost constant manipulation, raising, and lowering, so as to maintain the pools at the project level.

Q. Are you talking about the London and Marmet?

A. Marmet, Winfield, and Gallipolis, and London under certain conditions.

Q. Is there going to be any power installation at the Gallipolis Dam?

A. It is possible, but no application has been filed for an installation at that site with the Federal Power Commission.

Q. Is there any provision by the Government for that?

A. No, sir.

By Mr. Gatchell:

Q. Can you give me the elevations of the four pools, London, Marmet, and Winfield and Gallipolis?

A. I think I can give them to you from memory, but I have them in a letter here and maybe I had better refer to that.

By Mr. Jackson:

Q. A letter from whom?

A. From the Acting Chief of Engineers, General George B. Pillsbury.

By Witness. The normal pool elevations are as follows: London, 614; Marmet, 590;—these are elevations above mean sea level—Winfield, 566; and Gallipolis, 538, all of which elevations are referred to the Sandy Hook datum. These are the normal pool elevations except at London where at times a three-foot draw-down may be permitted, subject, of course, to the paramount requirements of navigation.

By Mr. Jackson:

Q. Are you reading from a letter now?

A. I read the last sentence from a letter to show that 614 was not the level for London, corresponding strictly to the levels I gave for Gallipolis, Winfield, and Marmet.

1659 By Mr. Gatchell:

Q. What effect would the impounding of water at the Radford dam have upon the navigable capacities of the Ohio, below the mouth of the Kanawha, during the low water periods, in the Ohio?

By Mr. JACKSON. We object to the question unless it is more definite—impounding for what purpose—time and manner?

By Mr. GATCHELL:

Q. What effect would the shut off of water at the Radford project for periods of two or three days, or longer, have?

By Mr. JACKSON. We object further for the reason there is no issue in the pleadings with reference to the Ohio River.

(Objection overruled. Defendant excepts.)

A. The discharge of the Ohio River immediately above the mouth of the Kanawha River sometimes falls below 1,650 cubic feet per second. Between Pittsburgh and the mouth of the Kanawha River, are a large number of navigation dams, all of which are strictly navigation dams, and and the exigencies of operation of these navigation dams, all of which are operated in the interest of navigation, are such that the flow of the river immediately above the mouth of Kanawha sometimes falls very materially below what otherwise would be the natural flow of the river at that point, in fact I am thoroughly convinced that the flow of the Ohio River above the mouth of Kanawha at times falls below 1,000 cubic feet per second. The navigation dams on the Ohio River, below the mouth of Kanawha, are of the wicket type, that is, all of them at present are of the wicket type, and all of them, so far as we know and can foresee, will remain to be of that type, except Gallipolis dam, which will be of the same type as the Winfield, Marmet, and London dams, the only difference being that the Gallipolis dam is a larger dam. Now in times of critical low water in the Ohio River, the army engineers have great difficulty in maintaining navigation in an effective way on the Ohio River, due to the difficulties of maintaining pools above these wicket dams.

By Mr. JACKSON. I move to strike out the statement as to what difficulties the army engineers experienced as being purely hearsay.

By the COURT:

Q. Do you have knowledge of that yourself?

A. I certainly do, Your Honor.

By Mr. JACKSON:

Q. Have you charge of operating these dams or have you ever operated these dams?

A. I never have operated any of these dams; no.

Q. And you never had charge of that District?

A. No; but I have been familiar with these dams for twenty years, with their design and method of operation, for twenty years.

1660 Q. All you know about the operation is what has been told you about it, at best?

A. It is notoriously known that they had difficulty there, I mean, it is notoriously known among persons who would be expected to have that information.

By Mr. JACKSON. I renew my motion to strike out the statement.

By the COURT. I might sustain it but it has already been testified to by people who did have actual connection with it out there, and they have stated the effect or the difficulties of navigators along the river. That has already been testified to.

By Mr. JACKSON. I do not think they have testified as to the difficulties that engineers have had in regard to the pool.

By the COURT. Go ahead.

By Mr. JACKSON. I desire to except.

A. In times of extreme low water in the Ohio River, which is the criterion in what we are now talking about, the Ohio River below Kanawha River, needs every second-foot of water the Kanawha River can supply, and needs more.

Q. What would be the situation with respect to that after the Gallipolis dam is completed?

A. The Gallipolis dam will have a fixed pool and variations in discharge will be transmitted through that pool and they will continue just the same on down the river below the Gallipolis dam.

Q. Do you have in mind any particular periods in the past when the shutting off of the flow at the Radford dam would have adversely affected the navigable capacity of the Ohio?

By Mr. JACKSON. May it be understood that all of this evidence is subject to our objection, that it is not within the issues in the pleadings and not within the experience and competency of this witness.

By the COURT. Yes.

By Mr. GATCHELL. Go ahead.

A. I have in mind particularly the ten-day period in 1932, and the eight-day period in 1918. I could give any number of other instances when navigation on the Ohio River would be seriously embarrassed by impounding the water of the entire flow of the river at Radford for two or three days at a time. I will have to refer to my notes to get those figures.

During the ten-day period from September 15 to September 24, inclusive, 1932, the mean flow of the Kanawha River at its mouth was 1,210 cubic feet per second, and the mean flow of the Ohio River just above the mouth of the Kanawha River was 1,770 cubic feet per second. The combined flow at the confluence of the two streams was approximately 3,000 cubic feet per second, and the Kanawha contributed 40 percent of this combined flow.

Of the 1,210 cubic feet per second contributed by the Kanawha River, approximately 700 cubic feet per second came from above the Radford dam site. The withholding of that 700 cubic feet
per second in the Radford reservoir would greatly increase
1661 the difficulties of maintaining navigable depth above the
wicket dams in the Ohio River, and consequently increase
the cost to the United States of Caulking the wicket dams. Any number of similar instances could be shown.

For instance, during the eight-day period from August 24 to August 31, 1918, the Kanawha River contributed more than three-fourths of the water that flowed in the Ohio immediately below the mouth of Kanawha River.

By Mr. **Jackson**:

Q. Is that your own memorandum you are using there?

A. That is my own memorandum that I am reading from but these Ohio river figures that I gave were obtained from the army engineer at Cincinnati.

Q. Mr. McWhorter, there was some doubt as to the elevation of the pool above London Dam. I show you Government Exhibit 199, being the license issued to the Kanawha Valley Power Company for project 1175 and will ask you to read article 16 of that license.

A. Article 16 is as follows: "It is hereby understood and agreed that the United States specifically retains and safeguards the right to use water in such amount to be determined by the Secretary of War as may be necessary for the purposes of navigation. The operations of the licensee, so far as they affect the use and discharge of the water, and the regulation of the elevation of all pools shall be controlled at all times by the Division Engineer, War Department, in charge of the improvement of Kanawha River, pursuant to such reasonable rules and regulations as may be made from time to time by the Secretary of War in order to prevent any impairment of navigability. Subject to the foregoing paramount conditions, the licensee shall so operate power stations and utilize pondage of the London pool between elevation 614 and 611, that it will make the most efficient use of the water power potentially available."

By Mr. **Gatchell**:

Q. If the London pool should be operated so as to elimi-
1662 nate the three-foot draw-down would any variation in flow
above the pool be transmitted through the London pool?

By Mr. **Gatchell**:

Q. Answer the question.

A. If the London pool should be maintained at its maximum level at elevation 614 feet above sea level, variations in discharge would be transmitted rapidly through the pool and in full effect.

By Mr. **Gatchell**:

Q. Mr. McWhorter, I believe you stated before recess that you were familiar with the plans for the proposed Bluestone project. Is that correct?

A. I am.

Q. If the Bluestone project were to be constructed as proposed, what affect would the shutting off of water at the Radford dam during low flow periods have upon the navigable depth in the New, Kanawha and Ohio Rivers below Bluestone?

A. The Radford project has sufficient storage capacity to impound the entire flow of the stream during periods of low water for many days at a time. It has sufficient capacity to impound the entire flow during two months like September and October 1930.

The Bluestone reservoir has been designed to regulate the flow of New River during a dry period like 1930, so that the flow immediately below the dam will at no time fall below 2,000 cubic feet per second. This regulated flow compares with the natural extreme low flow of somewhat less than 700 cubic feet per second.

In a long dry season such as occurred during the period from June to November 1930, the Bluestone storage would at some time during that period, probably towards the latter end of the period, be approaching exhaustion.

By Mr. **Jackson**:

Q. 1930, you are talking about?

A. Like the summer and fall of 1930.

Now, if at that time, the Radford project should be storing water it would be impossible for the Bluestone project to maintain a minimum flow of 2,000 cubic feet per second throughout the season, and as a result navigation on the New, Kanawha and Ohio Rivers, would suffer by reason of the fact that those 1663 streams would not have the regulated flow, which otherwise would obtain from the Bluestone project.

Moreover, such shutting off of the water would reduce the prime power at the Bluestone project, and in that way affect the Government's investment in the project.

Q. In what way would it affect the Government's investment in the Bluestone project?

(Defendant objects to any testimony that is designed to show damage to the Government's investment.)

Q. Will you answer the question?

A. May I have the question read.

(Question read.)

A. The Government's investment in the Bluestone project would be jeopardized to the extent that the prime power at Bluestone is reduced.

Q. And does the prime power that the Bluestone project may produce have any relevancy to the value of the power from that plant?

A. Absolutely.

Q. Now, if the Bluestone reservoir should discharge a minimum flow of 2,000 second feet or more, would that increase the flow on the Kanawha River?

A. Yes; it would very substantially increase the extreme low water flow on the Kanawha River, it would very greatly increase any extreme low water flow on the Kanawha and also greatly increase any extreme low water flow on the Ohio River.

Q. And would that benefit the power projects on the Kanawha River?

A. It would. It would be a very substantial benefit to the Marmet, London, and Winfield power projects, and also to the project at Kanawha Falls of the Electro Metallurgical Company, and to the project at Hawks Nest of the Electro Metallurgical Company.

Q. And how would that benefit be evidenced?

A. By increasing the reliable power available at these plants, that is, reliable to the extent it would be reliable, and to a greater extent than it is now reliable at Marmet, London, and Winfield.

1664 Q. Is primary power more valuable than secondary power from a generating station?

By Mr. Jackson. Of course it is understood that our objection applies to all of this evidence.

By the Court. Yes.

A. Yes; it is very much more valuable.

By Mr. Gatchell:

Q. What do you mean by primary power?

A. Power that is dependable continuously.

Q. For how long a period of time?

A. Continuously throughout the day, throughout the week, and throughout the year, and year after year.

Q. For 100 percent of the time?

A. Yes, sir.

Q. What is meant by secondary power?

A. Power that is available only part of the time. There are various grades of secondary power, high grade, low grade, and very low grade, called dump power, some secondary power that is available for say nine or ten months in the year.

Q. And does the time at which the power will be available affect its value?

A. Yes. If at certain times it will not be available that would certainly very radically affect its value.

Q. If there was a demand and it was not available, it would affect the value of it?

A. Under those conditions no one could be expected to pay much for it. What they would pay for would be dependable power.

Q. Would the Radford project ameliorate or aggravate flood conditions in the New, Kanawha, and Ohio Rivers?

By Mr. Jackson. May we have an exception noted to all of this testimony as irrelevant?

By the Court. On the grounds you have already stated?

By Mr. Jackson. Yes.

By the Court. I will overrule the objection.

(Defendant excepts.)

A. The Radford project by reason of the fact that its reservoir occupies valley storage, which otherwise would be available for the temporary storage of flood waters, would tend to increase flood heights below the dam

I make that statement on the assumption that before the largest flood flows arrive at the head of Radford reservoir, the flow at the plant would be in excess of the hydraulic capacity of the plant, and usually the reservoir would be full or
1665 nearly full. If full, the results could not possibly be other than to increase flood heights below the dam, increase flood heights in the New, Kanawha, and in the Ohio Rivers, and would place an increased flood height or flood liability on the Bluestone project.

Q. Assuming the reservoir at Radford to be drawn down in anticipation of a flood, what would be the effect when a flood came along?

A. Under the conditions you have stated, the effect of the Radford reservoir would be to reduce flood height below the Radford dam. Such operation might, however, increase the flood heights down in the vicinity of Charleston, by synchronizing with flood flows from the lower tributaries.

Q. Are you familiar with the provisions of a license issued on October 25, 1932, by the Corporation Commission of Virginia to the Appalachian Electric Power Company for the construction, maintenance, and operation of this Radford dam?

A. I am.

Q. Does the State license provide for a minimum release of water from the Radford reservoir?

By Mr. GATCHELL:

Q. I show you Government Exhibit 156, in the back part of which appears an order granting a license dated at Richmond, October 25, 1932, Case No. 4991, and ask you if that is the license to which you have reference?

A. It is.

By Mr. GATCHELL:

Q. Will you refer to paragraph 3 of that order appearing on page 233 of Government Exhibit 156, and tell me what discharges are required to be passed by the Radford project?

A. Paragraph 3 on page 233 of Government's Exhibit 156, reads as follows:

"3. That the construction and operation of the proposed dam and power station shall be such as at all times to prevent all unreasonable interference with the stream flow and at all times to minimize, as far as practicable and consistent with the reasonable use of the stream, interference, obstruction, and impairment
1666 of the stream flow, and the licensee shall, unless a smaller quantity be hereafter authorized by this Commission, discharge not less than twenty-five cubic feet of water per second, and not less than a total of 50,000,000 gallons of water in each twenty-four-hour period, and not less than a total of 1,000,000,000 gallons of water in each weekly period, provided that whenever and so long as the amount of the water in New River immediately below the mouth of Little River shall be at least as much as would be produced at such point by the release at the dam of twenty-five cubic feet per second and not less than a total of 50,000,000 gallons of water in each twenty-four-hour period, and not less than a total of 1,000,000,000 gallons of water in each weekly period, if there were no other source of supply, the licensee hereunder shall be relieved of the obligation and duty of releasing or discharging any water, or any more than a sufficient quantity to constitute the minimum flow below the mouth of Little River, that would be produced at the same point by a discharge of twenty-five cubic feet per second and not less than a total of 50,000,000 gallons of water in each twenty-four-hour period, and not less than a total of 1,000,000,000 gallons of water in each weekly period at the dam if there were no other source of supply at all at the particular time;"

Q. Mr. McWhorter, does the flow of Little River ever fall below 25 CFS?

A. It never has.

Q. What is the equivalent of 50 million gallons per 24-hour period in cubic feet per second, mean flow?

A. Approximately 77 cubic feet per second; to be exact 77.36 cubic feet per second.

Q. Has the flow of Little River ever fallen below that?

A. Yes, sir.

Q. What is the equivalent of One Billion gallons per week expressed in cubic feet per second, mean flow, for a week?

A. It is 221 cubic feet per second.

1667 Q. Did you hear the testimony of Mr. C. H. Pierce regarding the flow of Little River?

A. Yes, sir.

Q. Do you know what the flow of Little River would be—do you know what the flow of Little River has been?

By Mr. Jackson:

Q. When?

A. The flow of Little River, recorded a minimum of 50 cubic feet per second at the Graysonton gage a few miles above the mouth of the river in 1932. The estimated flow at the mouth, on the basis of proportional drainage areas, would be about 56 cubic feet per second, mean flow that day; this 50 cubic feet per second was mean flow for one day.

The maximum flow of Little River at its mouth is not known; that is, not to my knowledge; it never was determined to my knowledge.

The flow of Little River, the average flow of Little River based on past records, is 401 cubic feet per second as testified by Mr. Pierce.

By Mr. Gatchell:

Q. Have you made an independent investigation of the flow of Little River, since you have been Chief of Engineers of the Federal Power Commission?

A. Yes, sir. About three years ago, I computed—I estimated the mean flow of Little River from past records—no; I did not estimate—I did not estimate the average flow of Little River. I prepared a flow duration curve of Little River, from which the flow of 77 cubic feet per second was shown to be available for 99.3 percent of the time. My flow duration curve showed that 221 cubic feet per second would be available 73.6 percent of the time.

1668 By Mr. GATCHELL:

Q. Mr. McWhorter, have you compared the average discharge of the New River and the average discharge of the Gauley River, as shown by stream flow records, over a long period of years?

A. I have.

Q. And what does that comparison show?

A. (Producing papers.) It shows—first I will state the results found for the sixth months period, June to November, 1914: The mean flow of New River at its mouth for this six months period, was approximately 2480 cubic feet per second, and the mean flow of the Gauley River at its mouth for the same period was about 260 cubic feet per second.

Q. What per cent came from above the Radford dam site, Mr. McWhorter?

A. Sixty per cent of the New River discharge at its mouth came from above the Radford dam site, during the period—the six months period from June to November, inclusive, 1914.

Next I considered the six months period from June to November, inclusive, 1930. During this period, the mean flow of the New River at its mouth, was about 1480 cubic feet per second, and the mean flow of the Gauley River at its mouth was 50 cubic feet per second. Approximately 97 per cent of the combined flow of the two streams was contributed by the New River and 65 per cent of the New River contribution came from above the Radford dam site.

Next I considered the three months period of June, July and August, 1911. During these three months—this three month period—the mean flow of the New River at its mouth was about 2820 cubic feet per second, and the corresponding flow of the Gauley River at its mouth was 312 cubic feet per second. The New River contributed 90 percent of the combined flow of the two streams, and 55.3 per cent of the New River contribution came from above the Radford dam site.

The next month was September, 1932, during which the mean
flow of the New River at its mouth was 1270—about 1270
1669 cubic feet per second, and the mean flow of the Gauley
at its mouth was 100 cubic feet per second. New River
contributed 92.9 percent of the combined flows of the two streams
and about 71 percent of the New River contribution came from
above the Radford dam site.

Next I considered the month of September, 1934, for which the mean flow of New River at its mouth was about 3,690 cubic feet per second, and the mean flow of the Gauley River at its mouth was 390 cubic feet per second. New River contributed 90½ percent of the combined flow of the two streams during that month, and about 62 per cent of the New River contribution came from above the Radford dam site.

By Mr. GATCHELL:

Q. Have you looked at the month of October, 1930? Or did you look at it?

A. Yes, sir. During the month of October, 1930, the mean flow of the New River—I mean, during the month of October, 1930, the mean flow of the Kanawha River at the Kanawha Falls' gage, was 1,130 cubic feet per second and only seven (7) second-feet of that flow came from the Gauley River, the remaining 1123 cubic feet per second being contributed by the New River.

Q. What are the respective drainage areas at the Kanawha Falls gage and at the Radford dam site?

A. The drainage area at Kanawha Falls gage is 8367 square miles and at the Radford dam site 2382 square miles.

Q. And what is the drainage area between these two points?

A. It is 5,985 square miles.

Q. What percentage of the drainage area at the Kanawha Falls gage lies above the Radford dam site?

A. 28½ percent of the drainage area above Kanawha Falls gage lies above the Radford dam site.

Q. Now, during the dry periods, which is more productive of run-off—the drainage area above the Radford dam site or the drainage area below that point?

1670 A. The drainage area above the Radford dam site is enormously more productive of run-off during dry periods than is the drainage area below the Radford dam site. I am speaking of the yield of water on a square mile basis.

Q. Give us an explanation of this?

A. The comparative yield of water per square mile from these respective areas is well illustrated by conditions that prevailed in the month of October, 1930. During that month the flow—the mean flow at the Radford dam site was 760 cubic feet per second. The mean flow at Kanawha Falls gage was 1,130 cubic feet per second. Therefore, the drainage area of 2,382 square miles—the drainage area above the Radford dam site, contributed 760 cubic feet per second, and the 5,985 square miles between Radford dam site and Kanawha Falls gage contributed 370 cubic feet per second——

This will show, if computed, that each square mile of the drainage area above the Radford dam site contributed five times as much water as each square mile below, and between the Radford dam site and Kanawha Falls gage, during that particular month——

By Mr. **Jackson** (interrupting). That is October, 1930?

A. Yes, sir.

By Mr. **Gatchell**:

Q. What is the total drainage area of the Kanawha River basin?

A. It is 12,200 square miles.

Q. And you gave the drainage area at the Radford dam site as 2,382 square miles?

A. Yes, sir.

Q. And what percentage of the total drainage area of the Kanawha River basin lies above the Radford dam site?

A. Less than 20 per cent of the drainage area of the Kanawha River basin lies above the Radford dam site. It is 19½ percent, to be exact.

1671 Q. You gave a relatively high run-off per square mile from the drainage area above Radford dam site, as compared with the corresponding run-off below. Have you compiled any figures to show the relative run-off per square mile above the Radford dam site, as compared with the 9,818 square miles of drainage area below the Radford dam site?

1672 A. Yes, sir.

Q. Give those?

A. In a discussion of this matter of run-off in comparing drainage areas, it is convenient to use round figures, where the use of such figures will not introduce any appreciable error.

The drainage area above Radford dam site is 2400 square miles; and the drainage area—the remaining drainage area of the Kanawha basin lying below the Radford dam site is 9800 square miles, or a total of 12,200 square miles.

Q. Did you use these approximate figures in your computations?

A. No, sir; I just use these for convenience in speaking. I used the actual figures in the computations.

By the **Court**:

Q. What were the actual figures in the actual computations?

A. 12,200 square miles for the entire basin; 2382 is above the Radford dam site, and 9818 below that point. During a 37 day period, from August 25th to September 30th, 1932, the mean flow of the New River at the Radford dam site, was 810 cubic feet per second; and the mean flow of the Kanawha River at its mouth was 1580 cubic feet per second.

By Mr. **Jackson**:

Q. For what period?

A. August 25th to September 30th, 1932.

Q. And the other run-off?

A. The mean flow of the New River at the Radford dam site was 810 cubic feet per second; and the mean flow of the Kanawha River at its mouth was 1580 cubic feet per second. The yield of water from the 2382 square miles above the Radford dam site was 810 cubic feet per second and the yield of water from the 9818 square miles below the Radford dam site was 770 cubic feet per second. The yield per square mile from the drainage area above the Radford dam site was 4.3 times as great as the yield per square mile from the drainage area below the Radford dam site.

Next I considered the 31 day period in the month of
1673 August—that is the entire month of August, 1930. During that month, the mean flow of the New River at the Radford dam site was 980 cubic feet per second, and the mean flow of the Kanawha River at its mouth was 1580 cubic feet per second. The yield of water from the 2384 square miles above Radford dam site was 980 cubic feet per second, and the yield from the 9818 square miles below was 600 cubic feet per second. The yield per square mile from the drainage area above the Radford dam site was 6.7 times as great as the yield per square mile from the drainage area below the Radford dam site.

I next considered the month of September, 1930, during which the mean flow of the New River at the Radford dam site was 847 cubic feet per second and the mean flow of the Kanawha River at its mouth was 1330 cubic feet per second. The yield of water from the 2382 square miles above the Radford dam site, was 847 cubic feet per second and the yield from the 9818 square miles below the Radford dam site was 483 cubic feet per second. The yield per square mile from the drainage area above the Radford dam site was 7.2 times as great as the yield per square mile from the drainage area below the Radford dam site.

I next considered the month of October, 1930. The mean flow of the New River at the Radford dam site that month was 760 cubic feet per second, and the mean flow of the Kanawha River at its mouth was 1150 cubic feet per second. The yield of water per square mile from the 2382 square miles above Radford dam site was 7—no; I did not mean to say that: The yield of water from the 2382 square miles above the Radford dam site, was 760 cubic feet per second, and the yield from the 9818 square miles below the Radford dam site was 391 cubic feet per second. The yield per square mile from the drainage area above Radford was 8 times as great as the yield per square mile from the drainage area below Radford.

I also compiled figures for the entire six month period from June 1st, to November 30th, 1930. During that six months period, the mean flow of the New River at the Radford

1674 dam site was 964 cubic feet per second, and the mean flow of the Kanawha River at its mouth was 1,660 cubic feet per second. The yield of water from the 2,382 square miles above the Radford dam site was therefore 964 cubic feet per second, and the yield from the 9,818 square miles below the Radford dam site was 696 cubic feet per second. The yield per square mile from the drainage area above the Radford dam site was 5.7 times as great as the yield per square mile from the drainage area below the Radford dam site, during that six months period.

Cross-examination by Mr. JACKSON:

Q. Mr. McWhorter, on your direct testimony you stated that you had caused some engineer to make a survey or examination along the shoals on New River. Was that engineer Mr. Gerdes who testified here in this case?

A. It was. I stated that I caused a competent engineer to examine all the shoals between Wylies Falls and Radford.

Q. I understand you to say you thought a competent engineer?

A. That was Mr. Gerdes.

Q. In any event, it was Mr. Gerdes who made that examination and the examination you have in mind is the one about which he testified here in court?

A. That is correct.

Q. You didn't mention his name and I didn't know but what it was someone else.

A. I didn't have any objection to mentioning his name.

Q. Mr. McWhorter, you enumerated a number of reports which you had read, including a report of the Chief of Engineers for 1891. You recall that, I presume?

A. I do.

Mr. JACKSON. I produce a photostat of what appears to be a typewritten report consisting of seven pages written upon the letterhead [partly obscured] of Craighill, Colonel, Corps 1675 of Engineers, United States Army, United States Engineer Office, 9 Pleasant Street, Baltimore, Maryland, April 17, 1891, addressed to Brigadier General T. L. Casey, Chief of Engineers, U. S. A., Washington, D. C., and signed by William P. Craighill, Colonel, Corps of Engineers, U. S. A., to which there is attached a photostat of a folder cover, bearing the stamp "Received Engineer Department April 20, 1921," and "Received War Department, April 21, 1891," bearing certain endorsements signed, the last one by the Acting Secretary of War, and ask to have it marked for identification as "Defendant's Exhibit 528."

Mr. GATCHELL. May I say that as this is a copy of one of the many documents we have gladly supplied to the defendant, we have no objection to its reference at this time.

By Mr. Jackson:

Q. Mr. McWhorter, this document, Defendant's Exhibit 528, is the complete report of Major Craighill of which a part is reproduced in the report of Chief of Engineers for 1891. Do you know about that?

A. I know that a large part of what is in this letter is reproduced in the report of the Chief of Engineers for 1891.

Q. And did you, among the documents that you read, examine or read this document, Defendant's Exhibit 528, or a copy of it?

A. I did. I read every word of it.

Q. You produced and offered in evidence Exhibit 196, being a profile of New River. Do you know the Exhibit to which I refer?

A. I do.

Q. And you testified on your direct examination that the data from which those profiles appearing on Exhibit 196 were prepared are data appearing in certain reports of the Chief of Engineers; is that right?

A. I didn't say it appeared in the reports of the Chief of Engineers.

Q. What did you say you got it from?

A. I say I got it from the maps prepared from the surveys
made in 1872—that was the Hutton survey of the Lead
1676 Mines-Greenbrier River reach of New River, the maps
prepared from the survey of 1874 by Lieutenant Thomas
Turtle under the direction of Major Craighill, covering that part of New River below the mouth of the Greenbrier and——

Q. The only point I want to get at is this: Plaintiff's Exhibit 196 is based upon data appearing on the reports or maps of certain reports of surveys made by Major Craighill or officers subordinate to him in 1872, 1874, and 1878?

A. All of the depths shown in yellow, as I explained at the beginning, were obtained from maps prepared as the result of the surveys of 1872, 1874, and 1878.

Q. Maps prepared by whom, Mr. McWhorter?

A. The maps of 1872 were prepared by the Army Engineers at Baltimore from the Hutton survey of the Lead Mines-Greenbrier section of New River and the maps of 1874 were also prepared by the Army Engineers at Baltimore from the survey of Lieutenant Thomas Turtle covering the portion of New River below the Greenbrier River. The maps of 1878 survey were prepared by the Army Engineers, Baltimore office, from the results of the survey made by William Proctor Smith, Civil Engineer, in 1878. The depths shown in red represent the two-foot low water depth provided by the United States in the 26½ mile reach above the steamboat landing at Hinton and in the 29¼ mile reach above the

New River bridge at Radford and in the 8 mile reach above Ivanhoe Furnace. The Green——

Q. I don't want to interrupt you, but you have described it once and if you get away from the point I want to ask you we will have to go back over it again. You told me first that the area in yellow was based upon data appearing in certain maps made by the Army Engineers from certain surveys made in 1872, 1874, and 1878, did you not?

A. That is correct.

Q. Are those maps published?

A. No; they are not published, not to my knowledge.

1677 Mr. JACKSON. Are they the maps you offered here in evidence?

Mr. GATCHELL. Yes.

A. I want to keep you straight on that. I don't believe that all of those maps have been offered as yet. They are all in Roanoke.

By Mr. JACKSON:

Q. The only point I am getting at, confining ourselves to this part of your chart, Exhibit 196, is intended to be merely an accurate reproduction of the data appearing upon these maps prepared by the Army Engineers; is that right?

A. Just as accurate as we could possibly make it. You understand that this red and this green does not appear on any of those old maps. It is only the yellow that appears on those maps—I mean it is only the yellow that is deduced from those maps.

Q. And therefore if these maps do in any way depart from the data shown on the maps of the Army Engineers which you have just described, that is an unintentional error, of course?

A. Yes; it certainly is.

Q. Turning now to the part which you have colored in red, the source of data from which you made that part of the graph is, I assume, the reports of the Army Engineers?

A. The reports of the Chief of Engineers, 1877 to 1889, inclusive, or 1890. Anyway, it includes all the work they did on the river within that period.

Q. It includes the various reports of the Chiefs of Engineers?

A. That is right.

Q. And it is intended, as far as that part of the graph is concerned, to accurately portray merely the data that you found or believed you found in those reports of the Chiefs of Engineers?

A. It is intended to show the sections of the river that were improved by the United States to provide a two-foot navigable depth below the low water surface.

1678 Q. Let us not argue about that, Mr. McWhorter. I am only trying to find out what your data is. Am I right in understanding that the red parts of the graph appearing on Exhibit 196 are based upon the information or data contained in the reports of the Chief of Engineers?

A. That is correct.

Q. And if the diagram, referring now to the red sections on Exhibit 196, departs from that data in any respect, it is an error, isn't it?

A. It would be unless there was some reason for it.

Q. You based it merely upon the data that you found in the Chiefs' reports, didn't you?

A. As far as I remember now.

Q. That is all you claim to have based it on?

A. That is all I remember.

Q. You think you may have based it on something you don't remember?

A. Well, I might have used something that would be perfectly good that I don't remember at this moment. I certainly didn't use anything unless I thought I was justified in using it.

Q. I am not questioning that, Mr. McWhorter. I am trying to find out what you used. To the best of your knowledge, what you used were the reports of the Chief of Engineers; is that right?

A. That is right. You are speaking only of the red now, that two foot channel?

Q. That is right. You have got certain area colored green. Is that based upon the survey of the witness, Mr. Gerdes?

A. That is based upon the survey—not a survey—examination, I call it.

Q. I think that is a better term.

A. The examination of the shoals made by Mr. Gerdes a month ago or such a matter, maybe less, and also to a large extent upon the Hutton survey of 1872. I want to explain that. That green strip there shows only two feet of navigable 1679 depth, where as for more than five-sixths of that distance the navigable depth ranges from four to six feet.

Mr. Jackson. I move to strike out the statement that it shows any navigable depth.

Q. What I want to find out then is merely upon what data you base it and am I right in understanding that you base it upon Mr. Gerdes' examination?

A. Not entirely. I base it upon his examination and the Hutton Survey of 1872, and I knew for five-sixths of this distance that this two feet does not show correctly. It simply shows that the minimum depth is two feet except as otherwise shown on the profile and at all other places, covering five-sixths of that distance or more, the depth is much greater than two feet.

Q. In case of divergence, did you conform this green area to Mr. Gerdes' examination or to Mr. Hutton's survey?

A. I have already explained I didn't attempt to show it more than two feet although I knew it to be more than two feet and very substantially more than two feet.

Q. I am asking you in case of any divergence did you conform it to Mr. Gerdes' examination or Mr. Hutton's survey?

A. At all the shoals I conformed it to Mr. Gerdes' survey except at those shoals where he found the depth greater than two feet and at those places I showed it as two feet.

Q. I understand you didn't show anything more——

A. I showed it as two feet just like I showed the Hutton part two feet.

Q. If a pool were ten feet deep you didn't show that?

A. If it was ten feet deep I showed it as two feet or if it was four feet deep on the shoal I showed it as two feet.

Q. Can you point out the places where Mr. Gerdes reported one foot on the shoals on that green part?

A. Yes.

Q. Where is it?

1680 A. Mr. Gerdes reported one foot at Sifford's Falls, from mile 125 to mile 127.3, about. Just above the head of that Sifford's Falls, and so close to it that we couldn't show it on a map of this scale, is another little place, just a few feet, at a depth of one foot. That doesn't appear because it is just the upper part of Sifford's Falls. I am calling attention to it because I want to give you as accurately as I possibly can exactly what obtains on the river. At mile 130½ is a place where the depth is 1.8 feet.

Q. I would like to ask you a question about your Exhibit 197.

A. You didn't want these other places where it was less than two feet?

Q. No; I only asked you for the one foot measurement. I think the others can be read on the graph.

A. There is no place where it is less than one and one-half except at Sifford's Falls.

Q. You, I believe, testified that New River was not shown to scale on Exhibit #197?

A. That is right.

Q. Is it magnified at any particular rate?

A. I would have to figure it out.

Q. I didn't know if you had it magnified or not.

A. I didn't attempt to magnify any particular thing, but simply to portray it with meticulous accuracy.

Q. Is it shown twice as wide or five times, or do you know?

A. I would say it is shown—if you would actually scale it—it would probably be about two and one-half times, maybe, but we were not trying to show the width of the river.

Q. As I understand it, all you know about these questions of acquisitions and periods of construction of these railroads, is certain data was given you at the Interstate Commerce Commission?

1681 A. This exact data was supplied to us at the offices of the Interstate Commerce Commission. It is exactly as it was furnished to us.

Q. Yes; I wasn't questioning that. Will you define "low water depth or depth at low water" as you have used it in the interpretation of the surveys of 1872, 1874 and 1878?

A. Yes, sir; on 1872 Mr. Hutton, a civilian engineer, under Major Craighill, made the survey of the Lead Mines to the mouth of Greenbrier river [interrupted].

Q. I merely asked you to define it.

A. I will have to give you a little background.

Q. I should think you could define it without a background.

A. Mr. Hutton said the inhabitants, I am not certain whether I have the right report or not, it was either Mr. Hutton or Mr. Smith—let me see—those reports, of course, speak for themselves.

Q. I just wanted you to define low water depths or depth at low water, as you used it in interpreting these reports and surveys?

A. I want you to understand that I did not say that the water surface found by Hutton between the Lead Mines and the Greenbrier, and the water surface found by Smith between the mouth of Wilson Creek and the Lead Mines, was low water. I did not testify that. I said these depths are the depths below the water surface that obtained at the time of those surveys.

Q. You didn't undertake to interpret these maps so as to show depths at low water?

A. Extreme low water?

Q. Yes.

A. Mr. Hutton or Mr. Smith one stated the inhabitants told him the water had been 3″ or 4″ lower than it was at the time he was making the survey. I can't show 3″ or 4″ on the profile, but I can show 3′ or 4′ in accordance with my depth scale.

1682 Q. What I am wanting to get at, I am sure you understand me, is whether in interpreting the data appearing on these maps of the army engineers, for the purpose for instance of preparing that part of your graph on your Exhibit #196 shown in yellow, did you assume a certain low water flow?

A. No; I took the depths below the water surface that obtained when Hutton and Smith and Turtle made those surveys.

Q. So you didn't construct this chart on the basis of any particular low water flow?

A. No; but when Turtle made his survey in 1874 he said it was during the low water of 1874, and that is all I know about it.

Q. You do not know what it was?

A. No; and Smith said the water was low when he made his survey, and the inhabitants told him they had seen it 3″ or 4″ lower.

Q. You testified about the scale on #196, and it was not quite clear to me. You said the horizontal scale was 1″ to the mile on the large chart you used for illustrative purposes. Now on the small chart offered in evidence you said it was about ⅓″ did you not?

A. It takes about 3¼ or 3½ miles per inch. This is a photographic reproduction of that and no scale except the miles, you can tell exactly what they are, for the mileage is on there for each section.

Q. For instance on the depth scale that scale is inapplicable to the chart as it is reproduced by photograph?

A. No, sir; the depth scale is reproduced on this chart, the scale is reduced in the same proportion that the indicated depth is reduced.

Q. It wasn't clear to me is all.

A. That is all right so far as I can see.

1683 By leave of Court the following questions were asked on direct examination:

By Mr. **Gatchell**:

Q. Mr. McWhorter, if the New River is entirely shut off at the Radford plant for a period of two, three or more days, what would be the effect upon the power plants on the Kanawha River at the London, Marmet and Winfield dams during times of low flow?

Mr. **Jackson**. We object to that question for the same reason that we have objected to all questions dealing with alleged injury to Government power.

The **Court**. I will let it be answered for the same reason that I indicated the other day, that I want all information that I can have of that sort about the operations.

Mr. **Jackson**. May we have our exception noted for the record.

A. If the flow of New River should be impounded for two or three days at a time or for longer periods during low flow, the power plants at Marmet, London and Winfield would be out of commission because of lack of water until resumption of the natural flow of the river. The Radford plant would be out of commission for two or three days at a time and it would be out of commission for longer periods.

By Mr. Jackson:

Q. You are talking about the Radford plant now?

A. I am talking about the Radford plant.

By Mr. Gatchell:

Q. The Radford plant would be out of commission or would be shut down?

A. It would be either shut down or it would be floating with no generation and no discharge of water below the dam for two or three days at a time and also for longer periods.

Q. Is that the normal and customary manner of operating such a plant?

1684 A. It is. It is the rule, rather than the exception, to shut such plants down over week-ends. It is also a frequent occurrence to shut such plants down for longer periods than two or three days.

By Mr. Jackson:

Q. Mr. McWhorter, have you ever had charge of the operations of Wicket dams?

A. No, sir.

Q. The operation of such dams has never been under your supervision, has it?

A. No; but I know how they operate.

Q. Well, I do too. You stated, I think, that you worked for the Government for four and one-half years on the construction of Hale's Bar Dam?

A. I did.

Q. Isn't it a fact that Hale's Bar Dam was constructed by private individuals?

A. Hale's Bar Dam was constructed by the Chattanooga and Tennessee River Power Company, as I recall the name, but it was under Government supervision and Government inspection the entire period from the time it was started until the last day of its completion.

Q. You will, of course, agree that it would be physically possible to operate the Radford project on any basis between run-of-river and the extreme basis of peaking, which you assume?

A. It will be possible to operate it in different ways. I think to operate it in a freak, unusual, exceptional, and uneconomical way, would be folly, but it would be possible.

ERRATA

Pages 1273 and 1274:

The last six lines of page 1273 and the first seventeen lines of page 1274 should be transposed to page 1289.

Q. So far as the economics of the operation are concerned, there is no difficulty in operating it over any variation between run of river and extreme peaking, is there?

A. No; you could hold it there and not operate it at all.

Q. I didn't ask you about that. Will you answer my question?

A. I don't know whether the answer is no or yes, I don't remember the form of your question.

Q. Read the question?

(Question read.)

A. You could operate it as a base load plant or anywhere between that and peaking plant, as you will operate it, but it would be uneconomical to operate it as anything except for carrying peak load, or as a peak carrying plant.

Q. Who told you how we would operate it?

A. Your application tells me how you will operate it. The very nature of the project tells me how you will operate it. There cannot be any doubt in my mind——

Q. Your job was on the inspection, I presume?

A. I served in various capacities. I first served as an inspector and after about a year I served as an engineer.

Q. You testified that you have been in charge of various works being carried on by the United States in connection with the Tennessee River and the Great Lakes and St. Lawrence and various reports that were being made. Is it not a fact that each of those projects and reports was under the responsible charge of some officer of the Corps of Engineers of the United States under whose direction and supervision you worked?

A. I testified about the report on Muscle Shoals. The District Engineer who was at that time Major Burgess was in responsible charge of the district. I, like the other engineers on that investigation, worked under him. On the St. Lawrence River work I testified that I was principal engineer assistant to the American section of the joint Board of Engineers which the record shows.

Q. Who was the head of that—General Pillsbury?

A. General Pillsbury was Chairman of the American section, the present Assistant Chief of Engineers.

Q. Am I right in understanding since you have been at school your experience has wholly been in public employ?

A. Not wholly in the Government service.

Q. Not the Federal Government, but some public body?

A. My experience has been continuous. It has been upon hydraulic engineering work at all times, with the Federal Government for a considerable part of the time, with the Miami Conservancy District, a political subdivision of the State of Ohio for seven years; I was consulting engineer for the Orleans Levee district and the City of New Orleans for two years.

Q. I appreciate that. If you will produce them they can be checked. This Exhibit 197 is entitled "Railroads" and in the upper right-hand corner there is a column headed "Period of Construction" which confuses me a little. What is the purpose of that column? What is it intended to show?

A. To show when the railroads were constructed.

Q. By examining that column, or any other data on your map, Exhibit 197, is it possible to tell when any particular section or division of the railroad was completed and placed in operation?

A. By examining that column and what else?

Q. Anything else on your exhibit?

A. Well, the first one shows 1860 to 1861. That is clear enough. The next one 1867 to '73. Within that six years that railroad was built.

Q. Let us take that. Your item 1 purports to cover the main line of the Chesapeake & Ohio between Covington and Huntington and to show that it was constructed during the period 1860 to 1861 and 1867 to '73. Do you know when that railroad reached Hinton?

A. No. It was in the early seventies, as I recall.

Q. Isn't it a fact it reached there somewhere around 1872?

A. Somewhere around that time. You understand we didn't know when these railroads were built. We went to the Interstate Commerce Commission and got this information.

Q. I understand. My difficulty is that information of a railroad covering a wide area that was built anywhere from eight to ten years doesn't seem to me, from anything that I know of, to be very helpful. Take again the New River Division of the Norfolk & Western. Do you know where that is?

A. What number is it on this chart?

Q. I can't find it on this chart; I don't know.

A. Do you mean the railroad that crosses the river up here at Hiawassa?

Q. Don't you know that the New River Division commenced at New River Bridge and extended down to Glen Lyn and then over to Bluefield and westward to the Pocahontas coal fields?

A. You say it starts at New River Bridge?

Q. You don't show that on your maps, but it would be just across the river from Radford, about.

A. We have a Norfolk & Western Railroad just across the river from Radford extending upstream.

Q. This extends downstream to Glen Lyn, from New River Bridge down to Glen Lyn and thence to Bluefield and thence westward to Pocahontas.

A. If you will look on there you will see the railroad crossing the river below Radford and extending down the river to the Narrows and to Glen Lyn and then going westerly to Bluefield.

Q. You understand that the New River Division was not built as you show it, but was built down the other side of the river from New River Bridge Depot toward Glen Lyn, don't you?

A. There is a railroad on both sides of the river there.

Q. The Norfolk & Western we are talking about.

A. There is no Norfolk & Western shown on the right bank of the river on this map, that is immediately below Radford.

Q. Well, isn't it a fact that the New River Division started at New River Bridge just on the left bank of the river from Radford, went downstream to Glen Lyn and thence over to Bluefield and thence west to Pocahontas?

A. I don't know.

Q. Don't you know that that division was begun in 1880 and finished in 1883?

A. No; I don't know that.

Q. There is nothing on your map to tell one way or the other, is there?

A. Let me get clear on that. You say that the Norfolk & Western built a line of railroad along the left bank of the river from New River Bridge?

Q. Down to Glen Lyn, thence to Bluefield, thence west to Pocahontas.

A. We have got the Norfolk & Western here going down the left bank of the river to Glen Lyn, thence west to Bluefield. The only thing that is missing there is a link on the left bank between New River Bridge and the Norfolk & Western Railroad at the point where it crosses from the right bank to the left bank.

Q. You will notice that your item 9, Mr. McWhorter——

A. Let me find out this first. Are you contending that they built two separate lines of railroads down the left bank of the river?

Q. No; I merely say that the original New River Division extended from the New River Bridge on the left bank of the river across from Radford down to Glen Lyn and thence to Bluefield and thence west.

A. I have told you that I don't know whether the line we have shown on here was the original but all that is lacking is the connection from New River Bridge on the left bank of the river to this line that we have shown.

Q. I am coming to something else if you won't be so anxious to argue about it and let me bring to your attention the point I would like to have you tell me about. Will you turn to Item

9 on your chart, "Branch between Glen Lyn and Bluefield to Norton." Don't you know it to be a fact that the railroad from Glen Lyn to Bluefield is part of the main line and part of the New River Division as it was originally constructed, that is the division that commenced at New River Bridge, went down to Glen Lyn, west to Bluefield, and on west to the Pocahontas coal fields?

A. No; I know that the Norfolk & Western had a railroad extending from Glen Lyn to Bluefield as shown.

Q. And west to Pocahontas?

A. It goes on west. I don't know where it goes. I wasn't particularly concerned with where it went west.

Q. Isn't it a fact that that New River Division construction was begun in 1880 and that it was completed by continuous construction from New River Bridge through Glen Lyn to Bluefield and on to Pocahontas and placed in operation in 1883?

A. I don't know when that railroad was completed over there west of where we have shown it here or when it was placed in operation. All I know is that the information shown on this chart as to when these railroads were built is the information that we got from the Interstate Commerce Commission which we assumed to be correct.

Q. The point is you don't know anything about it personally, do you?

A. All I know is what the Interstate Commerce Commission gave us.

Q. And that doesn't tell you when the New River Division was commenced or completed, does it?

A. It tells approximately when all of these railroads—it gives the bracket of years when they were built.

Q. That includes a great many other things than the New River Division?

A. I would say that the construction was completed in the last year given.

Q. Your testimony is that the construction, for instance, to Bluefield which was part of the New River Division, was completed in 1891, referring to your Item 9 on the map?

A. That is the information we got, that it was constructed in that four-year period from 1887 to 1891.

Q. As a matter of fact, didn't you investigate enough to find out that the railroad between Glen Lyn and Bluefield is not a branch at all but a part of the main line of the Norfolk & Western?

A. We didn't attach any great importance to the type of line that is. All we wanted to show on the map was the existence of that railroad at that place.

Q. Were you trying to show when any of the divisions or parts of these railroads were constructed or placed in operation?

A. We were seeking only to compile or prepare an accurate map showing reliable information. We had absolutely no desire to show anything else.

Q. (The question was read.)

A. We were trying to show when all of these railroads were constructed and placed in operation.

Q. Mr. McWhorter, you understand me. You know what a division of a railroad is, don't you?

A. Yes.

Q. Were you trying to show on this map, or pretending to show on this map when the New River Division or any other division of the Norfolk & Western was completed and placed in operation?

A. Not particularly. We were trying to show the information that is embodied in that tabulation in the upper right-hand corner of the map or chart.

Q. You say "Not particularly." You weren't trying to show and you weren't able to show, were you, from the data that you had when any particular division such as the New River Division of the Norfolk & Western was constructed and placed in operation?

A. Not any particular segment of line. We were attempting to show the best information we could possibly obtain about all of these railroads in the New and Kanawha River Valley.

Q. Do you know where the Cripple Creek Division of the Norfolk & Western is shown on this map, Exhibit 197?

A. Where does it extend from and to? I know the general locality of that line. It is up there in the vicinity of Ivanhoe Furnace. Isn't that line extending from Dora to Allisonia to Austinville to Ivanhoe the line you speak of?

Q. That is the Cripple Creek Division, isn't it?

A. That is what I take it to be.

Q. Isn't it a fact that that Cripple Creek Division from Dora, formerly known as Martin's Tank, as I understand it, near Pulaski, up to Foster's Falls some miles above Allisonia, was commenced in 1883 and completed in 1886?

A. This chart shows within the period 1881 to 1888.

Q. That covers a much larger section, doesn't it?

A. I am unable to tell you whether that particular line was built in the period 1883 to 1886, or not.

Q. Did you find out that there was no intermediate operation on that line between the years 1883 and 1886?

A. I did not.

Q. You don't know anything about that, do you?

A. All I know is when it was built.

Q. All you know is that the Interstate Commerce Commission gave you some figures as an over-all period during which certain railroads were built; is that so?

A. They gave us a seven-year period within which that particular line was built, from 1881 to 1888.

Q. And that included a good deal more than the distance from Dora to Foster's Falls, didn't it?

A. I believe it did.

Q. You know it did, don't you?

A. I don't know. I think it did.

(Defendant's exhibit 529, being letter dated February 4, 1930, from Appalachian Electric Power Co. by Curtis, Mallet-Prevost, Colt & Mosle to the Federal Power Commission re minor-part license, marked for identification.)

(Defendant's exhibit 530, being memorandum dated February 4, 1930, re minor-part license prepared by Curtis, Mallet-Prevost, Colt & Mosle, marked for identification.)

Q. I show you, Mr. McWhorter, Defendant's Exhibit 530 and ask you whether or not in your examination of this file you did not find that a copy of this exhibit was in the files of the Federal Power Commission and whether it is not the memorandum referred to in Exhibit 529?

A. My answer is that I have read everything in the Federal Power Commission's files relating to this project and if this is in there I have read it. I would have to read this to see if I can recognize what is in it and tie it in with things that I have read in the files.

X Q. I produce a photostatic copy of a letter, on the letterhead of the Federal Power Commission, dated July 21, 1930, addressed to the Attorney General of the United States, and signed by Patrick J. Hurley, Secretary of War, as Acting Chairman of the Federal Power Commission, and ask to have it marked "Defendant's Exhibit #531," for identification.

NOTE.—Letter was marked for identification "Defendant's Exhibit #531."

X Q. I show you Exhibit #531 marked for identification, and ask you whether or not you can identify that as a photostat of one of the documents in the file of the Federal Power Commission dealing with the application of the defendant for a license, which you examined, and in regard to which you undertook to say what, if any, modifications had been made of the license or the application rather?

—

X Q. I produce here a document headed "Department of Justice, Washington, D. C., September 22, 1930, addressed to the President and signed Wm. D. Mitchell, Attorney General," and bearing at the top the notation, "The following opinion of the Attorney General was released by the Federal Power Commission September 26, 1930." The paper consists of nine typewritten or mimeographed sheets, and ask to have it marked "Defendant's Exhibit #532," for identification.

NOTE.—Document marked "Defendant's Exhibit #532," for identification.

X Q. I show you Exhibit #532 marked for identification, and ask if you found a copy of that document in your examination of the file dealing with the application of this defendant for a minor part license?

A. I don't recall this document in the files, but I have read this opinion, and I know that the Attorney General's opinion was at variance with the opinion of the Commission's counsel, and the Commission did not follow the opinion of the Attorney General.

X Q. Did you understand me to ask you if the opinion was at variance with the opinion of the Commission's counsel?

A. No; but I thought you would want that information.

X Q. Why did you volunteer that answer?

A. It was the facts.

X Q. You don't have any interest in the matter, do you?

A. I do have an interest.

X Q. You say you did not go to the Commission until 1931?

A. June 27, 1931.

X Q. Did you or did you not testify that the application of the defendant was amended by a letter dated October 16, 1930?

A. I testified the Appalachian Electric Power Company sent a letter to the Commission.

X Q. October 16, 1930, you said?

A. Dated October 16, 1930, with which plans different from those submitted with the application for license were filed with the Commission. I simply testified the company did that as shown by the records of the Federal Power Commission.

X Q. Can you tell me, Mr. McWhorter, why your memory and knowledge is so much more certain about the letter of October 16, 1930, which was received, if at all, before you came with the Commission, than it is about the other documents to which I have referred?

A. Because I particularly noted that date. I testified that last opinion you showed me I had read. I remember specifically reading that in the annual report of the Federal Power Commission, I believe for the year 1926. I do not specifically remember reading it in the files any more than the previous letter you showed me.

X Q. I produce a letter dated October 6, 1930, addressed to the Federal Power Commission, signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle, and ask to have it marked "Defendant's Exhibit #533" for identification.

NOTE.—Letter dated October 6, 1930, marked for identification as "Defendant's Exhibit #533."

X Q. And I produce a further document which appears to be a photostat copy of letter dated October 16, 1930, addressed to the Federal Power Commission, Washington, D. C., and signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle, and ask to have it marked "Defendant's Exhibit #534" for identification.

NOTE.—Letter dated October 16, 1930, marked for identification as "Defendant's Exhibit #534."

X Q. I show you Defendant's Exhibit #533, marked for identification, and Defendant's Exhibit #534, marked for identification, and ask you whether or not Exhibit #533 marked for identification does not refer to the so-called amendment of the application, about which you testified yesterday, and which you said is set forth more particularly in Defendant's Exhibit #534, the letter of October 16, 1930?

A. Did I say that, or did you say that?

X Q. I understood you to say that was in this letter.

A. I didn't refer to this letter so far as I know. I stated those amended maps were with the letter of October 16, 1930, and did not make any reference to the letter of October 6, 1930.

X Q. This letter, Exhibit #533, is a letter advising the Commission the defendant is about to file a revision of its plans with its application, isn't it?

By Mr. GATCHELL. We don't like to be captious about this, but they are still attempting to have this witness identify letters purporting to be sent to the Commission prior to the time he came with them. The letter speaks for itself. If they want to introduce it when their time comes, they can do so.

By Mr. JACKSON. We aren't introducing it, but I don't think he should identify documents before he came with the Commission he likes, and object to identifying any he doesn't like.

By the COURT. The only serious objection I can see is you are utilizing this witness to identify exhibits which ought to be identified by your own witnesses. I have permitted that throughout the case, because it struck me it would simplify the matter and hasten things, and I don't see why it should not be done. Now the question is whether or not this matter was received by the Commission. If this witness can say it was in the files when he went there, I can't see there is any objection. Is there any dispute about it?

By Mr. **Gatchell**. No particular dispute that the Commission had some, but as to others we say there is, and the main point about the last letters, preceding the one he now has, is whether the Commission itself saw the matters to which counsel has referred, namely, the memorandum whether the Commission should issue a minor part or major license. If this witness was not with the Commission when that was received, how can he tell if the Commission saw it, if it was in the files there, and this witness is not the one to tell about this letter.

By the **Court**. Nor is anyone else. When an applicant dealing with the Government addresses a communication to the Government, and such communications are in the files, I think the Court would presume that they were seen by the Commission.

X Q. Did you find that Exhibit #533 marked for identification, or copy of it, in the files?

A. I don't remember this letter of October 6th at all. I do remember the letter of October 16th very clearly.

X Q. To refresh your recollection I direct your attention to this statement in the letter of October 6, 1930, Exhibit #533, marked for identification, "in this connection we intend shortly to submit to you appropriate copies of revised plans to be substituted for certain plans filed with you," and ask if that doesn't refresh your recollection as to this letter being in the files?

A. No; that doesn't refresh my recollection. If I should look in the files I would expect to find that.

X Q. This Exhibit #534, marked for identification, dated October 16, 1930, is the one about which you testified on your direct examination?

A. Yes, sir; it is. I remember this letter and do not remember the other letter.

X Q. To keep the record perfectly clear, what you are now telling me is that the notation on these revised maps, which reads:

> "War Department—Approved so far as the plans affect the navigable capacity of navigable waters of the United States, November 1930, Patrick J. Hurley, Secretary of War—November 5, 1930, Lytle Brown, Major General, Chief of Engineers."

was not on these maps when they were received?

A. No; they came from the Power Commission and as is customary they were sent to the Chief of Engineer's Office for consideration, and as is customary if the Chief of Engineers and Secretary of War find the proposed construction [interrupted].

By Mr. **Jackson**. I object to the witness stating what is the custom as incompetent.

By the **Court**. Overruled.

By Mr. **Jackson**. Exception.

A. (Continuing.) The Power Commission submits these maps and plans to the Chief of Engineers and Secretary of War, because the Federal Power act requires that in the event of the proposal of any applicant to construct works or structures which would affect the navigable capacity of any navigable water of the United States, that the construction—before construction can be commenced, those plans must have the approval of the Chief of Engineers and the Secretary of War. Now, of course the Chief of Engineers and the Secretary of War in this case never on earth would have signed these plans except on condition they would be made a part of a license issued by the Federal Power Commission.

By Mr. JACKSON. I renew my objection, and move to strike out the statement as to what the Secretary of War and Chief of Engineers would have done.

By the COURT:

Q. I do not understand what you mean they would not approve them unless made a part of the license. As I understand they approve the construction of projects based on certain plans that have been submitted?

A. They approve them conditionally, your Honor, and that approval carries with it the prescription of numerous special conditions for insertion in the license.

Q. Conditions revealed by the plans?

A. They are contained in the recommendations for insertion in the license for protection of navigation.

Q. Did the Chief Engineer of the Federal Power Commission submit his recommendation?

A. I take it you mean the Chief of Engineers.

Q. The Chief of Engineers submits to the Secretary of War his recommendations?

A. Submits to the Federal Power Commission his recommendations of provisions for insertions in the license.

Q. Let's get this straight. Here are a set of plans and application for license, as I understand submitted to the Secretary of War, as required by law, and there has been stamped on the plans the approval of the Secretary of War approved so far as the plans affect the navigable capacity of navigable waters of the United States?

A. Yes, your Honor; but attendant upon that approval, and as a part of it, were numerous recommendations for special provisions in the license for protection of navigation.

Q. You mean when these plans came back to the Water Power Commission they were accompanied by recommendations to be included in the license?

A. About that time, or somewhat earlier than that time, the Department's recommendations had been filed with the Commission.

Q. Suppose it were before that time, this would indicate the War Department—would indicate these plans conformed to the recommendations of the War Department, otherwise they would not have been approved?

A. Not unless those provisions were inserted to protect navigation. To clear that up, in June 1934, the Appalachian Electric Power Company notified the Secretary of War it was beginning the construction of this project. The Secretary of War replied that the provisions [interrupted].

By Mr. JACKSON. I object to what the Secretary of War replied.

By the COURT. Let him finish.

A. (Continuing.) Replied to the Appalachian Electric Power Company that he would not at that time prescribe any conditions directly to the company, but that the provisions for the protection of navigation would be included in the license issued by the Federal Power Commission for this project, such provisions being necessary for the protection of the interests of navigation.

Q. Let's go back to 1930, regarding this approval by the Secretary of War. Why did he approve these plans unless they revealed conditions which, in his opinion, made the operation of that plant such as would not interfere with the navigable capacity or unless he had been satisfied by some memoranda apart from this as to the method of operation, which he felt justified in approving?

A. I will tell you how those things are handled. These applications for water-power projects are filed with the Federal Power Commission. If those projects would affect the navigable capacity of any navigable water of the United States the Commission refers them to the Chief of Engineers of the War Department for examination and report. The Chief of Engineers submits a report to the Commission, with his recommendations of provisions to be inserted in the license for the protection of navigation, and after we get those recommendations, then we take the tracings which the applicant has submitted, and with that information we have received from the Chief of Engineers, we send those tracings over there for the formality of getting his signature, and the Secretary of War's signature approving those plans on the condition the license shall embody those plans and also shall contain the special provisions the War Department has recommended for the protection of Interstate Commerce.

Q. And after all that has been done, and was done in this case, the Secretary of War approved these plans?

A. Yes, sir; but the Secretary of War and Chief of Engineers approved those plans with the provision all those provisions as were recommended, would be inserted in the license, and become a part of the license.

Q. Were those conditions inserted in the license?

A. To the best of my knowledge and belief substantially all of them were inserted in the license and such changes as were made were made after consultation with the Chief of Engineers.

By the COURT. What I am getting at is, as late as November 1930, after the submission of the plans to the Secretary of War, and knowledge on his part of those plans, and of the conditions of operation imposed in connection with those plans, he approved them as not interfering with navigation.

By Mr. JACKSON:

X Q. I now produce a letter on the letterhead of the War Department, Office of the Chief of Engineers, dated November 7, 1930, addressed to the Executive Secretary, Federal Power Commission, Washington, D. C., and signed for the Chief of Engineers by Major John J. Kingman, and ask to have it marked for identification as "Defendant's Exhibit #535."

NOTE.—Letter of November 7, 1930, marked as "Defendant's Exhibit #535."

X Q. I direct your attention to this Exhibit #535, marked for identification [reading]:

"(1) Reference is made to your letter of October 17, 1930, requesting approval by the Chief of Engineers and the Secretary of War of tracings accompanying the application of the Appalachian Electric Power Company (Project 739) for a minor-part license to develop water power on the New River, near Radford, Va.

"(2) In reply I would inform you that the plans, which have been examined and found satisfactory so far as the interests of navigation are concerned, have been approved by the Chief of Engineers, and the Secretary of War, and are returned herewith.

"(3) It is understood the construction of the project will be under the supervision of this office, that all work will be done to the satisfaction of the District Engineer in charge, and that detailed plans will be submitted to him for approval as he may direct.

"(4). It is requested that the conditions suggested in your letter of October 3, 1930, and approved in the letter of October 10, 1930, be revised to read as follows:

"Whenever the flow at Lock #2 at Kanawha River falls below 1,400 second-feet, the licensee shall, when so directed by the

Secretary of War, discharge in each twenty-four hours, the natural flow of the river at the dam site during that period up to a discharge of 1,150 acre-feet, the discharge from the project shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent undue interference with navigation on the Kanawha River."

I will ask you whether or not you found that letter, marked for identification "Defendant's Exhibit #535," in the files of the Federal Power Commission; dealing with the application of the Appalachian Electric Power Company?

A. I did, and it shows on its face that as late as November 7, 1930, the Chief of Engineers submitted a recommendation showing his signing of those plans did carry with it the reservation that the license to be issued should contain that particular special provision for the protection of navigation.

(Defendant's exhibit 536, being letter dated October 31, 1930, from Bonner, Executive Secretary of Federal Power Commission, to Appalachian Electric Power Co., enclosing draft of minor-part license, marked for identification.)

Q. Then let me produce here an original letter, on the letterhead of the Federal Power Commission, dated November 6, 1930, addressed to Appalachian Electric Power Company and signed by F. E. Bonner, Executive Secretary, to which is attached an enclosure, 1088 from Federal Power Commission, U. S. Govt. Printing Office 1927. The inclosure, composed of several typewritten sheets bears the title "Federal Power Commission, Minor Part License on Non-Navigable Waters. Project No. 739—Virginia—Appalachian Electric Power Company," and will ask you whether or not you found that letter or a copy of it, and the inclosure in the files when you examined the files with regard to the application for license of this defendant, of the Radford project.

A. I do not remember that this Commission ever tendered any such license.

Q. I did not ask you that question. I asked you if you did not see this letter or a copy of this memorandum in the files of the Federal Power Commission?

A. I may have seen it since I have been with the Commission for the past five years, but I do not remember it.

(Letter and memo marked for identification, "Defendant's Exhibit 537.")

By Mr. Jackson. For the record, I will state that the document which has been shown to the witness has been marked "Defendant's Exhibit 537," for identification and consists of a letter dated November 6, 1930, signed by F. E. Bonner, Executive Secretary, and addressed to the defendant, together with the inclosure headed "Federal Power Commission, Minor Part License on Non-Navigable Waters, Project No. 739—Virginia—Appalachian Electric Power Company," which I have described somewhat more particularly before.

Q. Now I produce what appears to be a photostat of a letter dated November 8, 1930, addressed to General Brown, Chief of Engineers, and signed F. E. Bonner, Executive Secretary, and will ask to have it marked "Defendant's Exhibit 538," for identification?

(Said letter is marked "Defendant's Exhibit 538" for identification.)

Q. Mr. McWhorter, I direct your attention to Defendant's Exhibit 538, being a letter reading:

"Dear General Brown: I have Col. Kingman's letter of November 7, regarding approval of the plans, for the project on New River near Radford, Virginia, contemplated by the pending license application, (No. 739) of the Appalachian Electric Power Company.

In preparing this case for presentation to the Commission for final action a question has been raised regarding the formal finding made by the Commission on June 1, 1927, that the portion of New River embracing the proposed project works is not 'navigable waters' within the definition of the Act."

Q. Can you identify Defendant's Exhibit 538 as being a copy of a letter in the files of the Federal Power Commission, dealing with the application of the defendant for a Minor-Part license?

A. I do not remember this particular letter. Of course, I have knowledge of that whole controversy.

Q. Do you wish to testify that you cannot identify this Exhibit 538 as one of the letters in the files of the Federal Power Commission?

A. I do.

Q. I now produce letter on the letterhead of the Federal Power Commission dated December 15, 1930, with the following words in the left-hand corner "EP-739—Virginia, Appalachian Electric Power Co." addressed to Curtis, Mallet-Prevost, Colt & Mosle, New York City, and signed by F. E. Bonner, Executive Secretary, to which is attached a further typewritten sheet with a printed form on the typewritten sheet reading: "Inclosure 7992, from Federal Power Commission, U. S. Govt. Printing Office 1927." Being marked "Copy. War Department, office of the Chief of Engineers, Washington, November 11, 1930, addressed to The Executive Secretary, Federal Power Commission, Department of the Interior, Washington, D. C.," and signed "Lytle Brown, Major General, Chief of Engineers," and will ask to have the letter marked "Defendant's Exhibit 539A, for identification, and the enclosure marked "Defendant's Exhibit 539B for identification."

(Said letter and inclosure marked "Defendant's Exhibits 539A and 539B for identification.")

Q. Mr. McWhorter, I show you defendant's Exhibit 539A and Defendant's Exhibit 539B and ask you if you can identify those exhibits as documents, the originals, or copies of which you found in the files of the Federal Power Commission, dealing with the application of this defendant for a Minor-Part License?

A. I am not certain whether I remember these particular letters or not. As stated before, I have general information about this entire matter, but I do not remember particularly about these two letters.

Q. In your direct testimony you said you had examined every report of the Chief of Engineers in connection with this application, did you not?

A. Yes. I said I had examined every report of the Chief of Engineers, and if that is in the files, I have examined that, too.

Q. Does not the report of General Brown refer to Project 739, Appalachian Electric Power Company?

A. It does. All I had to do is to examine the files which we have here, and I can do that.

Q. Isn't that project 739?

A. It is. I can look in the files there and find out in two or three minutes.

Q. If you have the files here, will you look at them at noon recess and let us check about these documents, about which your memory is infirm, and let us see if they are in the file?

By Mr. Gatchell. If they want this witness to look in the files and see if they are in there, that is one thing, but for them to examine our files is quite another matter. I do not know just what the object is, in going through our files. If he wants the witness to take the exhibits he has marked for identification and see if they are in the files, that is all right.

By the Court. I think that is the proper way to do it.

By Mr. Jackson:

Q. I now produce a letter on the letterhead of the Federal Power Commission dated November 28, 1930, addressed to the Appalachian Electric Power Co., signed F. E. Bonner, executive secretary, to which is attached what purports to be a certified copy of the action of the Federal Power Commission upon application of the defendant for Minor-Part license, and will ask to have the letter marked "Defendant's Exhibit 540A for indentification" and the inclosure "Defendant's Exhibit 540B for identification."

(Said letter and inclosure are here marked for indentification "Defendant's Exhibits 540A and 540B.")

I show you defendant's Exhibit 540A and Defendant's Exhibit 540B for identification, and will ask you if you can identify the letter and document attached thereto as being a letter and document of which either the original or copy is in the files of the Commission, dealing with the Minor-Part license of the defendant?

A. May I ask if this is a letter addressed to Col. F. W. Scheidenhelm or to the company?

Q. It is addressed to the Appalachian Electric Power Co.

A. That has been stricken out with a pencil.

Q. It was not stricken out before it came from the Commission?

A. No; I do not remember that letter.

Q. Now I desire to produce one more document, headed "Federal Power Commission, Washington, October 28, 1930. Memorandum for the Executive Secretary," and signed "M. C. Tyler, Lt. Col., Corps of Engineers, Chief Engineer," which appears to be a photostatic copy of a document consisting of 11 sheets, and will ask to have it marked "Defendant's Exhibit 541 for identification."

(Said paper is here marked "Defendant's Exhibit 541 for identification.")

Can you identify defendant's Exhibit 541 for identification, as a document in the files of the Federal Power Commission dealing with the Application of the defendant for the Radford project?

A. I remember seeing it.

Q. As I understand it, you have never operated an electric-power system?

A. No.

Q. Did you ever operate a single power station?

A. No.

1685 Q. One moment. That is what you mean when you say how we will operate it?

A. There can be no doubt in my mind or in the mind of anyone else competent to speak of that subject that the Radford project will be a peak load carrying plant in a system of this company.

Q. So it was with full knowledge on your part that the Rad-

ERRATA

Page 1289:

After line 13 from the bottom of the page insert the following: The last six lines from page 1276 and the first seventeen lines from page 1274.

Q. You knew all of that when the license dated May 5, 1931, marked "Exhibit 131," was tendered?

A. I was not with the Federal Power Commission when it was tendered. I observed it after I came there. I have also seen representatives of the Appalachian Electric Power Company frequently in the past five years and never once has there been any suggestion that this plant would be anything except peak load carrying plant in that system.

Q. Has anybody told you that there is going to be some peaking below 9,000 feet?

A. Representatives told the State Commission at Richmond.

Q. I asked you if anyone has told you, any representative or officer of the defendant, that they were going to operate the Radford project peaking from zero to 9,000 through the low season?

A. I don't remember whether they told me that or not.

Q. If anyone ever told you I would like to know who it was and when they told you?

A. Certainly nobody has told me anything other than that. Nothing but what I expect them to tell me, nothing other than that.

By Mr. Jackson. I move to strike out what the witness would expect.

Q. Let me ask you this question: Is it physically possible to operate the Radford project on a basis involving the passing of the natural flow during low-water periods and peaking that water which is drawn from storage?

1686 A. Yes; the Federal Power Commission tendered a license which would require the licensee to pass that low-water flow, of 580 cubic feet per second.

By Mr. Jackson. I move to strike out the voluntary statement of the witness as to what the Federal Power Commission did.

Q. Did you understand me to ask you whether the Federal Power Commission had tendered any license requiring the passage of any flow?

A. You did not ask me that.

Q. You know I didn't ask you anything about it?

A. But you asked me something relating to it.

Q. Then why did you volunteer the information?

A. That is pertinent information.

Q. You were not trying to argue the case, were you? You have testified the economic consideration would in your opinion, require operation of the Radford plant on extreme peak-load basis?

A. I did not say extreme peak-load basis.

Q. Let me finish my question. Peak-load basis during low-water season. Do you say that you did not testify to that?

A. I did not say extreme peak lead, but I think I said that part of that time it would be on extreme peak load. I think if it was below extreme peak but somewhere on the peak, they would have those fluctuations in flow just the same.

Q. If you did not mean extreme peaking, from zero to 9,000, during low-water season, what did you mean?

A. I said in every case, whether extreme peak or just below the extreme peak. There are some other small plants, as we know, and you would have fluctuations in flow, and in either of those cases you would shut this plant down, when the flow is down to five or six hundred second-feet, when the rivers below this plant would be in great need of that water.

By Mr. Jackson. I move to strike out the answer.

By the Court. Read the question.

(Question read.)

By Mr. Jackson. Add to the question: What kind of peaking did you assume?

By Mr. Gatchell. He is adding something to the question that he did not ask before.

A. My reply was in substance, that regardless of whether it was on extreme peak or not, you would have those great fluctuations in flow below the plant.

Q. I move to strike the answer out. I ask you if you 1687 did not assume in speaking of peaking during low-water season, extreme peaking, from zero to 9,000 second-feet or what kind of peaking did you assume?

A. My testimony is that part of the time it might be operated on extreme peak, part of the time it might not be, but in either case, you would have great fluctuation and flow below the dam.

By Mr. Jackson. I move the Court to strike out the last part of the answer as not responsive to my question.

By the Court. I will let it stay in.

By Mr. Jackson. The witness is an intelligent witness but he will not answer my question, and I do not want to take up the time of the Court repeating them all the time.

Q. You tell me now, if you please, what was the range of peaking that you assumed, during low-water season?

A. At times it would be full range of discharge below the dam, ranging from zero flow just below the dam to 9,000 cubic feet per second. At some certain times if you put it on the very peak of the load, the spread might not be quite so wide as from zero to 9,000, but it would be from zero up towards 9,000. I would say from zero to more than 8,000, under most any of those conditions.

Q. I see. Well, you testified, Mr. McWhorter, that there would be week end shut-downs for two or three days—three days, as I understood you, being when a holiday fell on Friday or Monday.

A. I went further than that.

Q. I am not asking you how far you went. Could you answer a question——

A. I did. I think there would be shut-downs for two or three days over the week ends and there would be longer shut-downs.

Q. Suppose we take the one question that I asked you—am I right in understanding your testimony to be that you say that there would be shut-downs of two days over the week ends and three days when a holiday falls on Friday or Monday?

A. Yes, sir; I would say that, if this plant is operated in the usual manner of operating storage power plants—hydroelectric plants, in a system like the system of the Appalachian Electric Power Company carrying general utility loads, this Radford plant would be shut-down over the week end during periods of low flow.

1688 Q. Yes, sir; during periods of low flow. Mr. McWhorter, how many times does a holiday ordinarily fall on Friday or Monday during low-water season in this territory?

A. May 30th, July 4th, and Labor Day will fall on Monday in the same year, and Decoration Day and July 4th will both fall on Friday every time one of them falls on Friday, and the plant would be shut down.

Q. Suppose we take one thing at a time, unless you want to go into it anyhow.

A. I am talking about week ends from late Friday evening until Monday morning.

Q. I have no objection to your going into it, but we can get along faster if you will answer my question. Do you know when the low-water season commences in this territory?

A. Yes, sir.

Q. When?

A. In general——

Q. (Interrupting.) When do you think it commences?

A. Generally we have low water in late summer and early fall.

Q. Do you think that the low-water season commences before Decoration Day?

A. No, sir.

Q. Why so?

A. Because July 4th and Declaration Day fall on the same week day. Labor Day will fall on Monday the same as July 4th falls on Monday.

Q. Labor Day falls on the same day, too?

A. Yes, sir.

Q. Do you think that the low-water season here always starts about the first of July?

A. Not always. We did have some years, I think in 1914, and I believe in 1930, when July was a low-water month.

1689 Q. Wouldn't it be fair to say, as a general rule, that the low-water season in this territory does not start until after July 4th?

A. I say it does not start until after Decoration Day. I think you will find July——

Q. (Interrupting.) More often it will not start until after July 4th?

A. Yes, sir.

Q. It will only be once in seven years, or about twice in seven years, that it will fall on Friday or a Monday?

A. That is about right.

Q. So you think that possibly a Labor Day suspension, or a holiday suspension during low-water season, will be of importance?

A. I was not relying so heavily on that?

Q. You mentioned it.

A. It was a matter of fact that I mentioned, but if you have a plant shut down for two or three days or a week or so, one day is of little importance.

Q. If you were operating the Radford project, would you involve your company in any possible hazard of liability for injuring the rights of riparian owners downstream or interfering with navigation down on the Kanawha River, to save one day's operation of the Radford project?

By Mr. Jackson. Change that "in order to save one day's operation" and say "to attain one extra days' peaking of the Radford project."

A. My intentions would be probably not to do that, but I will not be here very long and the officers of your corporation in that project will not be here very long, and that project might not be owned by the Appalachian Electric Power Company ten years hence, and the people who feel now that they would not do this might come to some other place and say they will do something else. The people who are operating it now may not 1690 be here thirty years from now. We don't know how it will be operated. They may be expected to operate it in any manner they wish for power alone, and they will do it to bring the largest pecuniary returns to the company. I hope the officials of the company will live to be as old as Methuselah, but we all know that we will not be here indefinitely.

By Mr. Jackson. I will ask that the question be read:

(The question is read.)

By Mr. **Gatchell.** This question goes to whether or not this witness will operate the dam in a particular manner. The question of the bona fides of this company is not involved here.

By the **Court.** No, sir; but this witness has stated that this company will operate it in a certain way. He has repeated that time and again, and he has answered the question indicating that belief on his part. They are asking him if he would run the risk of being involved with the United States by affecting navigation and having lawsuits by lower riparian owners in the operation of the plant to save one day. I think it is proper.

A. My intentions might be one thing, but I could not give the assurance that it would be carried out, except in the immediate future.

By Mr. **Jackson**:

Q. What would you do? Answer the question and state what you would do.

A. I think I have answered the question.

Q. Is your answer yes or no?

A. I would operate the plant with regard to other interests, at least, that would be my expectations, and I would expect to use that power plant, operating there within reasonable periods, very soon after construction, if allowed to operate for power development alone, but without any restrictions on its operation as to its effect on other interests, I assume it to be operated in a manner that would bring the greatest financial returns to its owners.

Q. If you owned the project and operated it, would you expect that you would soon operate it in order to obtain the greatest returns, without any regard for the rights of lower riparian owners and without regard to the navigation interests on the Kanawha River?

A. If I owned it, I would be in the same position as the people that built it. I would not wait very long——

Q. I will ask that the question be read. (The question is read.) What would you do?

A. If I owned it, my guess is that I would operate it so as to get as much money as I could, but I expect I would soon find myself complained of.

1691 Q. You think that, if you owned it, that you would operate it to make the most money you could and you would not care if it injured down stream riparian owners or the navigation on the Kanawha River?

A. I am talking about the frailty of human nature. That would be the natural thing to expect. If built for power alone, without any provisions for navigation or the protection of navigation, it will be operated for power and without regard to anything else, and that project has the potentiality of driving navigation off the rivers.

Q. I will ask that the question be read.

(The question is read.)

A. I answered that two or three times. My intentions would be doubtless not to interfere with other people or their rights, but I could give no assurance that that would be carried out for any particular length of time. I might sell the plant after I built it.

Q. You feel that you would sell the plant to people with lesser moral fibre than you?

A. If there were no license and no restrictions of any kind on it, the person buying from me would not expect me to tie him down with things that I was not tied with or with conditions not imposed on me by anybody. I would not be able to sell it if I tried to tell the man I was selling to how to operate it and what he could or could not do.

Q. Do you think that, if you operated that plant and involved your company in lawsuits by downstream riparian owners, and by the United States in connection with navigation on the Kenawha River, that you would hold your job very long?

1692 A. If I were an official, or had an official position with the company, under the conditions involved, I would not expect to build that plant without receiving a license from the Government for that project.

Q. You would feel uncertain of yourself without some governmental restraint upon your pecuniary acquisitiveness?

A. The potentialities for affecting it are too great for anybody to take that risk.

By Mr. **Jackson**. I will ask that the question be read.

(The question is read.)

A. I would feel that I was in a better position with the license than without one, and a great many other people feel the same way.

By Mr. **Jackson**. I move to strike out from the record how some other people feel.

A. (Continuing.) That is evidenced by the applications filed with the Federal Power Commission over a term of years.

By Mr. **Jackson**. We object to that and move to strike it from the record.

By the **Court**:

Q. The Commission did extend to the Appalachian Electric Power Company a license, didn't they?

A. Yes, sir; on two occasions—July 1st, 1927, and May 5th, 1931.

Q. And imposed certain restrictions in regard to the discharge of water?

A. Yes, sir; restrictions were recommended originally by the Chief of Engineers or arrived at by consultation with the Chief of Engineers.

Q. And the Company indicated its willingness to accept these conditions in regard to the discharge of water—the most of them?

A. I don't know that it did, Your Honor.

1693 By the COURT:

Q. Isn't that true? Isn't it true that the Government imposed in this license tendered—they suggested certain conditions relating to discharge a required or prescribed amount of water from the dam at regular intervals into the lower stream, and the company, while denying that right to impose these

1694 conditions, indicated that they would accept it?

A. They did not accept the license and I would have to refer to the record.

Q. You have seen the license, have you?

A. I saw the letter they wrote to the Federal Power Commission before I went there, talking about the provisions of license, one at a time, and expressing their willingness as to some of them and expressing their objections and unwillingness as to others.

Q. Didn't they agree in substance with about all of the conditions relating to the discharge of water from the dam?

A. I am sorry I cannot tell the Court right at this moment, but I can find that shortly and will be glad to do so.

Q. Didn't the Company, in its response to the conditions that the Government sought to interpose, very flatly deny the implications that you have given here repeatedly this morning and in your other testimony that they would operate the dam in only one way and that was the only way it could be operated? Haven't they indicated in their response to the Commission just the contrary from your position?

A. If you recall, I did not say that it could not be operated in any other way.

Q. But you have insisted very strongly that they would not operate it only in one way?

A. Yes, sir; I think so.

Q. Didn't they, in their answer, indicate that they would not, and didn't they go far enough with the Commission to indicate that they would not insist on operating the dam in the manner in which you have insisted that they would.

A. They did say something of the kind, but then, in their Declaration of Intention, they made some kind of a statement—

but those documents speak for themselves, of course, and it is very difficult for me to quote what they said or give it in 1695 substance the exact meaning of what they said, but I can refresh my memory in the next hour and tell the Court.

Q. Suppose no license were granted, and in the exercise of their free-handed authority, they decided that they might operate the plant to suit themselves, as you insist they would, what I am getting at—doesn't the course of conduct between the parties heretofore, as evidenced by the conditions that the Government suggested and the response of the Company, indicate its willingness to accept the conditions and indicate that they are willing to operate the plant along lines quite different from those that you insist would be enforced and operated?

A. Your Honor, in all seriousness, my opinion is that, if this project is built, without any restrictions from the Federal Government for its operation, sooner or later, it will cause a great deal of inconvenience and a great deal of adverse effect on the interests of commerce on New River and Kanawha River and the Ohio River, and the potentialities are such that this project can largely drive navigation off the Ohio River.

Q. You say that it was your opinion and conviction that this plant will be operated, as you call it, as a peak load plant all the time, because there was no other way to economically operate it?

A. I beg your pardon.

Q. Hasn't the company indicated by its acceptance of the suggestions of the Commission that they are willing to operate in conformity therewith?

A. They have said in Court and they have said in their Declaration of Intention that they would operate it in some manner so as not to interfere with navigation, but as to my saying that operating at peak load was the only way for it to be operated, I am sure you will see that I said, when there is an abundance of water, the project will be operated on base load; but it will be operated on peak load only in times of moderate flow and 1696 low flow, and at these times, the project will cause this great fluctuation in flows and these periods happen to be critical periods from the viewpoint of navigation.

By Mr. Jackson:

Q. Mr. McWhorter, you testified on direct examination that, if the Radford project was shut-down for two or three days, or longer, that would render navigation impossible at low water below Marmet Dam. Am I right in assuming that you are refering to navigation on the pools above Locks or Dams No. 6 to 11?

A. Yes, sir; my testimony expressly shows that I said with the Kanawha River, in its present condition, that navigation would be impossible between Marmet Dam and Wicket Dam No. 11, near the mouth of the River.

Q. You don't have to argue with me every time, Mr. McWhorter? I just want the facts. You refer to Wicket Dams which will be replaced by Winfield and Gallipolis?

A. Yes, sir; I do.

Q. What is a reasonable amount of leakage from a well-constructed wicket dam the size of these dams on the Kanawha River, properly maintained and with proper needling and calking?

By Mr. JACKSON:

Q. Make it dam No. 6—of the size of Dam No. 6, if it will help you.

A. I don't know what leakage is there before the needles are put in, but I do know that, when the Kanawha River is only flowing between eleven and twelve hundred cubic feet a second, and when you take away two-thirds of that at the Radford reservoir, there would not be any water left to operate the power plant and no navigation water left for the operation of the locks and the maintenance of the pools.

By Mr. JACKSON. I move to strike the answer from the records. I asked the witness if he knew—and if he did not, he could say so—if he knew what would be a reasonable amount of leakage through a well-constructed wicket dam the size of Dam No. 6 on Kanawha River, properly maintained and with proper needling and calking.

A. If the Government should go to enough expense in needling and calking, the leakage could be reduced to a very small figure.

Q. Give me that figure.

A. I don't know what it is.

1697 Q. You have been testifying about the dam. What is your judgment about it?

A. I don't know what the leakage is, but I do know that, if you take out two-thirds of that water from a low flow, you could not operate those facilities of the power plants or dams or the locks.

Q. Did I ask you to express an opinion as to what the effect would be? I realize that you will not answer my question, but I hope you will let me ask one.

By Mr. JACKSON:

Q. Why do you volunteer this information when you haven't been asked anything about it?

A. Don't I have a right to answer your question yes or no and then explain it?

Q. Now, that you have given me what you think would follow from cutting off two-thirds of the flow of the Kanawha River, explain your answer as to how much leakage would be through a well-constructed wicked dam, the size of No. 6, with proper needling and calking?

A. It is necessary to take into consideration three things: the leakage of the dam, the water needed for lockage, and the water needed for the operation of the power plant.

By Mr. JACKSON. I move to strike that from the record as not being responsive.

The motion was overruled and the Defendant excepted.

By Mr. JACKSON:

Q. Give your best estimate of what the leakage from Dam No. 6, properly needled and calked and properly constructed—what the leakage would be?

A. I don't know.

Q. Would it be as much as 100 second-feet?

A. I will not guess at it.

Q. You did not arrive at an estimate before when you gave your testimony.

A. That situation is so clear you don't have to go down and go in to the last details of it. It is obvious that, if a private corporation has control of two-thirds of the water flowing in the Kanawha, and the United States only one-third, it would not operate the facilities in the river. 1698

Q. And you think that determines the leakage from the wicket dam. You testified about the lock in 1930?

A. Yes, sir.

Q. Was there any trouble at Dams 6, 7, 8, 9, 10, and 11, in the year 1930?

A. I heard that there was a great deal of trouble there, and nobody was holding back two-thirds of the water, then, I will remind you of that.

By Mr. JACKSON. We move to strike that statement as being argumentative and unresponsive.

The objection is overruled and the Defendant excepts.

By Mr. JACKSON:

Q. Is it your testimony that there was or was not trouble in the navigation pools on the lower Kanawha River in the latter part of 1930, during low water?

A. It is my testimony that there was general information that the Government had difficulties with navigation on the Kanawha River and Ohio River in 1930 in the low-water period.

Q. Could we get down to one thing and not draw the whole encyclopedia of your knowledge to get an answer? And will you state whether or not you will testify that there was trouble in maintaining the pool heights on the lower Kanawha River during low water in 1930?

A. I testified that that was my information.

Q. I produce a letter written on the letterhead of the War Department, United States Engineer's Office, 13th Floor, Coal Exchange Building, Huntington, West Virginia, dated October 20, 1931, the subject being: "Pool levels on Kanawha River;" addressed to Mr. F. W. Scheidenhelm, 50 Church Street, New York, N. Y., and signed "United States Engineer Department, by F. B. Duis, Principal Engineer," already identified by Mr. Winn, having identified the signature of Mr. Duis—I mean Mr. Teeter, rather, and marked for identification "Defendant's Exhibit 514," and I read it as follows:

By Mr. **Gatchell**. We object to that. They have not introduced it in evidence.

By the **Court**. No, sir.

By Mr. **Jackson**. He says he has information, and that is all they claim to have that there was trouble, and I want to confront him with the statement and see whether or not it affects his evidence. It is a matter of cross-examination only. The letter reads as follows: "In reply to your letter dated October 16, 1931,"——

By Mr. **Gatchell** (interrupting). He is reading a letter that is not in the record. If he wants to introduce it——.

By the **Court** (interrupting). This is a matter of cross-examination and he wants to contradict him. It may have some effect upon his present testimony. He can do that.

By Mr. **Jackson**. The letter reads as follows: "In reply to your letter dated October 16, 1931, regarding difficulties experienced in 1930 in maintaining pool levels above Dams Nos. 2, 3, and 4, on Kanawha River, you are hereby advised that difficulties were experienced in maintaining pool levels above Nos. 2 and 3. However, the deficiency in pool levels was not due to the low discharge in the river, but to missing timbers and stone filling at the tops of the fixed crib dams. After repairs were made, the pools were a little low at times due to leakage through the old crib dams. No particular trouble was experienced in holding pools above movable dams below, though considerable caulking was required to prevent excessive leakage."

Q. State whether or not that shakes your confidence in your opinion that the Government had difficulty in maintaining pool levels above the wicket dams in 1930.

By the **Court**. I don't think your question or the letter are proper, Mr. Jackson. I thought the letter had something to do with a previous statement or report of this witness, or at least indicating some sort of knowledge possessed by him, but what you are doing is, after a witness has made a statement, to ask him if he had knowledge of what somebody else said that was different. I don't think that is the proper practice.

By Mr. Jackson. I am sorry if it is not the proper practice. It was my understanding, particularly in dealing with an expert witness, that where a witness undertakes to testify about certain conditions, and particularly where he is pretending to give testimony that calls only for general information, that we may bring information from a reliable source, such as engineers—the Chief Engineer in charge of the actual operations, and confront the witness with it, and ask whether or not it affects his testimony.

By the Court. My recollection is he was asked whether or not they had trouble with the dams on the lower Kanawha and he said they had a great deal of trouble in the summer of 1930.

By Mr. Jackson. I think he said he had general information about it. But it is not of sufficient importance to stress it.

By Mr. Gatchell. Do you withdraw it?

By Mr. Jackson. No, sir.

By the Court. I will strike the contents of that letter out, and you can reoffer it. It has been identified.

By Mr. Jackson. We except to the ruling of the Court, for reasons stated.

By the Witness. Am I to proceed with my explanation?

By Mr. Gatchell. No, sir.

By Mr. Jackson. No, sir.

Q. You have testified, on your direct examination, that, if the Radford plant were shut off for two or three or more days—I mean by that—if the flow were shut off at the Radford plant for two or three or more days, even if the new dams are completed on the Kanawha River, after that, that it would decrease the depths at the upper ends of the pools, above these new pools—these new dams?

A. I did.

Q. That was during low water?

A. Not very low—moderate flows.

1699 Q. Low and moderate flows?

A. Regardless of how low, if you cut it off, it will certainly cause some reduction in the navigable depths in the pools.

Q. Yes, sir.

A. The greater the flow you cut off, the greater reducing effect it will have.

Q. Would it, in your opinion, reduce the level of the upper ends of the pools above these new dams below project depths?

A. It depends on whether or not the project depths are there. These pools, as you brought out so well, with another witness, the pools progressively silt up, and this cutting off of water, in the first place, will tend to aggravate that condition, and as that silting comes along at the upper ends of the pools, the reduction in the navigable depths will be more and more objectionable.

Q. The normal maintenance of pools is to dredge to maintain the project depths, isn't it?

A. We expect it in natural conditions, but do not expect the United States to bear the cost of dredging under conditions aggravated by the works of private individuals or private companies.

Q. Laying your explanation aside, it is the normal procedure to dredge to maintain project depths, isn't it?

A. Yes, sir.

Q. And dredging is regularly carried on every year, isn't it?

A. More or less regularly, but you may not get to the upper end of a certain pool in time, and if it came down about a foot, or half a foot, your boats are on the ground.

Q. Is there silting during low flow?

A. There is silting at any time the river brings down silt. After rains even during low-water periods, there is considerable silt in New River. The question was raised the other day when another witness was on the witness stand, and said he was up
there on Apr. 3, 1936, was up there and the River was
1700 carrying silt. That was questioned. I was on the river
April 9th, on the upper part, and in the middle part on April 10th, and downstream on April 11th, and at every place I was on the river at the time it was muddy.

By Mr. **Jackson**. I move to strike the volunteered statement, as to the river, because it is not responsive.

The objection is overruled and Defendant excepts.

By Mr. **Jackson**. Without waiving my objection, I want to ask the witness a question.

By the **Court**. All right.

By Mr. **Jackson**:

Q. Were the stream flows raised from rain or any source at that time?

A. The river was in moderate flow. It was not low nor was it in freshet, and we went as far as the mouth of the Gauley River and stopped and viewed the river and took particular note of the line of demarcation—the clear water coming down the Gauley and the muddy water in the New River.

Q. When was this?

A. April 11th of this year.

Q. Going back to the point in your statement of the reduction of the depth of the upper pools—assuming that there is no silting in the upper end of the pools—say that project depths fully obtained, is it your testimony—it is assumed that the plant would be cut off—two or three days or more, that it would reduce the upper pool—the upper end of the pools above these new dams, below project depths?

A. It is my testimony that it would certainly reduce the navigable depth, and as to your assumption that there wouldn't be any silting, that is not in accordance with the facts. I can assume that if you want me to.

Q. You don't have to assume that, but assume that the project depth obtained in the upper end of the pools; is it your testimony that, assuming it was cut off two or three days, it will reduce the depths at the upper end of the pools above the new dams below the project depths?

A. No; you would have to cut off all water to do that and, of course, you could not cut off all of it. You can cut off enough to reduce it half a foot, or by something over a foot, and that half a foot or foot would be badly needed.

1701 Q. Above project depth?

A. Yes, sir; because when silting takes place to a certain degree, it reduces the depth to less than the project depth.

Q. In assuming the depth was there, then your answer would not follow.

A. If you assume the depth is there, then it is there. That is all there is to it.

Q. The project depth?

A. Yes, sir.

Q. You know what the project depth is, don't you?

A. Oh, yes.

Q. What is the leakage in se ıd-feet in these new dams, like London and Marmet?

A. I don't know, and nobody else knows.

Q. Do you know that the District Engineer has computed that to be 35 second-feet?

A. He has computed that part of it, but that goes through the gates; he has not computed what would go through the foundation or around the abutments, and none of us know that. I wish we did.

Q. It has been testified here, I believe, that the low-water flow at the head of the Kanawha is somewhere about one thousand or eleven-hundred second-feet.

A. The lowest monthly mean flow is about 1,130 cubic feet per second at Kanawha Falls gage.

Q. Would you say that around about 1,100 second-feet would be approximately accurate?

A. Yes, sir; a little above or a little below that during a month like October, 1930.

1702 Q. Mr. McWhorter, what is the fall for 1,000 second-feet of flow in Marmet pool; what is the increment caused at the head of the pool by reason of 1,000 second-feet of flow?

A. It is a very small figure.

Q. The water at the dam being maintained at pool level?

A. Cutting off 1,000 can make a reduction.

Q. Isn't it a fact that with a flow of 1,000 second-feet, that the fall between the upper end of Marmet pool and the dam— in other words, the increment above dead level?

A. Yes, sir.

Q. At the head of the pool would be about one-fifth of an inch?

A. I don't know exactly what, but it would be small.

Q. I show you Plaintiff's Exhibit No. 116 and direct your attention to the back water elevations for 2,000 second-feet—that is, at the head—is that for Marmet pool?

A. Yes, sir—no, sir; this is the head of the Winfield pool.

Q. Yes; that shows 2,000 second-feet and a back water effect of .1 of a foot.

A. It does. Let me explain about that.

Q. Let me ask you this. Am I right in understanding that with 1,000 second-feet, it would on that basis be about one-fifth of an inch?

A. I don't know what it would be for 1,000. It would be less than for 2,000 second-feet, of course.

Q. Is it not in direct ratio to the decrease in flow?

A. My answer would be that it would be less, but I don't know how much.

Q. Don't you know it would be one-fourth?

A. No, sir; I don't know exactly what it would be.

Q. Don't you know, as a hydraulic engineer, the nature of the relationship between back water effects of one and two thousand second-feet?

1703 A. I could guess at it. No engineer knows unless he figures it.

Q. Doesn't it vary in ratio?

A. Any of us can guess and make an intelligent guess.

Q. Would one-fifth in your judgment be an intelligent guess?

A. It would be less than half the effect for twice that flow. I don't know how much less; I could not tell you how much less.

(Exhibit 542 marked for identification.)

By Mr. Jackson:

Q. Mr. McWhorter, I show you defendant's Exhibit 542 for identification, and ask you whether you can identify that as copy of a letter in the files of the Federal Power Commission dealing with the application of the defendant for a minor part license?

A. I don't remember it.

Q. Well, when you check these other exhibits for identification, I will ask you to check that also.

A. I have not had time to go over the files carefully, but I understand all of these papers are in the files, and there is a stipulation between counsel that they are in there.

By Mr. **Jackson**:

Q. Then you can state all these marked for identification are in the files?

A. That is my information. You understand, Mr. Jackson, I have not had time since I left here to go over the files, but I am informed that they are all in the files.

Q. Will you check them?

A. If I find anything to the contrary, I will bring it to your attention.

Q. And you will incidentally check for that?

A. What is the date of that?

Q. November 8, 1930.

A. Yes. Before you start, the Court asked me about——

Q. Unless the Court has some inquiry, I would rather go ahead.

1704 The **Court**. What is it?

Witness. The Court asked me for something, and I told the Court I would be very happy to look it up during the first opportunity, and, during the intermission, I found what purports to be a copy, or rather a somewhat mutilated copy, of the license that was tendered July 1, 1927, to this company. So far as I know, they have the only two copies of the license in existence.

By Mr. **Jackson**:

Q. That is already in evidence. The license tendered May 5, 1931, is already in evidence, and Government Exhibit 131——

A. The Court asked me what the company offered to do, and I am trying to show it, and if it is not wanted I have no desire to press it at all.

By Mr. **Jackson**.

Q. Mr. McWhorter, we had just finished taking up the matter of your statement that if Radford shut off the flow for two or three or more days it would reduce navigable depth at the upper end of the pools at the new dams like London——

A. I had not finished my answer.

Q. You can answer on redirect, if you want to. You also stated that the impounding of the entire flow of New River for periods of two or three days or longer, at Radford, would increase the cost of operation of the new navigation dams on Kanawha River, such as London, Marmet, and Winfield; do you recall that?

A. Yes, sir.

Q. And you stated that that increased cost of operation would come about through the necessity of raising and lowering the gate to maintain the pool, I believe?

A. It was my testimony that these gates would have to be manipulated a great deal more than they would under normal conditions.

Q. And don't you know that at low water flow the levels of those pools behind the new dams on Kanawha River, like London, and Marmet, now, and Winfield in the future, are and will be 1705 controlled by the power company through its wheel and not through operation of the gate?

A. They will to some extent. If they are not controlled to suit the Government, the Secretary of War has amply authority to require it to be opened just exactly as it wants it to be opened.

Q. I want to know, as a matter of fact, whether the power company is required to so manipulate its machinery as to maintain the levels of those dams, like Marmet, or pools like Marmet, at the required level?

A. No. The license requires that the licensee, so long as the Secretary of War does not step in and say that this pondage is is required for navigation, the license requires the license to make economic use of that pondage.

Q. Did you understand that there was three-foot pondage on the Marmet pool?

A. No; on the London pool.

Q. I asked you about the Marmet pool.

A. I had the London pool in mind.

Q. Please pay attention to my question and answer accordingly. Don't you know on the Marmet pool the power company is required to vary the hydraulic capacity of its machinery so as to maintain the Marmet pool at the project level, or thereabouts, at low water?

A. Yes, I know that they are not allowed to fluctuate that pool.

Q. And don't you know that the level of the Marmet pool, during low water, is maintained by manipulation of the power wheels and not by the gates on the dam?

A. If you hold the pool stationary at the dam, it does not mean the shutting off of the flow would not cause the surface to drop at the upper end of the pool.

Q. Don't you understand the outlet at the Marmet pool, at low water, is controlled by the hydraulic capacity of the power company and not the lowering of the gates?

A. If it is not controlled by one, it is controlled by the other.

1706 Q. Don't you know that it is controlled by the manipulation of the power?

A. Yes; that is usual.

Q. If you were operating the Marmet dam, would you raise the gates to let low water flow past out of the dam without going through the turbines?

A. You know that license requires the company to make economic use of the water, and the pondage also.

Q. Mr. McWhorter, you do know what the Marmet pool is, don't you?

A. I know the Marmet plant makes use of the London pondage, the same as the London plant.

Q. Do you, or not, know that the level of the Marmet pool, at low water, is controlled by manipulating the hydraulic capacity of the power installation and not by lowering and raising the gates?

A. Yes; it is.

Q. And isn't the expense, if any, of controlling the hydraulic capacity of the power installation an expense of the power company?

A. No; it is not an expense to the power company. It is a great benefit to the power company.

Q. Who does pay the expense, if any, of manipulating the hydraulic capacity of the power installation in the Marmet dam for the purpose of controlling that pool level?

A. Of course the power company bears the cost of operating this plant, but these difficulties that I speak of would come not at extreme low water, but the moderate flow, as I testified just before the recess but did not have a chance to fully answer the question, and that I have not answered it as I wanted to, and you cut me off and said if I answered it at all I would have to answer on direct examination. May I go on?

Q. What question are you talking about? The last question you were asked was what was the back water effect, 1707 and you told me it was very small.

A. A small amount for 1,000 second-feet but I did not get a chance to finish. I will finish now if you will let me.

Q. I think you have answered the question, and I do not know what you want to volunteer.

A. You have only about one-third the information you would have to have to intelligently to understand this difficulty.

Q. You had enough information to understand what the backwater effect was for the thousand feet flow?

A. Certainly, but I have not told you the balance of it.

Q. That is all I ask you.

A. If it is agreeable to you, I will proceed now.

Q. I would rather you would not, because I haven't the slightest idea what you want to volunteer. You are familiar with the fact that the hydraulic installation of Marmet is 9,000 second-feet?

A. Yes; as a matter of fact, I think the engineers did not say it was 9,000 but said it was 8,000; it is my belief it would be about 8,500. There is no use in wasting time in talking about the hydraulic capacity of the plant, because it is somewhere in that neighborhood. I have not answered that question yet, and I would like to answer it.

By the COURT:

Q. Which question is it you want to answer?

A. He is talking about this matter of fluctuation in the flow affecting the expense to the United States operating these dams. I testified that it would increase that expense, and it will, and I would like to be able to put the evidence into my testimony to show that it will.

By Mr. JACKSON:

Q. Mr. McWhorter, is it not a fact that when the roller gates on the Marmet dam are operated, they are raised and lowered by pressing an electric button or switch?

1708 A. They are operated in that way, but somebody must do that. Now, that has to be done particularly at times when the flow down there in the Kanawha River is greater than the hydraulic capacity of the power installation, and there may be times and many times, and for various substantial parts of the time, when the flow up at Radford is around the mean, the average flow which would be in excess of 3,000 cubic feet per second, and at the same time the corresponding average flow down the Kanawha River would be about 13,000 cubic feet per second. To keep varying that flow of 3,000 second-feet, or 4,000, or whatever it may be, would require manipulation of the gates. This power plant at Marmet and the one at London cannot regulate those pools, under such conditions and it would be necessary to keep repeatedly raising and lowering the gates.

Q. Is that all you have to say?

A. That is all I have to say right now.

Q. You do raise and lower the gates by pressing a button, don't you?

A. I don't know whether it is a button, or not. I know that they do it in an easy way.

Q. The power company supplies the current for raising and lowering them?

A. Whatever the license requires.

Q. Do you know the power company does supply current for raising and lowering roller gates?

A. Yes.

Q. Isn't it a fact that there is constantly an attendant at the Marmet dam, or any other dam of the character?

A. I think so.

Q. And isn't it a fact that the attendant has the time to press the buttom occasionally?

A. He may have a good many other duties besides looking out for the gates.

Q. And is'nt it a fact that the Federal Government does not pay the attendant on piece work on account of the number of times that the button is pressed?

1709 A. It is a fact that the Government pays all the men, and it is a fact that the Federal Government has to keep the gates in condition.

Q. You understand what piece work is, don't you?

A. I do.

Q. Don't you know that the Government does not pay the attendant at the dam by piece work for the number of times he pressed the button to raise and lower the gates?

A. My supposition is the same as yours, that they pay these men by the month.

Q. You know that, don't you?

A. I think that is true.

Q. Now, you also gave some testimony as to your opinion of the effect of cutting off all the flow, at Radford, for two or three days or longer, upon the Ohio River, and that testimony is in the record at 3414 and following, you purported to give certain low estimates of flow for the Ohio River above the mouth of the Kanawha. From what, if any, public record did you obtain those flows?

A. I testified where I got them, that I got them from the Army Engineers at Cincinnati.

Q. That is the basis of your statement as to these flows—is what somebody told you in the office of the Army Engineers at Cincinnati?

A. No, sir; not from what somebody told me, but from the Hydrographs and the figures showing the corresponding discharge for those periods.

Q. Will you produce those records?

A. They will be produced.

Q. Will you produce them?

A. I can.

Q. Will you do it at recess, or at some convenient time in the afternoon?

A. Yes; I will.

1710 Q. You also made the statement that at times the flow in the Ohio, and above the mouth of the Kanawha, falls below a thousand second-feet; will you tell me upon what public records you base that statement?

A. I base that upon the same Hydrographs, and I felt that those flows of 1,000 second-feet or less were correct, but I was convinced that that was not the natural flow of the Ohio River. As I explained on direct, there are a large number of Government dams for navigation between Pittsburgh and the mouth of the Kanawha River. I presume that there are 25, because one just above the mouth of the Kanawha is numbered 25. I explained the operation of those dams in the interest of navigation would at times reduce the flow in the Ohio River just above the mouth of the Kanawha to a figure which would be substantially less than what the natural flow of the Ohio River otherwise would be.

Q. When do you think that this flow of less than a thousand second-feet occurred? Give the date, please?

A. One instance of it I would say was between August 24th and August 31, 1918. That is one period, to the best of my recollection, that the flows were about or possibly a little less than a thousand second-feet in the Ohio River just above the mouth of the Kanawha. I can't tell you from memory whether it fell to a thousand second-feet at any other time, but I am sure it fell down to a figure close to that, if not below, at other times.

Q. The only one that you can recollect now is the one from August 24th to August 31?

A. Maybe I can pick it up.

Q. I want you to show me what you know.

A. I have the figures right here. I will not have to wait to go back anywhere to get them. Beginning in the year 1918, these figures show that on July 26th the discharge of the Ohio River above the mouth——

Q. What year?

A. July 26, 1918, the discharge of the Ohio River above the mouth of the Kanawha River was 1,140 Second-feet. On August 27——

1711 Q. Where does that figure come from?

A. These figures, as I have testified, came from the Division Engineer's office in Cincinnati—the Army Engineer.

Q. Supplied to you by that office?

A. Yes. On August 27, 1918, the flow was 1,000 second-feet. All of these flows are on the Ohio River above the mouth of the Kanawha. August 22nd 1,000 second-feet.

Q. What year?

A. All 1918 until I tell you otherwise. August 28th, 1,125 second-feet; August 30th, 1,075 second-feet; August 31, 1,120 second-feet; October 8, 1923, 1,000 second-feet; October 10, 1923, 1,090 second-feet. To show you how that may vary there, on October 9th the flow was 2,040 second-feet, and on October 11th it was again 1,090 second-feet.

Q. What about August 29th you skipped?

A. August 29th, 1918, the flow was 1,160 second-feet; on September 7, 1925, the flow was 1,350 second-feet; September 8, 1,440; September 15, 1925, the flow was 1,030 second-feet, and on September 16th, the next day, the flow was 1,070 second-feet. In the month of August, 1930, there are many flows for the Ohio River immediately above the mouth of the Kanawha ranging from 1,400 second-feet to 1,600 second-feet. Do you want them all read?

Q. Are you speaking for the whole month?

A. The month of August, 1930, I said there were many. The extreme limits are from 1,400 to 3,750.

X Q. Those are all figures you got from the Engineer's Office in Cincinnati?

A. Yes, sir. Now for the month of October 1930, from October 1 to October 15, there are many discharges in there between 1,500 and 1,600 second-feet.

X Q. Quite a little above 1,000 isn't it?

A. Yes; but my testimony is clear about that. During the period beginning with September 19, 1932 on September 19 the flow of the Ohio above the mouth of the Kanawha was 1,000
1712 second-feet; September 20th, 1,000 second-feet; September 21st, 1,000 second-feet; September 22nd, 1,050 second-feet. That is all.

X Q. Are those figures supposed to be estimates of daily averages?

A. Those are estimates of mean daily flow.

X Q. All you know is you got them from the Engineer's office at Cincinnati?

A. Yes, sir.

X Q. Mr. McWhorter, in 1918 don't you know it is a fact there was a good deal of construction work going on on the locks on the upper Ohio river?

A. I know the project was not finished at that time, but it was in 1930.

X Q. Don't you also know there was a good deal of construction work going on in 1923 on those dams?

A. I don't remember just when that project was finished I do know it was finished before 1930.

X Q. You know there was construction work going on in do you not?

A. No; I do not.

X Q. You were talking about this period back in 1918 they have navigation on the Ohio River then, do you know

A. They have had navigation on the Ohio River sinc pioneers came, so far as I know.

X Q. They had navigation in July and August 1918, d they, October too?

A. I suppose they did.

X Q. You know they did, don't you?

A. I didn't see it, but I have every reason to think they some kind of navigation there. Not as good as they have

1713 X Q. You said you thought there were manipula of the navigation dams that reduced the actual flow. did you have in mind about that?

A. I testified when these low flows were there, ranging 1,000 to 1,500 second-feet on the Ohio River above the mou the Kanawha River: If you cut off 700 or 800 second-feet o water it would immediately in the river below the mouth o Kanawha cause great difficulties in using the Ohio Rive navigation.

X Q. I think you misunderstood my question. I will read testimony to you, page 3414:

"Between Pittsburg and the mouth of the Kanawha are a large number of navigation dams. The exigencies of o tion of these navigation dams, all of which are strictly na tion dams and all of which are operated in the intere navigation, are such that the flow of the river immediately the mouth of Kanawha sometimes falls very materially b what otherwise would be the natural flow of the river at point."

A. Exactly right.

X Q. I am asking what you had in mind as to the mani tions of the dam that resulted in reducing the flow of the River above the Kanawha River below its natural flow?

A. I had this in mind, that the twenty-five navigation or some number, about that, whatever it is, that even wit very best intent of operating all those dams in the intere navigation, even if they were making the best possible eff maintain the natural flow in the vicinity of the mouth o Kanawha there would be times when they would have more natural flow, and other times when it would be less tha natural flow. That is exactly what I meant, but it wouldn practical to operate all those dams so as to just produce the natural flow at the mouth of the Kanawha, and therefore it would have to be either above or below the natural flow, and sometimes I am certain it would be substantially below.

1714 XQ. Mr. McWhorter, are you familiar with the fact that back in 1918 and even after that, there was a practice on the Ohio River of impounding water to create a tide down the river on which were floated barges?

A. That is true, and testimony has been given on that. I knew that a long time ago, but that certainly has not been the practice since the navigation project was completed.

XQ. But it was not complete in 1918?

A. No; it was not.

XQ. Mr. McWhorter, are you familiar with the fact that the low water flow of the Ohio River above the Kanawha has been, or is being augmented by the Clarion River reservoir, Cheat River reservoir, Pymathening reservoir, and the Tygard River reservoir?

A. I knew that certain releases were made at one time or another from one or more of those reservoirs, but to the best of my knowledge and belief those reservoirs except Tygart were all constructed by 1930.

XQ. Isn't the Tygart River reservoir being constructed now for the express purpose of providing an augmented regulated flow on the upper Ohio?

A. That reservoir is being constructed, at the expense of the United States, and certainly has not augmented any flow yet.

XQ. But it is being constructed for that purpose, isn't it?

A. Yes, sir.

XQ. Mr. McWhorter will you tell me how much would be a reasonable leakage on a well constructed and designed wicket dam of the size of Dam #25, properly maintained and with proper needling and caulking?

A. I don't know, but I do know that problem of maintaining pools is such that they have difficulty doing it, no matter how much they caulk or how much expense they go to in needling those dams.

XQ. I believe you told me you had never operated such dams?

1715 A. No, sir; but I have gotten this information from Army engineers.

By Mr. Jackson. I move to strike that answer out as hearsay.

XQ. Of course you never had charge of the Huntington District?

A. No, sir.

XQ. And that District does have charge of the wicket dams on the upper Kanawha and Ohio and for a considerable distance below the mouth of the Kanawha?

A. It has charge of those on the Kanawha. I am unable to say how much of the Ohio it has charge of.

XQ. Colonel Trippe testified at the time he was there it had charge of a considerable part of the Ohio above and below the Kanawha?

A. That is right. It may not be the same now.

XQ. Don't you know it to be a fact that Col. Conklin, Engineer of the United States, has charge of the wicket dams on the Ohio *Ohio* below and above the mouth of the Kanawha?

A. I know he is an engineer officer, but I don't know the extent of his jurisdiction.

XQ. Don't you know it to be a fact immediately before Col. Conklin took charge Fred W. Herman had charge of the wicket dams on the Kanawha and on the Ohio above and below the mouth of the Kanawha?

A. I do.

XQ. And don't you know it to be a fact before Col. Herman, Col. Ardery had charge of the wicket dams on the Kanawha and Ohio immediately below and above the mouth of the Kanawha?

A. I think that is right. I know he was at one time District Engineer there.

XQ. Coming back to my question, which you have not yet answered, will you tell me if you know, and if you do not, will you please so state, what in your opinion would be a reasonable leakage of a properly constructed and designed wicket dam, properly maintained, of the size and character of Dam
1716 #25 on the Ohio River, with proper needling and caulking?

A. My answer is already in the record. I told you I did not know, and went on to explain.

XQ. You don't know?

A. That is right.

XQ. Now don't you in any event know it to be a fact that the dams on the Ohio upstream from the Kanawha require practically the same amount of water to maintain pool levels as the dams on the Ohio below the mouth of the Kanawha, or immediately below the mouth of the Kanawha?

A. I think probably they do require about the same. I know both would be in far better condition if they had much more water during these low flow times instead of several hundred second feet less.

XQ. I show you this publication which Mr. Winn said was the official publication on the Ohio River, issued or compiled under the direction of the Chief of Engineers, U. S. Army and District

Engineer, Cincinnati, Ohio, and direct your attention to pages 151, which shows Dam #25, and 152 which shows Dam #28, and ask you whether or not as an engineer you cannot tell me that dam #25 would require as much water to maintain pool levels as dam #28?

A. Nothing shown here except some profiles on pages 151 and 152.

XQ. I will direct your attention to pages 179 and 182, which appear to show them, page 179 of Lock #25 and 182 of #28, and ask you whether you can't tell me from the profile you showed me that dam #25 would require as much water to maintain pool level as dam #28?

A. Dam #28 would require more, so far as I can tell from looking at these plans.

XQ. Why would it require more?

A. Dam #28 has a navigable pass 700 feet long and chanoin-wicket 296 feet, which is almost 300 feet, making a total of 1,000 feet in round figures.

1717 XQ. 996 feet, isn't it?

A. 996 feet, and #25 has 852 feet in comparison with that. There is that much difference.

XQ. Did you notice Dam #25 has a lift of 8.9 feet and Dam #28 has a lift of only 7.1 feet?

A. I qualified my statement by saying so far as I could tell from what you showed me here on these plans.

XQ. Look at pages 151 and 152, that shows the lift, doesn't it?

A. At Dam #25 the lift appears to be 9 feet and Dam #28 the lift appears to be 7.1 feet.

XQ. The lift is substantially higher in Dam #25 than Dam #28?"

A. Wait a minute now. Dam #28 appears to be a higher dam than Dam #25. The lift is more at Dam #25 but Dam #28 appears to be at least as high as Dam #25. I am speaking of the dam and not the lift.

XQ. What is the difference in the lift? I mean by that what is the lift of the two dams?

A. 9 feet at Dam #25 and 7.1 feet at Dam #28, but from my judgment from looking at that profile Dam #28 is fully as high a dam as Dam #25 is.

XQ. You think it is a higher navigation dam with a lower lift?

A. The profile indicates the distance from the foundation to the top of the pool is as great at Dam #28 as at Dam #25.

XQ. You don't believe the figures you see on this?

A. I didn't say I didn't believe those figures. You know I didn't. I said I took those figures from the figures shown on the pools. No figures on there show the height of the dam, but the profile indicates that #28 is as high as #25.

X Q. In your judgment, as an engineer, what counts, from the standpoint of leakage, the lift of the dam, or the distance from the foundation to the top of the dam?

A. It depends upon where that tail water is held, what the leakage would be.

1718 X Q. Lift means the distance between the water below and the power pool above, doesn't it?

A. Yes, sir; but if something is done to cause the upper end of that pool to drop two or three feet, then the relation is changed between the two.

X Q. That would be abnormal, would it not?

A. Not if you cut off 800 second feet. If you cut off 800 second feet you would get a substantial drop below the mouth of the Kanawha.

X Q. Two or three feet?

A. I should not be at all surprised if it were a couple of feet.

X Q. Let's see about some of those figures of yours——

A. You can't see about that because you never cut off 800 second feet.

X Q. You say at page 3416 of your testimony that with reference to the effect of cutting off the flow at Radford two or three days, on the Ohio River, in times of extremely low water in the Ohio River, which is a criterion of what we are now talking about, the Ohio River below the Kanawha River needs every foot of water the Kanawha River can supply, and needs more.

A. That is right.

X Q. And then you go on and were asked if you had in mind any particular instances.

A. Yes, sir, and I told you.

X Q. And you said, "I have in mind particularly the ten day period in 1932 and the eight day period in 1918," and after telling about the period in 1932, you said this, "for instance during the eight day period from August 24th to August 31, 1918, the Kanawha River contributed more than three-fourths of the water that flowed in the Ohio immediately below the mouth of the Kanawha River."

A. Yes, sir, it did.

X Q. Will you tell me what was the flow of the Kanawha River, average flow, during the period August 24 to August 31, 1918?

1719 A. Mr. Pierce testified to that, and it is in this record. You stopped me Friday for mentioning something about what Mr. Pierce testified. He is as fine an expert as there is on that subject, and he determined those flows during this period I talked about, and which figures are in the record. I can tell you what they are in a minute.

XQ. You, of course, didn't mean to say he said anything about flows in the Ohio?

A. No, sir; but in order to determine the ratio between the Kanawha River flow and Ohio River flow above the mouth of the Kanawha you have to have both sets of figures.

XQ. That is right; if we haven't got both we are in bad shape.

A. We have them though.

XQ. This critical low water period of yours——

A. Just a minute, I am trying to get this for you.

A. (Continuing.) From August 24 to August 31, 1918, the mean flow of the Kanawha River at its mouth was 4,737 cubic feet per second. During the same eight day period, the mean flow of the Ohio River, just above the mouth of the Kanawha River, was 1,207 cubio feet per second, which figures show that during that eight day period the Kanawha River contributed more than 79% of the combined flow of the two streams, just below the mouth of Kanawha River.

Q. And the flow of Kanawha River at that time was almost 5,000 second-feet, was it not?

A. Yes, sir; but what would the Ohio River do without it. You can hold all that passes Radford, you can hold it back.

Q. Do you regard 5,000 second-feet as the extreme low water flow of the Kanawha River?

A. I did not say that. I said the low water flow in the Ohio was the criterion of what we are talking about now. You were getting 1,200 feet in the Ohio and the Kanawha was the bulwark of the Ohio below the mouth of the Kanawha.

1720 Q. Do you think that the flash flow, during low water, of about 5,000 second-feet in the Kanawha River at its mouth, is a fair or typical example of the contribution, in percentage, of the Kanawha River to the flow of the Ohio River, below the mouth of the Kanawha?

A. I think that would be extremely valuable to the Ohio.

Q. Do you think that it would be a fair or typical representation of the proportion of flow below the Kanawha River contributed by the Kanawha River?

A. I want to be fair about it, I want the correct figures in here and that is all I want. I will say this, I do not think it would be very often that the flow of Kanawha River would be four times as much as the flow of the Ohio, as it is in this case, but at such times as it is, the Ohio River needs it very badly, or even when the flow of the Kanawha is equal to the flow of the Ohio River, it needs it.

Q. I suppose you simply mean to state where there is a flood in the Kanawha and none in the Ohio, you can get a higher ratio?

A. I don't think you will find anything about that in my testimony.

Q. You think this example that you gave was the worst, as you call it, or you could not find any worse in the records.

A. Goodness knows it is bad enough.

Q. Do you think it is the worst that you can find in the records?

A. I have not seen any ratio, that has any greater disparity.

Q. Why didn't you give the flow of the Kanawha River, in your direct testimony, of 5,000 second-feet?

A. No such question was asked me. I would just as soon have given it then as now. You know that I demanded that you allow Mr. Pierce to put these figures into the record, and you
1721 would not allow me to testify to them, so I brought them again this atfernoon after I had thought about it.

Q. Now take the very same page of your testimony, 3418, you gave the flow at the mouth of the Kanawha for a period of September 15 to September 24th, 1932. Where did you get that from, from the same source, from Mr. Pierce?

A. Exactly, I got the Kanawha flow from Mr. Pierce's testimony in this record.

Q. As I understand your testimony, you felt that my protest restrained you from giving the figure for the Kanawha River in the first illustration, but not in the second illustration. Is that true?

A. I haven't had an opportunity to take that period up, but I am perfectly willing to take that up now.

That shows the Kanawha River contributed substantially less than the Ohio, but at the same time contributed a very substantial part of the total combined flow of the two streams. Those are the low flows.

Q. Your figure of 1,210 second-feet for the Ohio River, for period from August 24 to August 31, was not gotten from Mr. Pierce, was it?

A. No; it was not.

Q. You got no Ohio flow from Mr. Pierce?

A. No; there are no United States Geological survey Gauges on the Ohio River.

Q. They had no means of gauging it, had they? If you get any figures at all, you have to make an estimate of the Ohio River flow?

A. Yes, you have to estimate them from the best information available, the best basis available.

By Mr. Jackson. I move the Court to strike out all of this evidence because it develops that the witness does not know anything about that except that he got some information from the U. S. Engineers office.

By the COURT:

Q. Did you say that the geological survey maintains no gauges on the Ohio River?

1722 A. No, the army engineers keep the gages, such as are kept on the Ohio River.

Q. I thought you referred to that record heretofore.

A. I didn't understand you then. The army engineers keep them.

By Mr. JACKSON:

Q. One other question about this August 24th to 31st, 1918 on the Ohio River. Did you observe as Mr. Pierce testified, that the corresponding flow at the Radford dam site was 2,260 second-feet?

A. I don't recall the figure, but that is about half of it.

Q. In your previous illustration you got a figure for that and deducted it. Didn't you do it for this one?

A. Yes; I paid attention to all of that. On that point now, before we get away from that, if they cut off that entire 2,200 second-feet, there certainly cannot be any question to that, as that is nearly half the flow.

Q. Just assuming that somebody ever did that, the flow out of the Kanawha would still be 2,500 second-feet, wouldn't it?

A. Yes, sir; but that wouldn't have been enough water in the Ohio for efficient operation.

Q. That would have been a great deal above low water flow in the Kanawha River, wouldn't it?

A. Yes, it would.

Q. And the natural low water flow——

A. (Interrupting counsel.) I can point out just any number of worse situations than that, if you want to take the time to do it.

Q. This situation that you picked out, the flow at the mouth of Kanawha River, would have been 2½ times the natural low water flow, wouldn't it?

A. No, sir. I did not characterize that as the worst condition. I just simply was casting my eyes over these figures and I picked them out at random, and I noticed the Ohio was low and 1723 the Kanawha was substantially—well, I could give you instances where the Ohio could be affected more adversely than that.

Q. Now you gave some testimony about Bluestone, and I would like to ask you a few questions about that. In one of your answers you said that the Radford project might impound the entire flow of New River for as much as two months, during extreme low water periods, like September to October, 1930. Assuming that you owned and were operating the Radford project, would you so operate it as to impound the entire low flow of the New River, for the two months period of extreme low water, like September to October, 1930, without regard to injury to lower riparian owners and without regard to effect on navigation in Kanawha River?

A. If I were a licensee under the State of Virginia I think I would do just like what any other licensee would do, and that is, conform to the requirements of that license, but I would not feel obligated to go beyond that and do something else. Moreover, I think I would, at times, shut that power plant down, because it is my information that other plants of this same kind do shut down, and I can give you a particular illustration——

By Mr. Jackson. One minute, if Your Honor please, I move to strike out the answer of this witness.

A. I know of a situation like this where the dam was shut down 28 different times in six years for periods of from ten to fifteen days at a time.

By Mr. Jackson. You heard me make a motion to strike out your evidence, didn't you?

By the Court. I have been right patient with this examination all day long, but it is dragging out. I want the question asked and completed before any answer starts and then I want the answer to the question completed before another question is asked; I do not want the answer interrupted, until it is completed, but I want the answer to be responsive to the question and no further.

By Mr. Jackson. May I have a ruling on my motion to strike out this witness' answers?

By the Court. I did not hear what he said. Both of you were talking at the same time and I was looking at a paper and did not hear what he said. Just read it. (Answer read to court.)

By the Court. Cut out about the illustrations. He is asking you what you would do if you were in charge of the Radford plant.

A. My recollection is that I said I would operate it in accordance with the State license, if I were a licensee under the State of Virginia, as this compa'y is. I would not feel that I would be obligated to go beyond that.

Q. That is, without regard to the injury to lower riparian owners, or damages suits or the effect on navigation on the Kanawha River.

A. I would operate in accordance with this license, if that is the license I had, and I would expect the State of Virginia to protect me from the Federal Government.

Q. If you were operating this project would you arrange to fill the reservoir during low water seasons?

1724 A. You mean fill it originally?

Q. From year to year?

A. During its operation I would fill it as often as I could.

Q. Isn't it perfectly feasible to fill the reservoir with the run-off, or rather when the run-off is high?

A. Certainly it is, and under this State license you can fill it when the flow is 600 second feet.

Q. That would not be the period of high flow, would it?

A. No, sir. You asked me first if I would fill it at low flow, and I told you I would not, but under the State license, I could.

By Mr. Jackson. I move to strike out his answer as to what could be done under the State license.

Q. Now, Mr. McWhorter, have you made any estimate as to the minimum regulated flow which would be obtained by the use of storage of the Radford project during extreme low water season?

A. In 1930, or a year like 1930, we estimated, in my office, you could regulate if your foresight was as good as your hind sight, you could regulate it so as to have a minimum flow of 1225 second feet.

Q. You would not disagree with the estimates of Mr. Kramer and Col. Watkins, that the regulated flow would be 1230 to 1250 second feet?

A. That is about right. It is all right if you look back on it, at those years, where you figured that could have been, or if anybody could dip into the future and see what the flow would be. I am quite willing to agree that in the future one would be justified in assuming that you would not have a season much worse, if any, than either 1925 or 1930.

Q. You would not quarrel with that result from the application of the rule curve, would you?

A. No, sir.

Q. As far as 1930 is concerned, that would be a reasonable estimate, wouldn't it?

A. It would, if the year was like 1930, that would be about right.

1725 Q. Now historically that is the low water year, isn't it?

A. I have forgotten whether 1925 or 1930 was the extreme low. They were very much the same. The extreme low was 520 in one of those years and 539 in the other.

Q. 1930 was the year that you referred to any way?

A. That is the year that I said you would have about 1,225 second-feet. If you could look ahead as well as you can see back, that may be true.

Q. Does, or does not, the normal operation of a storage reservoir such as would constitute a part of the Radford project, involve entering the low water season with a full reservoir?

A. Certainly we would try to do that, but I don't know whether we could do it all the time or not, but we would certainly try to do it.

Q. That would be the normal operation of any storage reservoir, would it not?

A. That would be the objective.

Q. The objective is normally attained, isn't it?

A. I think it would be.

Q. It would be unreasonable to assume that any reservoir project would begin the low water season with its reservoir partly drawn down, wouldn't it?

A. They certainly wouldn't do it if they could help it, but if the water was not there that would be something over which they had no control.

Q. Is it not a fact that the object is to have the benefit of the utilizable storage available for use in the low water season, or to use it during that time to such extent as may be necessary?

A. That is true, but right there is where the great trouble comes in, and right there is where the main difference comes in between the United States Government, or one of the main differences between the United States Government and Power Company. The Power Company says——

1726 Q. (Interrupting.) You mean the Power Commission when you say Government?

A. Yes; I mean the Power Commission is one agency of the United States; the Department of Justice is another. The Power Company says by constructing this dam we so regulate the flow that the mean flow during low water period ought to be twice as much as the natural extreme low water flow. That statement is 100 percent true, the mean flow is some 1,225 second-feet, and the extreme low natural flow is less than 600 second-feet. When you look, however, and see in the operation of this plant a minimum flow in the New River, below the dam, instead of being 530 second-feet, as the natural flow would be, it would be zero. That is the difference, and that is one of the main points of difficulty between the Government and the Power Company in this case.

Q. The regulated flow would be utilized under peaking, would it not, during the low water season, even under your theory?

A. You utilize in operating a power plant or if the Power Plant would operate as a peak load plant, but now on that point, it reminds me, when you say if it has as much water there as under natural conditions, it is just like saying I will feed a man four or five times as much as he can eat one week and starve him to death next week, and benefit his condition, and if you reduce the natural flow of the stream from 530 second-feet down to nothing, it certainly does not benefit the reparian owners or navigation.

Q. The Bluestone reservoir has been designed to regulate the flow of New River to a minimum of 2,000 feet during extreme low water seasons, has it not?

A. It is based upon the assumption that 1930 would be as bad a year as we would have.

Q. Can this be accomplished if the Bluestone reservoir were to be drawn down in part prior to the beginning of such low water season?

A. No, sir.

Q. Is it not reasonable to expect that the Radford reservoir would in that respect be operated the same as the Bluestone reservoir?

1727 A. No, sir. I would say the Radford reservoir would be operated like the owners wanted to operate it, but during a season like that, you know very well, and I have reason to think, that at times it would move the company to store water for a considerable period of time. You know the reason I think so, which is the result of my experience. If I were allowed to give an illustration I could make it very clear, but I will not attempt to do that, of course.

Q. Just a minute, we are talking about whether or not the reservoir would be drawn before the beginning of the low water season?

A. It might possibly be not entirely full and I think many times it would not be entirely full.

Q. I understood you to say that the regulation at Bluestone could not be accomplished if the Bluestone reservoir were to be drawn down in part prior to the beginning of the low water season?

A. Mr. Jackson, let us get straight on that. My testimony is that in a year like 1930, if the flow of the New River above Bluestone Dam site is not interfered with, and if the Bluestone reservoir starts the low water season with a full reservoir, then that story together with the natural flow would be sufficient to insure an extreme minimum release from the Bluestone Reservoir of 2,000 second-feet per second. If something above, has cut a part of that water off for a part of the time, of course it would not.

Q. That has nothing to do with the question I was asking you. I asked you whether or not the Bluestone reservoir has been designed to regulate the flow of New River to a minimum of 2,000 second-feet during extreme low water season. I understood you to say yes, for seasons like 1930.

A. With the natural flow of the river coming down.

Q. I will ask you if this can be accomplished if the Bluestone reservoir were to be drawn down in part, prior to the beginning of such low water season, I understood you to say no.

1728 A. My testimony was that it could not be done at all if the Radford project were holding back the water for a couple of months up there.

By Mr. Jackson. I move to strike out the answer.

By the Court. Strike out the latter part of his answer because it was not responsive to the question.

By Mr. Jackson. Read the question.

(Question read.)

A. I think that is right.

Q. Now I asked you, isn't it reasonable to expect that the Radford reservoir would, in the matter of entering the low water season with a full reservoir, be operated the same as the Bluestone project?

A. No, these projects are entirely different. The Radford project is purely a water power project and the Bluestone project is a navigation and flood control and power project. The Bluestone project is a multiple purpose project but the Radford project is a one-purpose project. I testified three or four times that the objective would be to bring up the reservoir as full as possible at the beginning of the low water season.

Q. You also said there is plenty of water to fill the Radford reservoir.

A. You might call it up at the top in a certain date, in the early summer or spring.

Q. It is just as feasible for the Radford reservoir to be able to enter the low water period with a full reservoir as it is for the Bluestone, is it not?

A. They are operated for entirely different purposes.

Q. But you said the objective of any reservoir for power purposes would be to enter the low water season with a full reservoir?

A. Yes.

Q. Then is it not just as feasible for the Radford project to attain that objective as it is for the Bluestone?

A. Perhaps so.

Q. You know so, don't you?

A. I know, that is right.

Q. Now you have already stated on your direct examination and again on your cross-examination, I think, that the

729 Bluestone reservoir has been designed to regulate the flow of New River, so that there would be a minimum regulated ow of 2,000 second-feet, at least under conditions no worse han 1930, with no interference with the flow?

A. That is right, with emphasis on that last.

Q. In that design has the Bluestone reservoir been in way deendent upon utilization of storage of the Radford reservoir?

A. I don't know.

Q. Do you know whether or not the Bluestone reservoir in rder to produce 2,000 minimum flow during extreme low water elies upon any augmenting of the low water flow by the Radford roject?

A. I did not design the Bluestone project, I haven't had anyhing to do with it, and the Federal Power Commission has not nything to do with it since the Government has been interested n it. I can tell you what my understanding is.

Q. You testified, I think, on your direct examination that you were familiar with the plans of Bluestone?

A. I did.

Q. And they appear in Government Exhibit 145, don't they? House Document 191?

A. The only plans I am familiar with are the plans referred o in the so-called 308 report, Supplemental Report on the Bluetone project, they are the only plans I have any familiarity with t all, and I have no information whether those plans have been nodified since that time, or not.

Q. Didn't you study this document, Government Exhibit 145, losely enough to be able to say that the regulated flow does not lepend upon any storage at Radford?

A. I don't know whether it does or not.

Q. If you do find anything in Exhibit 145 that would indicate hat that regulated flow of 2,000 second-feet during extreme low water at Radford, does do so, will you let me know?

730 A. Certainly I will be glad to, but as I have testified if Radford is holding it back rather than sending it along, hey would not have it.

By Mr. **Jackson**. I move to strike out the answer as not esponsive to the question.

Q. Assuming that the Bluestone project does not depend on ny storage at Radford, with 2,000 second-feet regulated flow, hat is, it does not depend on augmenting the low water flow of hat storage, and assuming that during the low water season uch as 1930, the Radford reservoir outflow were to be cut off, nd Radford project storing water that condition could not reaonably exist unless there had previously been some drawdown of the storage during low water season, could it, that is, the Radford storage I mean?

A. No, assuming the reservoir was full at the beginning.

Q. At least, if the Radford reservoir had obtained its objective of being full at the low water season, and subsequently storing during low water season, it would mean there were some drawdown of the low water during that season?

A. That is right.

Q. Is it not a fact under such circumstances Bluestone would have the benefit of all stored water released by the Radford project?

A. Yes, sir; it would.

Q. Would not that mean that the operator of the Bluestone project would thereby have been able to conserve the water stored in the Bluestone reservoir?

A. He would, but that would not necessarily mean, or that doesn't follow that the storage of water at Radford, any time the owner might choose to store it, could not adversely affect Bluestone.

Q. I was just asking you for an answer to this particular question, and I do not want to argue a collateral point with you, that is, under these assumptions, the Bluestone operator because of the stored water coming down from Radford, which could be passed on down the stream, would be enabled to use that water in lieu of the Bluestone storage.

1731 A. If your assumptions and your statement that the Radford reservoir would be entirely full and then they would draw that storage out, were to be taken as facts, the Bluestone would have the benefit of such storage as may have been drawn down.

Q. And under those assumptions unless the Bluestone operator chose to waste the water stored from Radford, he could enter the latter part of the low water season with more water in the Bluestone reservoir than is necessary to maintain a regulated 2,000 second foot flow during the balance of the low water season?

A. That all depends on what is sent down there.

Q. If he had his reservoir full to start the season and if he has had the benefit in the meantime of the Radford storage, he would have left more than enough under the conditions for which the reservoir was designed, to maintain a 2,000 second feet regulated flow for the balance of the season?

A. If the Radford reservoir is operated primarily to increase the flow below rather than primarily as a power project, then it could benefit the Bluestone project. On the other hand, under certain other conditions, as I have testified, it could be a detriment to the Bluestone project, and not only render it impossible for the Government to provide that 2,000 second feet but it would reduce the prime power at the Bluestone project.

By Mr. **Jackson**. I move the Court to strike out the voluntary statement of the witness.

Q. Am I not correct in saying that to the extent that the Radford project reaches the end of low water season, with the reservoir drawn down in whole or in part, to that extent the Bluestone project will have been enabled to maintain a regulated flow of more than 2,000 second-feet during low water season?

A. That is true, if they do that, but if before the end of the season they start storing and store every bit of the water for a month or more, it is not true.

Q. Now Mr. McWhorter, if the operator of the Bluestone project utilized the storage of Radford project, would not that produce more power at Bluestone?

1732 A. Yes; it would produce more kilowatt hours, but if the shutting down of the Radford plant was such as to reduce that minimum flow, after certain other water supplies from Radford had necessarily been discharged down at Bluestone, to prevent encroaching upon the flood storage space, the prime capacity of Bluestone would be reduced and that is the important thing, and the investment there would be seriously affected.

Q. Now I thought we had been all over that once, but I will just ask you to make an assumption. Assuming that the Radford project entered the low water season with a full reservoir, and assuming that sometime during the course of low water season, the Radford storage were let down into Bluestone, in whole or in part, would not that necessarily increase the amount of power which could be produced by Bluestone during low water season?

A. I think I have answered that would increase the number of kilowatt hours. The Bluestone project, they cannot hold any water in the reservoir above a certain elevation because there is a very substantial draw-down there reserved for flood storage.

Q. Mr. McWhorter, is it your anticipation that the Bluestone reservoir will be filled throughout the low water season?

A. No.

C. If the Bluestone reservoir is not filled, will it not be able to hold the Radford storage as it is let down?

A. It would, but Mr. Jackson, you have assumed, or rather, you are trying to prove that we have assumed that these projects will be operated just alike, and I have testified before that they will not be operated alike, because Bluestone is a combination navigation, flood control and power project, whereas Radford is purely a power project.

Q. Mr. McWhorter, from the standpoint of power production, assume that the Radford reservoir enters low water season

1733 full and during the low water season lets down most of storage, will not that stored water be available for the u power, or production of power rather at Bluestone, regardless whether Radford is operated, on daily peak or otherwise?

A. Yes, sir; that water will be available at Bluestone for t production of energy, but it does not follow from that that t prime capacity at Bluestone would not be reduced.

Q. Let me ask you another question. Assuming that Radfo entered the low water season with a full reservoir, and durin the low water season lets down all or substantially all of t storage, will not that increase the prime power capacity Bluestone?

A. It would.

Q. Assuming that Bluestone reservoir is in operation, isn't a fact that any daily fluctuations from peak load operations Radford could not have any effect down stream below Bluesto upon the flow—the variations in flow?

A. I think that is right.

Q. What did you say was the drainage area of New Riv at its mouth?

A. The drainage area of New River at its mouth?

Q. Yes, sir.

A. I did not give that; I think it is——

Q. Will you give it?

A. I think it is—I better look it up—it is 6,900, I think. Le see.

Q. Couldn't you get that for us quickly?

A. I think so; 6,918 is proper; I will have to verify that. said 6,918—it is 6,941.

Q. It is 6,941?

A. Yes, sir.

Q. For September 1932, what was your estimate of the me flow above Radford dam site?

A. In September 1932?

Q. Yes, sir.

1734 A. I don't remember; I will have to look it up. (Wi ness produces papers.) Did I testify to that yesterday?

Q. According to the record, page 2441, you say 1,220 secon feet?

A. I have no reason to think that it is any different from th

Q. How did you find that?

A. What year.

Q. In September 1932?

A. September 1932—we took the published flow of New Riv at Allisonia and at Eggleston, and we estimated the average di charge of Little River at its mouth by using the flow at Grayso ton a few miles above on Little River, a few miles above the mouth, and increased that in accordance with the proportional drainage area at the mouth and at the Graysonton gage.

Q. When——

A. (Continuing.) Then we deducted from the flow at Eggleston, the flow of Little River, and we deducted from the drainage area at Eggleston, the drainage area of Little River, and then, from the remaining flow at Eggleston, and the observed flow at Allisonia, I interpolated the flow at the Radford dam site on the basis of the proportional drainage areas.

Q. All I wanted was the estimated flow?

A. Yes, sir; it is a very satisfactory estimate, I take it.

Q. Have you compared the United States Geological Survey estimates of stream flow at Hinton, the Pack's Ferry gage on New River and the one at Alderson on the Greenbrier River, with like estimates for the New River at its mouth, for the month of September 1932?

A. I may have; I don't remember now; I worked on this from time to time, a good many times.

Q. Look at Water Supply Paper 728, page 95, and tell me
whether the flow for September is there estimated at Hinton
1765 as 1,180 second-feet average for September 1932?

A. It appears to be 1,180 second-feet.

Q. And at the same time, notice if the drainage area is 4,560 square miles?

A. 4,560? [Witness examines papers.]

Q. Make a note of those figures, please, and turn to page 113 of the same Water Supply Paper and state whether or not the flow at Alderson on the Greenbrier River is 89 second-feet, the average flow for September 1932?

A. (Examines paper.) 89.4 second-feet.

Q. Well, call it 89 or 90, whichever you wish; but please take that down.

A. All right, call it 89.

Q. What is the drainage area at Alderson on the Greenbrier river—1,340?

A. Yes, sir.

Q. State whether the combined drainage areas and run-offs at this point would be 5,900 square miles and 1,269 second-feet?

A. That is right. Wait a minute—the first one was Hinton?

Q. Yes.

A. The Hinton gage—is that at Pack's Ferry?

Q. I think it is given there [indicating book being examined by witness].

A. Yes, sir; two miles above on the Greenbrier river.

Q. Now, that estimate of 1,269 second-feet or 1,270, whichever you use with Alderson, compares with your estimate for New River at its mouth of 1,270 second-feet?

A. 1,270.

Q. Yes, sir.

A. I said about 1,270.

Q. Yes; now, what of——

A. In 1932?

Q. The point is——

1736 A. (Interrupting.) That 1,270 is the flow—the published flow at Caperton gage, probably a little more—not much more than at the mouth of the river. At certain times of low flows—there is extremely little inflow in that part of the river. I gave figures to show—that did show the times the inflow was almost negligible.

Q. The point is—your drainage area at the mouth of New River is 6,941 square miles, is it?

A. Yes, sir.

Q. And we have your estimated flow at 1,270 second-feet?

A. I took the actual flow published by the Geological Survey at Caperton and I said that the flow at the mouth was about that.

Q. That is the estimated flow of the Geological Survey?

A. That is the flow they determined at the gaging station and published it.

Q. The Water Supply Paper No. 728 shows the same flow substantially, 1,269, in comparison with 1,270, for a drainage area of only 5,900 square miles?

A. Yes, sir; it shows the same at the head of the reach at Hihton.

Very little water comes in theres. As you will recall, I showed you Friday that for that drainage area of 12,200 square miles at the mouth—we compared the 8,367 at Kanawha Falls for the entire month of October 1930, and the discharge at the mouth of the river of 1,150 second-feet, and 1,130 at the Kanawha Falls, meaning that it practically showed that there was practically no increase in almost 4,000 square miles of the drainage area of the river; but that above Radford dam site, where there is a substantial yield of water during low flow periods, you find a different situation.

Q. All of these things——

A. (Interrupting.) I do not mean, however—I do not mean
to say that at any place on this river or on any other river where
the Geological Survey, or any other agency, published the
1737 flows, that you will not find an occasional inconsistency,
but these things in general certainly do not tend to break
my confidence in these records. To illustrate, on a previous day,

a question came up about the flow at Kanawha Falls being less for one day than the flow at Caperton. The fact that the Geological Survey showed it less, increases my confidence in their report. If they had gotten busy and had tried to show that the flow was bigger there, they would not have given the correct answer and their records would not be as valuable. There was a reason for that variation and that reason was brought out and shown here. The Geological Survey people publish records of a great many streams and these records are reliable and dependable. They are used by the Power Companies all over the country and the Power Companies have confidence in them, and the Government agencies, including the Federal Power Commission, have great confidence in them, and the Appalachian Electric Power Company itself, I think, in them—it has enough confidence to spend Millions of Dollars, basing the economics of their projects on them, and to propose to spend Ten Million Dollars more, on occasional inconsistency—apparent inconsistency—in the records, or an inconsistency that you cannot explain, certainly does not tend to discredit these records. It does not affect their substantial value.

Q. Have you finished?

A. Yes, sir.

Q. Will you tell me whether or not, whatever the cause may be, your estimate does not show the same flow for New River for September 1932, as is shown by the gages for Hinton and Alderson, although the drainage area at the mouth of New River is 118% of the drainage area at Hinton and Alderson?

A. You mean 18% greater?

Q. 118.

A. It is 5,900 at Hinton.

Q. Yes, sir; and this is 6,941.

1738 A. That would not be 118%. It might be 18%. I showed you a moment ago, that further down stream, you have increased drainage area almost 50%, with very little increase in flow.

Q. These are all estimated flows?

A. Yes, sir; but they are mighty good. You cannot get around them.

Q. You gave the mean flow of the Kanawha River at its mouth as 1,660 cubic feet per second; I believe you gave that in the record at page 3448?

A. What month is that?

Q. That is——

A. This last example at Hinton and the mouth of the river—I do not see any difficulty about that at all. Those flows are the same but there is no considerable difficulty about that. You would expect it to be a little more at the mouth but not substantially more after the flow gets that low.

Q. I will ask you another question—on page 3448 of the record you say that during the entire six months period from June 1st to November 30, 1930, the mean flow of the Kanawha River, at its mouth, was 1,660 second-feet?

A. Yes, sir.

Q. How did you estimate that?

A. I estimated that just exactly like Mr. Pierce estimated his figures at the mouth of the river. I conceded—I recognized, at least, that the experts of the Geological Survey are better experts on that subject than I am, or anybody else connected with the Federal Power Commission, and so I discussed that with Mr. Pierce, and had members of my staff discuss it with him, the exact practice that he used in estimateing the flow at the mouth of the river, and this I used.

Q. What did you do. I do want what Mr. Pierce did, but what you did?

A. First I observed the flows—the mean flows each month
1739 at the Kanawha Falls gage, and then took into consideration that there were three tributaries of ordinary or substantial size between the Kanawha Falls and the mouth of the river—two of these tributaries on the right bank—one of the Elk River and the Pocatello and the other the Cole River, from the left bank. We observed the flows—the corresponding flows of those streams for the corresponding monthly periods, and noted the drainage area of each flow is those smaller basins, and then, in order to get the most accurage results possible, we allocated the remaining drainage area below the mouth of Kanawha Falls gage to these three separate drainage areas below, and then, on that basis, estimated the increase in flow in each one of these tributaries, in proportion to the amount of the allocations of the drainage areas in these basins, and in that way we estimated the flow there at the mouth of the river during that six months period would be 1,660 second-feet, or as compared with 1,590 second-feet at the Kanawha Falls gage.

Now, the corresponding estimate for the month of October is 1,130 at the Kanawha Falls gage and 1,150 second-feet at the mouth of the river. If there is any better way to do that, I would like to know it. That is the best way I know to do it.

Q. There is no gage reading of the other tributaries in 1930—I mean 1932, is there?

A. This was 1930, June to November 1930.

Q. Yes, I beg your pardon. You gave in your testimony a good many figures on certain stream flows, I believe, did you?

A. Yes, sir.

Q. These were all estimated in somewhat similar fashion, from such data as was available?

A. The basis of these figures was the published flows in the Water Supply Papers of the Geological Survey and the drainage areas determined by the Survey, and in many cases, we simply took the published flow direct from the records and used them. Where necessary, as for instance in estimating the flow at Radford or at the mouth of the river, we did as I have told you.

1740 Q. And you took some of the flows from Mr. Pierce?

A. Mr. Pierce had testified as to some flows and I took his figures to be correct.

Q. And in other cases, you have some from the Cincinnati Engineering office?

A. Those in the Ohio River we got from the Division Engineers' office in Cincinnati.

Redirect examination by Mr. Gatchell:

Q. There has been some little question as to whether or not the company had applied for a Major or a Minor License, and I show you Government's Exhibit No. 90, and ask you to read the first part of that paper (handing to witness)?

A. All right. (Reading): "The Appalachian Electric Power Company—Application to the Federal Power Commission for a license under Act of June 10th, 1920, for the development No. 6, New River, a Major project in the State of Virginia."

Q. And was that the application for this particular project?

A. Yes, sir.

By Mr. Jackson:

Q. What is the number?

A. It is Number 90.

By Mr. Gatchell:

Q. If the Bluestone project should be constructed as proposed and operated as set forth approximately in Government's Exhibit No. 145, being House Document No. 91, and if the Bluestone reservoir is filled except for that space reserved for flood control, would there be any place to store additional water coming into the reservoir from above?

A. No.

1741 Q. If, under such circumstances, the Radford project should be operated, as you have said it may be, as a peak-load plant, would there be any space to store the water in the Bluestone reservoir?

A. There would not be any place to store it as long as the Bluestone reservoir is full—up to the lower limit of the flood control—of the space reserved for flood control.

Q. Would it be to the economic advantage of the owner c the Radford project to empty and fill that reservoir as frequentl as possible during high water?

A. During high water, once they got the reservoir full, if th discharge is more than 9,000 second-feet, it would remain ful and there would not be any filling and emptying of it.

Q. During the times of discharge—during the times of flov in New River at the Radford dam site, of less than 9,000 second feet, would it be the usual practice to operate this reservoir a its full capacity, or would the discharge be sent through withou any ponding?

A. The plant would be operated at full capacity for part o the day, but could not be operated at full capacity for the entir day, without progressively drawing down the reservoir.

Q. At what stream flows on the Kanawha River would be— would it be necessary to operate the roller gates at the London Marmet and the Winfield dams?

A. It would certainly be necessary to operate the gates at al times when the flow of Kanawha River exceeds the hydrauli capacity of the power plants,—that is, exceeds the combine amount of water used—by the plants, the locks, and as the resul of leakage.

Q. You spoke this morning of stopping the flow of one thou sand second feet down at Kanawha Falls as possibly lowerin the back water elevation as a small fraction of a foot?

A. Yes, sir.

Q. Would there be any other flows at Kanawha Fall
1742 or below which would be more important than 1,000 secon
feet discharge?

A. From that particular viewpoint, the higher flows at Rad ford—I mean, now flows ranging about the average between zer flow and the capacity of the installation, between 4,000 and 5,00 cubic feet per second—the holding back of these flows woul have a substantial effect upon the surface elevation at the uppe ends of the Gallipolis and Winfield and Marmet pools. If at time when the flow in the Kanawha River is 10,000 cubic feet pe second, the operation of the Radford project should reduce tha flow by 4,000 cubic feet per second, the elevation of the wate surface in the Gallipolis and Winfield pools would be reduced a the upper ends of these pools, about .8 of a foot in one of the and about 1.1 feet in the other.

Q. Mr. McWhorter, if you were engineer in charge of th operation of the Radford dam, and the Buck and Byllesby plant of the Appalachian Electric Power Company, and knew that ther was a state license under which the Radford plant could operat and no federal license had been imposed, in what manner would you operate the Radford plant during the times of low water?

A. I have already testified on cross-examination that if I had a State license I would observe the terms of that license but I would not feel obligated to do anything more, and I would, under those circumstances, operate the Radford project to the best advantage to me and my company without violating any terms of the State license. In doing so, I would, if that method of operation caused these great fluctuations in flow from zero to 9,000 second-feet below the dam.

Q. If it was necessary, would you store the water in the reservoir in low water times?

A. Yes, sir.

Q. During low water times, under such manner by you as the engineer in charge, would it be economically advantageous for you to store the water?

1743 A. It would at times, and I would store it, but I would store it in such manner as not to violate the terms of the State license.

By the COURT:

Q. Would you do that at the risk of having the Federal Government come along and remove that very valuable investment?

A. Yes, sir; and I would expect the State of Virginia to protect me as long as I did not violate the terms of the license that the State had given me, and I think that is what anybody else would do.

Recross-examination by Mr. JACKSON:

Q. As I understand you, Mr. McWhorter, if you were operating the Radford project, you would not violate the State law, but you would the Federal law; is that right?

A. No.

Q. Did you observe, when you read the license, that it states that the licensee shall operate its project so as not to interfere with the navigable capacity of any navigable water?

A. Yes, and it goes ahead right after that and gives the licensee the right to operate the project just about any way it wants to, so far as the release of water is concerned.

Q. You state that if there were a flow of 10,000 second-feet in the Kanawha River, and it were reduced to 4,000——

A. (Interposing.) No, reduced by 4,000 down to 6,000.

Q. (Continuing)—it would cause the reduction in elevation or back water effect at the upper end of the pools of the Kanawha River, and you gave the figures?

A. Yes.

1744 Q. Would the water surface still be above the proje depth?

A. It would, but the depth might not be the project depth?

Q. It might be filled in, of course. All right, that is all.

Mr. **Thompson**. If the Court please, at this time I would li to offer in evidence the remaining part of Government Exhibit 9

Government Exhibit 91 was limited, at the time, to the first tw reports [6th and 7th Annual Reports] of the Federal Power Con mission. Under the same cover there was also the 8th Annu Report, the 11th Annual Report and the 12th Annual Report.

These reports are the only ones which cover anything with re erence to the project of the Appalachian Electric Power Compan and, at this time, I desire to offer in evidence the remaining r ports covering this subject, under this cover and under this E hibit 91.

Mr. **Jackson**. If your Honor please, I want to say that I thin counsel is mistaken in saying that these are all annual repor with reference to the project. I mean these and those previous offered. They are not, I think, the only ones. We concede th authenticity of 8th to 11th Annual Reports.

Mr. **Thompson**. And the 12th?

Mr. **Jackson**. And have no objection other than to their rel vancy or competency to prove the facts which may be recited i them, which I have not carefully read.

As to the 12th Annual Report, we object to its competency fo any purpose, for the reason that if proper proof were made i would appear that the quotations from the 12th Annual Repor relate to the famous Columbus Day meeting of the then Feder Power Commission, which met on November 12, 1932, and not i the regular course of business,—not for consideration of thi project, but in the midst of a law suit against these defendant It gathered in Washington and undertook to pass a resolutio spreading upon the minutes of the Federal Power Commissio such information as they thought appropriate to guide the Cou in deciding the case then before it.

We think any such action of Government representatives, a individuals, cannot be said to be in the regular course of Gov ernment business, nor can it have any relevancy.

As to that, the excerpt from the 12th Annual Report, appea ing in Exhibit 91, we object not only as to its relevancy an competency, but as a self-serving and self-promulgated documen

Mr. **Thompson**. They were not as individuals before this Cour That is what counsel attempted to make them in the entire cas and the Court threw them out, and that is one of the grounds o which a reversal came from the Circuit Court of Appeals.

He speaks about the regular course of business: I think the Court will take judicial notice that all meetings of members of a Government board transact business. Furthermore, the statement that is in the record here is by a new Commission and not by its predecessor, and we think also the Court can take judicial notice that no Commission is controlled by decisions of its predecessor.

All I am offering this for is as a record of the Commission. The Court may say that it has no value, after considering it, but I am offering it as a public record and public document.

Mr. **Jackson**. We submit that officers of the Federal Government cannot make evidence in a suit pending against them by meeting together and passing resolutions and undertaking to decide an issue before this Court,—which is just what these gentlemen did in their resolution after the previous case had been argued and submitted to Mr. Justice Way, and we think it has no competency whatever in this record. To my mind it is a highly inappropriate thing for federal officials to try to get before the Court resolutions undertaking to state upon what facts the Court should undertake to decide this case.

The **Court**. I think I will admit it in evidence for the reason that I want before me a record of everything that was done. What weight I will give to it, it is entirely possible I may have the same view you have and it may not be. That goes to the weight I would give to the action of the Commission. But I want before me in this case, which is a novel one, everything which does not fall within well established precedents, and I want everything done by the Commission relative to this subject.

Mr. **Jackson**. I fully appreciate the position of the Court. I do not want to be captious in asking for formal proof of the things that I know are accurate statements of what was attempted to be done. The situation that does disturb me is this: I am certain if the Government were required to make formal proof of this meeting, on cross-examination of anyone competent to prove it, he would say it was a meeting called and held in the course of the previous litigation in an attempt to bolster up what they conceded to be the weakness in their case then pending—not in regular course. If it goes in under this kind of showing, there is no opportunity to bring it out, but it appears on the face of the resolution that it is not described as they referred to it in briefs and arguments.

The **Court**. I have just glanced at it, and it appears that it was held during the pendency of that suit.

Mr. **Thompson**. I don't know whether the meeting was held for that purpose, or not, but whether held for that purpose, there was a good reason. If you will take the briefs, counsel said this Commission was reaffirming what a previous Commission has said, and that was put before Judge Way in open court.

Mr. Jackson. It went in at your request.

Mr. Thompson. Yes.

Mr. Jackson. We concede that it is an accurate copy of the resolution that these gentlemen attempted to pass, and we think it improper to spread it upon the minutes of the Federal Power Commission. The only matters argued before Judge Way were the actual resolutions that appeared, and they speak for themselves, and counsel for the defendant was unhappy with the way that they were quoted.

Mr. Thompson. We were very unhappy over the way that they tried to change language. The Commission was outraged, I may say to the Court.

The Court. Go ahead.

Mr. Jackson. May our exception be noted to the reception of the excerpts from the Annual Reports of the Federal Power Commission, 8th, 11th, and 12th Annual Reports, insofar as they are included in Government Exhibit No. 91, for the reasons already stated.

The Court. Yes.

1745 JAMES W. JOHNSON

Direct examination by Mr Thompson:

Q. Mr. Johnson, will you please state your name and residence to the Reporter?

A. James W. Johnson; Florence, Alabama.

Q. What is your occupation, Mr. Johnson?

A. I am an engineer.

Q. What schooling and experience have you had as an engineer?

A. I was prepared for college at Trinity Park Preparatory School, Durham, North Carolina. I graduated with the degree of Bachelor of Engineering from the North Carolina State College of Agriculture and Engineering in 1913. I entered the graduate students engineering course, at the Lynn, Massachusetts, Works of the General Electric Company in June 1913, and completed the course in August 1915.

Q. Mr. Johnson, what positions have you held since your graduation from college in your profession?

A. From August 1915 to January 1917, I was in the employ of Seymour Manufacturing Company, Seymour, Connecticut, as plant electrical engineer, in charge of design, construction, and maintenance of the plant electrical equipment.

From January 1917 to April 1918, I was employed as assistant to district superintendent Naugatuck-Seymour district of the Connecticut Light and Power Company. The duties consisted of supervision of operation and maintenance of transmission and distribution lines in several municipalities within this district.

From April 1918 to February 1921, I was in the employ of the Kerite Insulating Wire and Cable Company, Seymour, Connecticut, as plant electrical engineer, in charge of design, construction, and maintenance of the plant electrical equipment, including a power plant.

By Mr. JACKSON:

Q. Was it a steam plant?

A. It was steam, supplemented with hydro. It was a small hydro installation.

1746 From May 1921 to July 1922, in the United States Navy Yard, Norfolk, Virginia, engaged in electrical design and testing of power equipment aboard ship.

July 1922 to September 1923, Chief Electrical Engineer with the Sheffield Company, Sheffield, Alabama, a public utility company, which operated a steam generating plant, street railways and electric distribution system in the municipalities of Florence, Sheffield, Tuscumbia, Alabama.

From November 1923 to April 1926, in the employ Hugh L. Cooper and Company, Incorporated, Consulting Engineers, who were, during the time, engaged as consulting engineers upon the Wilson dam, the hydroelectric plant at Florence, Alabama.

My first assignment with the Cooper organization, on the Wilson dam project was in the design office. When the design of the project was approximately completed, I was appointed assistant operating superintendent, and in this capacity I first assisted in the forming of an operating personnel and in the starting up of the hydroelectric plant, which was then the largest in the world. I may say I supervised the functional tests, the acceptance tests and the efficiency tests incidental to the placing in operation of this plant.

After operations were begun, among other duties I kept records of gaging stations and flows on the Tennessee River from Halesbar, Tennessee, to Florence, Alabama, which included a reach of the Tennessee River of about 175 miles.

From April 1926 to March 1930, I was in the employ of the War Department Corps of Engineers as Assistant Operating Superintendent of the Wilson dam hydroelectric plant. This was a continuation of the position began while with Hugh L. Cooper & Company. I transferred to the War Department when the Cooper Company terminated their contract.

I continued to keep gaging station and stream flow records after my transfer to the War Department.

1747 From March 1930, to October 1932, I was in the employ of Hugh L. Cooper & Company as a member of the engineering staff engaged in the design, construction and later the operation of the Dnieprostroy hydroelectric project on the Dnieper River, in Russia.

In June 1933, to September 1934, I was employed as consulting engineer for the City of Florence and as consulting engineer for some other municipalities in Alabama. This work had to do principally with electrical distribution system and with the water works plant in Florence, Alabama.

From September 1934 to July 1, 1936, I was employed in the Department of Justice as Special Assistant to the Attorney General. My work with the Department of Justice consisted of studies of the New, James, Greenbrier and Kanawha Rivers, with a view to their navigability, their navigable possibilities and the engineering aspects of the issues involved in two cases, namely: U. S. v. Electro-Metallurgical Corporation and U. S. v. Appalachian Electric Power Company.

I may add that my employment with the Department of Justice terminated June 30, 1936, and that since July 1, 1936, I have been in the employ of the City of Florence, Alabama, as engineer and general manager of the electrical distribution system of that city.

By Mr. Thompson:

Q. How much time have you spent on the study of the New, Kanawha and the other rivers you named?

A. Altogether about a year and nine months.

Q. Have you ever been on the New and Kanawha Rivers?

A. Yes, sir; many times.

Q. How far up New River have you been?

A. I have been up as far as in the general vicinity of the two main forks—the head waters of the river.

Q. What is that called up there, where they come together?

A. It is in northwestern North Carolina, the North Fork and South Fork of New River.

1748 Q. State what research you have made of the records that have to do with the New and Kanawha Rivers?

A. I have read the annual reports of the Chief of Engineers on those rivers. I have made two trips of inspection of those rivers from the mouth of Wilson Creek to Charleston, West Virginia. I have also been down to the mouth of the Kanawha River, at the Ohio River. I have read the report of Chief Justice Marshall, made in 1812 to the General Assembly of the State of Virginia, referring to a proposed water highway for connecting the Ohio and James Rivers through the Kanawha and New and Greenbrier Rivers.

Mr. JACKSON. I move to strike out the reference to the Marshall Report. He states it provides for a highway, and he should not interpret it.

The COURT. What is the statement?

Mr. JACKSON. That the report was for a proposed water highway from the Kanawha through the New to the James River. I do not understand it that way.

Mr. THOMPSON. That is what the Legislature authorized—to make that study, and I think that they are almost the literal words.

The COURT. Let it stay in.

Mr. JACKSON. Note our exception.

I have examined the report of Moore and Briggs, made in 1819 on behalf of the Board of Public Works of the State of Virginia, covering an investigation with respect to a proposed water highway for connecting the Ohio, Kanawha, and New Rivers with the James River by way of Sinking Creek, and also a waterway for connecting the Ohio by way of the Kanawha, New, and Greenbrier Rivers with the James River.

I have made a study of the report of Major Graighill of January 27, 1871, covering an investigation and report of the methods and cost of improving New and Kanawha Rivers for navigation. I have also studied the report of Major F. W. Alstaetter, which was made in 1912.

By Mr. THOMPSON:

Q. Mr. Johnson, from your personal observation and studies of New River and the reports of the Geological Surveys, what would you say was the average number of days of the year in which water was above average in the Kanawha and New Rivers?

A. At the Radford dam site I should say that water above the mean annual flow prevails for about 126 days a year.

At the Hawk's Nest dam site I should say that water above the average annual stage prevails for about 110 days a year, and at the Kanawha Falls, on the Kanawha River, I should say that water above the average stage would prevail for about 114 days a year.

By Mr. JACKSON:

Q. That last statement is not clear to me. You use the flows a part of the time and average a part of the time.

1749 A. It means stages at mean flow. I can go back and make it clear. I believe the question was mean stage, wasn't it?

By Mr. Thompson:

Q. Yes.

A. Mean stage.

Q. And by "stage" you mean "flow," do you?

A. Yes, that is what I mean, and I wish to have that understood. The stages above mean flow, I will put it, prevail about 114 days per year.

Q. From the sources which you have indicated in your previous testimony, what would you say was the average flow in the New and Kanawha Rivers?

A. At the Radford dam site, the average annual flow is 3,211 cubic feet per second. At the Hawk's Nest dam site it is 9,600 cubic feet per second. At Kanawha Falls it is 13,000 cubic feet per second. At the mouth of New River it is 9,645 cubic feet per second.

By The Court:

Q. Those figures represent what?

A. Those figures are average annual flows.

Q. The larger percentage of the water flowing into Kanawha River comes from the New River watershed above Radford. The flow at Hawk's Nest is 9,600 feet and the flow at Radford is thirty some hundred feet.

A. 3,211.

Mr. Thompson. We do not say that is on the average, but there are certain stretches on which the opposite is true.

Witness. It is during low water periods.

Mr. Jackson. May I make one inquiry; I understood you to ask the witness to give these figures from records which he referred to, and that was the annual engineering reports. I wonder whether or not there are additional reports?

Witness. The U. S. Geological Survey is the basis of these figures.

1750 Mr. Thompson. And he has also testified that he has made personal observation.

Mr. Jackson. I did not suppose that he based these on personal observation.

By Mr. Thompson:

What would you say, from the sources you have already testified, as to the basis of your information as to the average when the low flows usually occur?

A. The low flows usually occur between July and November, but there are some exceptions to that rule.

Q. What are the exceptions, if you know?

A. Well, the exceptions I do not exactly recall very definitely. There is one striking exception that comes to my mind, and that is that in the year 1930, the low flow period began very much earlier than July; in fact, it began back in April, and I might refresh my memory from the water supply papers as to other years. There are, of course, other years when the periods vary from that I have given.

1751 Q. State to the Court some of the dry years that are shown from the records.

A. The years 1921, 1925, 1926, 1930, 1932, and 1933. Those were years of low flows.

Q. Now, have you made any study, or did you hear Mr. McWhorter testify?

A. The greater part of it.

Q. Did you see the chart which he introduced here of the channel of New River and the Kanawha?

A. I did.

Q. Have you made any study of that chart and channel?

A. I have examined that chart and the channel very closely.

Q. Have you made any study of it in the light of the reports of '72, '74, and '78 of Major Craighill?

A. I have gone over in considerable detail comparing the profile as presented with the documents presented with the reports made by Major Craighill and the surveys.

Q. You say you did that?

A. Yes, sir.

Q. I understand you say now you prepared that chart?

A. I say I made a close study and examination of the chart and of the reports, much of which information was used in the preparation and construction of the profile.

Q. From your study of the channel of this river, as you have outlined, and from your reading and study of the Geological Survey reports, what would you say as to whether or not there is sufficient water for navigation on New River, during the periods you have described, as above average flow?

By. Mr. Jackson. I object to the question as irrelevant and immaterial. I object to it further as to the competency of this witness to answer any question with reference to navigation. His qualifications do show he has familiarity with the electrical development, but do not show any qualification whatever with reference to navigation.

By the Court. I didn't quite get the question. I thought you left something out.

By Mr. Thompson. I asked from his judgment or from the study he had made of the channel of this river, the depths, etc., his study of the place, as indicated by the Water Supply Papers of the Geological Survey, whether there was sufficient water at times above average flow for navigation on that river, and your Honor, that question was put in the Utah case.

By Mr. Jackson. Not to this witness.

By the Court. It seems to me it has been gone into in this case already, hasn't it?

By Mr. Thompson. Your Honor, this witness will take a different phase of the case. Here is a witness who testified for years he was reading the gages and watching the flows of the Tennessee River at its most important part.

By Mr. Jackson. I would not consider that made a man a navigator. I might read gages. There is not the slightest competency of this witness to testify on this subject, and it is irrelevant and immaterial. The volume of water is not material, almost any stream has enough water if one removed obstructions and dammed it up it would supply some sort of navigation.

By Mr. Thompson. The volume of water is one of the most essential factors in navigation. We are asking him as an expert on channel depths and water flows as to whether there would be enough water for navigation.

By the Court. He may answer.

By Mr. Jackson. May I make my point a little clearer? The quantity of water appears very clearly from many witnesses, as well as this witness, the flow of this stream. Now the question here is, is that quantity of water sufficient for navigation? Now if that isn't a conclusion to be made by the Court, this much seems to be perfectly clear, this witness hasn't the qualification to express any opinion on that subject. All that appears in the record as to his qualification is that he has done considerable electrical work for manufacturing companies, and has read gages. That has nothing to do with the question of what would be a sufficient quantity of water, standing alone, for navigation.

By Mr. Thompson. If you have depths, heights and quantity, you can certainly draw a conclusion if you can put a boat through of a certain size.

By Mr. Jackson. If that is all that is needed, then the Court can draw any sort of conclusion to be drawn from that sort of facts, and this witness under no hypothesis could bring any aid to the Court, because his qualifications do not touch that field.

By the Court. I will let him answer, although I hold exactly the same view you do.

By Mr. Jackson. May the record show our exception?

By the Court. Yes.

Note.—Question read.

A. During such periods when the river is above average stages I should say there is sufficient water for navigation on New River.

Q. What do you mean by navigation, Mr. Johnson?

By Mr. Jackson. I object to that question.

By the Court. He may answer.

By Mr. Jackson. Exception.

1752 A. I mean the floatability of logs, rafts, flat bottom boats, bateaux, keel bottom boats, steamboats and other small craft.

Q. From the source of information about which you have testified, from your personal observation, what would you say as to whether or not there was sufficient water in New River during the periods of average flow?

By Mr. Jackson. I object to that question. The witness has no competency whatever to answer the question. Any conclusion to be drawn, could be drawn by the Court without any conclusion or opinion of this witness, and I think it is incompetent and irrelevant.

By the Court. Let him answer.

By Mr. Jackson. Exception.

A. During the periods of average flow I should say there is sufficient water for navigation in New River.

Q. You mean by that the type you have testified to?

A. Yes, sir.

Q. From the sources you testified to, and your personal observation, what would you say as to the sufficiency during extreme low flow period annually on New River for the types of boats and navigation you have testified to?

By Mr. Jackson. I object to the question upon the ground it appears affirmatively from the record this witness is without competency to answer the question, and invades the province of the Court.

By the Court. He may answer.

By Mr. Jackson. Exception.

A. During periods of extreme low flow, which may occur, or such as do occur annually, I should say there is sufficient water in New River for navigation, so long as this flow is not interfered with by artificial obstructions, such as that occasioned by the Buck and Byllesby dams, assuming an improved river, when not frozen over.

By the Court:

Q. You mean assuming an improved river?

A. Yes, sir.

Q. What do you mean by that?

A. A river that has the channels restored, or where over ledges and chutes channels have been cut through to provide the necessary depth.

By Mr. **Thompson**:

Q. You mean have already been cut through?

A. Where they have already been cut through. I should
sume that repairs would be needed, and where boulders are
the river, the boulders would have to be blasted out, and wh
minor obstructions to navigation occur, or where artific
obstructions occur, those would all have to be removed.

Q. What do you mean by artificial obstructions?

1753 A. That would be stone, debris, boulders, at such pla
as the Buck and Byllesby, bridges, and material thro
into the river of considerable size, by the construction of railw
and highways. It would be obstructions placed there other th
by natural means.

Q. Might not boulders be stationed there by natural means?

A. Boulders in some instances are placed in the river, or
into the river, as a result of construction carried on by a railro
or by highway construction.

Q. You are not referring to boulders that are there by natu
means, but rather those by artificial means?

A. I am referring to both. To improve the channel, if th
were no artificial obstructions, would not be so difficult as it wo
otherwise be if it were necessary to remove the artificial obstr
tions, but a large number of artificial obstructions would have
be removed.

Q. I don't know I understand you. State whether or not th
are any artificial obstructions by way of boulders in that river

A. I will cite an instance. In the lower reach of the river,
C. & O. Railway, in grading their tracks closely beside the riv
have encroached upon the river width by filling out over what w
formerly the bank and in doing so they have allowed large sto
to roll down, or they have rolled down, and it is evident from
inspection of the river, and I have seen it myself, that this h
narrowed the width from its original width.

Q. Is that what you mean by the boulders you would have
remove?

A. You would remove those boulders as well as such ot
boulders as it may be necessary to remove that you may find w
already in the river, particularly in the lower fifty mile stre
of the river from below Hinton to below Hawk's Nest.

By Mr. **Jackson**. I understand while I have not interrupt
as to each question, all of this testimony is subject to our objecti
and our exception is allowed?

By the **Court**. Yes.

Q. How far can you float logs on New River during the ma
mum, mean and low flow?

By Mr. Jackson. I object to that question, because it is a triple question, and because the witness on the face of the record is wholly incompetent to make any answer to the question, and further because it is irrelevant.

1754 By the Court:

Did you ever float any logs down there and try it?

A. No, your Honor.

By the Court. There is a great deal of evidence in here on the flows and where the channels are located. I will let you ask him about floating logs.

By Mr. Jackson. Exception.

1755 A. I should say that for flood stages it would be possible to float logs from the mouth of Wilson Creek to below the mouth of the New River; and that during mean stages of the river it would be possible to float logs from Wilson Creek, the mouth of Wilson Creek, to below the mouth of New River; and during moderately low stages of the river I should say it would be possible to float logs from Foster Falls, Virginia, to Hinton, West Virginia.

Q. Have you observed the condition of the channels where the Government has made improvements in the past?

A. I have observed the channels in many places.

Q. Have you observed the channel from Radford upstream above where the project of the defendant is located, up to Allisonia?

A. In some places; yes.

Q. What is the condition of that channel?

By Mr. Jackson. I object to the competency of the witness to describe the condition of the channel. It is shown he had no knowledge about channels.

By Mr. Thompson. He has seen the channel, looked at it, and waded into it.

By Mr. Jackson. He has not stated that.

By Mr. Thompson. He has testified he has seen it.

By Mr. Jackson. I didn't know where you got the wading.

A. I noticed it was used in a good many places for motor boating.

Q. What is the condition of it?

A. The condition, I forget just what the slope is.

Q. I am asking for that part the Government improved, according to the map?

A. The channel has had some improvements made in that section, some of which are in evidence.

Q. State whether or not any of that channel has any silt or debris in it, according to your investigation?

A. In the chutes, there are some stones. I have not noticed that there was silt in the chutes. Silt is to be found in most reservoir pools.

By the COURT:

Q. What do you mean by reservoir pools?

A. I mean any pools, any still basin will accumulate a certain amount of silt during certain times and may be flushed out during floods and large stones deposited during floods.

Q. Have you made any study of what is known as the 308 Report, Government Exhibit #145?

1756 A. Yes, I have.

Q. Can you give us the height of the pool, at its maximum, of the Bluestone reservoir?

A. The Bluestone reservoir pool at its maximum height would be 150 feet high or about that.

Q. Have you seen any of the plans for the construction of this reservoir?

A. Yes. I have examined some of the preliminary plans.

Q. What plans have you seen?

A. I have noted the general plans and elevations and some plans that showed the power house and some showing navigation structures and facilities.

By Mr. JACKSON. I move to strike out the statement of the witness that not merely had he examined plans, but he had examined plans showing navigation construction and facilities. I don't think there are any, but if there is, the proof will have to be made in a competent fashion, and not by this witness, as to something he has seen somewhere. The only thing about the Bluestone before this Court is what is in the 308 Report, to which your Honor referred a moment ago.

By Mr. THOMPSON:

Q. I hand you, marked for identification, Government Exhibit #200, 200-a, and 200-b, consisting of three pages, and with the words up in the left-hand corner: "War Department," and then down in the right hand corner: "Preliminary study of New River, Bluestone Reservoir project, dam navigation features, log chute flume type with adjustable sections," and dated January 1, 1936, U. S. Engineer's Office. Harry Pockras, Principal Engineer, and approved by John Conklin, Major, Corps of Engineers, and ask if you know what that is?

A. It is a print of the log chute of the Bluestone dam showing for facilities to pass logs.

By Mr. JACKSON. I object to the statement of what it shows, and move to strike it out.

By the COURT. Overruled.

By Mr. JACKSON. Exception.

By Mr. THOMPSON:

Q. Where did this come from?

A. This was prepared by the War Department Corps of Engineers.

By Mr. JACKSON:

Q. Are you reading from the lower right hand corner?

A. I am reading from the upper left hand corner. I didn't read it all as a matter of fact, I was supplying the rest, my eye merely fell on the "War Department." I have seen these exhibits before.

By Mr. JACKSON. Is it offered or not?

By Mr. THOMPSON. We offer this exhibit in evidence at this time.

NOTE.—Tracings marked "Government Exhibit Nos. 200, 200-a and 200-b" so marked and filed.

By Mr. JACKSON. I object to it, as not properly proved. This witness didn't make the exhibit, and doesn't know anything about whether it was ever authorized or what its status is, or anything else.

By Mr. THOMPSON. We are offering it exactly for what it is worth at this time. It has been shown in evidence the War Department is in a state of developing this whole plan and we simply offer this as of January, 1936, and that was the plan at that time.

By Mr. JACKSON. That last is purely a statement of counsel.

By the COURT. Objection overruled.

By Mr. JACKSON. Exception.

By Mr. THOMPSON:

Q. Will you please look at Government Exhibit 200 and I will ask you whether there is some provision on there for a log shoot?

1757 A. Yes, sir; there is.

By Mr. JACKSON. If Your Honor please, I assume, inasmuch as Your Honor has admitted these exhibits over our objection, you will let it be understood that our objection applies to what they show, and to avoid interrupting it will be understood that all of our exceptions having to do with exhibits 200A and 200B are insisted upon by the defendant, and that an exception is allowed to the ruling of the Court.

By Mr. THOMPSON:

Q. Now state whether or not any plan for a log crane is provided on page 2?

A. It shows the drawing providing a device for a log chute.

Q. Is there a log crane on that exhibit 200A or a plan for a log crane?

A. A log chute.

Q. What is the title here?

A. That is the crane shown on top.

Q. Now in reference to exhibit 200B.

A. Exhibit 200B is a drawing which shows a barge lift for construction at the Bluestone Dam, to permit the passage of barges from downstream to upstream, and from upstream to downstream over this dam.

Q. Mr. Johnson, assuming that the construction and operation of the Bluestone Dam at Hinton on the New River is as described in the 308 report, of the Secretary of War, House Document 191, Exhibit 145, how would the depth of the river upstream from the Bluestone dam site be affected, if at all?

A. It would create a slack water of pools at the maximum height, as provided by the plan, for a distance of about 36 miles upstream from this dam.

Q. To what point?

A. That would be approximately to Narrows, Virginia, I believe, and it would be about 13 miles across the State line.

By Mr. Jackson. I move to strike out the statement of the witness that it would be 13 miles across the State line because there is no proof in this record that the witness knows where the State line is.

Motion overruled. Defendant excepts.

By Mr. Thompson:

Q. What would the conditions of navigation be in that pool when filled to useable storage?

By Mr. Jackson. I object to the competency of the witness to testify as to navigation conditions in this pool.

By the Court. You mean as to the depth of the pool?

By Mr. Jackson. We object to the form of the question. He can state the depth of the pool, and how far up there would be certain depths.

By Mr. Thompson:

Q. How far up would there be a 9-foot depth for navigation? Objection.

By Mr. Jackson. Did I understand that Your Honor overruled my objection?

By the Court. Yes.

Defendant excepts.

A. For a distance of about 27 miles for 9 foot navigation.

1758 Is that for the upper pool navigation or normal pool navigation?

Q. Normal pool navigation.

A. Normal pool at 1485. I would consider that normal, and is sought to maintain the pool at that elevation for the greater rt of the time. That would provide 9 foot navigation for a stance of more than 4 miles across the State Boundary or to thin less than 3 miles of the Town of Glen Lyn, Virginia.

By Mr. JACKSON. I again move to strike out the statement of e witness as to the State boundary, as incompetent.

Motion denied. Defendant excepts.

A. That would be for drafts up to 9 feet.

By Mr. THOMPSON:

Q. Could there be any navigation beyond there for a draft less than 9 feet?

A. Yes, there would be a pool for small flows in the river, thout any appreciable amount of back water effect and would eate slack water for a distance over the State line of about five iles, and would give almost an additional mile of navigation r light draft vessels and crafts.

By Mr. JACKSON:

If Your Honor please, may it be understood that all the testi- ony of this witness with reference to the State line is subject the objections we have heretofore made, and on the further ound that there is no showing here that he has any knowledge the State Line.

A. I will say then to within two miles of the town of Glen yn.

By Mr. THOMPSON:

Q. Do pools of this kind create back water?

A. Back water is created by flows into pools of this kind.

Q. That is what I meant.

A. Yes, sir.

Q. If the Radford project were constructed to provide as one its purposes a navigation project, extending from its dam e to Allisonia, to what extent would the project, as so con- ucted, differ, if any, from the proposed Radford project?

By Mr. JACKSON. It seems to me that he is comparing the dford project with the Radford project.

A. If one of its purposes——

By Mr. JACKSON. One minute, please.

By the COURT. I do not understand your statement there, Mr. ompson. Are you basing that question on navigation projects ending from Bluestone to Allisonia?

By Mr. THOMPSON. I am not speaking about Bluestone, I am aking about the Radford project.

By the **Court**. I am asking the question if constructed to operate as what, or if what is constructed?

By Mr. **Thompson**. If the Radford project was constructed to operate as a navigation project as well as a power project, would there be any difference in the construction and operation?

By Mr. **Jackson**. I object to the question because it is certainly obvious that this witness is not at all competent to answer the question. I object further on the ground that it is irrelevant and immaterial. The most this witness could possibly do would be to state what length of pool there is, what depth there is, for a certain type dam, and that is as far as he can go.

By Mr. **Thompson**. He first states that this witness is not competent to testify here on that subject. Here is a man that was an engineer on the Muscle Shoals project which was constructed, and which is both a navigation project and a power project, he not only was instrumental in constructing it but he ran it for a long time, so that I say, first of all he has shown his competency and is competent to testify on this matter.

The question arises, can he run a power project or construct it in the same way as you would if it were both a power and navigation project. That is the question I am asking him.

By Mr. **Jackson**. He is not a navigation expert simply by testifying that he assisted in the design of the power project, the Wilson Power Plant, and what he said in his qualification shows that he had no qualification as a person who is competent to answer this question.

By the **Court**. I am not sure that I caught the nature of the question.

Do you mean how should the Radford dam be constructed other than it is now planned?

By Mr. **Thompson**. Yes, if it were to be constructed so that there could be navigation up there.

By Mr. **Jackson**. On the pool?

By Mr. **Thompson**. Yes, as an aid to navigation.

By the **Court**. Aid to navigation above the dam?

By Mr. **Thompson**. Yes.

By Mr. **Jackson**. I object to the competency of the witness and the relevancy of the question.

Objection overruled. Defendant excepts.

A. There would be no difference in the manner in which the dam would be constructed if one of the major purpose of 1759 the Radford project in its function and operation was to provide navigation on the pool from the dam site to Allisonia, but there would be a difference in the method of operation. If navigation were to be maintained from the dam site to Allisonia, then the pool, under the circumstances, would have to be kept at or near the upper limit of its level, its maximum level.

By the Court:

Q. That simply means that if the pool were not kept at or near its upper limit, then nagivation would not be extended as far as Allisonia?

A. Exactly.

1760 Q. But take some point on the river nearer down, you would have a navigable pool to that point?

A. Yes, sir; you would have a project somewhat similar to the Tennessee River projects. And such projects as are employed on navigable rivers.

By Mr. Jackson. I move to strike out the last statement of the witness.

By Mr. Thompson:

Q. Have you ever been to the Buck dam?

A. Yes, I have.

Q. What would you say as to the length of the pool behind the dam?

A. It is about a mile and a half, possibly slightly over a mile and a half.

Q. Have you been to the Byllesby dam?

A. Yes, sir.

Q. What would you say as to the length of the pool behind the Byllesby dam?

A. It is something over 3¼ miles.

Q. Have you been to the Washington Mills dam?

A. Yes, sir.

Q. What is the length of the pool behind it?

A. About four miles, perhaps slightly more.

Q. State whether or not you have made any studies of the ferries that cross New River?

A. Yes, sir; I have. I have investigated the ferries on New River.

Q. How many ferries are there now operating on New River from Wilson Creek to its mouth?

By Mr. Jackson. I object to the question as irrelevant and immaterial.

Objection overruled. Defendant excepts.

By Mr. Thompson:

Q. Answer the question.

A. There are approximately 44 ferries, 33 of which were in operation in July, 1936, and eleven of which have operated as recently as 1935, but which had either ceased or suspended operation prior to July, 1936.

Q. What are the types of the boats that are used at these ferries?

1761 A. They are the customary river ferry boat, sizes about from 9 to 12 feet in width and about 28 to 62 feet in length.

Q. Have you got any idea of their draft when loaded?

A. That will depend on the amount of free board, the manner in which they are constructed, and as to their size. I should judge a fair average loading would be to a draft of about 12 to 14 inches.

Q. I hand you marked for identification Government Exhibit 201, and will ask you what that is?

A. It is a map showing existing ferries below the mouth of Wilson Creek on the New and Kanawha Rivers.

Q. State whether or not that map was prepared under your supervision?

A. It was.

Q. What indicates the ferries on the map?

A. The red rectangle.

By Mr. Thompson. We offer this Government Exhibit 201 in evidence.

By Mr. Jackson. Is it offered as any evidence of the location of the State line?

By Mr. Thompson. No, sir.

By Mr. Jackson. If not, we have no objection to it.

By Mr. Thompson. We are simply offering it to show where the ferries are on the river.

By Mr. Jackson. We object to the relevancy.

(Objection overruled. Defendant excepts.)

(Said map is here filed in evidence, and marked Government Exhibit 201.)

By Mr. Thompson:

Q. I hand you, marked for identification, Government Exhibit 202 and will ask you what that is?

A. It is a map showing the ferries in operation prior to 1935, as shown by records of the United States Geological Survey, below the mouth of Wilson Creek on New and Kanawha Rivers.

By Mr. Thompson. I now offer this Government Exhibit 202 in evidence.

By Mr. Jackson. I suppose it is not offered as any evidence of the location of the State line.

By Mr. Thompson. No, sir; it is just offered to show where the ferries are.

By Mr. Jackson. Then we simply object to its relevancy.

By Mr. THOMPSON:

Q. State whether or not the ferries which are indicated on these maps are all the ferries which have been used on this river?

By Mr. JACKSON. Since when?

By Mr. THOMPSON. At any time.

By Mr. JACKSON. I object to the competency of the witness to answer such a question.

(Objection overruled. Defendant excepts.)

A. No, sir, it is not all. The records I have examined, show all told, 57 ferries, including present and past ferries, have operated on the New River.

Q. And what records have you examined?

A. Records of the surveys made by the U. S. Geological Survey.

Q. Have there been any ferries in operation in what is known as the 50-mile stretch between Hinton, W. Va., and the mouth of New River?

A. Yes, sir.

Q. How many?

A. There were five ferries in this 50-mile stretch, in operation in 1911.

1762 Q. Where were they located?

A. There was the Bowyer's Ferry near Sewell, at Mile 18½, which is from the mouth of New River. There was a ferry at Beury at about mile 21½.

Q. Above the mouth of the river?

A. Yes. All mileages refer to the mouth of the river.

Q. Where was the next one?

A. I don't believe I mentioned the one at Sewell.

Q. Yes, you did.

A. The next one is Terry June, at approximately Mile 38. There is another one at Mill Creek at approximately Mile 42.

Q. What is the next one?

A. The next one is at Glade, at approximately Mile 44.

Q. Including those which you have just named and those which have been in operation, how many ferries have there been in operation on New River, all told?

A. All told, 57 ferries have operated according to the records of the U. S. Geological Survey, as I was able to note them or able to determine.

Q. Have you noted on the exhibit the times when these ferries have operated, I mean on Exhibit 202?

A. You mean the period?

Q. Yes, sir, the dates.

A. The ferries shown on Exhibit 202 on New River are those which have operated prior to 1935, including the ferries now in operation, the present ferries.

Q. And they show the dates, do they not, opposite the name of the ferry?

A. In several instances, or in a great many instances they do. Those are the dates when surveys were made, and the ferries were then in operation as of those dates.

Q. You mean by surveys, the U. S. Geological Survey?

1763 A. Yes, sir.

By Mr. JACKSON:

Q. You mean the topographic map, Mr. Johnson?

A. Yes, that is right.

By Mr. THOMPSON:

Q. State how many ferries on New River you have inspected, if any?

A. I visited the sites of 33 ferries, which are now operating, or most of the present existing ferries.

By Mr. JACKSON. If Your Honor please, I was not looking for any statement on these exhibits, but I notice on Exhibit 201, the Government has again followed the policy of stating conclusions, and I find this on the exhibit: To wit: "Many such ferries not operating were forced to suspend service because of damage to the boats caused by the floods and ice that occurred during the winter of 1935–36."

I move to strike that statement from the exhibit, as not being an appropriate legend to place upon the exhibit.

By the COURT. All right.

By Mr. THOMPSON:

Q. Where did you get that information from as to this statement on Exhibit 201, and which statement has just been read by Mr. Jackson?

A. I got that from the ferry owners and operators in most instances, and from inquiries at or near the sites of those ferries when I visited them.

Q. That is the result of your personal investigation?

A. Yes.

Q. What is the nature of the commerce that these ferries carry, if you know?

A. They transport passengers, vehicles, livestock, commerce, general merchandise, and other commerce.

By Mr. JACKSON. I move to strike out the statement of the witness that they transport commerce.

Objection overruled. Defendant excepts.

By Mr. THOMPSON:

Q. Now will you please look at Exhibit 201 and state to the Court what ferries there are located between Radford dam site and Allisonia?

A. There are five ferries now in operation between Allisonia and the Radford dam site.

Q. Just name them.

A. Just below Allisonia there is a ferry which is called the Allisonia Ferry. Then there is the Clark Ferry. Next is the Whitt ferry, then the Towes Ferry and then to Cecils ferry.

Q. Now what ferries have been in operation between the Radford project, that is, the dam site and Allisonia, that are not running now?

A. There was Eanes Ferry, Macks Ferry, Lowman and Linkous, which were recently discontinued, or as recently as 1935.

Q. What was the time of your inspection of these ferries?

1764 A. It was in July, July 3rd to 5th, inclusive.

Q. Of this year?

A. Yes, sir.

Q. What was the condition of the stream on New River as to flow?

A. It was at the customary summer low flow.

Q. Did you take any pictures or photographs of the river and the place where the ferries crossed?

A. During this trip of Ferry inspection, I had along with me a camera and one of the men in the party with me took photographs.

Q. I hand you an album of photographs marked for identification Government Exhibit 203 and will ask you to look at it and state whether you know what it is?

A. Yes, sir; it is an album showing photographs of ferries that were made at my direction, while I personally looked on, and I was in most of the photographs myself.

Q. Were all of these photographs taken in your presence?

A. Yes, sir; they were.

Q. And when were they taken?

A. They were taken during the period from July 3, to July 5th, inclusive, 1936.

By Mr. Thompson. I now desire to offer this Government Exhibit, marked for identification, 203, in evidence.

By Mr. Jackson. We desire to object unless the government will strike out the statement that appears in photograph No. 9.

By Mr. Thompson. If counsel will look at each one of the photographs and if there is any matters that they object to——

By Mr. Jackson. I just made a statement in regard to Photograph No. 9, and have objected to what appears on Photograph No. 9, as to when service was suspended and that they expect to resume the service soon. I did not state that at first, but I did object to what was on Photograph No. 9. You will see there that it states that service will be resumed as soon as a new ferry can be built. If such statements are stricken from the identification strip we will not object except as to its relevancy.

By Mr. **Thompson**. Is there any other statement on the pictures that you would like stricken out? That is the only one I see.

By Mr. **Jackson**, Just look at 29, 26, 14 and 12.

By Mr. **Thompson**. Any of that language in there where it explains the reason for suspending, I am perfectly willing that it be stricken out.

By Mr. **Jackson**. That is all right, then.

By Mr. **Thompson**:

Q. Now, Mr. Johnson, look at these photographs in this album, Government Exhibit 203, which we now file as Government Exhibit 203, and please state what the first one is on the first page?

A. The first one is the Meadow Creek Ferry, at about Mile 49.2 on New River.

Q. I will ask you, Mr. Johnson, whether all of these photographs were taken on this trip?

A. Yes, sir.

Q. So that goes to all of them?

A. Yes, sir.

Q. All right, what is the second one?

A. The second ferry is Sandstone Ferry, at about Mile 52.5 on New River.

1765 Q. Where is Sandstone Ferry located?

A. It is about 10 miles below Hinton.

Q. Is that in what is called the gorge?

A. It is just above the approach to the gorge. The ferry is shown on the opposite bank of the river in this picture. It is in the far background and may be seen.

Q. Now take the next page, No. 3A, what is that?

A. No. 3A is U. S. Engineers Ferry at about Mile 66, on the New River. The ferry is on the opposite side of the river and it is used for Government employees only. It is on the other side of the river near the site of the old Packs Ferry.

Q. Is that in the gorge?

A. It is not in the gorge. It is near the Bluestone Dam site.

Q. Now what is the next one?

A. Ferry #3, Haynes Ferry, at Mile 67.5 on the New River. The ferry in this instance is also tied up at the opposite bank of the river, in the background.

Q. Now take the next page?

A. No. 4, is Bull Falls Ferry at approximately Mile 74.1, on the Kanawha River.

Q. Is that above or below the falls?

A. It is just above the falls, but the falls may be seen from the ferry site.

Q. Now take the next one?

A. No. 5, is Shanklin Ferry, at Mile 82.9 on the New River.

Q. All right, take the next one?

A. McCoy Ferry, 126.2 on the New River—a motor propelled ferry.

Q. Did you see that ferry operated?

A. No, sir; I did not.

Q. What is the next one?

A. No. 8, is Whitethorne Ferry at about Mile 132.8, on New River.

Q. That is just a few miles below Radford, is it?

1766 A. Just a short distance, not a great distance below Radford.

Q. Now turn to the next page?

A. #9, Peppers Ferry at Mile 139.5 on New River.

Q. That is Ferry #9?

Q. Now, what is No. 10?

A. No. 10 is Dudley Ferry, Mile 144.5, just below Radford, or you might say at Radford. This was a passenger ferry only.

Q. Now take the next one, or No. 11?

A. Ingles Ferry, approximately at Mile 148.7, on the New River.

Q. Now take No. 12?

A. That is Cecils Ferry at approximately Mile 154.2, on the New River. The photograph shows an old boat now out of service which has been replaced by a new boat which was brought down from Lowman's Ferry.

Q. Now turn to the next page, or No. 12?

A. That again is Cecils Ferry at Mile 154.3, and this shows the boat now in operation.

No. 13, is Towe's Ferry, at mile 157.3.

No. 14, is Linkous Ferry, mile 158.6. The Ferry is shown on the opposite side of the river.

The next is No. 15, Whitt's Ferry, mile 159.9, New River.

Eanes Ferry, No. 17, mile 164.4; service suspended and cable removed.

No. 18, is Clark's Ferry, mile 170.7.

No. 19, is Allisonia Ferry, mile 173.6.

1767 No. 20 is Barren Springs Ferry, mile 177.7.

No. 22—Austinville Ferry, mile 189.2.

No. 23, Ivanhoe Ferry, mile 192.9.

No. 24, Fowler Ferry, mile 196.5; shoals below 400 feet down stream from ferry site.

No. 25 is Bower's Ferry, 199.2—a motor propelled ferry. I sat it in operation.

No. 25 again is Bower's Ferry, mile 199.2. The picture shows it in operation near midstream.

No. 26 is Dixon's Ferry site, mile 204.2. Service discontinued and has been since 1922; the head of Dickinson's shoals are shown in the background of the picture.

No. 27—Blair's Ferry, mile 205.4.

No. 30 is John Bowyer's Ferry, mile 221.2.

No. 31 is known as Henry Bowyer's or Mary Bowyer's Ferry, mile 224.6; the Appalachian Electric Company's gaging station is shown on the opposite bank.

No. 32 is A. R. Shaw's Ferry, mile 227.2.

No. 33 is Troy Cox's Ferry, mile 241.5.

No. 34 is S. E. Rose's Ferry, mile 244.

No. 35 is Preston Osborne's Ferry, mile 244.5.

No. 37 is Potato Creek's Ferry, mile 246.3.

No. 38 is Wheatley's Ferry, mile 250.

No. 39 is Opal Halsey's Ferry, mile 251.6. It is shown about to leave the bank to proceed across the river.

No. 40 is N. C. Halsey's Ferry, at approximately mile 252.

Q. In your trips up and down the river, have you seen boats in the river?

A. Yes, sir; a good many.

Q. What type of boats have you seen?

A. Mostly row boats; a few motor boats.

1768 Q. You say you saw them up and down the river. What stretches of the river would you indicate?

A. I saw numerous boats on all stretches above the gorge of New River, as far as I went—near the head waters.

Q. What type of people used these boats?

A. They were generally farmers, people who lived in the vicinity near the river.

Q. Where were the boats going so far as you could observe?

A. They were used for passage across the river and some were moving up and down on the river. It was my information—that the ferries were used to transport farm produce to a considerable extent and that they were used very frequently—the boats were, I will say——

Q. The boats were used for what?

A. To carry school children back and forth to school where the school happened to be was on the opposite side of the river.

By Mr. Jackson. We move to strike out as hearsay evidence his testimony with reference to the use of the boats.

The evidence not being struck, the Defendant excepted, to the ruling of the Court, for reasons stated.

By Mr. THOMPSON:

Q. Did you see school children in the boats?

A. No, sir; there were no schools in session at the time I was on the river.

The Defendant again renewed its motion to strike the evidence as being hearsay, which objection was overruled and the Defendant excepted, for reasons stated.

1769 Direct examination by Mr. THOMPSON:

Q. Have you ever been at the London pool?

A. Yes, sir.

Q. Do you know how far upstream that London pool produces a pool with a three-foot draw down?

A. For approximately to mile 92.

Q. Without it?

A. Shall I state my understanding of the question. The length of the London pool above this dam, when the pool has been drawn down three feet, will be approximately 9.2 miles, slack water will extend to about mile 92.

By Mr. JACKSON:

Q. The back water will extend that far?

A. Yes, sir, slack water.

By Mr. THOMPSON:

Q. If the three foot draw down is not used, how far upstream will there be a pool?

A. For eleven miles approximately upstream from the dam or to about mile 94 above the mouth of Kanawha River—in both cases I referred to the mouth of Kanawha River.

Q. You heard, you said, the testimony of Mr. Pierce here?

A. I did not.

Q. Did you read his testimony?

A. No, sir.

Q. Have you made a study of the United States Geological Survey records with respect to the flow of Kanawha River at Kanawha Falls in October 1930?

A. Yes, sir.

Q. State what the average flow at Lock No. 2 for the month of October was, in second-feet?

A. It was—the records of the United States Geological Survey show for the month of October 1930, the flow at that lock would average 1,143 cubic feet per second.

1770 Q. What was the corresponding flow at Radford Dam site from September 28th to October 28th, 1930?

A. It was 763 cubic feet per second—an average of 763 per second.

Q. How long do you estimate it takes water to travel from the site of the Radford Dam to Lock No. 2?

A. During periods of extremely low flow, such as has been indicated, I estimate about three days would be required for water to travel from the Radford Dam site to Lock No. 2.

Q. Assume that the Radford Dam site—assume it as being so constructed and in operation in 1930, and the stream flow at that point cut off from September 28th to October 28th, inclusive, what would be the flow in cubic feet per second entering Lock No. 2, for the corresponding period beginning and ending three days later?

A. Assuming the Radford project to have been in operation in 1930 and the stream flow cut off from September 28th to October 28th, inclusive, the flow at Lock No. 2 would have been about 465 C. F. S. per second.

Q. 465 cubic feet a second?

A. About 465 cubic feet a second would be the average.

Q. Did you figure any other item in there in making your subtraction from 1,143?

A. I did.

Q. What was that?

A. The flow from Little River was not the full amount to suffice to meet the requirements of the State of Virginia as to the flow passing down the river from that point.

Q. How far short did it fall?

A. About 85 C. F. S. short.

1771 Q. When you made this deduction, you also subtracted 85 C. F. S., did you?

A. From the flow at Radford, I believe 678 is the average flow which would have been impounded during that period behind the Radford dam, if Radford were required to release 85 C. F. S., to comply with the conditions of the Virginia State license.

By Mr. Jackson. We move to strike that answer from the evidence. It is not responsive to the question, and instead of going into the flow at Radford, the witness undertakes to give some other answer based on the hypothesis of a construction at Radford of the Radford plant and it is erroneous for him to attempt to construe the license of the State of Virginia; he is not competent to construe it and he cannot construe it.

The foregoing evidence was not struck from the record and the Defendant excepted for reasons stated.

By the Court:

Q. Where was 763 checked from—what gage station?

A. 763 was determined by proportionate drainage area based upon flows at the two gaging stations nearest to the dame site, one above at Allisonia and one below at Eggleston, and eliminating from the computation the drainage area of Little River, which is in the intervening drainage area beween the two gaging stations, and determining the flow at the Radford Dam site then upon the basis of the proportionate drainage areas and flows at these two gaging stations after having deducted from the Eggleston gaging station the flow and drainage area of Little River.

Q. The flow at Little River was eliminated in order to arrive at the figures 763 for the Radford Dam site?

A. Based on that, yes, sir.

Q. Well, now, the question is simply this: If you cut off 763 feet of water from New River, to see how much the flow is in Lock 2, if I am not mistaken, it is a matter of subtracting the amount to 380.

A. May I explain that, under the conditions of the Virginia State license, they may not cut off the full amount of 763?

Q. The question was, if they cut off the flow at Radford—I don't remember anything about the Virginia license, and I don't care about that.

1772 By Mr. **Thompson**:

Q. Without considering the Virginia license. He simply took—I asked him if the flow was cut off at Radford, what would be the result.

A. There would have resulted under the circumstances a flow of 550 cubic feet per second at Lock No. 2.

By the **Court**:

Q. How do you reach that figure?

A. By subtraction.

Q. Subtracting what?

A. Subtracting 763 from 1143.

By the **Court**:

Q. I get that to be 380.

A. Oh, yes; it was my mistake.

By Mr. **Thompson**:

Q. Do you know what the leakage measured by the Geological Survey at Lock No. 2 on the Kanawha River was, before the construction of the present London and Marmet Dams?

A. The leakage as measured in September 1917 at Dam Lock No. 2——

By Mr. **Jackson**. Are you reading from a book?

A. (Witness closes book in his hand.) I can give it to you without that.

By Mr. **Jackson**:

Q. Are you giving the statements from some books?

A. No, sir; it is simply from notes I have.

It was 500 cubic feet per second through the dam. That was the leakage determined by the United States Geological Survey. It is found on page 119 of the United States Geological Survey Water Supply Paper No. 503. And further answering the question—depending on which of the two gates were closed—the leakage through the lock varied from 110 to 260 cubic feet per second.

By Mr. JACKSON:

Q. That is for 1917?

A. For September 1917, and from these measurements allowing for lockage water or water required to maintain the pool at its highest level—Lock 2 is estimated 750 C. F. S.

Q. In 1917?

A. Yes, sir; in 1917 it would have been that.

By Mr. THOMPSON:

Q. Assuming the Radford project to have been constructed and in operation in 1930, during the 31 day period, from September 28th to October 28th, inclusive, of that year, and
1773 that they shut off all the flow at the dam site, state whether or not the average flow of 465 second feet, which has been determined, what, under the circumstances would have been the flow entering—I mean, correct that 465 to 380, which had been determined—would be determined under the circum-
1774 stances, to be the flow entering pool—entering the pool above Lock 2 for the month of October, corresponding to the shut off period at the Radford Dam site, would this have been sufficient to furnish capacity navigation operations at Lock 2.

By Mr. JACKSON. We object to that. We object to any testimony that he may give about lockage or leakage in 1917, which he read from Water Supply Paper, as to what the effect would be in 1930, and secondly, the question relates to the effect upon the pool above Lock No. 2, which in this case has been shown has been long since removed and has no bearing on any action to be taken by the Court in this case, and third, it deals with the question of maintaining the pools for navigable depths, because this witness is not competent to express an expert opinion on that matter.

By Mr. THOMPSON. We are going to talk about 1925 to 1927.

By Mr. JACKSON. You said 1930.

By Mr. THOMPSON. Assuming conditions June 1st, 1927, when the Commission made a ruling—the Federal Power Commission made this finding; supposing conditions exist where you had this runoff, what would be the result in the pools below? It is true the dam has gone out, but had not gone out in 1927.

By Mr. JACKSON. The question related to 1930.

By Mr. **Thompson**. The assumption was the condition of the river in 1930, so far as the dry season was concerned and we took figures already testified to.

By the **Court**. Your question was to this effect—supposing in 1930, the month you described, the month of October 1930, the flow of the stream at Radford Dam site was shut off.

By Mr. **Thompson**:

Yes, sir.

Q. What would be the effect on the pool then existing at No. 2 dam?

A. Yes, sir.

By the **Court**. He may answer the question.

The Defendant excepts to the ruling of the Court, for reasons heretofore stated.

By the **Witness**. Assuming that the Radford project had been constructed and in operation in 1930——

By Mr. **Jackson** (Interrupting.) I move to strike the answer so far as the witness has gone and that assumption that the Radford dam is in operation. The question is: Assuming the flow was cut off at the Radford Dam site.

By the **Court**. All right. Assume that the flow is cut off.

By Mr. **Thompson**. Read the question. (The question is read.)

A. It would have been short of the requirements necessary for navigation by the difference between 750 and 380, or approximately 370 cubic feet per second under the circumstances; and this: that is of the amount needed for leakage and lockage at Lock No. 2 and navigation would have had to be suspended until some means could have been found and applied for stopping or reducing the leakage.

Q. What was the flow at the Radford Dam site from October 3rd to 8th, inclusive, 1930?

A. The flow at the Radford Dam, from October 3rd to 8th, inclusive, was, 1930, was 696 cubic feet per second.

Q. What was the flow three days later at Lock No. 2?

A. It was 979 C. F. S., that is, October 6th to 11th, inclusive.

Q. What would have been the flow at Lock 2, if the Radford project had been cut off at that time?

A. That would have been the difference between 696 C. F. S. and 979 C. F. S., or 283 C. F. S.

Q. State whether or not the flow of 283 C. F. S., would have been sufficient water for six-foot navigation at Lock No. 2?. Or in the pool upstream?

By Mr. **Jackson**. We object to the competency of the witness to answer that question.

The objection was overruled and the Defendant excepts to the ruling of the Court for reasons stated.

A. No, sir.

1775 By the **COURT**:

Q. Hasn't it been testified to in this case that, taking account of the leakage and the amount of losses putting vessels through the locks, that it took somewhere around 700 cubic feet a second to maintain the level of pool No. 2?

A. It was determined by the United States Geological Survey in 1917 that the leakage through Dam No. 2 was 500 cubic feet per second and through the lock itself was from 110 to 260 cubic feet per second, depending upon which lock gate was closed and after adding the water required for lockage, it is estimated that it would require about 750 cubic feet per second to meet all demands of navigation.

By the **COURT**:

Q. What he asked was if it could be maintained on 280?

A. Yes, sir.

By Mr. **THOMPSON**:

That is the idea.

A. My answer was that it could not have been.

Counsel for the Defendant excepts to the ruling of the Court for reasons stated.

By the **COURT**:

Q. Do you know the leakage of London Dam?

A. Your Honor, I have the War Department estimate of some leakage through there, although it is admitted that all leakage has not been determined; therefore, the estimates given and used represent in all probability something lower than the actual leakage.

Q. Have you certain figures as to what the leakage is?

A. Yes, sir.

Q. Do you have them in mind without looking for it?

A. Yes, sir.

Q. Do you know the amount of loss in ordinary amount of navigation through the London Dam by the discharge in the lock?

A. I didn't understand your question.

Q. Do you know the amount of loss of lockage through the London Dam?

A. Yes, sir.

1776 Q. Mr. Johnson, have you made any study of what is known as the 308 Report, Exhibit 145?

A. Yes; I have.

Q. What is the maximum height, from that record, of the Bluestone pool?

A. The maximum height is 150 feet above the tail water elevation.

Q. What does the report state as to the uses for which this dam is to be used?

A. The report states that this was a report recommending the construction of the Bluestone Project before construction had been authorized and ordered, and it states on page 4, near the middle of paragraph 15 (the Chief of Engineer's Report), "That it is recommended the construction"—he is there referring to the report of the Board of Engineers for Rivers and Harbors, who had examined the District Engineer's report and recommendation and the Division engineer's report and recommendations on this
project. It recommends the construction of the Bluestone
1777 reservoir in the interest of flood control, navigation and
power production in accordance with plans prepared under the direction of the Chief of Engineers, and approved by him, at a total estimated cost of $12,942,000, provided a definite agreement is entered into before the construction is begun for the disposal of the power at prices and under conditions that, in the opinion of the Secretary of War, will fully protect the public interest.

Q. What is the gross capacity of this reservoir according to that?

A. The gross capacity of this reservoir, according to that, is 625,600 acre-feet.

By Mr. **Thompson**:

Q. What will be the capacity of this reservoir for flood control?

A. May I refer to my answer? 625,600 acre feet.

Q. That is what you had?

A. That is right.

Q. What will be the capacity of the reserve in this reservoir for flood control?

A. The capacity for flood control within the reservoir, that volume above a height of 120 feet or head in the reservoir [the capacity reserved for flood control], will be 235,500 acre-feet, approximately.

Mr. **Jackson**. Have you the page?

Witness. It does not definitely state this capacity. They give the capacity for specific elevations, but it is page 111 that we were on.

By Mr. **Thompson**:

Q. What are the uses to be made of the remaining storage capacity within the reservoir?

A. The next lower five feet below the bottom of the volume of reservoir reserved for flood control will have a capacity of 32,700 acre feet, and will be reserved for the reception of freshets. The next 50 feet lower, which goes down to a head of 66 feet, is known as draft storage capacity, and has a capacity of 235,300 acre feet. Below that, there will remain about 122,100 acre feet, if I recall correctly, of dead storage capacity, which is not usable.

1778 Q. From the sources of information to which you refer, from the Geological Survey reports, what is the lowest flow of record at the Bluestone dam site?

A. About 610 cubic feet per second. Should I refer to the page which gives this figure?

By Mr. THOMPSON:

Q. How far above Bluestone dam is the Radford project located?

A. As I recall it, about 90 miles. I will check myself on that figure.

Q. About 86 miles, isn't it?

A. 86 miles, yes.

Q. Mr. Johnson, have you ever made any study as to what effect the cutting off of the flow from the Radford project would have on the conditions under which the Bluestone operates, namely, allowing a minimum discharge of 2,000 second feet?

A. Yes; I have.

Q. In making this study, I desire to call attention at this time to Government Exhibit 97, and ask you if you have considered in your study a paragraph on page 5 of Government Exhibit 97, namely, the report of General Taylor, of December 29, 1925, which I read to you: "It may be assumed as a possibility that the plant"—may I interpolate the Radford plant,—"closes down completely for an indefinite period of time during a dry season and at times when the storage above the dam had been drawn down. In the combination of circumstances, all water from the drainage area above the dam would be shut off until the reservoir filled or until operations were resumed." Did you consider that statement in the preparation of your study?

A. Yes; I did.

Q. I also call your attention to paragraph 3, page 233, of plaintiff's Exhibit No. 156, which reads as follows: "That the construction and operation of the proposed dam"—by the 1779 way, your Honor, this is the license from the State of Virginia that I am reading from, "that the construction and operation of the proposed dam and power station shall be such that as at all times to prevent the unreasonable interference with stream flow and to minimize as far as practical and consistent with the reasonable use of the stream, interference, obstruction and impairment of the stream flow, and the licensee shall, unless a smaller quantity be hereafter authorized by this Commission, discharge not less than 25 cubic feet of water per second, and not less than a total of fifty million gallons of water in each 24-hour period, and not less than a total of one billion gallons of water in each weekly period, provided that whenever and so long as the amount of water in New River a mile immediately below the mouth of Little River shall be at least as much as would be produced at such point by the release at the dam of 25 cubic feet per second, and not less than a total of fifty million gallons of water in each 24-hour period, and not less than a total of one billion gallons of water in each weekly period, if there were no other source of supply, the licensee hereunder shall be relieved of the obligation and duty of releasing or discharging any water of any more than a sufficient quantity to constitute the minimum flow below the mouth of Little River that would be produced at the same point by a discharge of 25 cubic feet per second and not less than a total of fifty million gallons of water in each 24-hour period and not less than a total of one billion gallons of water in each weekly period at the dam if there were no other source of supply at all at the particular time." Did you take that into consideration in your study?

A. Yes.

Mr. **Jackson**. I object to the question as incompetent and immaterial. It can have no purpose whatever unless it is an attempt to ask his witness to construe the license of the State of Virginia. The only possible purpose counsel can have in asking that question whether he took that into consideration is to draw that question and the answer to it into a hypothetical question. I object to it as it is not the proper method of examining a witness on direct anyhow—whether he considers the terms of the Virginia State License.

Mr. **Thompson**. I asked if he took those two things into consideration in the study which he made.

Mr. **Jackson**. It is utterly irrelevant unless he is going to interpret the conditions of the Virginia License, and, if he is going to interpret the conditions of the Virginia License impliedly, without bringing it to the attention of the Court, it is obviously improper.

The **Court**. The Virginia license does not provide for the discharge of water at a minimum, but this question is whether or not, considering the effect of the shut-down on water supply at Radford, in the answer which he now proposes to make he took into consideration and made allowance for a minimum discharge, as allowed in the Virginia License?

Mr. **Thompson**. That is right.

The **Court**. I think that is admissible.

Mr. **Jackson**. We can see nothing more in it than a construction of the license. I do not want to argue the construction of that license at this time unless the Court desires it, but the construction of it is entirely different from what has been referred to in this case. I presumed the time to argue that would be when the Court hears argument on the case. I shall be sorry to see the witness interpreting the terms of that license and undertaking to give testimony that involves the interpretation of the license. I can think of no more dangerous way to try to interpret it than by a hypothetical question to the witness as to what effect would be produced on Bluestone by the operation of the Radford plan.

Mr. THOMPSON. Counsel is trying to anticipate what we are going to ask the witness.

The COURT:

Let me ask him this:

Q. The answer which you are about to give, what figure did you consider as being the discharge from the Radford dam?

A. For a dry season, I considered the figures that were permitted under the State License of Virginia.

Q. When you went to figure and knew you had to use definite figures, what definite figures did you use?

A. The figures I used were such that the discharges would be within the limitations provided by the Virginia State License, which were, whenever that and so long as the discharge from Little River just below the Radford dam site shall always exceed 25 cubic feet per second, and shall average 77 cubic feet a second for a twenty four hour period or average 221 C F S for a 7 day period, they could impound the entire flow of New River.

Q. I want to get back to the original question, the answer as to which has he taken those things into consideration.

Mr. JACKSON. I do not think he has answered that question.

The COURT. Yes, he has.

Mr. JACKSON. I did not so understand it.

NOTE.—The testimony was read.

The COURT. "What effect would the cutting off of the Radford dam have on Bluestone?"

Mr. THOMPSON. Yes, and I asked if he had taken into consideration two things which I have named.

The COURT. If he took into consideration those things?

Mr. THOMPSON. Yes, sir.

The COURT. I will let you ask him another question first.

Mr. THOMPSON. I will ask him to demonstrate this to this point.

Mr. JACKSON. Is my objection overruled, or is it held in abeyance?

Mr. THOMPSON. I want, first of all, by preliminary to incorporate the limits by which this study is going to be demonstrated.

1780 The **Court**:

What I want to know is, in arriving at the result of that study, you had to take into consideration some flow of water above Bluestone, either for that for which the Virginia License prescribed must be discharged from the Radford dam, or that coming from Little River. He must take into consideration some definite figures.

Witness. I did.

The **Court**. I want to know what figures you did take into consideration.

Witness. Your Honor, I took into consideration just what the actual flows were for the dry year of 1930, for the Little River, for the discharge passing Radford and all tributaries discharging water into the river above the Bluestone dam site. I took into consideration the actual flows that existed during 1930.

Mr. **Thompson**. We are taking a concrete case and applying it to an assumed case.

Mr. **Jackson**. We have no objection to any variety of assumptions that these gentlemen want to make as to flow of water, but we do have objection to questions that undertake to interpret the Virginia License.

Mr. **Thompson**. We are not trying to interpret the Virginia License.

Mr. **Jackson**. Wait a minute.

Mr. **Thompson**. But you repeated that four times.

Mr. **Jackson**. The hypothesis upon which the question depends should be stated, and those conditions to which counsel constantly refers are merely part of the conditions—to provide adequate water for stock and other things. You may have an immense amount of water, but the State of Virginia wanted to be sure that there would be always plenty of water. It is the particular conditions involved, and there are other conditions in the license. I cannot imagine that it would be helpful to the Court to ask this witness to interpret these conditions without stating the hypothesis upon which it depends.

The **Court**. If you read the answer over, he has taken certain figures which he has outlined, and I want to know what those figures are.

Witness. Do I understand your Honor that you are not clear on what the figures are?

The **Court**. You have not stated them. I heard you when you read them from the license.

Mr. **Thompson**. Does your Honor understand what the fifty million gallons of water means in basing a point in second feet?

The COURT. I don't know that I have it exactly

Mr. THOMPSON. Then I will ask this question.

Mr. JACKSON. Please note our exception.

1781 Q. What does 50,000,000 gallons of water equal passing a certain point in twenty-four hours?

A. It is approximately 77.36 c. f. s.

Q. And what does one billion gallons of water passing a certain point within seven days or a week equal?

A. Approximately 221 c. f. s.

Q. And when you are considering these figures you consider rather in second feet than in gallons, do you not?

A. Exactly so.

Q. Have you prepared a chart with respect to the study you have made?

A. I have.

Q. Have you got that chart here?

A. Yes, sir.

Q. I hand you, marked for Identification, Government Exhibit #204, which is entitled "Illustrating how the Radford project could affect operating results of the Bluestone development," and I will ask you what that is?

A. This is a diagram which was prepared at my direction to illustrate how the Radford project could affect operating results at the Bluestone development.

(Exhibit 204 offered in evidence over defendant's objection that said exhibit should not be admitted until after proof as to the nature of the exhibit had been adduced.)

Q. Will you please tell us what there is on that chart up in the upper right hand corner?

A. In the upper right-hand corner are listed, or tabulated, the principal features, the important features, physical features, of the Bluestone project.

Q. What is down in the right-hand corner, the middle?

A. The principal features, the important physical features, of the Radford project of the Appalachian Electric Power Company.

Q. What is the river that is indicated there?

1782 A. On the map there is a river shown in map plan, which shows at or near the upper right-hand end, the Radford dam site, with its reservoir extending upstream approximately to Allisonia.

In the lower downstream end toward the left is shown the dam site of the Bluestone project, and behind that its reservoir. The reservoirs are colored in green on the map.

A. And what is the scale of the map?

A. The scale is as shown. I forget just what it is, but it speaks for itself.

Q. You have here on the left-hand side "Log of Operations"—will you read what that states?

A. "Log of Operations—Based upon actual river flow records for the period of June 24 to December 6, inclusive, 1930, when the flow of the New River at the Bluestone dam site averaged less than 2049 C. F. S. for each consecutive week."

Q. Will you please tell the Court what these colors mean on this chart?

A. Referring to the profile——[interrupted].

Q. That is the Bluestone——

A. (Continuing.) We will see we have the Radford reservoir shown in profile, then the line that connects the Radford reservoir with the reservoir below and to the left, which is the Bluestone reservoir section, colored in green, getting back to the Radford reservoir represents 27 feet of usable draft storage capacity for that reservoir.

The section of reservoir colored in blue represents dead storage capacity, which is not usable.

In the Bluestone reservoir, that not colored, the upper 30 feet, is reserved for flood control, and the next lower 5 feet, which is also not colored is a space reserved for reception of freshets.

1783 Q. What is the green?

A. The green is the next 49 feet, shown in green, usable draft storage, and that below in blue is dead storage capacity which is not usable.

Q. In these reservoir representations you have here, as I understand it, the white represents that which is reserved for flood control in the Bluestone, and the green represents the usable storage, and the blue represents the dead storage, is that correct?

A. The blue represents dead storage which is not usable.

Q. Under the "Log of Operations" there are first of all the Radford dam site represented on the right hand side and the Bluestone on the left hand side, and your colors there, the empty part is represented by white, is that correct?

A. That is right.

Q. And when it is full that is represented by blue or green?

A. Green, the part represented in green is shown as water.

Q. Now the blue is dead storage in each instance, is that correct?

A. That is right.

Q. Will you take this illustration and explain to the Court what the effect of the Radford project would be under the conditions you have set forth there, on the operations at the Bluestone project?

A. The year 1930 was a dry year. The flows very early in 1930 above the Radford dam site fell below and considerably below the average annual flows, so that by June 23rd there had been a considerable period of drought already, and of low flow in that river.

Q. May I interrupt to ask if you are assuming at this period and the dates that are on here the Radford project and the Bluestone were constructed and operating?

A. I am assuming they were constructed and operating for by the laws of probability a similar dry year will occur.

1784 Q. Proceed.

A. If the Radford project had been operating as it normally would, namely to drawn down its usable draft storage in dry periods, by June 23rd it could easily have exhausted its reservoir capacity, and the probabilities are very convincing it would have, because the flow beginning as early as in April was far below the normal.

Q. What do you mean by the normal?

A. The average annual flow.

Q. 3,200 feet approximately?

A. Yes, sir.

Q. Proceed.

A. So that I am abundantly justified and can justify the statement, or basic assumption, made here on June 23rd the Radford reservoir will have been emptied of its usable storage, and that beginning June 24th it would close the gates to refill. So we take June 23rd the Radford reservoir is emptied of its draft storage and the Bluestone reservoir on that date is full to the upper limit of its draft storage capacity. The operations of the Bluestone, under a proper rule of operation, based upon the records of the river, in which large or great weight is given to the dry year of 1930, in fact it is actually based upon the record of 1930, would not have begun to draw water down until the flow of the river dropped below, or approximately below, the 2,000 cubic feet per second, and from June 24th to August 24th, inclusive, for sixty-two days, the Radford reservoir, would have been refilling, the Bluestone reservoir would have been releasing 2,049 cubic feet per second.

Q. Why do you say that 2,049 cubic feet per second?

A. It so happens the Bluestone could have regulated to that minimum flow instead of exactly 2,000 cubic feet per second, using its usable draft storage, plus the natural flow into

1785 the Bluestone, if it had not been interfered with.

The average flow entering the Radford reservoir was about 881 cubic feet per second for this sixty-two day period, and the average discharge from Radford reservoir was about 69 cubic feet per second.

This, your Honor, was to comply with the conditions of the Virginia state license.

During that period the Little River fell 68 cubic feet per second short of the weekly requirements of 221 cubic feet per second.

The average flow entering the Bluestone reservoir was about 460 cubic feet per second.

On August 24th the Radford reservoir was full and ready to begin its draw-down.

The draft storage in the Bluestone reservoir at that time was about, or would have been, about 48,000—48,204 acre feet, indicated by the green space.

August 25th to September 16th, inclusive, twenty-three days, the average discharge from the Radford reservoir was 3,008 cubic feet per second.

The discharge from the Bluestone reservoir was 2,049 cubic feet per second.

Average flow entering Radford reservoir for this period about 818 c. f. s.

Average flow entering the Bluestone reservoir about 3,500 c. f. s.

On September 16th the Radford reservoir has again been emptied and ready to begin refilling.

Q. May I interrupt you there? The Radford reservoir all that time would be discharging that figure you gave above, about 3,008 second-feet?

A. That is right.

Q. Proceed.

1786 By the Court:

Where do you get that figure 3,008 cubic feet per second?

A. Your Honor, I took that figure, assumed that figure, that was approximately 30% load factor for the Radford project. I assumed the Radford project would be operating on a 30% load factor, which would result in 3,008 cubic feet per second, approximately.

By the Court:

What do you mean by 30% load factor?

A. For approximately 30% of the time it could operate its wheels at a discharge of 9,000 cubic feet per second.

By the Court:

You mean they would be operating at a rate which represented about 30% of that full hydraulic capacity?

A. Approximately that, something of that sort. I don't remember exactly. And I assumed the same would have emptied the Radford reservoir before the beginning of the period when the Bluestone would have been required to have begun releasing to regulate the flow to 2,000 cubic feet per second, that is before June 23rd.

On September 16th the Radford reservoir emptied and was ready to begin refilling.

The draft storage in the Bluestone reservoir, that is remaining draft storage, about 115,020 acre feet.

September 17th to October 21st, inclusive, thirty-five days, Radford reservoir refilling, Bluestone releasing water, at the rate of 2,049 cubic feet per second.

Average flow entering Radford reservoir about 830 cubic feet per second.

Average discharge from Radford reservoir about 82 cubic feet per second.

Average flow entering Bluestone reservoir about 394 c. f. s.

October 21st the Bluestone reservoir has now become emptied of draft storage.

1787 The draft storage in the Radford reservoir about 52,350 acre feet.

October 22nd to November 16th, inclusive, twenty-six days, the Radford project continues impounding water, the average discharge from the Radford reservoir during this period is about 34 cubic feet per second.

The Bluestone is compelled to reduce discharge from 2,049 cubic feet per second to a quantity equal to the flow into the Bluestone reservoir, which for the remaining twenty-six day period required to complete the refilling of the Radford reservoir averaged only about 409 cubic feet per second.

If there had been no impounding of water in the Radford reservoir the Bluestone reservoir on October 21st would have had about 52,350 acre feet of draft storage remaining, which would have enabled it to continue the constant release of 2,049 c. f. s. up to and including December 6th. At December 6th the natural flow of the river at the Bluestone Dam site was increased to an average in excess of 2,049 cubic feet per second, by the rain fall which terminated the drought.

By the COURT:

Q. If on October 21st there had been no impounding of water in the Radford reservoir and the Bluestone had about 52,350 acre feet of draft storage remaining, you say that this would have enabled it to continue the constant release of 2,049 cubic feet per second up to and including December 6th. But 52,350 acre feet vouldn't permit the discharge of over 2,000 cubic feet per second rom October 21st to December 6th, would it?

A. That would have been supplemented by the natural flow into he Bluestone reservoir, which would have enabled the Bluestone o continue its regulated discharge of 2,049 cubic feet per second.

788 By the COURT:

Q. Been supplemented by only 409 cubic feet per second, ccording to your own figure there. 52,350 acre feet of water unning off at the rate of over 2,000 cubic feet per second would mpty in about two weeks. You are supplementing that by less han 20% increase.

A. There would have been a larger amount, this, I believe was he flow into——[interrupted].

Q. I was thinking you said Bluestone was compelled to reduce ts discharge from 52,350 to a quantity equal to a flow into the luestone reservoir, which for the twenty-six day period averaged bout 409 cubic feet per second.

A. Your Honor, I should have explained that in addition to he 409 cubic feet per second that was contributed by the drainge area below the Radford dam site while the Radford dam was npounding (interrupted).

Q Vell that 409——

A. There was a much larger amount flowing.

Q. 409 added to your 52,350 acre feet looks to me like that would n you down in less than three weeks.

A. You must add more than 409, you must add that which is owing into the Radford reservoir also, there was a flow into the adford reservoir at the same time, which would have been vailable to the Bluestone.

Q. Which was about what?

A. About 954 cubic feet per second, your Honor, at Radford.

By Mr. THOMPSON:

Q. Now, Mr. Johnson, what effect would such a reduction on the ow from the Bluestone reservoir have on conditions down below, the Kanawha River?

By Mr. JACKSON. What kind of conditions?

By Mr. THOMPSON. You don't want me to say navigation, you ave got me scared on that, but I will say navigable conditions if ou wish it.

By Mr. JACKSON. I object to the competency of the witness to swer the question.

Objection overruled. Defendant excepts.

A. It would increase—one minute, may I ask that the question read.

By Mr. **Thompson**. Read the question. [Question read.]

By Mr. **Thompson**. Answer the question—navigable conditions?

A. It would be insufficient to meet the requirements for navigation on New River.

Q. On the New River; I said on the Kanawha River? What would be the reduction in flow from what the Bluestone was under such conditions flowing or discharging?

1789 A. From 2,049 to a figure of 409.

Q. What is that difference?

A. A reduction of 1,640 cubic feet per second.

Q. And you have testified as to the effect on navigation below?

A. I have testified——

By Mr. **Jackson**. We object to the competency of the witness if he is going to testify any further in regard to navigation.

Objection overruled. Defendant excepts.

A. That it might have an adverse effect on navigation below.

Q. And by "below" what do you mean?

A. All the way down the New River, and possibly in the Kanawha River, and possibly it might affect navigable conditions in the Ohio River.

Q. Mr. Johnson, I believe you gave your figure, 2,049, did you not?

A. Yes, sir.

Q. After the subtraction what would be the reduction in flow?

A. I think I stated 1,640.

Q. What effect would such reduction during periods that you have described, due to the cutting off of the Radford project, have upon production of prime power at the Bluestone reservoir?

By Mr. **Jackson**. Your Honor understands that we are objecting to this evidence for reasons heretofore stated.

By the **Court**:

I understand, but I am letting it in for the present.

A. It would have a very profound effect, it would reduce the primary power by the amount of reduction in flow, approximately.

Q. In percentage what would it reduce it?

A. It would reduce it approximately 80 per cent.

By the **Court**:

Q. I notice in making up this chart of yours you started on June 23rd. Why was that the date on which you started?

A. On June 23rd the natural flow at the Bluestone project fell to from above 2,049 you see to below the 2,049, and that was the date that the Bluestone had to begin its regulation.

Q. What was the flow at Radford, at that time, do you know?

A. Just at the moment I cannot recall from memory, but I can look it up.

1790 Q. I wondered why you started on that date with the Radford dam empty?

A. There had been a dry period, as dry as occurred in a number of years before June 23rd, certainly dry enough or as dry as there is, for justification for the premise, in view of General Taylor's letter, that they would have exhausted their useable provided storage by that time.

Q. It was not any more dry than the pool at Bluestone, was it?

A. Bluestone would operate under a very definite rule curve, and that rule curve is that the water will be released, and when released they will begin the use of the provided storage capacity until or when the flow falls below 2,049 or 2,000 cubic feet per second, predetermines the amount to which the river is to be regulated.

Q. On June 23, it had not fallen below that?

A. No, sir.

Q. Why did it fall so much below at Radford?

A. At Radford they have a relatively larger installed capacity and will have at that time, so that making use of only one-third of their daily possible capacity, which would be to operate the machine three times as long as I have assumed they did, they still would have to discharge all of that draft storage in addition to the water flowing into their reservoir prior to June 23rd, they would only have had to use approximately one-third of their continuous capacity to have accomplished that.

Q. How low does the flow of the stream have to get before the Radford dam begins to lower its pool level?

A. I assume that the Radford dam would lower their water whenever the stream flow is such that it does not suffice to meet their customary power demands.

Q. And that is going to be what figure, or what figure did you take for that?

1791 A. What the exact demands are, it is assumed their demands will be approximately one-third of their full daily generating capacity, I would say that as a fair figure.

Q. Then you assume that the Radford pool starts to lower whenever the flow in the Radford Dam got below 3,000 feet?

A. Exactly so, the average annual flow. I might explain that. The average annual flow into the Radford reservoir is in excess of 3,000 cubic feet per second, so that if they were continuously operated and drawing 3,000 cubic feet per second, or approximately that, it would not very often occur that they would ever reach the bottom of their useable draft, because before they had gone that far rains would have ordinarily come along to replenish it or refill the reservoir, but in the instance such as we have taken for the year 1930, and for exceptionally dry years, that rule would be broken, that is, when they go to that 27 feet of draft then obviously the only thing to do, or there would be such a small trickle of water passing that there would be very little power, something like 1,880 cubic feet per second, would be generated at this greatly reduced head, and it would compel them to make use of some auxiliary power to supply that needed, it may be some retired steam capacity, or some steam capacity that is not very efficient to use, that has aged a good deal, that is held as a reserve capacity, or it might be they would get it elsewhere within their system. That, I do not know, but it would be better for them to do so and close their reservoir after having exhausted this draft storage in the midst of a very long dry season, to refill, because in doing so, they would generate more power from that reservoir. Of course, it would not be good economics to continue to operate at the very low level they have drawn it down to, that is determined by their lowest level after the 27-foot draw-down, and with a very small stream flow coming in. If they filled the reservoir of course they get the benefit of a high head, and then they could close down their steam plant, and use that after filling the reservoir, with the probability 1792 that before that was exhausted they would not have to start their steam plant again, and the difference between continuously operating, that is, just as a matter of power, they could generate, and the filling of the reservoir or just one reservoir filling alone, if you evaluate at four mills—Let us see what that would amount to—that would be something over, as I roughly estimated, $5,000, and that would be, in addition to other reasons, an incentive to fill it.

Cross-examination by Mr. Jackson:

Q. Mr. Johnson, you testified that in your opinion the lag between the Radford dam site and Kanawha Falls at low water is about three days?

A. Yes, sir; with very low water.

Q. And you were referred to a date?

A. One moment—perhaps I did not get the question. The Radford dam site to what—Kanawha Falls?

Q. Yes; that is my understanding.

A. Yes, sir; or to Kanawha Falls; it is an approximate figure; as a matter of fact, between two or three.

Q. You said three days; do you change that?

A. Yes, sir; I say three is the proper figure. Closer to three days. I think that is the proper figure to use.

Q. You were referred to a date in October 1930 when you say that the Water Supply papers show at Kanawha Falls an average flow that day of 1,143 second-feet?

A. Yes, sir.

Q. And you gave a corresponding flow at the Radford dam site of 763 second-feet. Isn't it a fact that the flow of 763 second-feet at the Radford dam site occurred only two days before the reading at Kanawha Falls?

A. No; it is my information that it occurred three days.

By Mr. Thompson. Now, Mr. Johnson, I ask you whether it is possible to develop navigation in the 50 miles or more that is covered by the distance between Hinton and Kanawha Falls, of the type as described by Chief Justice Marshall.

By Mr. Jackson. I object to the form of the question, as entirely an improper form on direct examination, to read a volume to a witness and ask him whether he agrees with it, or what comments he wishes to make upon it.

By Mr. Thompson. I didn't ask him if he agreed to it.

By Mr. Jackson. I object further to the competency of the witness to answer any question respecting the improvement of navigation.

I object to the question because it is entirely irrelevant and immaterial. I think it is highly improper to have this witness commenting upon these documents that are before the Court, and particularly to have him construing them and laying down possible methods of navigation.

By the Court. I think it is largely immaterial. All this witness, if he knows, can say, is that you could do what Chief Justice Marshall said you could do.

By Mr. Jackson. Of course, I don't know what the witness is going to say and I have to make my objections now.

By the Court. What you mean is, this witness having been through the river, did he say anything to cause him to think that Chief Justice Marshall did not know what he was talking about. That is about it, is it not?

By Mr. Thompson:

I have a step further to go in urging this testimony, and I want to ask the witness if that was feasible normally for that time being?

A. It was.

Q. You would not recommend it at this time, would you?

By Mr. Jackson. I object to the competency of the witness and the immateriality of it.

A. No, sir.

(Objection overruled. Defendant excepts.)

By Mr. Thompson:

Q. Now I believe you said you have read and studied the Moore-Briggs Report to the Board of Public Works of the Commonwealth of Virginia?

A. Yes, sir.

Q. How far does that survey go up New River, if you remember?

A. It extended to the mouth of Sinking Creek, up to Sinking Creek a distance of 54 miles above the mouth of Greenbrier.

Q. Have you the figures and items set forth in the pages of that report?

A. Yes, sir.

Q. What would you say as to the feasibility or non-feasibility of the proposed improvement of navigation set forth in that report covering the stretch between Sinking Creek and Kanawha Falls?

By Mr. Jackson. I certainly object to that question.

By the Court:

What does that report set forth?

A. It sets forth the whole engineering system in great detail as to how to make that river navigable so far as their times were concerned.

By Mr. Jackson. I object to the competency of the witness to speak on that question and the materiality of the evidence.

By the Court. He may be competent to testify whether an engineer feels it was possible of accomplishment. The reason I asked what was in the report was, it suggests the construction of certain locks or dams. From an engineering standpoint alone he wants to know if the improvements suggested are feasible.

By Mr. Jackson. Of course, my objection is to the competency of the witness to testify in regard to any purported method of improving the river for navigation.

By the Court:

He is an engineer and he may be able to testify in regard to it.

Defendant excepts.

A. It is my opinion, that the proposed project for which Moore and Briggs submitted estimates was entirely feasible.

Q. You would not advocate that system at this time, would you.

A. I would not advocate the improvements, employing the same identical system at this time. Nowadays, we would use much more modern machinery, much more improved methods of improvement of waterways, making it serve more than just one purpose, navigation alone. We would incorporate in the improvement that of flood control and power along with navigation. By so doing the pools of the river would create slack water, and rather than rely upon open river navigation, improvements, just for open river navigation alone, which would enable ships of decidedly heavier tonnage, barges as well, to pass much more rapidly up and down the river, or navigate the river much more rapidly, and at very much more lower cost, than would be possible in the open river or sluice navigation, which was contemplated by Moore and Briggs and Chief Justice Marshall.

By Mr. JACKSON. I move to strike out so much of the answer as purports to tell what you could do or what you might do, or what might happen in the way of surveying a navigation picture on the ground that the witness is wholly incompetent to testify on that subject.

By the COURT. He has testified to what the customary method of improvements is now.

Defendant excepts.

By Mr. THOMPSON. I desire to say at this point that in referring to the Moore-Briggs Report, it is Government Exhibit 32, and is already in evidence.

By the COURT. You have asked the witness if the matters in the Moore and Briggs Report and in the report of Chief Justice Marshall were not such matters as he would recommend at the present time, and he said no. Now from the standpoint of navigation, pure and simple, taking nothing else into consideration, do you, Mr. Johnson, believe that the improvement of New River, above its mouth, the expenditure of money in the attempt to make that a canalized navigable stream, would be justified, purely from the standpoint of commerce, to be borne on that stream.

By Mr. THOMPSON. Do you mean all the way up the river to Hinton and then by the James River and Kanawha Canal?

By the COURT. I am talking about up this river, not about the James River, or the Kanawha Canal,

By the WITNESS. Let me ask Your Honor if you mean to do that for navigation alone?

By the COURT:

Absolutely for navigation alone.

A. You would exclude production of any power in doing so?

Q. Yes, sir.

A. Would you exclude flood control, too?

Q. Yes—eliminating any question of flood control—and you approach it from this point of view, take the river from its mouth up, we will say to Allisonia. Now considering the practicability and potentiality of that stream as an avenue of Commerce, and nothing but from that standpoint, as an avenue of commerce, do you think the improvement of it by a series of dams and locks would be justified?

A. Your Honor, if a sufficiently large tonnage were assured, it would be justified, just as a commerce carrier.

Q. Of course it would if a sufficiently large tonnage of commerce was secured.

A. I mean to say it could be shown, I feel quite confident of this, although I am expressing my opinion, and giving you my opinion, I have not the computations to entirely justify what I am saying, but it is my opinion, if there were sufficient commerce, say up to a maximum of thirty million tons per year, which would be in excess of the normal capacity of any railroad that I know of——

Q. One minute, do you know where that commerce would originate on New River?

A. In the form of coal perhaps. There is an immense amount of coal, and possibly in the form of some other ore, as I understand there are some valuable ores in that territory.

Q. Where is that coal above Radford?

A. There may not be coal just above Radford, but there might be hidden the transport of coal possibly, not very far below Radford, and below Hinton.

Q. I am not going to get into any discussion as to the possibility of sending thirty million tons of coal down the river, but the reason I was asking you the question was, because you stated in answer to a question from Mr. Thompson, that you would not recommend certain things at this time and day, leaving the impression that you might recommend a development by other ways of navigation at this time. As I understand this 308 Report of the Chief of Engineers he states very clearly that the Kanawha River and its tributaries have no potential value for purposes of navigation, at least that is what I understood him to say. I want to know if you agree with that?

A. I do not agree with that.

By Mr. Thompson. Your Honor, are you sure you have read that correctly, the 308 Report of Major General Markham's Report there?

By the Court. Where is that?

By Mr. Thompson. That is on page 11.

By the Court. "Because of their unfavorable natural characteristics (steep slope and tortuous alignment) none of the tributaries of Kanawha River offer potentialities for development in the interest of modern navigation". I just wanted to know whether the witness agrees with that.

By Mr. Thompson. Isn't that a report of a subordinate? You will find that Major General Markham's Report overrides the report of subordinates in most every instance.

By the Court:

That is a letter from Col. Spaulding to the Chief of Engineers. I don't know whether the chief agreed with that or not. I hapned to notice that statement in there, and I wanted to know if s witness agreed to it.

A. Your Honor, I do not agree with that statement.

Q. Is that all, Mr. Thompson?

By Mr. **Thompson**. We reserve the right to recall him on the er matter we discussed.

By Mr. **Jackson**. Mr. Johnson, you testified from—that from ptember, 1934, to July 1st, 1936, you were a special assistant to Attorney General of the Department of Justice of the United tes?

A. That is right.

Q. Are you—you are not a lawyer, are you?

A. No, sir.

Q. Is it not a fact that you were merely a special investigator the Department of Justice during that period? Is that right?

A. I was an engineer with that designation.

Q. You carried an appointment with the Department of Justice Special Assistant to the Attorney General? Is that correct?

A. Yes, sir; that is right.

Q. And you devoted all of your time to working on those two suits that you mentioned?

A. Yes, sir.

Q. Mr. Johnson, I think you said you operated the power sta- n at Wilson dam for a while; is that right?

A. That is right.

Q. You were Superintendent, were you?

A. I was Assistant Superintendent and in the absence of the perintendent, I was in charge.

Q. Who was in charge as Superintendent?

A. While I was there at Wilson dam, a Mr. N. B. Ambler was perintendent.

Q. And he was under the officer of the Corps of Engineers of United States Army, who had responsible charge of that?

A. That is right, yes, sir.

Q. What was the maximum draw down on the pool at Wilson n for power purposes, when you were there?

A. It was nothing.

Q. It was nothing?

A. Nothing.

Q. Did you ever operate a hydro-electric reservoir plant, utiliz- a substantial amount of storage for draw down during low er season?

A. Yes, sir.

Q. Where?

A. The Dneiprostroy project in Russia on the Dneiper River.

Q. You are now going to be Manager of the Water Works Division?

A. No, I am manager of the Distribution system in the City of Florence, extending beyond into the surrounding area of Florence—Alabama.

Q. You testified on direct examination that you had observed a number of dams on New River, notably the Washington Mills dam, the Fries dam, Buck and Billesby, Hawks' Nest and Glen Ferries and perhaps others?

A. Whether or not I testified to exactly those that you mentioned, I can testify that I have.

Q. You could do that?

A. Yes, sir.

Q. Is there a Lock in any of these dams?

A. There is not.

Q. Now, Mr. Johnson, you offered in evidence here some charts bearing the designation "Preliminary Study, New River, Bluestone reservoir Project," marked Exhibits 200, 200-a and 200-b. Can you state whether or not Exhibit 200 and Exhibit 200-a are alternative preliminary studies for a Log Chute—a method of passing logs?

A. It is my opinion they are.

Q. Did you notice on Exhibit 200, for instance, the dotted lines bearing the legend "Future Flumes" and then on the left hand side, other dotted lines structures which bear the legend "Future work shown dotted" and below that different structures with the legend "Present work shown solid"?

A. I have the Exhibit before me and I will not ask you to repeat all, but if you will repeat the number of the Exhibits to which you——

Q. I referred only to No. 200.

A. And your question is?

Q. You see this, do you [indicating]?

A. I do.

Q. Isn't it a fact that the structures shown solid, indicate work that would be done at the time of construction, if this preliminary study were adopted and followed out, and the dotted and dashed lines indicate suggested possible construction at a later date?

A. Mr. Jackson, that is right, but this has to be done in order to reserve the space and to reserve within the facilities the possibilities of working these in later so that they will not—that other structures and devices will not encroach on the space reserved for this in the future.

Q. It is to make it possible to add these facilities at a future date, subsequent to the construction of the main project, with the minimum of expense, if desired?

A. It is so that, if desired, in building the plant, that they will not be precluded in the possibility of other installation. As a matter of fact, Mr. Jackson, I notice here that there will be some of these facilities installed at the time the dam is built, according to this drawing. [Indicating.]

Q. We are agreed that the dashed and dotted structures are future construction that may be constructed in the future, when and if needed?

A. It is that part shown dotted.

Q. And dashes?

A. Yes, sir; but that does not include the navigation facilities.

Q. Did you understand me to say anything about that?

A. I wanted it clear that I would understand it.

Q. I wondered if that was your only reason for volunteering that statement. Turn to Exhibit No. 200-a, which shows certain diagrams with reference to Pivoted Flumes and Log Cranes, and I will ask you whether or not it is also true in that drawing, that the dotted and dashed structures indicate merely provision for structures that may or may not be built at some future date, and the solid lines indicate structures to be built when and as the project is constructed, if this preliminary study should be adopted and followed out?

A. These structures shown dotted, according to this drawing, are for future construction, according to this drawing, which we know to be a preliminary drawing.

Q. I understand that it is nothing more than that. Now, I direct your attention to Exhibit 200-b—another sheet—preliminary study, which has some drawings on it in connection with Barge Lifts, and I ask you whether or not, similarly on that sheet, structures shown in dotted and dashed lines, indicate structures which may or may not be built at some future date, depending when, if at all, they shall be considered desirable, and the solid lines indicate those structures which would be built when the project is constructed, if this preliminary study is adopted?

A. That is right. It so states on the drawing. It does not state "if and when," but it states that this is for future installation. We assume when needed and provision is made for this installation.

Q. You also testified that, according to Government exhibit No. 145, the Bluestone reservoir would create a slack water pool for a distance of 36 miles upstream from the dam: Isn't it a fact that that condition could only obtain when, if and to the extent that the entire flood storage surcharge capacity of the reservoir—that is, the upper thirty feet reserved for flood control, should be entirely filled?

A. That will obtain when it is entirely filled.

Q. And only when it is entirely filled; is that right?

A. Substantially only when it is somewhere near that. I am not exact on the mileage, and neither will I be exact as to say it has to be entirely at the maximum upper elevation of this pool.

Q. You can be as exact as you were on direct examination—36 miles, can't you?

A. Did I say 36 or approximately 36?

Q. Well, whatever you said. Now, am I right in understanding that when and if the Bluestone project should be drawn down, so as to utilize the utilizable storage for power purposes, the maximum drawdown will leave a head of 66 feet? Is that right?

A. This project as—while it has no final determination of that—so far as I know, it has not been definitely made—the best information that the War Department say—that they can get at this time, is that the turbines have not been ordered and the characteristics have not been sufficiently determined to say with absolute positiveness, but it is understood that will be the lower limit of draught.

Q. You know, from your study of Government Exhibit No. 145 that the plans set forth there provide for a maximum drawdown, leaving a head of 66 feet, don't you?

A. Yes, sir.

By the COURT. At Bluestone?

By Mr. JACKSON:

Yes, sir.

Q. And that is necessary in order to get a regulated flow of 2,000 second-feet in low water season?

A. You get approximately that. Something slightly over that.

Q. If the Bluestone reservoir were drawn down to a head of 66 feet, the pool elevation would be 1,436, wouldn't it?

A. Yes, sir.

Q. And did you estimate how many miles upstream from the dam that elevation would provide a slack water pool?

A. Why, I can do that.

Q. Did you?

A. I have done that; I don't know that I testified to that.

Q. I do not suggest that you did. I noticed that you omitted it.

By the COURT. What is the number of this Exhibit?

By Mr. JACKSON. That was introduced generally by Mr. Winn and Colonel Watkins vouched for the placing of the pool levels on that exhibit and for the top of the flood storage for Blue-

and for the top of the utilizable storage, but he drew a line how that if there was a maximum drawdown, the elevation he pool would be 1,436.

y the Court. I was going by the coloring.

y Mr. Jackson. I have that on the one here.

y Mr. Thompson. He said it was drawn as you stated it.

y Mr. Jackson. He drew it to 1436.

y Mr. Thompson. He said he drew it as you suggested.

y Mr. Jackson. He said it was 1436.

y the Witness. Mr. Jackson, I do not have it sufficiently accu- —well, I do have—may I refer to the profile?

y Mr. Jackson. Here is one [indicating].

Witness goes to map on pedestal in Court room and figures.)

y Mr. Jackson. Your Honor asked for the number of the bit. It is No. 120—it is the one that shows the profile colored.

y the Court. It shows dead storage to 90 feet—to be 90 feet?

y Mr. Jackson. Yes, sir.

y Mr. Jackson. We brought out that the dead storage would 436 with maximum draw down and he drew a line to show re that is.

y the Witness. Roughly—I could determine that with greater ision—but roughly I stated the pool—at Bluestone—to be ele- on 1436—wasn't that it?

By Mr. Jackson:

es, sir.

. Would have a slack water length, not taking into account back water effects—

. Yes.

. (Continuing.) Of approximately 17½ miles.

y Mr. Jackson. Mr. Thompson, I neglected to ask you, when offered Exhibit 204, if you offer that as proof of the location he State line?

y Mr. Thompson. No, sir.

y Mr. Jackson. I am not sure that it was offered, as a matter of fact.

Q. What is the source of your information?

A. Water Supply Papers of the United States Geological vey.

. Give me the number of the paper and the page on which you for that.

. (Witness examines books and papers.) You spoke of a od in September—which is it now?

. October 1930?

. The month of October 1930. (Witness examines papers.)

. Just give me the number so that I can check it.

A. Yes, sir; I want to be sure that I am getting it right. Water Supply Paper—Mr. Jackson, the number of this paper (indicating) is 713, and it happens to be at the division between one year and the other, as the records are kept. If I correctly——

Q. I wanted to find out what corresponding——

A. You mentioned the Kanawha Falls, and I think in my testimony, I gave Lock No. 2, didn't I?

Q. I made a note of Kanawha Falls. I could not be sure about it.

A. The figures are 1143, and I believe that applied to Lock 2.

Q. I merely wanted the source of the data; if it is in that paper, it is satisfactory to me, unless you want to say something further.

A. At Kanawha Falls, it was 1130 cubic feet per second, to get it straight.

Q. You also offered in evidence some exhibits on which you undertook to locate certain old ferries. Did you get those off the Dublin Sheet, in part?

A. Where they referred to the survey of 1911—on those surveys prior to 1935—is that it?

Q. You testified that you got the locations of a number of ferries off of maps of the United States Geological Survey, and I am asking you whether or not you got part of those from the Dublin Sheet?

A. I am not clear as to whether or not we got some from
1794 the Dublin sheet or not. As to whether or not the Dublin
sheet was used, I did not make a mental note in regard to
the sheet.

Q. Are you familiar with the Dublin sheet?

A. I have seen it.

Q. I want to ask you a few questions about your Exhibit No. 204. On that exhibit, you show the Radford reservoir empty on June 23rd, 1930. Is that right?

A. Yes, sir.

Q. You are familiar with the fact that, as shown by the testimony of Colonel Watkins and Mr. Kramer, and I think of Mr. McWhorter, that the Radford project is designed to provide an average regulated flow of 1200 or 1236 second-feet in the extreme low water season?

A. The Radford reservoir is designed now—you say I am familiar with whose testimony—Kramer and Colonel Watkins and Mr. McWhorter?

Q. I said——

A. I am not familiar with all that testimony. I want the record clear on that.

Q. Are you familiar with the fact that the Radford reservoir is designed to provide an average regulated flow of 1200 or 1236 second-feet throughout an extremely low water season?

A. That it is designed for that purpose?

Q. Yes, sir.

A. I am not.

Q. You did not know that in preparing plaintiff's exhibit No. 204, did you.

A. I doubt that now.

Q. Whether or not you doubt it, you did not know anything about it when you prepared Plaintiff's Exhibit No. 204? Is that right?

A. Exactly so.

By Mr. Jackson:

Q. How long ago did you prepare plaintiff's Exhibit 204?

1795 A. Plaintiff's Exhibit 204 was a preliminary draft of that exhibit, and it must have been made—the idea occurred, and possibly something was done on it, as far back as oh, September, I should say, of 1934—I mean to say 1935,—but it was finally completed—I will see the date: It is not shown. It was completed, I should say, about a month or six weeks ago.

Q. That long ago, do you think?

A. Yes, sir.

Q. But you say you do not now know that the Radford project is designed to provide an average flow of 1,200 or 1,230 second-feet throughout low water period?

A. That question is not clear to me. Are you asking me what would it be possible to accomplish with the approved storage capacity you have in the Radford reservoir and that would be made use of within certain limits of that reservoir?

Q. I am asking you whether you do not know now the Radford project is designed for an average flow of 1,200 or 1,230 second-feet throughout low water season?

A. No.

Q. You say the Radford reservoir emptied on June 23, 1930. Don't you know it to be a fact that the flow of New River, at the Radford dam site, did not fall below 1,230 second-feet before the 22nd of June, 1930?

A. Before the 22nd of June?

Q. Yes.

A. I don't recall just what the flows were—that is, the specific exact amounts of those flows at that time. I can look that up if you wish to have me verify it.

Q. There was no dropping of the flow really below 1,230 second-feet until after June 21, 1930. Do you know about that now?

A. I would have to look at the papers.

1796 Q. At least, you did not ascertain anything about that when you prepared this Exhibit 204?

A. I did not know that that particular question was coming on cross-examination. That is my explanation why I have not done that. That was not exactly pertinent. I did not have that much legal mind.

Q. I will show you a Water Supply Paper, No. 698, page 62, in June 1930, and ask you whether or not it was not June 21st before the flow at the Radford dam fell below 1,200 or 1,230 second feet and continued below that figure—June 22nd?

A. Whether it fell below 1250?

Q. 1200 or 1230, and continued generally below that figure?

A. That is all right.

By Mr. **Jackson**:

Q. That is all right.

A. Yes.

Q. That would be just one day before June 23rd?

A. June 21st?

Q. June 22, the date when it dropped below?

A. Was it June 21 or 22, to be exact?

Q. I again show it to you. June 22, when it dropped below and continued?

A. Yes. It would be two days, because June 23 is inclusive.

Q. There would be some lag in low water flow between Radford and Bluestone, would there not?

A. If it would be extremely low water, it would be about three days.

Q. As I understand your direct testimony, the Bluestone project is operated on a rule curve, designed to provide an average flow of 2000 second feet through extreme low water; is that right?

A. To insure a minimum discharge in New River immediately below the Bluestone dam site of not less than 2000 cubic feet per second.

1797 Q. And that operation is based upon a rule curve, isn't it?

A. Yes; it would be based upon a rule curve.

Q. And that rule curve would be predicated upon an extreme low water year, like 1930; is that right?

A. Yes; that much of the rule curve—that determining the low flow regulation.

Q. And under operation by a rule curve, you regulate the draw-down of your reservoir in accordance with that curve so that you will have that average amount available throughout that low water period; is that it?

A. Exactly so.

Q. Well now, assuming, Mr. Johnson, that the Radford reservoir or project had been built and in operation in 1930, and you were operating the Radford reservoir on a rule curve to provide an average flow of 1230 second feet throughout the extreme low water season, and assuming, as shown by your examination of the water supply papers, that the flow into Radford reservoir did not fall and stay below 1230 second feet until the 22nd of June, 1930, what would have been the condition of your reservoir on June 23, 1930?

A. You are assuming that the Radford reservoir, Mr. Jackson—it is a long involved question, and I want you to clear it.

Q. It will be read to you.

A. So I may understand you; before I answer this intelligently, I must understand you.

(Last question and answer were read.)

A. That is a hypothetical question, I take it, Mr. Jackson?

Q. It is hypothetical like your exhibit.

A. We are assuming the Radford reservoir will be operated in an entirely different manner from that I have shown in the exhibit?

1798 Q. I am sure that that is so.

A. I want to understand that. And that it is operated not within the limitations required by the State of Virginia License—not that at all?

Q. I would not know.

A. It would be operated in much the same proposition as Bluestone: It would accomplish two things—provide power and river regulation.

Q. I am asking you to assume it is operated under a rule curve?

A. I don't know exactly what kind of question I am answering. First of all, I don't know that the rule curve, of which you speak, would produce a regulated river below the Radford dam of 1,270 cubic feet, did you say?

Q. 1,200 to 1,230?

A. 1,200 to 1,230. To that extent my answer would be a guess.

Q. It is not any guess. I have given you the facts. All you are responsible for is the answer.

A. I can even go further than that.

Q. But I don't want you to go further than that. I just want the answer.

A. I mean to say if operated according to a proper rule curve, the Radford reservoir could be made to assist the Bluestone and to make it possible for the Bluestone to discharge a larger quantity of water in low flow years than 2,000 cubic feet per second.

Q. I will ask the reporter to read my question.

A. The question is what would have been the condition of the Bluestone reservoir?

Q. No; the Radford reservoir?

A. What would have been its condition? You will have to give me some time to investigate that. I can't answer that without some time.

Q. Mr. Johnson, do you mean to testify on the stand here that
given the assumptions you are operating the Radford
1799 project in 1930 on a rule curve to provide 1,230 second feet
average daily flow throughout the extreme low water season, and the fact the flow as you yourself verified in the Water Supply papers did not drop below 1,230 second feet, and stay below it until June 22, 1930, you cannot tell this Court what would be the condition of the Radford reservoir on June 23, 1930?

A. On June 23rd?

Q. Yes; one day later.

A. If you are operating it on a rule curve?

Q. Yes.

A. How could you; how am I to know unless I examine further, your Honor, into the Water Supply papers to see what drafts will be made from that reservoir prior, a week or a month before, and see if the reservoir could have been filled in the intervening time? I know the answer he expects me to give, but I cannot give that answer until I investigate.

By the COURT:

You mean the flow might not have been in operation for some weeks or months previous to that?

A. That is it. I have to know how it would be possible to have a reservoir full.

Q. Assuming in addition to what I have asked you to assume, assume that in accordance with any known, sane operation of a reservoir project, you would enter the low water season with a full reservoir and a rule curve to provide 1,230 c. f. s. throughout the extreme low water season, and you didn't fall below your rule curve figure until June 22, 1930, don't you know there would be no appreciable draw-down of that reservoir by June 23, 1930?

A. I cannot absolutely answer that question, because I do not know sufficiently well, don't recall sufficiently well, what the conditions were prior.

1800 Q. I told you the reservoir was full when you entered the low water season.

A. You said that, but if you make it a hypothetical question we will assume it is full.

Q. I made it a hypothetical question, like your Exhibit, and want you to answer it the same way.

A. I——

Q. Don't look at counsel, he isn't going to answer it for you.

By Mr. Thompson:

The exhibit isn't hypothetical.

A. When counsel speaks naturally my eyes turn to him I reserve the right to turn my neck.

Q. Due to your difficulties I will state another question. Assuming that in normal operation of a reservoir, on a rule curve, you would enter the low-water season, with a full reservoir, and assuming that you had been operating the Radford project in 1930 upon a rule curve to provide an average daily flow of 1230 second feet throughout the low water season, and assuming what you have yourself said, is a fact here on the stand, that the flow into the Radford reservoir did not fall and stay below 1230 c. f. s. until the 22nd of June, what would be the condition of the Radford reservoir on June 23, 1930?

A. Mr. Jackson, without seeming to evade your question——[interrupted].

Q. There is no seeming, so far, go ahead.

A. I clearly am not trying to evade your question, but I contend that I cannot with certainty answer your question until I am more positive. While a hypothetical question it commits me to the proposition in a way. Your reservoir is drawn down to that point, I meant to say is full on June 23rd, or approximately full, it wouldn't be full, as you have indicated yourself, that much would not be true, that much of my testimony would be untrue.

1801 Q. I have assumed it is full.

A. We have taken two days anyway.

Q. I asked you what difference it would make?

A. Some difference.

Q. How much?

A. I don't know exactly. You have it before you.

Q. We haven't anything on a rule curve of 1230 second feet?

A. You have the Water Supply papers, records of that, and the discharge, you don't have it computed for the drainage area—Allisonia——[interrupted].

Q. You would not expect it to get any less between Allisonia and the Radford dam site, would you?

A. I normally wouldn't expect it to diminish but there are instances where it actually does.

Q. Just give us your answer please, how much would it be drawn down in the two days?

A. How much would the Radford dam be drawn down?

Q. Yes, you have your Water Supply paper and the rule curve of 1,230 second feet.

A. You want me to take 1,230 or 1,250?

Q. That is the figure isn't it, 1,230?

A. (After calculating.) I have used the gaging station and not the accurate flows passing the Radford dam site.

Q. You are using the flows above the Radford dam site at Allisonia?

A. Yes, sir, Allisonia, which is a gaging station upstream, somewhat from the Radford dam site.

Q. You want to make a reservation there may have been some difference before you got to Radford?

A. No, I don't think there normally would be.

Q. Give me the figures?

A. It indicates there would have been a reduction in the capacity of only about 660 acre feet.

1802 Q. On June 23rd or end of June 23rd?

A. I want to check that figure. [Witness calculated.] About 1,320 acre feet.

Q. Will you give me the flow for the 22nd and 23rd at Allisonia?

A. Flows for the 22nd and 23rd are 1,060 and 1,070, respectively.

Q. And the amount of draw-down would be the difference between those figures and 1,230, c. f. s. wouldn't it?

A. The amount of draw-down yes, the average flow for these two days was ½ of 2,130. [Witness calculated.]

Q. What do you now make it?

A. Now the average flow on those two days was 1,065. The discharge is 1,230. 165 is the difference in discharge, and for two days would be approximately 660 acre feet.

Q. Would that be about $^{6}/_{10}$ of 1% of the storage capacity of the reservoir?

A. About $^{66}/_{100}$.

Q. Of 1%?

A. Yes, sir.

Q. In this Exhibit #204 you assumed, as I understand you, that the Bluestone reservoir was operating on a rule curve of 2,049 second feet, average discharge throughout the low water season?

A. Yes; for the rule curve is based on performance for 1930, what could have been accomplished in 1930, if you made it exactly that, it would have established approximately 2,049.

Q. And you assumed that operation on that rule curve in this Exhibit #204 for Bluestone?

A. The War Department corps of engineers have established that it can regulate the flow of the river to a flow less than 2,000 cubic feet per second, so you get a minimum flow of not less than

2,000 cubic feet per second. In going through the actual computations of it I found it could have established a minimum flow for 1930 of 2,049.

1803 Q. You testified that Bluestone would be full on June 24, 1930, under the rule curve, or operations based upon 1930, didn't you?

A. Yes, sir.

Q. And the reason for that was that it was not until June 24, 1930 or thereafter that the average daily flow at Bluestone fell below the rule curve figure?

A. After the 23rd I believe I testified.

Q. Which ever it may be, right at that time?

A. Yes, sir.

Q. And the only reason for selecting that precise date was because of the application of the rule curve to the figures for run off or flow in the Water Supply papers?

A. That was the reason, no other reason was in mind.

Q. But you didn't apply any rule curve in fixing when the Radford reservoir would commence to empty, did you?

A. That wasn't absolutely necessary. You can start from that date and explore the Water Supply papers and going back you find the Radford reservoir would have been emptied, if it had operated to have emptied, and then in dry season, up until July 3rd, we already had had a period of low flow, and I examined the Water Supply papers, the flow back of that, to determine that the Radford reservoir would have been emptied upon the assumed flows we used.

Q. If you had assumed a still higher discharge you could have shown it empty sooner, couldn't you?

A. Oh, yes.

Q. And you assumed the Radford reservoir was being emptied prior to the entry upon the low water season, measured by the flow under the rule curve for which it was designed to operate throughout that season, didn't you?

A. You mean the Bluestone?

Q. No; the Radford.

A. The Radford was operating under a rule curve? I know nothing about any rule curve for the operation of the Radford project.

1804 Q. That has been clear, but the point I am getting at is you assumed the Radford project would be empty of the storage capacity before entering the low-water season, didn't you?

A. I did.

Q. And why didn't you assume the Bluestone reservoir would be emptied of its storage capacity before entering upon its low water season?

A. Because if the Bluestone reservoir had been—it would have been absurb and ridiculous to do so, the Bluestone reservoir will be designed as one of its major purposes to regulate low flows in just such periods as occurred in 1930, to a flow of not less than 2,000 cubic feet per second, that is one of the important purposes of the Bluestone project.

Q. And on the other hand you assumed that the Radford reservoir entered upon the low-water season as fixed by its rule curve, empty, was filled during the low-water season, was emptied again during the low-water season, and over half filled again during the low-water season; is that right?

A. That is not right.

Q. Is your exhibit wrong then?

A. Your question as stated is not right. I did not assume such things as you are expressing.

Q. Tell me this, have you agreed after looking at the Water Supply papers that according to the rule curve for which Radford was designed, that is 1,230 second feet, the flow at Radford did not fall and stay below 1,230 second feet until June 22, 1930?

A. Your Honor, it is presupposed I am familiar with the rule curve for the operation of the Radford project, which I have never heard of before, and in these questions Mr. Jackson insists upon my answering them in a manner that will indicate I am accepting that rule curve as a fact.

1805 By the COURT:

He is asking you to assume it is a fact. The trouble is I am afraid you are not willing to assume it as a fact, even though it is hypothetical.

Q. Mr. Johnson, assuming the rule curve for which the Radford reservoir was designed to be an average flow throughout the low water season of 1,230 cubic feet per second, you do concede from your examination of the Water Supply papers, that the flow into the Radford reservoir did not fall below that figure and stay below that figure until June 22, 1930, is that right?

A. Mr. Jackson, I can't answer that positively at this time, however evident it may appear on the surface, I cannot say, because I have not examined that sufficiently.

Q. I showed you Water Supply papers showing the average flow for June, 1930.

A. It was all an assumption, but it isn't my assumption.

Q. Didn't you testify the average daily flow according to the Water Supply papers did not fall below and stay below 1,230 cubic feet per second at Radford until June 22, 1930?

A. It did not fall and did not stay there—how far back did we examine?

Q. We examined back through June.

A. We were examining about that time. As a matter of fact I was examining from that date forward more than back of it.

Q. Well, if we have to, if your examination of this flow is so insufficient you don't know the flow back of that was higher than that, I will show you this exhibit, Water Supply paper #698, at page 62, where you have already examined June, 1930, and ask you to go back through May, April, March, February, and as far back as you want to until the preceding October, and tell me whether you find any figures there as low as 1,230 second feet?

A. No, I don't find any, none apparent to me as low as 1230.

1806 Q. As a matter of fact a great many of the flows are a good deal higher, over 2,000 and up as high as 3,200, aren't they?

A. There is just one figure in May up to 3,200, one flash.

Q. What is the day before?

A. 3,100. The average for May is 1890.

By the Court:

The date of demarkation is what?

A. The demarkation is June 23rd and 24th.

Q. Now, Mr. Johnson, on June 23, 1930, you nevertheless show the Radford reservoir empty, don't you, on your exhibit?

A. That is right.

Q. And you show it filled during that low-water season by August 24th, don't you?

A. That is right.

Q. And then you show it emptied again during that low-water season, by September 16th, don't you?

A. That is right.

Q. And then you show it shut down entirely and only half filled again during that low-water season by October 21st?

A. Yes, sir.

Q. And that is the way you operate a reservoir on a rule curve, is it?

A. The way I operate a reservoir on a rule curve?

Q. I asked if that is the way you operate a reservoir on a rule curve?

A. That is the way one would be and the other would not.

Q. You mean this is the way not to operate a reservoir on a rule curve?

A. You may put it that way.

Q. So you assumed for comparative purposes you would show on the diagram on the one hand how to operate a reservoir on the rule curve and on the other hand you would show how not to operate a reservoir on a rule curve?

1807 A. The answer is yes, but I have to explain my answer. That doesn't——

Q. I don't see the necessity for an explanation.

A. That wasn't exactly the reason I did it, but it shows how one operated without a rule curve, and not operated under the same rule curve, and by coordinated authority may be operated in conjunction with one that is operated under a definite rule curve.

Cross-examination (continued) by Mr. JACKSON:

Q. Mr. Johnson, in your study of the plan for the Bluestone reservoir, as contained in Government Exhibit 145, House Document 91, you observed, I suppose, that the hydraulic capacity of the installation under some conditions would be as high as 11,000 second-feet, did you not?

A. I did.

Q. And even at flows as high as 4,000 second-feet, at Bluestone, the power installation would have the capacity to draw down the reservoir at the rate of 7,000 second-feet a day, or 14,000 acre-feet?

A. I may have to make some check before I can make a statement to that effect.

Q. If, as you said, the hydraulic capacity is 11,000 second-feet, you know as an engineer that if that is operated at maximum capacity, it would be able to discharge 11,000 second-feet a day, do you not?

A. Yes; 11,000 second-feet at any time it was discharging.

Q. And you know if the flow, at that time, were 4,000 second-feet, it would result in a draw-down each day equivalent to the volume of 7,000 second-foot days, don't you?

A. Yes.

Q. And that would be the same as 14,000 acre-feet, wouldn't it?

A. It would be approximately 14,000 acre-feet.

1808 By the COURT:

What is that proportion that you engineers use in calculating the volume of acre feet in terms of feet per second? I notice you arrive at the result very quickly. You must have some form of arriving at it quickly.

WITNESS. A rough approximation for cubic feet per second flowing continuously for 24 hours is 2, to put it in terms of acre feet.

The COURT. Do you mean a flow of 1,000 cubic feet per second you could figure out per acre on that?

WITNESS. Yes, sir.

Redirect examination by Mr. THOMPSON:

Q. You have shown that prior to June 23, 1930, the use of water through the Radford plant, according to your chart, Exhibit 204, would have been at a rate higher than 1,230 cubic feet per second. Would the company have had any incentive to operate the Radford project in the manner you have assumed?

A. Yes, sir.

Mr. JACKSON. We object to that.

The COURT. I allow that.

Mr. JACKSON. Exception.

WITNESS. The incentive would be to conserve water and to produce electricity of the highest value. As to the matter of conserving water, I mean less water would be spilled by such operation. If the pool were operated in a manner to be able to regulate the flow below, then the capacity, the storage capacity of the reservoir, would have had to be maintained at or near its upper elevation to produce that 1,230 second feet of regulation below during the dry season. If it were so operated many times when water passes in excess of the wheel capacity, it would be spilled and wasted.

Mr. JACKSON. That is 1,980 acre-feet, I am told, for convenience.

By Mr. JACKSON:

Q. Mr. Johnson, in stating your qualifications, at record page 3651, you said from March 1930, to October 1932, "I was in the employ of Hugh L. Cooper & Company——".

A. March when?

Q. March 1930 to October 1932, "I was in the employ of Hugh L. Cooper & Company as a member of the engineering staff engaged in the design, construction and later operation of the Dnieperstroy hydro-electric project on the Dnieper River in Russia." Do you remember that statement?

A. Yes.

Q. At record 3784 and 3785 I asked you this question: "Did you ever operate a hydro-electric reservoir without releasing a substantial amount of storage for draw-down through low water season?

"A. Yes.

"Q. Where?

"A. The Dnieperstroy project, in Russia, on the Dnieper River."

Q. Do you remember giving that testimony?

A. I do.

Q. Mr. Johnson, you left Dnieperstroy June 5, 1932, did you not?

A. I don't recall whether it was June 5th. I am under the impression it was June 12th.

Q. Well, if the records of the Hugh L. Cooper Company show it, I suppose you would say it is correct?

A. I am not sure that their records are correct on that point.

Q. You say on or about June 5th or 12th, 1932, you left Dnieperstroy?

A. I believe so. I can't be certain as to that. I should have to check on that.

Q. As a matter of fact, didn't you leave for Berlin for treatment for an illness about that time?

A. At sometime in the summer of 1932, I did.

Q. And, after taking treatment in Berlin, didn't you return to this country on the "Europa" about September 7, 1932?

A. I forget the date, but it was in September, 1932. That is right.

Q. And don't you know it to be a fact that the Dnieperstroy hydro-electric project was not completed until 1933?

A. I know it to be a fact, Mr. Jackson, that the Dnieperstroy project was in operation before I left.

Q. Isn't it a fact that the only operation that ever occurred on any part of the Dnieperstroy project, before you left Dnieperstroy, was the operation of a fraction of a unit on a run-of-river basis for some part of eight or ten days before you left Dnieperstroy ill?

A. It had been operating for, I forget just the period of time; they had been operating for a much longer period than that eight or ten days. The installation was not completed.

Q. Are you willing to testify that the Dnieperstroy plant, or any part of it, was placed in commercial operation before May 8, 1932?

A. Commercial operation?

Mr. **Thompson**. Your Honor, I do not understand that they have any commercial operation in Russia, and I think counsel would know it.

Mr. **Jackson**. I investigated it, and your understanding should be given him.

Mr. **Thompson**. I think everybody knows there is no such thing as commercial operation in Russia.

Mr. **Jackson**. Dr. Holmes wrote a poem on that.

The **Court**. What do you mean by "commercial operation?"

Mr. **Jackson**. Not experimental operation. It produced current for use as against purely experimental operation.

The **Court**. I presume that is what you mean, but counsel did not seem to catch it.

Mr. **Thompson**. That is right.

Witness. I might say the same could be applied to Wilson dam for a considerable period at the time it was starting up. But the Dnieperstroy plant, at the time it was being started up, for a considerable time, displaced a steam plant, which was operating continuously, and there were various shops and manufacturing enterprises at the site of the Dnieperstroy plant which were using that electricity.

By Mr. JACKSON:

Q. I want you to state directly, if you know, whether or not the Dnieperstroy project commenced commercial operation, as distinguished from experimental operation, before May 28, 1932?

A. Under your definition of the distinction between experimental operations and commercial operations, that is to say the production of electricity for use rather than waste, I should say it commenced commercial operations.

Q. Do you care to testify that the Dnieperstroy hydroelectric plant commenced operations other than experimental operations or testing operations, prior to May 28, 1932?

A. To the extent it replaced the steam plant, it was useful.

Q. Wasn't it experimental operation, Mr. Johnson?

A. You can construe anything to be experimental. At Wilson dam they construed the sale of power over a long time as experimental operation when, as a matter of fact, it was delivering useful operation.

Q. When?

A. Whenever useful electricity could be marketed. As a matter of fact, they started up Wilson dam earlier, at greater expense, too, than was intended and than the program called for, for experimental or test purposes, to relieve a serious drought; and yet that was termed experimental power.

Q. I have not confused you into thinking I am asking about Wilson dam, have I?

A. I am explaining how the definition may be misunderstood.

Q. I want you to answer this question directly: Do you care to testify that the Dnieperstroy project operated other than test operations prior to May 28, 1932?

A. That is the thing that can be extended as long as you see fit. To say that a plant is undergoing tests, it can be undergoing tests, but yet it is operated, it is delivering useful electricity, which makes it all the more important.

Q. Do you care to testify the Dnieperstroy project was engaged in regular operation prior to May 28, 1932?

A. Regular operation?

Q. Yes.

A. I don't know exactly the meaning of your question.

Q. Do you testify the Dnieperstroy project was operating regularly prior to May 28 1932?

A. It was operating. I would have to actually investigate the log to recall whether it was entirely shut down very much of the time during that period. I do know as adjustments were required to be made as is usual and to be expected in a plant during its earlier period of operation to make it conform with the specifications and the contract of those supplying various machinery, it is necessary at times to close down and make those adjustments. To that extent, Dnieperstroy may have suspended operation, and I recall an incident or two in the beginning when they did.

Q. As a matter of fact, you were ill for some time before you left, were you not?

A. I was working, though and carrying on.

Q. Not after May 23, 1932, were you?

A. I think so.

Q. In testifying that, you were measuring your words?

A. I am inclined to think so. I can't recall that exact date, but I am under the impression that I can't definitely say.

Q. Well now, isn't it also a fact——

A. I will testify, if you will pardon an interruption, that I was down day and night very much of the time that that plant was being started up and being placed into operation. I am very definite on that, and that contributed a good deal to my illness.

Q. Mr. Johnson, is it not also a fact that any operations that did occur with this plant prior to May 28, 1932, and for some time thereafter, were run-of-river operations?

A. Were run-of-river operations?

Q. Yes.

A. Yes, and the plant was essentially a non-run-of-river plant.

Q. But the operations you talk about at and before May 28, 1932, were run-of-river, were they not?

A. Yes, it may have been.

Q. And it was actually operated on run-of-river basis; is that true?

A. I am trying to recall the extent to which we may have reduced the pool elevations in the operation. I know this, that if it did, it occurred by chance and not by purpose, which would place it in the category as one of run-of-river, because a plant which is not run-of-river may at times operate with the constant pool elevation, if it just happens that there is an excess of water flowing over that required by the power plant.

Q. Let us get it clear. Do you want to testify that any of this operation occurring at or prior to May 28, 1932, was other than run-of-river?

A. Other than run-of-river?

Q. Yes.

A. That is a thing that is not susceptible of the answer that you expect me to give.

Q. I am glad you know what answer I expect you to give.

A. The plant was not a run-of-river plant. You asked me if I had operated a plant which was not a run-of-river plant.

Q. Don't be concerned about that.

A. You asked if during a certain period the plant did not draw down its reservoir.

Q. I asked you nothing of the kind, Mr. Johnson. I asked you if in operation of the Dnieperstroy plant, prior to the time you left, any operation of it was purely run-of-river operation?

A. My answer is, and I can state with definite assurance as to that, I am not sure whether we pulled the reservoir down, or not.

Q. May I again refresh your recollection on that? Don't you know it to be a fact that the gates on the main dam were not installed until June 3, 1933?

A. Isn't it possible to reduce the pool without affecting navigation?

Mr. JACKSON. I move to strike out the answer, and ask the Court to order the witness to answer the question.

The COURT. What is the date?

Mr. JACKSON. June 3, 1933.

The COURT. Do you know whether or not the gates were not installed at the plant you are speaking of until June 3, 1933?

WITNESS. Your Honor, I don't know the exact date that the gates were installed on the Dnieperstroy project.

By Mr. JACKSON:

Q. You do know the gates were not installed when you left Dnieperstroy, don't you?

A. Yes.

Q. And you do know that the pool had never been filled when you left Dnieperstroy, don't you?

A. I am not quite sure that it had not been filled.

Q. Did you keep close enough contact with this project to learn that it was not filled until after June, 1933?

A. That it was not up to discharge elevation, may I ask?

Q. That the pool was not filled?

A. Filled to where? If you have the gates, then you have the pool filled with the gates, and it will bring the pool to one elevation or level, and if the gates are not on, it will go to the crest.

Q. I presume you were at Dnieperstroy long enough to know the pool elevation which was attempted to be maintained by constructing that project?

A. Yes.

Q. I ask you whether you kept close enough contact to know whether that reservoir was not completed and filled to its normal pool level until long after June, 1933?

A. Well, that is perfectly well understood, if the gates were not installed.

Q. I should think that is so. And you have now told all of your experience about operating this reservoir at Dnieperstroy on a rule curve?

A. I have said nothing about a rule curve in connection with Dnieperstroy.

Q. Did you tell your experience about operating the Dnieperstroy project with a large draw-down?

A. The question you asked me was have you ever operated a hydro-electric plant.

Mr. THOMPSON. I protest the way that counsel asks questions as in a criminal case—inserting words that the witness has not uttered and has not suggested. It has gone on day after day.

WITNESS. I did not testify what you have said.

The COURT. I do not see anything in the cross-examination that he cannot understand.

By Mr. JACKSON:

Q. Now, just answer my question that I just asked you.

A. You asked if I have ever operated a large hydroelectric plant?

Q. Mr. Johnson, have you now told all your experience in operating the Dnieperstroy project with a large draw-down?

A. Have I told all my experience in operating the Dnieperstroy project with a large draw-down?

Q. Yes.

A. I have not.

Q. What operation did you perform of the Dnieperstroy project with a large draw-down that you have not told about?

A. It would require a very long time. Just what phase do you wish me to deal with?

Q. I want you to tell me during what periods of time, if any, you claim you operated the Dnieperstroy project, utilizing a large draw-down at any reservoir?

A. From the period of its starting.

Q. When was that, as you think?

A. In the early summer or spring, or sometime in the spring of 1932, and extending up to the time of my departure.

Q. In June 1932?

A. I forget the date.

Q. And do you want to testify during any of that period that plant was operated on a peakload basis or other than a run-of-river basis?

A. During that time was it operated other than as a run-of-river basis?

Q. Yes.

A. I am going to stick to my testimony that this plant was not a run-of-river plant, and nowhere have I found myself heretofore contradicted as to that proposition.

By Mr. Jackson. Please read the question.

Note.—The question was read.

A. Yes, but how, from day to day, that plant was operated in respect to the pool height, I think it is possible while that plant was in operation, and I feel pretty sure of that, the plant was impounding water, and to that extent it was not run-of-river. If the plant is maintaining water, if it is changing its pool elevation, it cannot be called run-of-river.

Q. You think it was filling during those first operations?

A. Yes.

Q. There was no draw-down, was there?

A. I don't recall. I do not have the log before me.

Q. In any event, from your knowledge of the operations, it is not sufficiently definite to state there was any draw-down?

A. That I could say that there was any draw-down?

Q. Yes.

A. The pool did change in elevation.

Q. You understand my question.

A. To that extent it is not run-of-river. If the pool were maintained at a constant elevation we could say for a certain time it was run-of-river, but if you are discharging more water than comes in, or if you are withholding water, it is not run-of-river.

The Court. The question is whether or not you are able to say definitely, from your recollection, that that plant was operated under conditions which necessitated at any time a draw-down in the pool elevation. That is the substance of it?

Mr. Jackson. Yes, during this period.

A. There may have been very short intervals during the draw-down. I can't say positively as to that.

Mr. Jackson. That is all.

1809 Of course, during such operation there would be periods when the flow was near the 1230 c. f. s., when they would not be releasing the water and would not be generating so much electricity. The electricity during relatively low flow periods is of greater value than the electricity when they have a great deal of water in all streams.

Now, as to conserving water, if they were discharging at or below the average annual flow, the reservoir would diminish when the flow fell below that flow, and if you had sufficient reservoir capacity, you could be reasonably sure of it falling if you were discharging. It would fluctuate, rise and fall, without spilling the water. By that method of operation, the operators would be able to deliver large quantities of power at low flow season, taking advantage of the contents of the reservoir when the power is most valuable. After the electricity is generated, it cannot by any practical means be stored. It is generated and delivered that moment. So that if you are to deliver and sell, to make it possible for a plant, a hydro-plant, to sell more power than is for the moment flowing in the stream, if we speak of the stream converted into head and power, they must draw upon the storage in the reservoir. Secondary power, that is power you are required to generate and sell as the water comes along, if you choose to operate that way, would be of less value than the power which follows the demand curve.

Q. Mr. Johnson, did you ever hear of applying a rule curve on this Radford project before?

A. No, sir.

Q. Is there anything which indicates any rule curve in the application for a license by this company?

A. I have examined the application and the amended application for license to the Federal Power Commission, and I have looked and searched for the rule curve on which it is said
1810 this plant was designed to operate, in the Virginia state
license, and I can find no such rule curve. I am given to understand it was designed to operate in accordance with that rule curve, and if so, I think that should have been a very important consideration in the application for the license showing how this plant would be operated.

Q. Is it possible for an engineer to estimate a thing of this kind, or determine at all, if he doesn't know, what the rule curve is; that is the basic factors that go to make up the rule curve?

A. It is impossible.

Q. So that it is impossible, is it not, for you to make any assumption?

A. Absolutely.

Q. Or to adopt any such assumption?

A. Absolutely. A rule curve does more than one thing. It has to take into account all conditions of flow, all seasons, hydrological conditions on the river. It has to go away back into the years of record.

By the Court:

You mean all the testimony you have given is completely valueless without a knowledge of what the rule curve is about this dam?

A. Absolutely.

By the COURT:

And for that reason, because you had no knowledge of any lant operating upon a rule curve, you have gone on the assumpion it was not to be operated in such manner?

A. No rule curve was in evidence.

Q. All your testimony has been based on the belief on your part hat no rule curve was applicable to this Radford project?

A. Absolutely. And a rule curve will not remain a rule curve nless—we know it will not be changed, you have to have fixed actors in a rule curve.

Q. Let me read to you from the testimony you gave yesterday, age 3800:

"Q. As I understand your direct testimony, the Bluestone projct is operated on a rule curve, designed to provide an average flow of 2000 second feet through extreme low water; is that right?" What is the important factor in making a rule curve there? 811

A. All flows of record enter in and it is designed to give a onstant discharge below that dam during very low periods of low of 2,000 cubic feet per second, and will be so operated to affect hat low flow regulation, which will be a constant amount.

Q. It is a fact there you have to have a constant factor in the naking of a rule of this kind?

A. Precisely so.

Q. (Reading:) "To insure a minimum discharge in New River mmediately below the Bluestone dam site of not less than 2000 ubic feet per second.

"Q. And that operation is based upon a rule curve, isn't it?

"A. Yes, it would be based upon a rule curve.

"Q. And that rule curve would be predicated upon an extreme ow water year, like 1930; is that right?

"A. Yes, that much of the rule curve—that determining the ow flow regulation.

"Q. And under operation by a rule curve, you regulate the raw-down of your reservoir in accordance with that curve so hat you will have that average amount available throughout that ow water period; is that it?

"A. Exactly so.

"Q. Well now [interrupted] assuming, Mr. Johnson, that the adford reservoir or project had been built and in operation in 930, and you were operating the Radford reservoir on a rule urve to provide an average flow of 1230 second feet throughout he extreme low water season, and assuming, as shown by your xamination of the water supply papers, that the flow into Radord reservoir did not fall and stay below 1230 second feet until the 22nd of June, 1930, what would have been the condition of your reservoir on June 23, 1930?"

Q. Is there any difference in attempting to set up the rule curve based upon average flow and one where there is a constant factor?

A. There is all the difference in the world.

1812 Q. Is it possible when they present to you a question of an average flow as a basis for an assumption to give any answer on it definitely?

A. It is not possible.

Recross examination by Mr. **Jackson**:

XQ. Mr. Johnson, you testified on your re-direct that electric energy is most valuable during the low flow period; is that right?

1813 A. Yes, sir.

XQ. Don't you think in view of that principle it would require a positively financial genius to adopt a plan which would result in entirely depriving a company of the production of any energy from August 24th to September 16th, 1930, and from September 16th, 1930, to some indefinite time, after October 21, 1930, as you show on your Exhibit #204?

A. No, sir; not under the circumstances. Under the normal operations the reservoir after being drawn-down to what it was at the date of June 23rd would have been replenished. There had been some low flow before that time, and having done so, that electricity would have been marketed at what was then a low flow period.

XQ. Have you finished your answer?

A. And after that time it would have been necessary in any event to have made use of the reserved capacity elsewhere because the flow diminished to such point.

XQ. In your opinion you would have been better off without any hydro peaking capacity from June 23rd and September 16th on, is that right?

A. I have not said that it would have been better if there could have been hydro peaking capacity of sufficient capacity to have prevented the starting up of steam installations.

XQ. Do you know how much swing the steam installations of the Appalachian Electric Power Company system will take?

A. In their aggregate?

XQ. Yes.

A. No; I don't.

XQ. You haven't the slightest idea, have you?

A. No; I don't know.

XQ. You don't know any more about that than you do
1814 about the rule curve for the Radford project?

A. I have never seen the rule curve.

XQ. Coming back to your Exhibit #204, Mr. Johnson. You examined the Water Supply papers at my request yesterday showing the flows in April and May and early part of June 1930, didn't you?

A. Yes, sir.

XQ. And there was no part of that time when the hydraulic capacity of the Radford installation did not very substantially exceed the average flow, was there?

A. Yes; it exceeded the flows shown.

XQ. You remember most of them were on the order of 2,000 second-feet?

A. I believe if I recall correctly—yes, I will agree to that, although I believe it is in the record you were pointing out for very long times there was 5,600 there.

XQ. Didn't you object strenuously when I pointed out for instance 3,200 and 3,100 and another of 5,600 or 5,900 second-feet, and you explained that was only for a day or two?

A. It was just a flash in that particular month.

XQ. Now to be perfectly frank and honest, you know those Water Supply papers show throughout that period the flow was very substantially less than the hydraulic capacity of the Radford installation, don't you?

A. I do.

XQ. Now, Mr. Johnson, if prior to entering the low flow period on June 23, 1930, as shown on your Exhibit #204, you had not drawn-down the Radford reservoir, as you did, would that flow have been utilized at a higher head?

A. If it had not been drawn down would it have been utilized at a higher head?

XQ. Yes.

1815 A. The stream flow was a small and diminishing stream flow, and it would have been utilized assuming no draw down even prior to that date. Assuming you had a full reservoir it would have been utilized at a higher head but without generating as much power, without producing as much power at the time when the power is more valuable, a time when there is great demand for that power, as you could have secured if you had drawn down the reservoir.

XQ. Is power more valuable in April and May than in August and September?

A. It is more valuable in April and May, if the flows are very low, and there is a reduced flow; therefore, plants are compelled to reduce outputs and reserve steam capacity has to be made use of.

XQ. Weren't the flows low in early August and late September of 1930, lower than they were in April and May?

A. While that is true, it could not have been anticipated by those operating it that this was a record year before it had occurred.

XQ. Let me understand you. You have gotten up an exhibit showing you operated Bluestone as of 1930, upon the basis of information derived after the experience of the 1930 condition, and undertake to operate Radford, denying it the benefit of the knowledge of the experience derived during 1930, haven't you?

A. Yes, and let me explain that. The Bluestone if operated in a different manner could show greater financial returns than it does. It sacrifices financial returns for stream regulations.

XQ. Coming back to this Mr. Johnson, don't you know that the Radford project under 1930 conditions could have been operated in April and May by simply using the then flow of the river?

A. The small flow.

XQ. Whatever it was, it is very much in excess of 1,230 second feet, without wasting any water, and without lowering the reservoir?

1816 A. That is true, but the incentive to discharge a larger amount of water than was flowing into the reservoir is apparent, because it was a period of low flow, when there is demand for electricity.

XQ. You said one reason, on your direct, for your drawing down the Radford reservoir during April and May and early June of 1930 was to avoid waste of water. Now the fact is, the hydraulic capacity of that reservoir would have utilized all the water that flowed during those months, wouldn't it?

A. It was done to prevent waste in water, the idea being this, that if you discharge something on the order of 3,000 cubic feet per second, assuming that is just under the mean annual flow, very little water will be wasted, the reservoir will be full at times and drop down at other times, and it will not vary within very wide limitations throughout a normal year, or any year excepting a very abnormal year, up and down.

XQ. Your theory of the operation of a reservoir is you operate it at a constant rate equivalent to what has been determined for the average flow of the stream for a year?

A. No, the rule curve would stay with that as a basis, and based upon experience——

XQ. Did you ever hear of such rule curve? Such rule curve as that for the operation of a reservoir, based upon a straight line operation, as equivalent to the average flow of the river?

A. It wouldn't be exactly that.

XQ. A rule curve would never be based upon the average flow of the river, would it?

A. It might easily be. If there were large enough capacity so you could be sure of utilizing all the water flowing into a stream and you could market your electricity, that is exactly what you would do. Your discharge would equal the flow of the river and you would not lose any water.

1817 By the COURT:

To that extent your rule curve is based partly at least on the flow of the stream?

A. Your Honor, that would depend upon the way—the relationship that existed between the reservoir capacity, the flow of the stream, the hydraulic capacity and the system demands. The one important element in the consideration of any plan of operation, and that of a rule curve, if a rule curve is determined, is the average annual flow of the river, if you could impound all that would be the exact amount you would discharge, to conserve and use all water.

XQ. But all you are saying now is if you could impound the entire flow of the stream, floods and all, you would have such a quantity of unsable storage you could maintain an average flow, isn't that so?

A. If you could store and impound all, yes.

XQ. It still remains true when you cannot store and impound all, and we are not talking about any such condition, are we——

A. You approach that condition within very narrow limits. It is possible.

XQ. We are trying to talk about these projects and not what is possible. Do you contend the Radford project or Bluestone project is so constructed it can impound the entire flow of the stream, floods and at all times?

A. I believe the wastage on the Bluestone is perhaps on the order of 4%.

XQ. You mean the Bluestone impounds within 4% of the total annual run-off?

A. That is according to their method of operation. If I am correct, and I won't be positive on that matter, but roughly 4% is discharged according to my best recollection, or wasted. It may be 5%, or a little larger, but I think not over 5%

1818 would be wasted by the Radford project.

XQ. Will you tell me what the average flow of New River is at the Bluestone dam site?

A. It is given as 6,440.

XQ. Will you tell me why they supply regulated flow of 2,000 second-feet if the Bluestone project has impounded the entire flow of the stream with an average annual flow of 6,400 second-feet annually?

A. Because the Bluestone discharges flows far in excess of the average annual necessary to maintain the reservoir down to below thirty feet of the upper limits of that reservoir, and it passes the water as it flows into the reservoir up to wheel capacity when it tends to rise above its elevation it is seeking to maintain. It does that as a sacrifice of marketing its electricity at the most advantageous season.

X Q. If you did impound the flood flows and had more storage capacity you could increase your regulated flow below the Bluestone impounded flow?

A. May I have reference to the 308 report?

X Q. Let me ask you another question, which may make clearer what I have in mind. If they utilize the thirty feet of flood storage, then they could increase the regulated flow below Bluestone, could they not?

A. Oh, yes, that is freely admitted by anyone.

X Q. But they have not done it, have they?

A. No, because one of its major purposes is to maintain flood control to provide capacity for flood control, that must be kept empty, and not encroached upon.

X Q. Whatever the reason, when we are talking about utilizable storage at either Radford or Bluestone, we are not talking about storage capable of storing the entire annual run-off of New River, so as to equalize the flow throughout the year, are we?

1819 A. You don't have to store the entire flow of the river to equalize the flow throughout the year.

X Q. We are not dealing with reservoirs that store enough of the high flow of New River to equalize the flow throughout the year, are we?

A. We are dealing with reservoirs that can store a very substantial amount or portions of the peaks. Bear in mind the reservoirs we are dealing with can vary their flows, as they enter the reservoirs, and there remains but a portion of the flow higher than that which they must store.

By Mr. **Jackson**:

Q. Now, Mr. Johnson, isn't it a fact that the 2,000, or approximately 2,000 regulated flow at the Bluestone is derived by adding the extreme low water flow at the Bluestone dam site to the utilizable storage of the Bluestone reservoir?

A. That capacity regulated to the dryest year, that is right.

Q. The rule curve for operating a reservoir during low water season is not an arbitrary thing, but one that is based upon the study of all available low water data on the stream.

A. For low water, did you say?

Q. Yes, sir.

A. That regulating the low water is not an arbitrary thing?

Q. It is not an assumed thing? It is something that is based upon a study of all available data on the low water flows on that stream?

A. It is, and it is based on knowledge of all natural artificial conditions.

Q. And don't you know that the power commission made such a study at Radford?

1820 A. I don't know that—of Radford, you say?

Q. Yes.

A. I do not—please let me have the question again.

Q. Read the question.

(It is not an assumed thing, it is something that is based upon a study of all available data on the low water flows on that stream?)

A. My answer as to what extent the Federal Power Commission may or may not have, is something ~~that~~ I don't know. I never was employed by the Federal Power Commission and I am not sufficiently well acquainted with what they have done to be able to answer that quetsion.

1835

JOHN A. DAVENPORT

Direct examination by Mr. Jones:

Q. Your name is John A. Davenport, and you reside in Cincinnati, Ohio?

A. Yes.

Q. What is your present employment, Mr. Davenport?

A. I am engineer with the Corps of Engineers, Division Office.

Q. United States Engineers?

A. Yes.

Q. Please state your training by way education and experience in the position you now occupy and the duties which you discharge.

A. I am a graduate in engineering, with the degree of B. S., from the University of Kansas. I also hold the professional degree of Civil Engineer from the same institution.

Among my experiences, I have been employed by the Department of Agriculture and in stream flow study by the United States Geological Survey. I have been Assistant State Engineer for the State of North Dakota. I have been on various works in the State of Illinois, about half of which was in the location, design and construction of bridges. I have done work involving hydraulic studies in the States of Utah, Nevada, Montana and Texas. I have been a special instructor in hydraulics at the University of Utah. I was Engineer Advisor to the Government of New Mexico in the Colorado River Commission affair. I have had valuation work, miscellaneous private employment.

What else did you ask, Mr. Jones?

Q. Have you had any experience—I believe you have already stated that—in considering hydraulic problems with reference to construction?

1836. A. About half of my work has involved hydraulic problems of one kind or another.

Q. Please state your present connection with the United States Engineers, how long that has been, and what duties generally you have been discharging since you have been with the Engineers.

A. I have been with the Engineers this time since about the first of May, 1931, first in the upper Mississippi valley division office, and then, when the Ohio River division office was formed, I was transferred to that office, and I am there at present, and among my other duties I take care of Federal Power Commission work, which is assigned by orders and regulations to the Division Engineer of the Ohio River Division.

I was previously employed by the Corps of Engineers on the Missouri River, in Kansas, and Nebraska, South Dakota and North Dakota, in the years 1912 and 1913—at that time under Colonel Herbert Deakyne.

Q. The Cincinnati office is the division office?

A. Yes.

Q. Is that office at Charleston?

A. No; that office is at Cincinnati, Ohio, and the division office is over the district office at Huntington.

Q. Your Cincinnati office, as I understand, embraces this field and the Ohio River?

A. All the Ohio River that is assigned to the Corps of Engineers.

Q. Have you made an investigation of low flows in the Ohio River in that section just above the confluence of the Kanawha with the Ohio, and, if so, at whose direction did you make such a study?

A. I have made those studies, or had them made under my direction, and that was a part of my regular duties in my assignment in Ohio River Division Office. The instructions came from the Chief of Engineers to the Division Engineer in charge of the office.

1837. Q. Do you know who Mr. G. H. Pierce is?

A. C. H. Pierce?

Q. C. H. Pierce.

A. Yes, sir.

Q. Is he from your office?

A. No, sir; he is from the U. S. Geological Survey.

Q. From the studies that you have made of this flow, are you prepared to testify in that connection at this time?

A. Yes.

Q. Are you familiar with Exhibits Nos. 110 and 111, introduced by the Government in this case?

A. I am.

Q. You have examined them with particularity?

A. I have used the information that they contained to assist me in the preparation of the figures I propose to submit here.

Q. In your calculations on stream flow I have indicated, you have used basic data 110 and 111; is that what I am to understand?

A. That is a part of the basic data.

Q. What other data have you used or employed in the preparation of your conclusions on this stream flow?

A. I used certain of the Ohio River charts, which are a compilation by the Corps of Engineers of the Ohio River, showing certain features, outlinging the stream, and the depth of water, and elevations, and so on.

Q. What part of the Ohio River do the charts cover to which your study was particularly directed?

A. My study was particularly directed to what was known as pool 25 in the Ohio River, and these charts to which I refer cover that area.

Q. Where is pool No. 25, Mr. Davenport, with reference to Point Pleasant, or the mouth of the Kanawha?

A. Pool 25 is the part of the river extending from dam
1838 No. 25 to dam No. 24. Dam 25 is about five miles above the
confluence of the Ohio and the Kanawha, and the pool is
about 18 miles in length.

Q. The record of surveys made by the Engineers are public records and are made in the course of investigations on the part of the Engineers; is that correct?

A. Yes. They are public records available to anybody upon application to the District Engineer at Louisville, Kentucky—the U. S. District Engineer—upon payment of twenty-five cents per copy. They represent the data collected by the Engineers over a period of several years and were published in 1915 by Government authority.

Q. Are Exhibits 110 and 111 copies of these charts?

A. No; Exhibits 110 and 111 are the official records of the gauge heights at dams 24 and 25. They cover the periods to which I intend to offer the figures of flow.

Q. These records from which your compilation is made, which you state are official copies, have you any certified copies of these records to accompany your testimony?

A. Yes; I have certified copies of the Ohio River charts.

Q. Where are they?

A. They are at your elbow. Those have been certified to by the Chief of Engineers and Secretary of War, as being official copies, taken out of the records of the War Department at Washington.

Q. Have you reference to Chart No. 67, Ohio River, Pittsburgh, Pennsylvania, to mouth, and charts of a similar nature numbered 68, 69, 70, 71, and 72?

A. Yes.

By Mr. Jones:

Q. These, I understand, Mr. Davenport, are the charts and records to which you have referred in answer to the
1839 questions just propounded?

A. Those are the basic data upon which my determinations are based.

(Exhibits 221, 221-A, 221-B, 221-C, 221-D and 221-E, being Ohio River Charts 67 to 72 respectively, were offered in evidence.)

By Mr. Jones:

Q. I believe you stated you used gauge records: Where did you say you obtained the gauge records—that is, the flow of the stream?

A. These are the official records of the lock gauge readings. They are taken from the Huntington office. They were brought here as Exhibits 110 and 111.

Q. Are you of the opinion that they are the best records available to you for your determinations?

A. These are the best records available for me. I consider them to be very accurate. They were taken in the course of their regular employment by regular employees of the War Department engaged upon lock operations. They were subject to check—not check, but subject to observation by the navigators on the river, and, being more or less public and subject to check at the time, they apparently contain very few errors.

Mr. Jackson. I move to strike out that statement. The witness cannot testify as the exhibits were prepared in 1918, and the witness indicated that he did not know about them then.

By Mr. Jones:

Q. Using these charts and lock gauge records, as I understand, you have made computations showing the flow of pool 25, Ohio River, during certain low flow periods?

A. I have done that, or had it done under my supervision.

Q. Supervision and direction?

1840 A. Yes.

Q. What, Mr. Davenport, was the average flow of Ohio River in the part you have referred to where your computations were made for the ten-day period from July 10 to July 19th, inclusive, in 1918?

Mr. Jackson. May it be understood that all testimony with reference to the flow of the Ohio River is subject to our objection as incompetent, irrelevant and as not bearing upon the issues in this case?

The Court. Yes.

Mr. Jackson. And exception noted.

Mr. Jones. As I understand, the Court has heretofore ruled that that evidence is admissible?

The Court. Yes.

A. The average flow in pool 25, as calculated, was 2,700 cubic feet per second.

By Mr. Jones:

Q. Adding this flow to the flow stated by Mr. Pierce in evidence in this case, would that show the combined flow of the Ohio River below the confluence of the Kanawha?

A. Yes.

Q. What was the combined average flow of the two streams, Mr. Davenport?

A. The computed combined average flow of the two streams was 7,735 cubic feet per second, which means that the Kanawha's part was 65 percent of the total, or, in other words, the Kanawha's flow was as great as the flow in pool 25 in the Ohio River and six-sevenths times besides for the Kanawha's flow was 1.86 times as great as the flow of the Ohio in pool 25.

Mr. Jackson. We move to strike out the part of the answer giving the ratios, as not responsive.

The Court. The motion is denied.

Mr. Jackson. Exception.

By Mr. Jones:

Q. Now, Mr. Davenport, using the same data and the comparisons, taking into account the exhibits which you have referred to, will you give us the figures on the nine-day period from July 23 to 31st, 1918?

A. Inclusive?

Q. Yes.

A. The same form of answer that I made before?

Q. Just in your own way, whatever the answer may be.

A. The calculated average flow in pool 25 in the Ohio River for that period was 1,680 cubic feet per second; the combined average flow was 9,045, of which the Kanawha contributed 81 percent or four and three-eighths times as great as in pool 25.

1841 By the COURT:

Q. Where were these readings taken from which you took of combined flows below the confluence?

A. I furnished the flow of 1,680 cubic feet per second. Mr. Pierce testified to the flow of 7,365 cubic feet per second at the mouth of the Kanawha. Adding those together, I get the flow in the main stem below the confluence—that is, adding the flow as it comes out of the Kanawha.

Q. Are there gauges below the confluence?

A. There are gauges at each of the locks below.

WITNESS. I am using the figures Mr. Pierce gave.

By Mr. JONES:

Q. You are making the computation of the flow below the mouth of the Kanawha, and you state that there is a Government dam below the mouth of the Kanawha; what is the distance of the Government dam you refer to below the mouth of the Kanawha?

A. Somewhere around 10 or 11 miles. I do not recall that figure. I have submitted information which caused me to give you the correct figure, but I do not have it here now.

Q. You are using figures which Mr. Pierce has submitted in evidence; do you know how he arrived at those figures?

A. I heard him give the figures.

Q. How did he arrive at them?

By Mr. JONES:

Q. What was his method of arriving at the figures which he testified to, if you know, Mr. Davenport?

A. I am not guaranteeing the accuracy of those statements. As I listened to Mr. Pierce, I gathered he took the gauge readings at Kanawha Falls, in which they had rating curves, and by using that and interpolations as to drainage area and proper run-off,
with the assistance of any gauging stations in the drainage
1842 area below Kanawha Falls, arrived at what would be the
correct discharge at the mouth of the river. That is a brief statement. These are based on the best sources of the U. S. Geological Survey, in making these determinations.

Q. Do you know of any better method of arriving at the discharge of the Kanawha than has been utilized by Mr. Pierce in his testimony?

A. The best method would be to dip it out in buckets and measure each one, but that method was not available. As far as I know that was the best method available at that time.

Q. We may understand your computations are based upon the conclusions reached by Mr. Pierce of the Geological Survey, together with the data which you have obtained from the Engineer's office, for these computations?

A. For the flow in the stream below the confluence of the Ohio and Kanawha

Q. I had asked you about the ten day period from July 10 to 19, inclusive, 1918. I think you said that was 2,700 cubic feet per second. Is that right?

A. Yes, sir.

Q. Had you proceeded to make computations as to the combined flow, if not, I wish you would do so?

A. I covered that period July 10th to 19th, 1918. I believe also from July 23rd to July 31st, 1918. All of these dates are inclusive figures, the same as Mr. Pierce showed.

Q. Will you give us the same data for the eight-day period, August 24 to August 31, 1918?

A. The calculated average flow in pool 25 of the Ohio for that period was 1,210 second-feet.

The computed combined average flow was 5,945 second-feet, of which the Kanawha contributed 79%, or 3.9 times as great as the flow in pool 25 of the Ohio. Practically the same conditions I have noted for the previous period.

By the COURT. Did I understand you to say according to
1843 your understanding, Mr. Pierce's figures of the discharge at
the mouth of the Kanawha were based on gauge readings at
Kanawha Falls?

A. In that neighborhood; yes, sir.

By the COURT. And then computed on a proportionate drainage area?

A. Partially and partly on other gauges they had in the remaining area, from that on downstream, in the remaining drainage area, and their experience as to run-off in low water periods in those areas.

By Mr. JACKSON. You don't mean any gaging stations on the Kanawha itself.

By the WITNESS. The other tributaries, like the Elk River and others.

By Mr. JACKSON. And very few of those?

By the WITNESS. I have been over it in connection with applications for license with Col. Scheidenhelm, but I am not competent at this time to testify as to the exact stations or readings. Did I answer your question, your Honor, to your satisfaction?

By the COURT:

The thought that was running through my mind was after what you had stated, that the discharge at the mouth of the

Kanawha was computed on a proportionate drainage area of readings at Kanawha Falls, there has been evidence in this case by the Government the larger part of the precipitation, the biggest part of the run-off, comes from above Kanawha Falls and in fact above Radford.

A. Yes, sir; that is why I stated they used a proportional run-off for these minor gauging stations in the remaining area. I have forgotten what the area at Kanawha Falls is, 8,000 or 8,300 square miles, and the area at the mouth is 12,200.

He did not take a direct proportion of drainage areas, as I understand, but used these proportions as indicated by the run-off, in the remainder of that drainage area, to arrive at their total figure, because as you stated the ratio for the run-off per square mile is much greater in the Radford area than it is farther
1844 down-stream, and that apparently decreases, the run-off
per square mile decreases, as it comes down toward the mouth, and in other studies involving Federal Power applications for this same company, or its affiliated companies, we have noted somewhat the same thing, that below Kanawha Falls it is very small.

Q. For the purpose of the comparisons you have made, whether Mr. Pierce be correct or not, you have utilized his figures in conjunction with the figures you have obtained?

A. Yes, sir.

Q. Will you give us the same comparison for the eight-day period August 24 to August 31, 1918, or have you given that?

A. I gave that one.

Q. Now take the same data for the eight-day period September 21 to September 28, 1920.

A. The calculated average flow in pool 25 Ohio River, was 2,360 second-feet; the computed combined average flow was 6,310 second-feet, of which the Kanawha contributed 62%.

Q. Now if you please the same information or data from October 8th to October 12th, 1920.

A. The calculated average flow in pool 25, Ohio River, was 3,925 second-feet. The computed combined average flow was 7,960 second-feet, of which the Kanawha contributed over 50%. May I add here the next period covered by Mr. Pierce I have inadvertently omitted from my notes, and if the Court will permit, I will furnish that data.

By Mr. **Jackson**:

Q. Would you mind stating the Pierce figure so I will have it?

A. 4,035.

Q. Supply the same data for the three day period September 19 to September 21, 1923.

A. The calculated average flow in pool 25, Ohio River, was 3,065 second-feet. The computed combined average flow was 5,425 second-feet, of which the Kanawha contributed over 44%.

By Mr. JACKSON:

Q. The Pierce figure was that?

A. 2,365.

Q. Supply the same data for the three-day period September 30 to October 2, 1923.

1845 A. The calculated average flow in pool 25, Ohio River, was 2,125 second-feet. The computed combined average flow was 5,815 second-feet, of which the Kanawha contributed over 64%.

Q. Mr. Pierce's figure was 3,690, was it not?

A. Yes, sir.

Q. Now the same data for the four-day period, October 8th to 11th, 1923.

A. The calculated average flow in pool 25, Ohio River, was 1,330 second-feet. The computed combined average flow was 3,225 second-feet, of which Kanawha contributed over 58%.

Q. And the Pierce figure was what?

A. 1,895.

Q. And the same data for the period October 14th to 25th, 1923.

A. The calculated average flow in pool 25, Ohio River, was 2,420 second-feet. The computed combined average flow was 4,075 second-feet, of which the Kanawha contributed over 40%.

Q. What is Mr. Pierce's figure on that?

A. 1,655.

Q. Now the same data for the six-day period August 24 to 29, 1925.

A. The calculated average flow in pool 25, Ohio River, was 3,105 second-feet. The computed combined average flow was 4,535 second-feet, of which the Kanawha contributed over 31%.

Q. And Mr. Pierce's figure?

A. 1,430 second-feet.

Q. In all instances the subtraction will afford the Pierce figure?

A. Subtraction will in this case. I got mine by addition.

1846 Q. Now as to the seven-day period, September 4 to 10, 1925.

A. The calculated average flow in pool 25, Ohio River, was 1,510 second-feet. The computed combined flow was 2,775 second-feet, of which the Kanawha contributed over 46%. The Pierce figure in this case was 1,265 second-feet.

Q. When you use the words "calculated average flow" you mean taking the readings of which you have spoken, and averaging the figures?

A. Calculated means the flows which we arrived at from the data we had available, and average means over that period, whatever number of days it was.

Q. Now the same data for the four-day period September 13, 1925, to September 16, 1925.

A. The calculated average flow in pool 25, Ohio River, was 1,955 second-feet. The computed combined average flow was 3,125 second-feet, of which the Kanawha contributed over 38%. The Pierce figure for the same was 1,170 second-feet.

Q. And for the eight-day period August 16 to 23, 1929.

A. The calculated average flow in pool 25, Ohio River, was 4,575 second-feet. The computed combined average flow was 8,325 second-feet, of which the Kanawha contributed over 45%. The U. S. Geological figure for the same period was 3,750 second-feet.

Q. You mean the Pierce figure when you say the U. S. Geological figure?

A. Yes.

Q. Supply the same data for the twenty-seven day period August 26 to September 11, 1929.

A. The calculated average flow in pool 25, Ohio River, was 3,660 second-feet. The computed combined average flow was 7,680 second-feet of which the Kanawha contributed over 52%, and
1847 the Pierce figure for Kanawha River flow 4,020 second-feet.

Q. Give the same data for the seven-day period September 24 to September 30, 1925.

A. The calculated average flow in pool 25, Ohio River, was 4,355 second-feet. The computed combined average flow was 7,175 second-feet, of which the Kanawha contributed over 39%. The figures testified to by Mr. Pierce was 2,820 second-feet.

Q. And the same data as to the month of August, 1930.

A. The calculated average flow in pool 25, Ohio River, was 2,050 second-feet. The computed combined average flow was 3,630 second feet, of which the Kanawha contributed over 43%, and Mr. Pierce's figure was 1,580 second-feet.

Q. Take the month of September 1930.

A. The calculated average flow in pool 25, Ohio River, was 2,690 second-feet. The computed combined average flow was 4,020 second-feet, of which the Kanawha contributed over 33% and the Pierce figure was 1,330 second-feet.

Q. And as to the month of October 1930?

A. The calculated average flow in pool 25, Ohio River, was 2,755 second-feet. The computed combined average flow was 3,905 second-feet, of which the Kanawha contributed over 29%. Mr. Pierce's figure was 1,150 second-feet.

Q. Now as to November?

A. For the twenty-seven day period November 1 to 27, 1930, inclusive, the calculated average flow in pool 25, Ohio River, was 3,130 second-feet. The computed combined average flow was 4,915 second-feet, of which the Kanawha contributed over 36%, and Mr. Pierce's figure was 1,785 second-feet.

Q. Take the 119-day period, from August 1, 1930, to November 27, 1930.

A. Summing up these figures, the calculated average flow in pool 25, Ohio River, was 2,640 second-feet. The computed com-
1848 bined average flow was 4,090 second-feet, of which the Kanawha contributed over 35%, and Mr. Pierce's figures for the same period are 1,450 second-feet.

Q. As to the nineteen-day period, October 25 to November 13, 1931?

A. The calculated average flow on pool 25, Ohio River, was 4,560 second-feet. The computed combined average flow was 7,005 second-feet of which the Kanawha contributed over 35%, and Mr. Pierce's figures for the same period were 2,445 second-feet.

Q. And the nine-day period, August [illegible] to 17, 1932?

A. The calculated average flow in pool 25, Ohio River, was 2,985 second-feet. The computed combined average flow was 6,920 second-feet, of which the Kanawha contributed over 56% and Mr. Pierce's figure was 3,935 second-feet.

Q. And the thirty-seven day period, August 25 to September 30, 1932?

A. The calculated average flow in pool 25, Ohio River, was 2,540 second-feet. The computed combined average flow was 4,120 second-feet, of which the Kanawha contributed over 38%. Mr. Pierce's figure was 1,580 second-feet.

Q. And the same data for the twelve-day period October 10 to 21, 1933.

A. The calculated average flow in pool 25, Ohio River, 3,490 second-feet. The computed combined average flow 5,250 second-feet, of which the Kanawha contributed over 33%. Mr. Pierce's figure was 1,760 second-feet.

Q. Take the period totaling 321 days.

A. This summation of all the flows given for the 321 days shows Ohio River 2,805 second-feet; Kanawha River 2,380 second-feet, total 5,185 second-feet. The Kanawha furnished 45.9%, or the flow of the Kanawha was 6/7 as large as the flow of the Ohio in pool 25.

Q. That is a summation of the 321 days you have just given or covered?

A. Yes, sir.

Q. Now will you supply the same data for the four-day period August 1 to August 4, 1930?

1849 A. Might I add the flow which Mr. McWhorter mentioned in his testimony for the ten-day period September 15 to 24, 1932, in which the calculated flow, average flow, in pool 25 Ohio River, was 1,770 second-feet.

Q. Have you answered as to the period August 1 to 4, 1930?

A. No, sir; the calculated average flow in pool 25, Ohio River, was 1,550 second-feet. The computed combined average flow was 2,935 second-feet, of which the Kanawha contributed over 47%, and the flow in the Kanawha at the same time was 1,385 second-feet.

Q. Assuming that the Radford dam had been erected and the flow at that site which formed a part of the 2,935 second-feet, the water was withheld at Radford, what would be the average flow for the four-day period?

A. 2,113 second-feet, a reduction of over one-fourth.

By Mr. Jackson. I object to the question. There is nothing to show the witness knows anything about the flow at Radford.

By Mr. Jones. That is what I am trying to find out.

By Mr. Jackson. He has already answered your question.

Q. Mr. Davenport, the question was, having made the calculation there was a combined flow of 2,935 feet below the mouth of the Kanawha River, and that the Radford dam had been built, that retention of water at the Radford dam, the water was withheld at Radford, what would be the dimunition of the flow in the Ohio River, if any?

A. I answered that the flow would be reduced over one-fourth, to 2,113 feet. The basis of that answer is that Mr. Pierce testified the flow at the Radford dam site for the equivalent period was 822 second-feet.

By Mr. Jackson:

Q. You simply subtracted Mr. Pierce's figure from your total?

A. Exactly.

Q. You used in reaching that conclusion just as you had with respect to your other testimony, the figures testified to by Mr. Pierce?

A. Yes, sir.

Q. For the eight day period August 13 to 20, 1930,
1850 what was the average flow in pool 25, of the Ohio River,
the combined flow in the Ohio River below the junction of the Kanawha, and what would have been the combined flow without the Radford portion?

A. The calculated average flow in pool 25, Ohio River, was 1,470 second-feet. The computed combined average flow in the Ohio River below its junction with the Kanawha was 2,840 second-feet, which would have been only 2,030 second-feet had the Radford portion been withheld, or a reduction of 28% in the combined flow.

By the COURT:

The figures you are quoting are figures you have compiled from the records and gauging stations on the Ohio River?

A. The flows in pool 25.

By the COURT:

You have certain figures which Mr. Pierce testified to, for the accuracy of which you do not vouch?

A. I do not.

By the COURT:

Then from the figures you have and the figures he gave you make certain calculations?

A. Yes, sir.

By the COURT:

Which the Court could make, but you save the Court the trouble. I don't see any objection to that.

Q. Now having in mind the same figures, or rather the same method, what is your data for the seven-day period, September 15 to 21, 1930?

A. The calculated average flow pool 25, Ohio River, was 1,570 second-feet. The computed combined average flow in the Ohio River below its confluence with the Kanawha River was 3,000 second-feet, which would have been only 2,173 second-feet had the Radford portion been withheld, or a reduction of over one-fourth.

By Mr. JACKSON:

Q. In those answers as you did before, will you
1851 give the Pierce figures you deducted?

A. 827 second-feet was the figure I deducted.

By Mr. JACKSON:

Q. For Radford?

A. Yes, sir.

By Mr. JACKSON:

Q. What about the one before?

A. 810.

Q. Those were the Pierce figures for the flow at the Radford dam?

A. Yes, sir.

Q. Now the data for the ten-day period September 26 to October 5, 1930?

A. The calculated average flow in pool 25, Ohio River, was 1,570 second-feet. The computed combined average flow was 2,859 second-feet, which would have been reduced to 1,951 second-feet had the Radford portion been withheld, or a reduction of over 30%. The Pierce figures for the Radford dam site at that time was 908 second-feet.

By Mr. JACKSON:

Q. The Pierce figure was what?

A. The mouth of the Kanawha 1,290.

Q. Now the figure for the ten-day period September 13 to 22, 1932.

A. The calculated average flow in pool 25, Ohio River, was 1,451 second-feet. The computed combined average flow in the Ohio River below its junction with the Kanawha River was 2,705 second-feet, which would have been only 1,935 second-feet had the Radford Portion been withheld, or a reduction of over 28%. Mr. Pierce's figures for the same time, Radford 766, mouth of the Kanawha river 1,250 second-feet.

Q. One other calculation for the period September 4, to September 8, 1925?

A. The calculated average flow in pool 25, Ohio River, was 1,195 second-feet. The computed combined average flow in the Ohio River below its junction with the Kanawha was 2,475 second-feet, which would have been reduced to 1891 second feet had the Radford portion been withheld, a reduction
1852 of 23%. Mr. Pierce's figures for the same time was 584
second-feet at Radford; 1,280 second-feet at the mouth of the Kanawha.

Q. Mr. Davenport, you have stated that among your other duties you had done some work for the Federal Power Commission.

A. I do work in connection with the Federal Power Commission, assigned to the Ohio River Division.

Q. Have you in that work come in contact with the officers or representatives of the Appalachian Electric Power Company on occasions?

A. Yes, sir; or their affiliated or subsidiary companies.

Q. What affiliated and subsidiary companies operate the London and Marmet dams?

A. My recollection is they are operated by the Appalachian Electric Power Company, although the license runs to the Kanawha Valley Power Company and other subsidiaries.

Q. Who is interested in the Winfield dam operation, or has that been completed?

A. No, sir; it has just been started.

Q. What company do you know will have the operation of it?

A. The license is to the Kanawha Valley Power Company. It was natural to suppose the same people would operate it as operate the Marmet and London.

Q. Who did you say operated the Marmet and London dams?

A. As I recall the Appalachian Electric Power Company.

Q. Did you ever have, within recent years, in fact in May, 1936 of this year, a conference or consultation or conversation, with the consulting engineer, Col. Shceidenhelm, in connection with the proposed operation of the Winfield power plant?

1853 A. I have; yes, sir.

Q. Where did the conversation take place?

A. Practically at the site where the Kanawha Valley Power Company is starting to construct the Winfield power house.

Q. And that was when?

A. In May 1936, this year.

Q. Did you interrogate Col. Scheidenhelm as to the proposed operation by the Appalachian Electric Power Company of the Kanawha hydro plants?

A. Yes, sir.

By the COURT. Has the license already been granted to that company to operate those two plants?

A. All three plants.

By Mr. JONES:

Q. Mr. Davenport, this was in May 1936, just two months or more ago, if I understand you, when Col. Scheidenhelm was at the Winfield dam with you?

A. A little over two months; yes, sir.

Q. What connection at that time, or what duties were you discharging in connection with the Winfield dam and what was the occasion of your visit there?

A. I was there as a representative of the Division Engineer. Col. Scheidenhelm was there to meet a representative of the company contractors, constructing the Winfield dam, and they were to effect some negotiations concerning a modification of construction of dam to fit into the plans of the Power House.

By Mr. JACKSON:

Q. You mean at Winfield?

A. Yes, sir.

By Mr. JONES:

Q. What were you doing at Winfield dam?

1854 A. It was a part of my duty to go up to the Winfield dam, and as it happened, this was the time when Col. Scheidenhelm was there to negotiate for his company for some arrangements in construction work between his company and the contractor.

By Mr. **Jackson.** I move to strike out the statement of the witness that Col. Scheidenhelm was there to negotiate for his company. The witness cannot know anything about that. All he can possibly know, if anything, is that Col. Scheidenhelm was there.

By Mr. **Jones:**

Q. Who was present at the time other than yourself, if you recall?

A. Do you mean at the whole conference there?

Q. No; who did Col. Scheidenhelm in your presence interview there that day about the business of the company?

A. A representative of the contractor.

Q. Who was the contractor?

A. The Dravo Construction Company.

Q. How long have you personally know Col. Scheidenhelm?

A. A year or two; I don't know exactly how long.

Q. How often have you met him?

A. At intervals over that time.

Q. Has he had any business at your office?

A. Yes, sir.

Q. How frequently during a period of a year have you seen him and has he had interviews with you?

A. Several times. I am not prepared to state without refreshing my memory as to how frequently.

Q. What was the occasion of Col. Scheidenhelm's visit to you or the purpose of his visit as he disclosed it to you?

A. My contacts with Col. Scheidenhelm have not always been on visits to our office. I remember there were two trips in which he came to the office, that is, in connection with this application for the Winfield license.

I have also met him a few times on the Marmet and London jobs when they were constructing those power plants.

4855 Q. Who, besides Col. Scheidenhelm, if anyone, was negotiating, if you know, for the Winfield license?

A. He was the only one, or he was the chief with whom I had any contact.

Q. What part did you have in these negotiations with respect to the Winfield license?

A. I did most of the engineering work for the division office, or it was done under by direction, in connection with this application.

Q. The application was from what company?

A. The Kanawha Valley Power Company.

Q. Has that contract been concluded for the licensing or for the operation of the dam?

A. I don't believe I understand what you mean by your question as to whether the contract has been concluded.

Q. The license for the operation of it, I mean.

A. The license has been issued by the Power Commission and accepted by the company.

Q. By the company?

A. Or by the licensee.

By the COURT. I do not see the materiality myself. It is provided in the license that the licensee is to pay a substantial sum, is it not?

By the WITNESS. $40,000, plus some other charges.

By Mr. JONES:

Q. In the course of this conversation with Col. Scheidenhelm was he discussing with you the annual charge that should be exacted from the power plant?

By Mr. JACKSON. I object to the relevancy of this evidence.

Objection overruled. Defendant excepts.

A. At what time—you mean in May?

1856 Q. In May, yes, sir; and at previous times.

A. At previous times it had been, but in May——

Q. I don't know whether I asked you before, but I will ask you now, when the license was concluded. Do you know?

A. I haven't that data at hand; no, sir.

1857 Q. It had been concluded, so far as you know, prior to May 1936?

A. Prior to the 15th of May; yes, sir.

Q. In the prior conversation on these occasions in which Col. Scheidenhelm was there, where did you discuss with him, if you did, the terms of license, with respect to payment?

A. In the office of Division Engineer; Corps of Engineers, Cincinnati, Ohio.

Q. Who, if anyone, was with Col. Scheidenhelm at that time purposting to represent the Kanawha Valley Power Company?

A. On those times?

Q. At the time you speak of, in the Cincinnati office.

A. I believe one time he was there by himself, and one or two times he had Mr. Stearns with him.

Q. Is Mr. Stearns an officer of the Kanawha Valley Power Company?

A. I cannot answer that question.

Q. Who discussed and undertook to arrive at the figure, which we will term for a better word, rental, to go into this license?

A. Col. Scheidenhelm.

Q. Now the visit to Winfield, if I understand it correctly, was in reference to installation that was going on there by a contractor, and was it the contractor of the Government, the Contractor of the Appalachian Electric Power Company or the contractor of the Kanawha Valley Power Company?

By the COURT. What is the question?

Q. Now the visit to Winfield, if I understand it correctly, was in reference to installation that was going on there by a contractor, and was it the contractor of the Government, the contractor of the Appalachian Electric Power Company or the contractor of the Kanawha Valley Power Company?

1858 Q. Who was the Dravo Construction Company contracting for?

A. Dravo contracts for the Government, for the construetion of the dam. The Kanawha Valley Power Company had their contractor starting in on the construction of the Power House, within the confines of the Dravo coffer dam, and their work was adjacent and more or less tied in, but there were two contractors there.

Q. Now the Winfield dam project, part of the work was done by the government and part by the licensee?

A. Yes, sir.

Q. You were familiar with the terms of that contract?

A. Of the contract?

Q. I mean of the situation, I withdraw the word "contract".

A. In general, only in general.

Q. And it was at that time, in May, and in that situation that Col. Scheidenhelm had this conversation with you as to which I was about to interrogate you?

A. Yes, sir.

Q. Was it a part of your duty to ascertain what the operation of the London and Marmet dams would be, Mr. Davenport?

Q. What was your answer to that question?

A. My duties did call me there.

Q. Did your duties, relate to the Winfield dam or London and Marmet dams on that occasion?

A. On that occasion they related to the Winfield dam.

Q. Had you expected to meet Col. Scheidenhelm there, or was it just a casual meeting?

A. I went there expecting to be present at the negotiations between Col. Scheidenhelm and the Dravo people.

Q. Col. Scheidenhelm was negotiating with the Dravo people for what, and how were you interested in that, representing the Government? 1859

A. A District Engineer is a designated representative at that place and a division engineer is an official engineer and consequently I was interested in all of the negotiations that took place.

Q. What was the subject matter of the negotiations insofar as you knew, by reason of your being present, between a representative of the Dravo Company and Col. Scheidenhelm?

A. It was in connection with some construction work in which the Government did not have an absolute interest, but only an interest insofar as getting these two parties together, one of them being a licensee from the Government and the other a contractor to the Government.

Q. Then you were there on official duties at a conference between Col. Scheidenhelm and the Dravo people and the licensee was the Kanawha Valley Power Company?

A. Yes.

Q. And on that occasion, it was represented by Col. Scheidenhelm?

A. Yes, sir.

Q. What is the relationship between the Kanawha Valley Power Company and the Appalachian Electric Power Company?

By the COURT:

Q. You say the evidence is abundant throughout the record on that point?

By Mr. JONES:

Q. He can state, if he knows, of his own knowledge, that the Kanawha Valley Power Company and the Appalachian Electric Power Company are affiliated?

A. I think——

By the COURT: He can say whether he understands they are affiliated.

A. All right, I do understand they are, and have made a report to that effect that the Kanawha Valley Power Company is
1860 a subsidiary of the Appalachian Electric Power Company and that they are amply financed, in connection with this discussion we had.

A. I will have to admit I don't know whether they are affiliated or a subsidiary, but they are all in the same organization.

Q. And Col. Scheidenhelm was there representing that interest on that day?

By the COURT. All right then, certainly they have a community interest.

The witness stated he had made a report to his Chief Engineer that in all probability they were amply financed because of their connection with the Appalachian Electric Power Company.

Didn't you say that?

A. Yes, sir.

By Mr. **Jones**:

Q. Do you know Col. Scheidenhelm's signature?

A. Yes, sir.

1861 Cross examination by Mr. **Jackson**:

Q. Mr. Davenport, you are a civil engineer and employed in the Division office in Cincinnati?

A. Yes, sir.

Q. And who are your superior officers there?

A. Officers?

Q. Yes, sir.

A. Colonel Roger B. Powell, Division Engineer; Lieutenant Colonel D. O. Elliott, Assistant Division Engineer, and Captain P. N. Strong, Military Assistant.

Q. Lieutenant Colonel John F. Conklin is Chief of the Huntington District, is he?

A. Yes, sir.

Q. And he has immediate charge of all the dams on the Kanawha River and the Ohio River in the vicinity of the mouth of the Kanawha River?

A. Yes, sir.

Q. How far upstream does his jurisdiction extend, do you know?

A. I believe it runs upstream to Dam 14.

Q. Inclusive?

A. As I recall; yes, sir.

Q. And how far downstream?

A. It includes Dam 28, and I believe, 29.

Q. He has actual direct charge of the operation of these dams, hasn't he?

A. Yes, sir.

Q. You do not personally have charge of or anything to do with the operation of these dams, do you?

A. No, sir; that would follow from your previous question.

Q. When did you go with the Engineer's Office in Cincinnati?

1862 A. In December 1933, on the formation of that Division.

Q. In December 1933?

A. Yes, sir.

Q. Have you been there ever since?

A. Yes, sir.

Q. You said you made investigations and study of low flows on the Ohio River and in the vicinity of the mouth of the Kanawha River. When did you begin those studies?

A. I would have to refer to my records. I believe it was early in 1935 or late in 1934.

Q. Wasn't it late in 1935?

A. No, sir.

Q. When did you complete them, if you ever did?

A. I believe they were completed late in 1935.

Q. And did you make those studies for the purpose of testifying in this case?

A. At that time, no, sir; I never expected to be a witness.

Q. You knew they were made for the purpose of use in this case, didn't you?

A. No, sir.

Q. You did not know that?

A. No, sir.

Q. Who told you to make them?

A. My superior officers, in the course of my duties.

Q. Who was that?

A. Who was the officer—I was designated by Colonel Powell. I don't know that this particular duty was assigned to me particularly. It was part of the duty that had been given to me sometime previously, after the formation of the Ohio River Division.

Q. Do you want to change your testimony as to when you started to make these studies?

1863 A. I told you that, without referring to the records, I would not be sure as to when it was. I have no reason to change my testimony.

Q. Colonel Powell told you to do this, did he?

A. This especial duty?

Q. Yes, sir.

A. It came from the Chief Engineer and, by routing slip, came to me.

Q. Now,——

By the COURT (interrupting.) The study of the river and the compilation of these things?

Q. You testified that these estimates which you have undertaken to make for the Kanawha River, are based upon gauge heights shown in Government's Exhibits 110 and 111, didn't you?

A. Partially; yes, sir.

By Mr. JACKSON:

Q. I said Ohio River—didn't I?

A. There was no argument about your question. There was no argument about the adequacy of your question.

Q. Read the question. [The question is read.] I referred to the Ohio River?

A. Yes, sir.

Q. What other data did you have—these charts [indicating]?

A. Yes, sir.

Q. And what did you learn from the charts—Exhibits 221 to 221–E, that you used in making your estimates?

A. From the charts I obtained the cross-sections and distances on the river.

Q. That is the only purpose served by these Exhibits 221 to 221–E, is it?

A. Water elevations and depths and distances, all is shown—can be obtained from the data printed on these charts.

1864 Q. You gave a good many figures for the estimated flow of the Ohio River at Pool 25, during 1918, did you not?

A. Yes, sir.

Q. And in these, for instance, you included figures for Lock 25—for July—for August, 1918, didn't you?

A. Yes, sir.

Q. And in arriving at those figures, you used Government Exhibit number 111?

A. I believe so.

Q. And doesn't that Exhibit show, on its face, that construction work was going on throughout August, 1918?

A. If it is on there, that is correct.

Q. In making your estimate, did you look to see?

A. I took the gauge figures without regard to the construction work.

Q. You paid no attention to the construction work?

A. No, sir.

Q. In your opinion, does it make any difference if construction work is going on at a Lock where a gauge is?

A. Yes, sir.

Q. It will affect the accuracy of the readings of the gauge, wouldn't it, in relation to the flow?

A. Affect the accuracy of the gauge—no, sir.

Q. It will affect the use of the readings shown by the gauge for the purpose of determining the flow, will it not?

A. Possibly it would; yes, sir.

Q. You know—not possibly—but you know that if you have construction work going on on a river at a lock where there is a gauge, it will affect the readings for a given flow, do you not?

A. Not necessarily.

Q. It certainly will vary very frequently, will it not?

A. Yes, sir.

Q. And you made no allowance and had no means of making any allowance for that?

1865 A. No, sir.

Q. As a matter of fact, all that this Exhibit III shows is one reading of gauge at 8:00 o'clock in the morning?

A. No, sir; each day.

Q. This is each day?

A. Yes, sir.

Q. You had no continuous reading of the gauge at—in August 19, for Lock 25, did you?

A. Every day.

Q. Is that continuous?

A. What do you mean "continuous"?

Q. Continuous recording gauge?

A. No, sir; there was not any there.

Q. So far as this single reading is concerned, there might be wide fluctuation in stage throughout the day, might there not?

A. Yes, sir; that is possible.

Q. Did you observe that you got your lowest estimated flows the Ohio River in 1918?

A. No, I haven't made any study of that.

Q. If it be a fact that your evidence shows that your estimates the flow of the Ohio River for the various times that you have dertaken to testify about, were the lowest in 1918, would that dicate to you that you had been using some unreliable data—ch data that was affected by the construction on the river?

A. Not necessarily.

Q. Would you think that a possibility under these circumances?

A. Possibly?

Q. Yes.

66 A. Yes, sir; that might be possible.

Q. And there might be a good many other things that ould affect that, and you have no means of determining it from is chart [indicating], have you?

A. Other things that might affect the gauge reading?

Q. Yes, sir.

A. That is right.

Q. That is the deduction from the gauge reading?

A. Yes, sir.

Q. For instance, all your figures for 1930, are flows, as I have ted them, of nothing less than 2,050 second-feet—in the Ohio, ove Kanawha, 2,690 second-feet; 2,755 second-feet; 3,130 secondt and 2,640 second-feet—they are much higher than your ures for 1918—wouldn't that very fact indicate to you that ur estimates for 1918 show a substantial error?

A. No, sir.

Q. And for other years, prior to 1930, wouldn't you reach same conclusion, from the discrepancy between these figures 1930 and your figures for earlier years?

A. No, sir.

Q. I read to you, Mr. Davenport, from House Document, No. 306, 74th Congress, First Session, being the so-called 308 Report, of the Ohio River, at page 146, as follows. [Reading:] "The flow of the Ohio River was, in general, lower during the fall of 1930, than it has ever been since records of this nature have been kept," and I ask you whether or not that shakes your confidence in the estimates or computations that you have undertaken to make of the low water flows on the Ohio River prior to 1930?

A. No, sir.

Q. You disagree with the statement in this report of the Army Engineers, that the low water flows in 1930 for the Ohio River was lower than since records have been kept?

1867 A. Not at all; no, sir.

A. (Continuing.) That would not cause me to feel that my earlier flows were—or calculations rather of the flows—were in error. As you may know, from previous testimony, we use the Manning formula for the determination of flow. In low flows, this Manning formula is not—may not give as close results as I would show. However, it is a most accurate method—the most accurate method available for determining flows, with the data and under the conditions which are available for these periods. Now, it is possible that the 1930 flows may have been liberally long in arriving at the figures I have submitted. In 1918, the flow being Open River, would probably give a more exact determination than it would in the pools during the year 1930.

Q. Would it not be fair to say that determination by use of the Manning formula, is simply the best guess you could make with such data as you had at hand?

A. I object to your use of the word "guess."

Q. Mr. Davenport, of course you know that the Manning formula requires the use of a constant?

A. Yes, sir.

Q. And you know that the constant is selected by the Engineer making the computation?

A. Yes, sir.

Q. And that it is selected as a matter of judgment, at best?

A. Yes, sir; or experience either.

Q. And the only way you can check the accuracy of these theoretical computations from the Manning formula, is to actually make the measurements at the point later on and see if that constant you have used is right, by mathematical process?

A. Later on?

Q. Yes, sir.

A. No, sir—the determination of the measurements made
1868 previously—there is no requirement that we make a determination later on.

Q. If you had the actual measurements before you would not use he Manning formula?

A. When this happens; yes, sir. I have no other method as ccurate as the Manning formula for making these computations.

Q. That is because you haven't the data to do anything else?

A. Yes, sir.

Q. You were asked if there was any better method of making determination of stream-flows than the matter of estimates such s made by Mr. Pierce, and you made the fanciful assertion that erhaps one might bail the water out of the river in buckets. on't you know that, if one wanted to make an accurate deterination of stream-flow at the mouth of the Kanawha River, the roper scientific way would be to put gauging stations there and ake concurrent stream-flow measurements, which could be aplied to the gauge readings?

A. If you can devise a method by which you can go back to 918 now or later on and make such determination, I would be lad to see it.

Q. Of course, you could not go back and find that such data or 1775?

A. I would not be able to. I did not search for that.

Q. That would not change the engineering fact, would it, Mr. avenport, that if one were going to take an accurate measureent on stream flow, and not an estimate or computation, the way do it—the accepted way—would be to establish a guaging staon at the place you wanted to know the stream flow, and make a oncurrent stream-flow measurement that could be related to gauge eights?

A. That is a very accurate way to do it and the accepted method.

869 Q. You undertook to describe Mr. Pierce's method—that he took the flow at Kanawha Falls, and then he used the ata at some further down gauge stations of the drainage area elow for 1918, and arrived at a figure for the mouth of the anawha—did you have or use a single gauging station or think at there was a single gauging station in the Kanawha Valley elow Kanawha Falls, upon which he could base an estimate for 918?

A. I believe I said that I was simply giving my expression of r. Pierce's method, as I had gained them.

Q. Don't you know it to be a fact that the only gauging staon down stream below Kanawha Falls in the Kanawha Valley, as on the Cole River, with a drainage area of 375 square miles?

A. I don't know that.

Q. And that was out of a total of 4,000 square miles of drainage ea?

A. I am not competent to answer that; I am not prepared to answer that question. The previous question.

Q. You say your estimates of the flow of the Ohio were from the gauge readings from dam 25?

A. Yes, sir.

Q. How did you convert these gauge readings into stream flow?

A. By the use of the Manning formula.

Q. Give me an illustration as to how you did that. Take a gauge height of 6.3 on the gauge at dam 25, and apply the Manning formula.

A. Are you familiar with what we mean by back water curves?

Q. I have heard the engineers explain it.

A. That is by means of back water curves, together with the cross-sections of the stream we made up from the charts.

Q. You have one figure that may or may not be right, but it is a
gauge height on Exhibit 111 for August 1918. What other
1870 things did you have? What other known facts?

A. The cross-sections of the stream.

Q. Where?

A. Throughout Pool 25, as obtained from the chart.

Q. In addition to the cross-sections, what other known fact did you have?

A. Our experience with stream flow.

Q. What other known fact did you have about the Ohio River—that is, the gauge heights or flow in 1918, on pool 25, which went into your estimate of low water flows, besides the gauge heights and cross-sections?

A. The length of the pool.

Q. What else?

A. Our experience with flows on the Ohio River and other streams.

Q. Did you have a rating curve?

A. No, sir.

Q. You did not use a rating curve?

A. No, sir.

Q. There is no rating curve for Lock 25, is there?

A. There was not any available to me when I had these determinations made.

Q. Did you try to find one?

A. Yes, sir; I have attempted to get all the information possible, and this was the best data I was able to obtain in making these determinations.

Q. It is fair to say that you did the best you could with the difficult and speculative problem given you?

A. Yes, sir.

Q. And you were asked to do it with scanty data that necessarily involved a great many assumptions of judgment as best you could from your experience?

A. I did practically as you say, when I considered all the data of the periods under consideration.

1871 **H. G. GERDES (recalled)**

Direct examination by Mr. THOMPSON:

Q. You have been on the stand before, and have been sworn, have you not?

A. I have.

Q. Mr. Gerdes, please state to the Court whether you have made studies of the economic coordination of steam and water plants in supplying power to large utility plants?

A. I have. I made studies of the economic coordination of steam power plants of different characteristics, of hydro-electric power plants, both storage and river-run, in several areas; of steam and water power plants serving domestic, industrial and commercial loads. I have also studied interconnection of these public utility facilities.

Q. Please name some of the studies you have made?

A. I have made such studies in connection with the power which is presently to be available from the Bonneville project, now being built on the Columbia River, Oregon, and I have also made such studies in connection with the Philadelphia Electric Company system, in Pennsylvania, which contains both a large hydro-electric plant and steam plants.

I have also studied the economics of the interconnection of that system with the neighboring public utility systems in New Jersey and Pennsylvania.

I have made similar studies of the Safe Harbor Baltimore Consolidated Public Utility System and the Alabama and Georgia Power Company systems.

Q. State whether or not these studies involve consideration of the relative economy of carrying peak loads?

A. These studies were made for the Federal Power Com-
1872 mission, and they involved in each case as one of the most
important factors the consideration of the plant or plants
1873 best suited to carry the peaks of the respective system loads.

Q. Have you studied the movement of waves traveling along rivers and similar bodies of water?

A. Yes, I have, for many years. One of my first jobs was to consolidate existing information and correlate data for use in preparing forecasts of flood waves in the Sacramento River, in

California. Later I have had frequent occasion to investigate and study flood and power waves in rivers, among others the San Joaquin and the Sacramento Rivers in California; the Klamath River in Oregon, the Eel, Van Duzen, and Mad Rivers, also in California.

In 1930 I had charge of a tidal hydraulic survey of San Francisco Bay and the lower reaches of the Sacramento River, which involved a very searching investigation of the phenomena of transitory waves moving in that body of water.

This work all deals with the same subject, and the phenomenon of power waves in New River is a specific case of this type.

Q. I hand you, marked for identification "Government Exhibit 223," with this legend on the right-hand corner, "Federal Power Commission, National Power Survey, Principal Generating Plants and electric transmission lines, United States, 1935," and ask you what that is?

A. This is a map, which shows, as the title indicates, the principal electric generating plants and transmission lines, including, among others, those of the Appalachian Electric Power Company and the systems with which it is connected.

The inner circle of the 120 mile radius covers approximately the service area of the Appalachian Electric Power Company and its own transmission lines.

The larger circle of 200 mile radius covers the same territory, and includes the transmission lines and generating plants with which energy is interchanged.

* * * * *

1874 Mr. **Thompson**. If the Court please, we offer this plaintiff's Exhibit No. 223 in evidence at this time.

Mr. **Jackson**. We object to it as immaterial.

The **Court**. Let it in.

Mr. **Jackson**. Exception.

Witness. This exhibit shows the principal transmission lines of the Appalachian Electric Power Company within the inner 120 mile circuit, Cabin Creek, Logan and Kenova Steam Plants on the north connected to the Philo Steam Plant of the Ohio Power Company, in southern Ohio. The Ohio Power Company is an affiliate of the Appalachian Electric Power Company.

By Mr. **Thompson**:

Q. How far is the Ohio from the Appalachian Electric Power Company?

A. Approximately 150 miles from the northern group of the Appalachian Electric Power Company plants. This group of steam plants serves principally the industrial area along the Ohio River.

By Mr. **Thompson**:

Q. Are there minor plants along there?

A. Yes; there are also minor plants. To the south there is shown the Glen Lyn steam plant of the Appalachian Electric Power Company and the Buck and Byllesby hydro-electric plants. still within the 100 mile circle, and reaching south to the Waterville plant of the Carolina Light & Power Company.

Q. Can you tell the Court where the Waterville plant is?

A. It is in North Carolina near the boundary line between North Carolina and Tennessee. As will be shown in a moment, the only substantial energy receipt of the Appalachian Electric Power Company comes over this line, and over the line which is shown on the map reaching from the vicinity of what is labeled Norris dam to Waterville.

Q. I hand you, marked for identification "Government Exhibit No. 224," the legend on it showing the States in which electric service is furnished.

1875 A. This is a map of the service areas of the various utility companies, and its purpose in connection with the present proceeding is to identify more closely and directly the service area of the Appalachian Electric Power Company and the utility companies adjacent to it.

Q. I hand you, marked for identification "Government Exhibit No. 225," consisting of one page, with this statement at the head, "Government Exhibit —, energy transactions between Appalachian Electric Power Company and interconnected systems, 1934," and ask you whether you prepared that, or not?

A. I did.

Q. What does that diagram purport to show?

A. This diagram shows the energy transactions between the Appalachian Electric Power Company and the companies with which it interchanged power in the year 1934, and also shows, for the purpose of illustration, the magnitude, whether large or small, of energy transactions between certain of these other companies and power companies located yet more distantly from it.

Q. You speak of other companies: What other companies do you mean?

A. I have specific reference to the Tennessee Valley Authority, Alabama Power Company and Georgia Power Company.

Mr. **Thompson**. I offer this in evidence at this time—Government Exhibit No. 225.

Mr. **Jackson**. We object to it as immaterial.

The **Court**. Admit it.

Mr. **Jackson**. Exception.

Witness. It will be noted from this diagram that the Appalachian Electric Power Company has a substantial power interchange with its affiliate, the Ohio Power Company on the north——

1876 By Mr. THOMPSON:

Q. Let me ask you about the Ohio Company: Does it have any hydroelectric project?

A. I don't think so—certainly no major one.

Q. It is of steam?

A. Yes; and these energy transactions, shown on this diagram, practically balance out, being in the nature of daily or weekly swings of power between the two companies.

Q. Look down at the Alabama Power Company: Has it, or not, a direct connection with the Appalachian Electric Power Company system?

A. It has not.

Q. How does its power, if at all, reach the Appalachian Electric Power Company?

A. No power from the Alabama Power Company reaches the Appalachian Electric Power Company. These two systems, as is common with public utilities systems generally, or at least to some extent, are operated in parallel; that is, the systems are physically connected together so that the customers living in the border line territory between the Appalachian Electric Power Company and the Tennessee Public Service Company, and between the Tennessee Public Service Company and the Tennessee Electric Power Company, and between the Tennessee Electric Power Company and the Alabama Power Company, may, in each case, receive a somewhat more reliable service, and with this the adjacent companies in each instance may benefit to some degree by the mutual production arising from the pooling of their resources. However, from this diagram it is to be observed that there are two utility companies intervening between the Appalachian Electric Power Company and the Alabama Power Company in addition to a physical length
of some 500 miles of transmission line. This latter fact
1877 alone, if nothing else were to intervene, makes the trans-
mission of power from the Alabama Power Company to Appalachian Electric Power Company economically altogether infeasible.

Q. Now, look at the Georgia Power Company: has it any direct connection with the Appalachian Electric Power Company for transmission purposes?

A. The Georgia Power Company is situated in approximately the same relation to the Appalachian Electric Power Company as the Alabama Power Company. Further describing, you will note from this diagram that, in addition to the physical distance of the Alabama Power Company from the Appalachian Electric

Power Company, these interchanges of power with its nearest connected utility, the Tennessee Electric Power Company, are very minor. The interchanges of the Georgia Power Company with the Tennessee Power Company are also minor, and it may be further stated that, though not shown here, the Alabama Power Company supplies the Georgia Power Company a considerable portion of its power and receives a substantial part from the Tennessee valley on a short term contract.

All of these circumstances taken together render it practically impossible for Appalachian Electric Power Company to receive any substantial amount of power from the Alabama or Georgia Power Company.

Q. I note on there the Aluminum Company of America; what is its situation with respect to the Appalachian?

A. During the year 1934, the principal net power receipt of Appalachian Electric Power Company was 312,000,000 kilowatt-hours from the Tennessee Public Service Company, which has no generation of its own and is a transmission and utility system. Approximately half of this power came from the Waterville plant of the Carolina Light & Power Company, which is shown
1878 between the two circles on the transmission map, and another half came from the eastern end of the Tennessee Electric Power Company systems, being received from the nearby Calderwood plants of the Aluminum Company of America.

I would like to say here that, as is well known, Tennesseee is a long State, and the system of the Tennessee Electric Power Company is pretty well split into two halves, and whereas the Alabama company comes into the western half, this power that we are talking about comes into the eastern half some 200 miles distant.

Q. That is distant from the western half?

A. Distant from the western half. In eastern Tennessee is the Calderwood plant of the Aluminum Company, which company sells to Tennessee Electric Power Company, which transmits to Waterville and sells over the lines of the Tennessee Public Service Company, together with a part of the output of the Waterville plant, a certain block of energy, shown on this diagram, which goes north through Tennessee and Virginia.

Q. State whether or not, if you know, what the situation was with respect to the Aluminum Company in 1934, when it was selling its power?

A. The Aluminum Company, as is well known, makes electricity for its own use in manufacturing, and this block of power sold is a block of what might be called depression or distress power, which is sold at any price obtainable, when its owner or developer is not in position to use it for the purpose for which the plant was.

built. A certain part of the power from the Waterville I believe to be in the same category.

The **Court.** Mr. Thompson, may I inquire the materiality of all of this evidence?

1879 Mr. **Thompson.** One of the questions which counsel asked Mr. Kramer was, "Don't you know that power can be purchased and supplied by the Georgia and Alabama companies to the Appalachian Electric Power Company," and we are trying to show that that situation is practically impossible.

The **Court.** If so, what?

Mr. **Thompson.** So if you have peakload operations, your peakload operations will have to come from the Radford project.

The **Court.** Go ahead.

Witness. Summing this entire matter up, this power is purchased on an energy basis at a very low price of not less than one mill per kilowatt-hour. The terms of the contract are ambiguous, but the price is somewhere between three-fourths of of a mill and one mill, and the entire picture of power received by the Appalachian Electric Power Company is a picture of "temporary convenience, distress, dump and interchange power," as it is variously termed. In other words, not a firm or reliable power supply.

Q. (By Mr. Thompson) And by "firm" you mean dependable?

A. A dependable power supply.

Q. Mr. Gerdes, I refer you now to plaintiff's Exhibit No. 204, and ask you if you are familiar with it?

A. I am. This is a study of the operation of the Radford and Bluestone reservoirs during the dry season of 1930, showing how it is possible to operate the Radford reservoir so as to prevent Bluestone reservoir from fulfilling its function of providing a regulated minimum floor of 2000 cubic feet per second in New and Kanawha Rivers below the dam.

Q. State whether or not it would have been possible to have the Radford reservoir emptied on June 24, 1930, as shown on Exhibit 204?

1880 A. Yes, it would be entirely possible. During the month of May and from June 1 to June 23, 1930, the average flow at the Radford dam site was 1770 cubic feet per second; the hydraulic capacity of the plant was 9,000 cubic feet per second; and assuming there was a storage at Radford on May 1st of 100,000 acre-feet of water, operation of Radford power plant at full load for only 7.2 hours per day would have used up the stream flow and emptied the working storage of 100,000 acre-feet.

Q. By what time?

A. June 24th.

Q. How many days is that?

A. 54 days. That would not be an impracticable operation in any sense.

Q. What do you understand by a "rule curve" in operating a hydroelectric peak plant such as Radford?

A. There is no such thing as a fixed rule in operating a hydroelectric peak plant. From the past records of water supply, there are laid down certain general guides, but the operation of the plant is determined by the supply of water available from day to day and by the demands of the system to which the power plant is connected. Ordinarily either the load dispatcher of the utility company, or perhaps an operating committee of the executive officials most concerned, meet weekly and decide upon the position and sequence of operation of the plants of the company for the week. These plans are flexible, are motivated by a desire to get the most energy out of these plants for the least expenditure of money, and they are changed weekly, and frequently daily or even hourly. It is a continuous business of planning. An electrical storm, or breakdown of system, blowing out a transformer, a circuit breaker anywhere, or a sudden rain—all of these things frequently cause changes in these operating plans.

1881 Q. What would you say as to whether the Bluestone, if operated on a minimum 2,000 second-feet requirement, for the regulation of navigation, would be on a rule curve?

A. Well the Bluestone reservoir is in a different situation, its intent is for use as a flood control and navigation relief reservoir, and in so far as navigation is concerned, the requirements of navigation are known, and are constant, namely a minimum depth of water, and the reservoir can be operated on a fixed rule to provide minimum regulated flow of 2,000 second-feet. That is a requirement known in advance.

Q. Do you know of any rule curve by which the Radford project has been planned to operate?

A. I do not.

Q. You never have heard of one?

A. I have not

Q. Wherein does the proposal for the operation of the Radford project differ with the proposal for the operation of the Bluestone project?

By Mr. **Jackson**. That question is objected to because the witness doesn't know what the proposal for the Radford project is, by his own testimony.

By Mr. **Thompson**. The witness can testify from the proposal of plants, Declaration of Intention, and application for license, as to how he understands this project will be run.

By **Mr. Jackson**. There is nothing to show he knews anythi about the proposed operation of the Radford project.

* * * * * * * *

Q. Have you read the Declaration of Intention in this case, fil by the Appalachian Electric Power Company?

A. I have.

Q. Have you read the application for license?

A. I have.

Q. Have you studied the maps connected with them?

A. I have.

Q. Have you read the hearing before the Virginia Power Co mission on the application of the Appalachian Electric Pow Company for license?

A. I have.

Q. Have you visited the site of this project?

A. I have.

Q. State, from you experience then, wherein you think, if yo do, the Appalachian Electric Power Company project, as propose by the defendants at Radford, will differ, will operate differentl from the Bluestone project?

By **Mr. Jackson**. I renew my objection. It is immaterial wh he thinks.

By **the Court**. Mr. Thompson, what you are getting at, is havin this witness compare the methods of operation at the Blueston project, with the Radford project. Now as to how the Radfor project will be operated in the future must be a matter of conje ture, because no proof of how it has been operated; it is not i existence. I think the witness would have to take into considera tion, if you think it is a matter of willingness or self-determinatio on the part of the Radford project operators, certain condition they have already told the Power Commission they would acced to and carry out.

By **Mr. Thompson**. I would like to know what that is. The have never told the Commission anything about a load curve

By **the Court**. Your witnesses have previously testified, in ef fect, the Radford project will be operated by impounding all th water for long periods of time and releasing it in great waves seriously detrimental to interests below, and that is mere surmis and conjecture on their part it would be operated that way. I a witness is going to testify how a plant will be operated he mus take into consideration all the known conditions and declaration of the parties as to how they intend to operate it. Now as understand it, the defendant here, following its Declaration o Intention and Application for License, tendered one containin certain conditions proposed by the Water Power Commission and that is indicative of the fact that is the manner in which i intends to operate its plant, and we cannot ignore that for the future.

By Mr. **Thompson.** I must say, with all due respect, I cannot go that far. I don't understand they have conceded—they say in their reply letter they will operate under reasonable rules. They didn't say what those rules were or let the commission decide [interrupted].

By the **Court.** Weren't certain conditions imposed in the license?

By Mr. **Thompson.** Yes, sir, but they objected to many of the conditions in the license. They offered to accept a minor part license, but not the major license.

By Mr. **Jackson.** We offered to accede to the conditions regulating flow or discharge as contained in the draft of the minor part license, and as contained in the draft of license last tendered to the defendant.

By Mr. **Thompson.** And in that acceptance they said they would subject themselves to reasonable rules and regulations. Suppose you have that up and down the river—operating on the basis of reasonable rules and regulations—how are you going to regulate the flow of the river so you can regulate it below or control the situation of flood control, with the question of reasonableness left up in the air?

By the **Court.** I can't help but think you are raising a considerable bogey in the idea the Radford project will shut off great volumes of water for long periods, to the destruction of navigation in the stream below, as a practical proposition, because I think you and everyone else would concede the fact if they did that, the Government would go in there and tear out that dam.

By Mr. **Thompson.** I do think that, but the Government can't wait on a situation of that kind to go in and tear out a dam. That is the situation in this case. If we go back to Section 23 here in this application—they are asking for something—and it may be said it is a nonnavigable river, and will not affect navigability, but if it is on a river that is navigable they have to come to certain agreements, and further, under section 23, if they come in and the Commission makes an investigation and finds it will affect certain conditions, then they have to accept certain agreements.

By the **Court.** My objection is this, the witnesses come in here testifying in regard to what their belief is as to how a plant is going to be operated, when the preceding course of events has indicated an intent and willingness on the part of the defendant to operate the plant in a different way.

By Mr. **Thompson.** Can you point to me any point where they agreed to let the natural flow of the river go down?

By the Court. No.

By Mr. Thompson. Did the Deakyne report say they should allow 535 second-feet to go down during certain periods of time, and when conditions below arise the War Department will order them to let all the flow go down? They have not accepted that. If they will come in and agree to let the natural flow of this river go down in low-water times, that is another thing. They have not done that.

By the Court. I don't know all the conditions in the license which were accepted and which were rejected.

By Mr. Thompson. We are putting this witness on as an expert. If they can break him down, his evidence goes out. We are putting him on as we did other witnesses, including Col. Watkins, to show they cannot operate this project economically or successfully unless they operate it as a peak-load proposition, and then we are contending they cannot run it on this average minimum flow of theirs, and I am trying to make the distinction by this witness, the difference between the way the Bluestone would be operated and [interrupted].

By the Court. You are attempting to have this witness state on the witness stand a different manner in which two plants are going to be operated, neither of which have been operated, or are in existence, so he has nothing to go by, except his own opinion and surmises. He ought to have stated to him and take into consideration all known conditions relating to the Radford plant.

By Mr. Thompson. We have introduced in evidence the hearing before the Virginia Commission. He said he had read and studied that. There is a recommendation by Col. Scheidenhelm as to how he thinks this project will be run. Now accepting his statement, as we understand it, we are asking him in view of that, and of the Declaration of Intention, what kind of operation they will have there as compared with the operation down below, and I am trying to bring out for your Honor's benefit a contrast showing one does operate under a rule curve and the other doesn't.

By the Court. I will let him answer.

By Mr. Jackson. I want to make this suggestion. He is asked to make a blind comparison. I think if he is going to be asked to make a comparison, he ought to first be given a hypothetical statement, assuming some kind of operation at the Radford plant, or at least asked how he assumes the Radford plant would be operated, then he could compare that assumption, but now he is asked to compare something no one knows in the record what it is with something else no one knows what it is.

By Mr. **Thompson.** I have asked him if he has read and tudied this Declaration of Intention, the Application for License, the hearing before the Virginia Power Commission, and ll those other documents, and the study of the plans he made imself. I think I have laid the foundation.

By the **Court.** Am I mistaken in believing that somewhere in he negotiation and discussion between this Defendant and the Power Commission some term was discussed with regard to 9,000 cre-feet discharge?

By Mr. **Jackson.** In the draft of the minor part license, and icense last tendered, May 1931, there is a paragraph that specifies what releases shall be made weekly, the discharges, and we have ad that identified, but have not yet had an opportunity to offer t in evidence—our willingness to accept those conditions as to discharge and our unwillingness to accept other conditions, such s recapture, etc.—

By Mr. **Thompson.** Does that go to the crux of the situation? Doesn't that leave the question again up in the air.

By the **Court.** Mr. Thompson, your witness, Mr. Johnson, I think, presented a diagram here. In making up that diagram he did not take into consideration, as I understand it, the release of this 9,000 acre-feet, did he, at the Radford plant?

By Mr. **Thompson.** What he did, as I recall the testimony, was o take into consideration the economical operation of that plant, he most economical operation.

By the **Court.** The trouble is, your witness is testifying here about a condition which apparently will not exist. Now your witnesses are testifying about what the Radford project could do, going to an extreme, in disregard of the conditions in the river below, by disregarding preceding events, and some of record show they have indicated an intention and complete willingness to operate differently, and your witnesses are not taking hat into consideration.

By Mr. **Thompson.** They say they will operate under certain onditions, but when they come in under Section 23, the Government is the one to lay down the conditions.

By the **Court.** And one of those conditions the Government aid down is there shall be released from the Radford project t least 9,000 acre-feet weekly, and they have agreed to do that. Now why is it fair to go ahead with a lot of testimony disregarding that and proceeding on the assumption they are going to withhold all the water and not comply with that condition.

By Mr. **Thompson.** Because they say they will operate on an verage basis, and that average may be above or below, and we on't know what it will be. They say they will do it.

By the COURT. I am talking about evidence based on assumptions, which I think are contradicted by known facts, it detracts a great deal from the weight of the evidence.

By Mr. THOMPSON. We don't ~~know their~~ known facts.

By the COURT. One is they agreed to release this certain amount of water. They agreed to a condition which involved the release, whether regular or irregular, I don't know, of at least 9,000 acre-feet of water a week, did they not?

By Mr. GATCHELL. May I state the first license proposed this 9,000 acre-feet release for a week, that was the license tendered on July 1, 1927. It was for a major project, and was refused by the company. The Executive Secretary of the Commission in 1930 tendered them two minor part licenses, neither of which was authorized by the Commission. He expressly informed them the Commission had not approved the tender of those license. The minor part license was acceptable to the company, and as shown by Exhibit #542 Col. Scheidenhelm wrote to the Commission and said that minor part license contained terms acceptable to the company—he was speaking for the company, and it was on his letterhead, and it is not in evidence yet. The next license, which was considered at all, was a major license, tendered by the New Commission in 1931, and that contained the provision of a daily release of so many acre-feet, 1,150 acre feet. Now, Your Honor will appreciate you may release 1,150 acre-feet in a day by shutting down a plant that has a hydraulic capacity of 9,000 cubic feet per second, shutting it down eight hours a day or more, and then releasing that whole block during the balance of the time, but during the day you release exactly the amount that is prescribed. Now all we are saying is the economical method of operating this plant would call for a certain peak load operation, and that peak load operation may be carried on under the very terms permitted, but the license tendered, even the minor part license tendered in 1930, and never authorized by the Commission, said the releases should be subject to the approval of the Secretary of War and Chief of Engineers, so that in the event this very condition arose, an extremely low period approached, and the company was withholding the water during a part of the day and releasing it for the balance of the day, then the Secretary of War could at that time, without going into Court, could write them and order them to release the water as it was needed, and as to that requirement they have never accepted. There is nothing in the record to show they will accept that requirement the Secretary of War may any day tell them they must send down a certain amount.

By the COURT. Did not they agree to the condition to release 1,100 acre-feet per day?

By Mr. GATCHELL. That was in the minor part license, not authorized by the Commission, Col. Scheidenhelm got for them, the company has never communicated with the Commission, but Col. Scheidenhelm did.

By the COURT. If that 9,000 acre-feet a week or 1,150 a day is released, it will flow down the river to the Bluestone dam and yet the witness comes in with a diagram which does not take any of that into consideration at all.

By Mr. GATCHELL. I don't know that is quite true—this chart is based upon the economical operation of the Radford plant under which they might release exactly the minimum required under that license tendered in 1930, the minor part license; but also bear in mind that under that very license that was tendered they had to submit to the instructions of the Secretary of War with respect to the release of water, and they could shut off their plant entirely for sixteen hours a day, under that license, and under the Virginia license, and not have a drop of water go down past this dam for a long period each day, and could have their peak operations, and that would flow into this Bluestone reservoir. Exhibit #204 is based upon that assumption, which takes into account the approval in the minor part license.

By Mr. JACKSON. I am sure counsel will agree, and if not, on refreshing his recollection, he will agree that the article of the so-called minor part license, whether authorized or not, relative to discharge, is the same as the one in the tendered license, Plaintiff's Exhibit #131, tendered May, 1931, as the letter of transmittal shows, and that provides, in Article 15:

"Whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 second-feet, the Licensee shall, when so directed by the Secretary of War, discharge in each 24 hours the natural flow of the river at the dam site during that period up to a discharge of 1,150 acre-feet. The discharge from the project shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent undue interference with navigation on the Kanawha River."

I don't think there is any change in that from the one in the so-called minor part draft.

Now counsel said it was on that kind of assumption this Exhibit #204 was prepared, which starts with the perfectly preposterous assumption that you enter the low-water season with an empty reservoir and shut off the reservoir entirely from June 23 to August 24, and counsel says that takes into consideration the discharge of 1,150 acre-feet per day, whether peaked or not does not have anything to do with the situation presented by this chart #204. The further preposterous assumption of again emptying the reservoir during lowwater season and shutting it down entirely, would be in the teeth of the consideration counsel now says was taken into consideration in making this assumption.

By Mr. **Gatchell.** All we say is when Col. Scheidenhelm said in 1927 the economical way to operate this Radford plant was on a peak load basis he was right, and this plant may be operated on a peak load basis—the flow of the river is sufficient to supply all the requirements of the Virginia license—it may be possible to shut down this Radford plant for an extended period.

By Mr. **Thompson.** May I add, we put forth this as a possible condition. We didn't say it was a normal situation, but a possible condition. If your Honor will remember I read first of all from the statement of General Taylor, and in it he said they have flows down for an indefinite period, and three times they referred to him as a part of their defense in the answer, so I thought I was well within my rights, and we were taking an indefinite period and expanding that to a period of fifty-four days. Now in addition to that they sought out a license from the Virginia Commission, which permits that to be done. We don't say it will be done every year, but it is a possibility.

By Mr. **Gatchell.** This Article 15 which has just been read speaks of the flow at Lock No. 2. The flow at Lock No. 2 will never fall below that requirement so long as the Bluestone is discharging the minimum prescribed under its rule of operation. As long as they discharge the 2,000, the Radford plant can shut down entirely, and not be required to comply with the terms of that license. This chart takes in exactly the terms of that license.

By the **Court.** That is the condition the Government arrived at itself as that sufficient for protection of navigation.

By Mr. **Gatchell.** On the assumption the company would accept the license.

By the **Court.** And a condition I understood the company acceded to. Go ahead. I think, as Mr. Jackson suggested, when this witness goes to compare the operation of the two plants, he should make us acquainted with the assumptions he is making.

Note.—The following question was read:

Q. State, from your experience then, wherein you think, if you do, the Appalachian Electric Power Company project, as proposed by the defendants at Radford, will differ, will operate differently, from the Bluestone project.

By Mr. **Jackson.** I object to the form of the question. I think he should first ask how he assumes the Radford project will be operated?

Q. I will ask you this. In your opinion, as an expert, is the proposed Radford project of the Appalachian Electric Power Company suited for peak load operation?

1882 A. I will answer that it is.

Q. Can you give an illustration?

A. I will illustrate: The Radford project is a typical storage hydroelectric plant, and I as all others experienced in hydroelectric engineering, would have no doubt in saying conclusively that that plant could only be used profitably to return an income on the money invested in it, if it were employed in peak load operation.

By Mr. JACKSON. I move to strike out the part of the answer undertaking to say what other people experienced in this field would state.

A. May I state that as my own opinion then.

By Mr. JACKSON. I think that would be better.

A. I would like to illustrate: The Radford project is estimated to cost $12,000,000, which for 75,000 KW installed capacity,
amounts to $160.00 per KW. It is well known among
1883 hydroelectric engineers that few, if any, hydroelectric
plants costing in excess of $200.00 per installed KW are at all feasible. I have here the cost of a number of representative hydroelectric plants [interrupted].

By Mr. JACKSON. I object to that, and move to strike out further testimony of the witness about what is well known among hydroelectric engineers. I think he should confine himself to such information as he personally has.

By the COURT. It may be an accepted, known fact in the engineering profession.

A. I have personal knowledge of the cost and installation of a number of hydroelectric plants similar to the Radford plant. These plants are [interrupted]——

By the COURT. Let's not go into anything about the cost of other plants.

Q. What is the average cost per KW——

By Mr. JACKSON. I object to that. [Question read.]

By the COURT. I would permit him to say it was generally accepted in the profession a plant costing more than $200.00 per KW unit of production was not profitable, but I don't want to hear the cost of all the other plants.

Q. What would be the cost on the basis of operation on peak load, or without peak load, at the Radford project, if operated?

A. The Radford project if operated without peaking would have a limit on reliable output capacity of around 16,000 KW. That figure divided into the $12,000,000 estimated cost would show the cost per KW to be $750.00, a figure approximately four times as much as the limit I mentioned. This is a crude illustration, and intended so, to be simple, because one may quarrel with my figure of $200.00 but, in my opinion no one could attempt to justify a plant costing $750.00 per KW. I might also illustrate

1884 on a basis of the annual cost; If your fixed charges are estimated at 9%, operation and maintenance cost at $.80 per KW the total annual cost of operation would be $1,140,000. On this basis, and assuming a capacity value of $11.00 per KW year the annual profit from the operation of the Radford plant using it as a peaking plant with a dependable capacity of 75,000 KW would be $105,000 per year. On the other hand, if it were used as a base-load plant, producing a dependable capacity, or with a dependable capacity of around 16,000 KW, the annual deficit would be $640,000 per year.

Now a more rigorous demonstration and proof could be made, but I think these simple examples ought to be enough.

A. In my opinion it would be extremely absurd to operate the Radford project in any other way than as a peaking plant to supply the variable peak load demands of the power system to which it would be connected.

By Mr. Jackson. I move to strike out the last answer as not responsive to any question pending, but a volunteered argument of the witness.

By the Court. Let it stay in.

By Mr. Jackson. Exception.

By Mr. Thompson:

Q. I hand you, marked for identification Government Exhibit 226, purporting to be a chart with this legend in the lower right hand corner: "Study showing operation of Radford with stream flow conditions as of the week ending Sunday, November 2, 1930, based on load curve, shape proportional to system load reported by Appalachian Electric Power Company for week ending November 3, 1935," and will ask you what that is?

1885 A. This is a chart and represents a study showing operation of a typical week of the Appalachian Electric Power Company after the completion of the Radford project. The load curve shape is taken by proportion from the weekly load curve reported by the Company for week ending November 3rd, 1935, the stream flow year is assumed similar to 1932, which was taken as a fairly representative average year. The system operation was assumed as shown on the exhibit with the upper portion of the peak carried by Byllesby, Buck and Reusens hydroelectric plants.

Q. That is in cross-hatching?

A. That is shown on the diagram by cross-hatching. These plants were deemed particularly suited to carry top peak because of their limited storage.

Q. Who prepared this chart?

A. This diagram was prepared under my direction.

(Exhibit 226 offered in evidence.)

Q. Will you now please describe this chart?

A. The solid white area shown in the so-called subpeak position represents the position that would be assigned to the Radford plant with its large storage capacity and facility for flexible operation.

The base of the load shown unmarked under the curve would be carried by steam plants of the company, and the London and Marmet hydroelectric plants which have no dependable peaking facilities, and also filled-in where available by coal saving kilowatt-hour production from the Byllesby, Buck and Reusens plant, using water, which they were not built to conserve for peaking operations.

Q. What does the Buck, Byllesby and Reusens plant show as to output, as to kilowatts?

A. The top 35,000 KW peak is shown carried by the Byllesby, Buck and Reusens plants with a week's output of 363,000 kw. hours an additional 2½ million kw. hours are available at these
plants, which are not available for peak carrying purposes
1886 because of limited poundage facilities at those plants and
would be used as coal saving kw. hours down on the base load of the system.

The diagram shows Radford starting up on Monday, Tuesday, Wednesday, Thursday and Friday, at 7 a. m. carrying its full load within an hour or almost immediately, carrying a full load at 8 a. m., then carrying practically a full load, 75,000 kw. to 3 p. m., the load then falling off so that at 10 p. m., the plant is closed down. The power output of Radford on this diagram, therefore, for the five days a week, shows up as a trapezoid approaching a rectangle in shape.

It is noted that on Saturday and Sunday the Radford plant would not be operated. These power blocks produced by peak load operation at Radford plant——

Q. Just tell what those are, I mean those power blocks, just describe them?

A. These blocks represent on this diagram, power output of plant. They also show water release by Radford plant. For instance, the vertical height of the block, 75,000 kw., also represents 9,000 second-feet of water flowing out of the plant, the interval between blocks represents a shut-down or no water flowing out of the plant.

The horizontal line, each week day, with an average length of 11 hours, represents a power wave 38 miles long leaving the plant. The interval of 13 hours between blocks, represents an interval, or a river dry of Radford stream flow of 50 miles between waves. The 57 hour shut down from Friday afternoon to Monday morning, represents an interval of approximately 150 miles of New River dry of flow from Radford power plant.

Q. How would those waves, following this chart, compare in their persistency in going downstream with the waves made by Buck and Byllesby in the test of 1930?

A. They would be very much more powerful and persistent.

1887 Q. Now I hand you, marked for identification, Govt. Exhibit 227, with the legend in the right hand corner, Appalachian Electric Power Company, wave study, New and Kanawha Rivers, March 30, and will ask you if you can identify it and tell us what it is?

A. This is a set of graphs or curves showing power waves generated during 1930 wave study on the New River.

Q. How many waves are there?

A. Approximately 18 waves.

Q. I hand you also marked for identification 228 (Govt. Exhibit 143 plus lines) with the legend down in the right hand corner, "New River and Kanawha River Power Waves."

By Mr. Jackson. I notice that the vertical lines are not on this exhibit, or on the copy which you hand to us.

By Mr. Thompson:

Q. On Govt. Exhibit 227 I show you some dark vertical lines and will ask you if you know who put them on there?

A. Those lines were added by myself and they are intended to point out and mark the travel of particular power waves 4 and 10 in the tests of 1930. The same lines continue through Govt. Exhibit (228) 143, as used here.

By Mr. Jackson. I think you had better let the designation Exhibit 228 stay in.

By Mr. Thompson. All right, change the second one to 228 instead of 143.

(Exhibit 227, being identical with Exhibit 513 marked for identification, and Exhibit 228 were offered in evidence.)

By Mr. Thompson:

Q. Now please have reference to Exhibits 227 and 228 and trace the waves therein shown on these charts, down the river.

A. These waves were generated at the Buck and Byllesby power plants on March 15th and on March 21, 1930, being two typical ones of a series of 18 waves, made during those tests.

Wave #4, to which I have reference, first arrived at Radford Dam Site on March 15–16 with amplitude of 4,700 second-
1888 feet and volume of 3,000 acre-feet, fluctuation on the Radford gauge was 2.0 feet.

This wave was traced down the river, arriving at Hinton on March 16–17, at Lock 2 on the Kanawha River, March 17–18.

[would like to say right here that it is necessary to use two
grams here because they are drawn on two different
scales.

39 Lock #2 is shown at the foot of exhibit 227, and is repeated at the top of Exhibit 228. The heavy black line
ces down the trough preceding wave #4.

This wave was traced down the river as shown, amplitude at
ck 2 being 2,800 second-feet, and the volume still approximately
00 acre-feet, showing the persistence from Radford dam site to
ck #2 of 60 percent in amplitude and 100 percent in volume,
ctuation on the Lock #2 gauge 0.6 feet. This same wave was
iced down Kanawha River through Locks 4, 5, and 6, reaching
ck 6 on March 17–18, with gauge fluctuation of 0.3 feet. This
ve also causesd fluctuation on the gauge at Lock 9 of 0.5 feet,
ck #9 being 72 miles from Kanawha River, and only 25 miles
m the Ohio River.

Referring to Wave 10. This was originated at same power
ant, travelled in a similar manner down river, its passage being
rked.

Q. Are you talking about Exhibit 227 now?

A. I am talking about Power Wave #10 which is shown on
vt. Exhibit 227 traveling down to Lock #2.

Q. How is it shown?

A. By a heavy black line.

By Mr. Jackson:

Q. You are pointing to the second one on the right?

A. Yes, also shown on Govt. Exhibit 228.

Q. When you say that, you refer to the third black line to the
ht?

A. The third black line to the right, starting at Lock 2 and
ced down the Kanawha River to Lock #9.

This wave was steeper than #4, at its point of origin and was
orter; that is, the same available pondage was used to produce
higher wave of a shorter duration.

At the Radford dam site the amplitude was 6,400 cubic feet per
ond and the volume 3,200 acre-feet, fluctuation in gauge heights,
2.4 feet.

90 Q. Are you talking now about the wave next in point of
time, I mean the one to the left or the one to the right of
black line you have identified?

A. I am pointing to Power Wave 10, which is the power wave
t to the right or next following in point of time the black
e referred to.

Q. That means to the right of the black line mentioned?

A. Yes, sir.

Q. Your last statement was in reference to situation at Lock #2?

A. Amplitude was 6,400 second-feet at Radford dam site, volume was 3,200 acre-feet, and the fluctuation in gauge height, 2.4 feet. At Lock #2 on the Kanawha River, amplitude was 3,000 second-feet, volume 2,800 acre-feet, and fluctuation on the gauge height was 0.6 feet.

This wave was observed down Kanawha River, through Locks 4, 5, 6, 7, and 9, the observed fluctuation in gauge height amounting to 1.0 feet on Lock #7, and 0.3 feet at Lock #9.

This wave appeared at Lock #9 on March 23rd, having been two days en route from the dam site. The persistence of this wave from Radford to Lock 2 was 50 percent in amplitude and 90 percent in volume.

Q. What is the significance of these experiments of 1930, from the Buck and Byllesby reservoirs in relation to the possible effect upon navigation in the Kanawha River by power waves produced at Radford plant, if operated on peak load, without reference to navigation and for the most successful and economical operation in the interest of the company?

By Mr. Jackson. I object to the question insofar as it calls for this witness to express any opinion as to the effect on navigation in Kanawha River, also because he is not competent to testify on that subject.

By the Court. I thought the question related to the plant below without reference to navigation.

By Mr. Thompson. Without reference by the company to the effect on navigation.

By Mr. Jackson. My point is this. I have no objection to the witness being asked what he thinks would be the relation between persistence of waves that were produced by some assumed operation, and the relation shown by the 1930 experiment, but when there is an attempt to drag in the effect on navigation on the Kanawha River, I think it is improper, because the witness is wholly incompetent to express an opinion on the question of navigation, and I object to the question on that ground.

By the Court. I think he may answer it, and will overrule your objection.

Defendant excepts.

By Mr. Thompson:

Q. Answer the question.

A. It is altogether logical to assume that the Radford project, if built, without the imposition of Federal requirements for coordination with other river users would be operated solely in the interest of its owners, and——

By Mr. **Jackson.** One moment. I move to strike out the answer as not responsive to the question and as an attempt to invade the province of the Court. He is giving an assumption, and he is not competent to testify as to that.

Objection overruled. Defendant excepts.

1891 A. Power waves that would be created at Radford having an amplitude of 9,000 second-feet, and a volume of 8,000 acre-feet, released with a duration of 11 hours out of each 24, appear to me to be at least three times as powerful as waves that are shown in these tests. The persistence of such power waves expressed as a percentage of the Radford wave, should also be much greater in proportion, for the reason that the test waves were both lower in amplitude and shorter in duration than waves which I would expect from the Radford power plant on peak operation. The 57 hour shut down for week-end at Radford would drain the entire New River down to the London pool of the flow from above Radford and would permit passage on the following Monday of Power waves with very little reduction in amplitude or volume.

Now considering the Kanawha River, as it was improved prior to the construction of the London and Marmet dams, I would expect waves with fluctuation of 1½ to 2 feet at Lock 2, and 1 to 1½ feet as far down Kanawha River as Locks 7 and 9.

By Mr. **Jackson:**

Q. When you refer to Lock #2 are you referring to London dam?

A. I said considering Kanawha River as it was improved prior to the construction of the London and Marmet dams. Considering the present set-up, of roller dams and power plants, I would expect a typical power wave, as I have previously described, from Radford, to arrive at the London pool with amplitude of about 7,000 second-feet and volume of about 7,500 acre-feet. The water surface at the London dam could be held fairly uniform by continuous and careful manipulation of the roller gate or power plant or both. The head water in the London pool would fluctuate, and the head water in the Marmet pool, below the London dam would fluctuate, I estimate, 1.2 feet or more; similarly the head water in the Winfield pool just below Marmet dam would fluctuate approximately 1.9 feet or more.

1892 The power wave described would travel relatively unimpeded through London, Marmet and Winfield pools out into the Ohio River.

The pool levels at these respective dams, could be held relatively constant by continuous manipulation of roller gates and power plants. However, the fluctuations occurring in the upper ends of the pools below the dam, together with the resulting currents set up in the navigation channels would be very much more severe than any yet experienced, which have already been the cause of considerable complaint.

By Mr. JACKSON. I move to strike out the answer of this witness in regard to what would be the effect of his assumption on navigation in these pools and upon currents, and the further statement that they would be greater than currents already set up, and also his expression "which have already been the cause of considerable complaint," first, because he is not competent to testify on the subject, and second, it is hearsay.

Objection overruled. Defendant excepts.

By Mr. THOMPSON:

Q. I hand you, marked for identification, Govt. Exhibit 229, entitled "automatic gauge records, London and Marmet, June 15–19–1936," and will ask you what that is?

A. This is a chart taken from the automatic gauge records at London, and Marmet, June 15–19, this year, 1936, showing fluctuations in the London, Marmet and Dam #6 pools, resulting there from the withdrawal of approximately 1,800 acre-feet of water at a rate of 3,600 cubic feet per second from the London pool on June 19th.

Q. Where did you get this chart, marked for identification, Govt. Exhibit 229?

A. This chart was prepared under my direction, and constitutes a direct tracing of the automatic gauge records from the Government gauges at Marmet and the London dams.

(Exhibit 229 offered in evidence.)

A. The upper curve on the chart shows withdrawal of 1,800 acre-feet of water, from the London pool during a period of six hours, at the rate of approximately 3,600 cubic feet per second. It will be noted on the solid line on the middle diagram of the chart, that when these started the withdrawal of this amount of water, it caused the London lower gauge at the upper end of Marmet pool to bob up suddenly, to elevation 590.1, amounting to about 0.7 feet, then to oscillate rapidly down again, then up again, and finally when the power plant use or withdrawal
1893 of water was stopped, to drop below Marmet pool level to elevation 589.3 feet, total fluctuation of about 1.7 feet, following which the gauge rapidly bobbed up and down through a series of oscillations, finally coming to a period of steady pool level some six hours later, at elevation 590.1. The resulting apparent fluctuation in flow ran from 4,600 second-feet to 11,000 second-feet, back to 1,400 second-feet. These rates of flow are read from the rating curve for this station and are applicable to

the condition of steady flow and this apparently extreme variation in flow, I do not believe accurately represented true conditions as records of flow. However, the gauge records themselves attest the variation in gauge heights so that one is forced to conclude that the fluctuations in the gauge are even more violent than fluctuations in flow.

A. (Continuing.) Going down to the lower end, the lower Marmet gage below the Marmet power plant—let me go back—at the same time this fluctuation was going on at the head of the Marmet pool below the London plant, the Marmet pool elevation was being held somewhat closer to a constant level as shown by the short-dash line on the middle graph. Going down to the lower Marmet gage at the upper end of Dam No. 6 pool, below the Marmet power plant, similar large fluctuation in pool level, amounting to in this case about 1.7 feet, was observable below Marmet Dam in the upper end of No. 6 pool. This fluctuation, it will be noted from the chart, was rapid and severe. Now, these fluctuations illustrated here are those from the manipulation of the London pool and from the withdrawal of only 1,800 acre-feet of water, at the rate of 3,600 cubic feet per second, both of which quantities are much smaller than the quantities of flow that would be expected to rise in the London pool as the result of the peak load operation of the Radford power plant. The resulting fluctuations in gage heights, I expect, would be more severe than those here shown.

Q. Are you assuming a full London pool?

A. In the delivery of the power waves from the Radford
1894 Power plant into the London pool, I have assumed that the London pool would be held at a fairly uniform level at the dam gate. However, the capacity of the London pool to receive and store water and smooth out fluctuations from up river power plants is very small in comparison with the fluctuation in flow that may be expected from power waves from the Radford power plant; so, regardless of the operation of the London pool between the limits of 614 and 611, I would not expect the London pool to be able to operate with any marked degree of success as an after bay for the Appalachian Electric Power Company, even if such operation were attempted.

Q. I show you Exhibit 230, for identification, being apparently a photostat and profile of water surface June 16th, 1936. What is that?

A. This is a set of condensed profiles showing five stages in the manipulation of the London, Marmet and Dam 6 pools as these occurred on June 16th, 1936.

Q. Under whose direction was this made?

A. It was made under my direction from the automatic gage records illustrated on Government's Exhibit 229.

(Exhibit 230 offered in evidence.)

Q. Do you care to make any remarks in regard to the question of oscillation referred to there.

A. I would like to describe the chart.

Q. All right.

A. The chart shows in a more direct fashion the fluctuations in pool line given by the automatic gage records previously described.

The first profile shows the condition of steady flow at seven A. M., June 16th, 1936. The water surface in London pool is near normal. The water is flowing through Marmet pool—a small flow at slight slope. The same water is leaving Marmet Dam and flowing through No. 6 pool.

1895 The next profile, reading down the chart, shows the condition after the withdrawal of water from the London pool has started. The London pool has been drawn down .4 of a foot. The slope of Marmet pool is built up as shown. The flow of water from Marmet pool has increased by 3,600 cubic feet per second being withdrawn from London. The slope of No. 6 pool is also built up by the discharge of this water through Marmet power plant, and it is flowing away through Dam No. 6 pool.

The third profile shows the condition or conditions just before the end of the power draft at one P.M. the same day. The London pool has been drawn down. The water surface slope of Marmet pool is still being maintained and the lower Marmet gage still shows the water flowing away through No. 6 pool.

The fourth profile shows London pool drawn down and the withdrawal of water from that pool stopped. The water continuing to flow through the Marmet pool, however, has drawn the London gage below horizontal, the water flowing uphill from London to Marmet for the time being.

Q. What is that due to—the water flowing uphill?

A. An inertia effect. The introduction of water into the Marmet pool is suddenly stopped and the water flowing from Marmet has not yet stopped. The result is that the water flowing is being supplied from the storage in the upper end of Marmet, and, until the stored energy contained in the flowing water in the Marmet pool has been used up, Marmet pool will flow uphill from London to Marmet Dam.

The last diagram, No. 5, at the bottom of the exhibit shows a condition of steady flow resumed at eight P.M., with the London pool drawn down and practically no slope in the Marmet pool. The gage height in pool No. 6—of Dam No. 6 pool has fallen to near its original position.

Q. Assuming the Bluestone project completed and operating and the Radford project completed and in operation, had the Radford project operated on peak loads, state whether or not the
1896 Bluestone will absorb all of the waves that would be made by the operation of the Radford project on peak loads?

A. During portions of some years, when the Bluestone normal pool was full, there would be free water released from the spillway of the Bluestone Dam, and under conditions, power waves from Radford received in the Bluestone pool would be propagated of travel through the Bluestone pool over the spillway and on down the river.

Cross-examination by Mr. Jackson:

Q. In your opinion, power waves from the Radford project would flow through the Bluestone reservoir, assuming its construction and operation—at what rate of flow in second-feet?

A. At what point?

Q. You just answered a question about it, and you ought to know the conditions.

A. What point on the river do you refer to?

Q. I should suppose at the Bluestone reservoir. Maybe you have a different idea about it?

A. When you say "Bluestone reservoir," do you mean above or below, in or out of Bluestone?

Q. You are talking about flowing over the dam.

A. I mentioned the flow over the dam.

Q. At what flow in second-feet do you think they would be wasting water over the dam at Bluestone?

A. I cannot say because the plans for the Bluestone Dam are still being—they are still in a preliminary state, and I have no way of knowing.

Q. Did that give you any difficulty in expressing your other opinion?

A. What other opinion was this?

1897 Q. On what would be the flow through there?

A. No, sir, it did not.

Q. Didn't you study Exhibit 145 and didn't that provide for a maximum hydraulic discharge of 11,000 second-feet?

A. What is Exhibit 145?

Q. That is the Bluestone report?

A. Yes, sir, that is correct. I have looked at it.

Q. If that is true, how much would the flow of second-feet have to be at Bluestone Dam, after it is built, to waste water over the dam?

A. That depends entirely on—it depends on many other things as to the operation of the Bluestone power plant.

Q. You know nothing about that?

A. No, sir, I do not.

Q. Assuming that Bluestone was operated so as not to waste water, it would utilize all the flow of water up to 11,000 second-feet, wouldn't it?

A. That is correct, but in my first answer, respecting which you are questioning me, I stated that, under some conditions. As has been brought out, the plans concerning the Bluestone plant are not fully matured, and I do not deem it material to know exactly what the conditions, or all the conditions, concerning these discharges to Bluestone would be. I think it is sufficient to know, from my general experience as an engineer, that there would be some periods, or some years, when the water level would be at the normal pool level and some small amount of water would be discharged over the spillway or dam at Bluestone. It is not necessary, in answering your question regarding the production of power waves, to know what conjunction of circumstances will bring it about.

Q. Isn't it a fact that, if the Bluestone project is operated so as not to waste water unnecessarily, the only time there could be any possible flow of a wave through the Bluestone reservoir, would be upon the coincidental conditions that the reser-
1898 voir was full and that the flow of the river at the Blue-
stone Dam site exceeded 11,000 second-feet?

A. No, sir.

Q. If it was operated so as not to waste any water?

A. Without going through a hydraulic study of operations of the Bluestone reservoir, which I submit is not practical, in view of the things we do not know, I will say that there may be conditions when the river flow into the Bluestone might be less than 11,000 and still be water above the spillway and waste over the dam.

Q. Why is that—how would that happen?

A. I don't think it is necessary to state that.

Q. I am not asking you if it is necessary, but I am asking you if you can explain that.

A. You would like for me to explain one possible condition that might cause that to happen? There might be any number of conditions to cause it.

Q. Can you give us one, just for a starter.

A. All right. That is what I asked you. Following a period of abundant river flow, there would be a time when the pool level at Bluestone would be above the spillway crest, and during that time, power waves propagated from Radford would go over the dam.

Q. Would these power waves that you talk about from Radford be less than 11,000 second-feet?

A. They would; they would be 9,000 second-feet.

Q. Now, according to page 115, of Government's Exhibit 145, it says [reading]: "A rule of operation was assumed as follows: Full wheel capacity, approximately 11,000 cubic feet per second to be used at times when water was wasting. At other times 10,000 cubic feet per second to be used to draw the pool down five feet, the top five feet of the reservoir being reserved for the reception of freshets."

1899 A. What page is that?

Q. It is page 115. Doesn't that show that it would be drawn down at the rate of 11,000 second-feet being in excess of the Radford hydraulic capacity, until they had drawn down five feet?

A. It states in this report that a rule of operation was assumed. As you know, having read many of these reports, and as I know from having written several of them, it is a preliminary tentative assumption made for some specific purpose.

Q. Accept that assumption in answering the question.

A. That is a brand new question. Literally, following this rule of operation, a power wave from Radford would be carried over the spillway only during relatively brief times before the withdrawal of 11,000 feet per second through the power units brought the water level below the fixed crest of the spillway. However, there is a fairly approximate assumption that we imply in this rule of operation. I don't know to what load the power plant at Bluestone, which is not yet completed, will be attached. That is not yet planned.

Q. I only asked you to assume what is in the reports. I did not ask you to accept the responsibility for the report.

A. Very well. Making the assumption that this rule of operation, which was gotten up, I anticipate, for another purpose, my answer would be as stated.

Q. Mr. Gerdes, will you tell me how the Radford plant would happen to be peaking while there is 9,000 second-feet of flow in the river?

A. I didn't say that.

Q. You were talking about power waves coming to the Bluestone reservoir and in a size that Bluestone could not handle. Tell me whether or not there would be any peaking at Radford, with the flow of the river 9,000 second-feet or better?

1900 A. There most certainly could.

Q. Would there be?

A. Yes, there would.

Q. You think they would be wasting water at Radford?

A. No, sir.

Q. You think that they would be passing it out without using it?

A. Where?

Q. At Radford?

A. No, sir.

Q. Why do you think they would be wasting any water if the flow was 9,000 second-feet at Radford?

A. I don't think so.

Q. What do you think they would do with it?

A. Where?

Q. At Radford?

A. They would be using it.

Q. Running it through the turbines?

A. Yes, sir. You understand, of course, that these 9,000 second-feet at Bluestone may come from other places than Radford very readily.

Q. What proportion of the year would the inflow into Bluestone at 11,000 second-feet obtain?

A. I don't know.

Q. Do you think it would be one-half of one percent?

A. I don't know that either.

Q. Of course, as soon as there has been any drawdown at the Bluestone reservoir, its capacity to absorb incoming waves would be far in excess of any wave that Radford could produce, wouldn't it?

A. As soon as there was a substantial drawdown, yes, sir.

Q. As soon as there was a draw-down of more than a few inches, that would be true, wouldn't it?

1901 A. I don't know how much a few inches in the Bluestone pond is.

Q. You don't even know the surface areas of the Bluestone—what they are?

A. I could look it up.

Q. You were interested in it enough so that you could testify to it on direct examination?

A. I keep figures in my head on ratio and proportion. I leave statistics in the books; there are reports that can be referred to for that.

Q. You have offered in evidence this morning certain exhibits, which I understand you say embody a part of certain studies that you have made.

A. To which exhibits do you refer?

Q. All of them that were offered?

A. That is right. If you will make your question read to all or some; I don't know what you are driving at.

Q. You don't have to know that. Now, this is the third time that you have testified in this case, isn't it?

A. Yes, sir.

Q. And you have made all of these studies since the last time you were on the stand, have you?

A. No, sir.

Q. You have made the greater part of them since then, have you not?

A. I have made a considerable amount since then.

Q. To be perfectly frank, you have done most of it for the matters you testified about this morning, since you were last on the stand, haven't you?

A. I have referred to a good many loose ends and correlated them to make a complete picture of it.

Q. Did you ever operate a large electric power generating distribution system?

A. No, sir, I have not, but I have made what might be
1902 termed critical studies of operations such as would lead
to the supervision and modification and the criticizing of these operations.

Q. Now, Mr. Gerdes, you have testified in considerable detail about the plants of the Appalachian Electric Power Company's system. Do you know how much swing a steam plant of the Appalachian Electric Power Company will take?

A. Define "swing."

Q. In load.

A. By swing, do you mean installed capacity?

Q. How much variation in load will they take?

A. They will take a variation in load from zero to their installed capacity.

Q. That is as much as you know about a plant taking a swing in the practical operation of a utility?

A. Your question is indefinite.

Q. If you don't understand the terminology, I will pass it by.

A. The word "swing" is employed in several ways in conversation. You might define what you mean by "swing."

By Mr. Jackson:

Q. What do you mean by the question as to how much swing a steam plant will take in operation?

A. Do you refer to peak load operation of steam plants? Swing is employed in several senses—there is a swing peak and a swing of load from one plant to another.

Q. Do you know what it means to estimate or state or determine how much swing a group of steam plants operating together will take?

A. Frankly, Mr. Jackson, I don't think you understand the question or the word, or you would not employ it in the sense that you do or appear to do.

Q. Do you understand it?

1903 A. I can read at least two meanings into your question.

Q. I don't doubt that. I wondered if you could answer the ordinary accepted meaning of a swing in a group of steam plants, which may be operating in a system.

A. I will state, as you don't appear to understand the question—a swing is a term employed in conversation among utility operating engineers, and one man may say it was one meaning and another another; and unless one has been associated with a particular group, he might not know the exact meaning.

Q. Now that we have had the benefit of your criticism, will you define both meanings.

A. Any two possible meanings where it might be used?

Q. Yes.

A. A swing peak—would be the maximum instantaneous peak load recorded on the integrating meter, covering or registering all of the demand upon the system of the power company. That is, the instantaneous maximum peak load recorded and known as the swing back. That is used for comparison with the hourly peak, the half-hourly peak, and the sixty minute integrated peak, and so forth.

meter?

Q. You said integrating meter—don't you mean indicating meter?

A. No, sir. I used that word in regard to the summation of the totals of several meters.

Q. What meter would illustrate that for a system?

A. That is another rather loose question. It might be an indicating or recording watt meter.

Q. Would you have one for each station?

A. Yes, sir.

Q. Where is the one that does it for the system?

A. Uusually in the load dispatcher's office. All systems don't have them, but the better run systems do. I am sorry that you are not familiar with it.

1904 Q. Do you know where the Appalachian Electric Power Company has its meter of the kind ou describe?

A. I don't know that they have any.

Q. Mr. Gerdes, I want to direct your attention to Exhibit 226 for a moment.

A. Yes, sir; what is that?

Q. They [indicating opposing counsel] will hand it to you. On this Exhibit 226, you have undertaken to show one method of operation during low water, as I understand it. Is that right?

A. I have undertaken to show one method of operation during non-flood season, this method being selected from my knowledge and experience, as being the one most likely to be used by the Appalachian Electric Power Company.

Q. But, of course, you realize that variations in method of operation to be used are almost infinite.

A. I realize that it is physically possible to operate a plant in infinite number of ways. I also realize that the Appalachian Electric Power Company must operate the plant in a manner essentially similar to the manner that I described, if it is to earn anything on the investment in the plant.

Q. You show on Exhibit 226 the method of operation for Radford, which would be essentially subpeak?

A. That is a term that you displayed here and I thought it was defined——

Q. You accepted that definition, did you?

A. Yes, sir.

Q. And used it in the construction of Exhibit 226?

A. Yes, sir.

Q. And you used it and that is what you mean and what you meant in your direct testimony when you referred to sub-peak?

A. Yes, sir.

Q. I show you, for instance, on Tuesday a peak on October
1905 25th of 407,000 kilowatts. You know on that day that
the peak of the Appalachian Electric Power Company was nowhere near that, don't you?

A. What year are you talking about?

Q. The year that you are talking about, I assume.

A. The year that the Radford plant is completed and the load that the Appalachian Electric Power Company has grown to the point where it could be usefully employed.

Q. Then this has reference—some reference to October 30, 1932, but your chart has no relation to the kilowatt load of the Appalachian Electric Power system June 30th, 1932.

A. Where does it say 1932?

Q. In the lower corner of your chart. Perhaps I should say it has no relation to the load as of November 3rd, 1935.

A. What do you mean—would you mind going back?

Q. Your chart, Government exhibit for identification 226, does portion from the acutal load oft he Appalachian Electric Power Company system for the week ending November 3, 1935?

A. No, sir. It follows the load I anticipate the Appalachian Electric Power Company will have shortly after the completion of the Radford power plant. This load is estimated by direct proportion from the actual load of the Appalachian Electric Power Company for the week ending November 3, 1935, each hours output being increased in direct proportion. The shape of the 1935 load curve embodies the characteristics in the load which can reasonably be expected to remain substantially unaltered and which are used here in the illustration.

Q. Your Exhibit No. 226 shows a hypothetical method of operation for a plant not constructed for a hypothetical load that does not exist and never has existed in the history of the Appalachian Electric Power Company?

A. That is correct. However, the hypothetical load and
1906 other hypotheses you mentioned, are derived from careful
study, and may I say, experienced judgment, and employing the same methods which, in my opinion, the engineers of the Appalachian Electric Power Company would employ, studying the same question. In my opinion, it is the best data available, and the Appalachian Power Company is presumably willing, and I will say it is willing so far to expend $12,000,000 on the Radford plant, upon the results of similar studies made by its own engineers.

Q. Am I right in thinking that if you lengthen the horizontal scale on this exhibit 226, it would make these peaks look different in shape?

A. They would look different in the picture. They would answer to the same description.

Q. They would answer to the figures they assume?

A. Yes, sir.

Q. But the picture shown by the graph would be a much flatter and longer peak curve, wouldn't it?

A. It would appear so in the illustration. However, this shape diagram is one commonly employed by power companies and commissions in representing this sort of data.

Q. As I understand, you say the hatched portions of the tops of the peaks, is the amount of the peaks supplied by Buck and Billesby?

A. Yes, sir.

Q. And Reusens?

A. Yes, sir.

Q. That is on your hypothetical operation?

A. Yes, sir.

Q. Will you look at your peak operation for Monday, October 24, and peak operation Tuesday, October 25, and tell me what is the relation between the amount of peak supplied by these three plants, Buck, Byllesby and Reusens, for these two successive
days?

1907 A. On Tuesday, these three plants are shown as carrying
their full reliable minimum capacity; on Monday they are carrying similar capacity except——

Q. What actual ratio was the capacity you show them carrying Monday and Tuesday?

A. About 3 to 1.

Q. You show them carrying three times as much on Tuesday as on Monday?

A. Yes, sir.

Q. Why is that?

A. Why that is shown in the fashion it is to simplify the diagram, and make it easier to understand.

Q. That is the point; why did you——

A. Let me finish.

Q. All right.

A. The additional power during this week there—an additional 2½ million kilowatt-hours shown were used at other hours, as shown by the note at the top of the exhibit. That power block might have been shown on Monday, below and to the right of the Radford portion of the diagram—that is, between 250 and 300,000 kilowatts and between 12 noon Monday and 10 P. M. Monday. You understand all power plants on the system are operating simultaneously and one is shown on top of the diagram, as a matter of convenience and ease of understanding and portrayal.

Q. The hatched blocks show the amount of power supplied by the plant for peak purposes?

A. Yes, sir.

Q. And they vary as to size?

A. Yes, sir.

Q. I direct your attention to Exhibit 227 and 228. You gave that amplitude of Wave 4 at Lock 2, in second-feet, didn't you?

1908 A. I believe I did.

Q. You can refer to your notes that you used and find it very readily?

A. That is right.

Q. What is it?

A. I believe I said 2,800 second-feet.

Q. How did you arrive at that figure?

A. That was calculated from—not calculated—read off from the respective upper and lower gage heights in the wave shown on Exhibit 227 or 228, I don't remember which. Look at 228, it is a better scale and I suppose I used that.

Q. You read it from the gage heights?

A. Yes, sir; there is a rating curve at Lock 2 and the lower gage has a flow corresponding with it, and this flow difference is the amplitude on the second day.

Q. You took some rating curve and applied it?

A. Yes, sir; the one used by the United States Engineers, I think.

Q. Do you know that?

A. I can refer to the curve.

Q. Don't you know what curve you used?

A. I did not make it; I used it.

Q. Which one did you use, do you know?

A. Yes, sir.

Q. Was it the one of the Army Engineers?

A. May I have that rating curve.

Q. How did you measure the amplitude of Wave 4, at Lock 2, from what base?

A. If you will permit me, I will refer to my notes.

Q. Can you tell me about what base you used?

A. Yes, sir; just a second. Why that was, the amplitude was measured from the crest—between the crest of the average and the preceding and succeeding troughs.

Q. What is your amplitude for Wave 10, Lock 2, on that same basis.

1909 A. 3,000 second-feet.

By Mr. Jackson:

Q. Mr. Gerdes, you testified in your direct that the Radford project, without peaking, would have a capacity of 16,000 k. w.?

A. Yes.

Q. In giving that figure, you gave the prime load carrying capacity without peaking?

A. That would be the prime load carrying capacity as estimated by me during the months of the system peak load, being in the fall, in the months of November and December.

Q. And that did not make any allowance for the capacity of the Radford project, or include any allowance for the capacity of the Radford project, to develop power in addition to prime load carrying capacity, as you have assumed that capacity?

A. I will refer to the calculation on that, if I may.

Q. Don't you remember?

A. My dear sir, I don't remember details of every calculation. You are referring to a detail.

Q. It is not a detail, but the principle of the method of calculation.

A. Do you mind repeating that question?

Q. Will you read the question, please?

A. I did make allowance for the power produced at the Radford project in excess of the prime load carrying capacity.

Q. Is your figure of 16,000 k. w. prime load carrying capacity as you assumed it, or not?

A. Do you mean did I assume what I said?

Q. Read the question, and I think you can understand it.

A. I don't think that makes sense.

Q. Under your assumption, did your figure of 16,600 k. w. represent prime load carrying capacity, or something else?

A. It represents prime load carrying capacity if Radford is operated as a base load plant.

1910 Q. And, therefore, it does not include any capacity which Radford may have to generate power in addition to its prime load carrying capacity?

A. It does.

Q. How much? What is your figure for prime load carrying capacity?

A. Expressed in what? Are you interested in dollars or kilowatts?

Q. Kilowatts.

A. 16,600 is the figure I have assumed as——

Q. Assumed as what?

A. I have assumed that if Radford is operated as a base load plant, it would utilize during an average year, during the months of November and December, a minimum average flow of 2,000 cubic feet per second—that is, operating the plant, taking the river and regulating it, but without peaking it.

Q. I understand.

A. If that flow is used at uniform rate through the Radford plant, it would permit the plant to assume responsibility for carrying 16,600 kilowatt of the system peak.

Q. And that, on your assumption, would have prime capacity, wouldn't it?

A. During that year, it would.

Q. There would be other times during the year when the flow would exceed 2,000 second-feet, and, without peaking, it would produce more than that, wouldn't it?

A. That is correct, but that would not be prime capacity?

Q. I didn't say it would, did I?

A. You appeared to imply that.

Q. Now, you said that, on your assumption of a complete cut-off of water at the Radford dam site over a period of 57 hours,
1911 the river would be drained of all flow for a considerable distance below the dam site before the release of your assumed wave on Monday, and that this would make your assumed wave on Monday go faster; is that right?

A. I did not say that.

Q. Well, repeat what you did say as to the effect of the stream bed being empty, or substantially empty, as you assumed upon the rate of travel of the waves you assumed to be released at the Radford dam site?

A. I did not make the assumption which you have just stated.

Q. Well, did you say that if the flow was cut off at the Radford dam site for 57 hours over a weekend, it would leave the stream below the Radford dam site for a considerable distance empty of the flow coming from above Radford?

A. That is what I said.

Q. Did you say that that condition in the stream bed would increase the amplitude of the waves that you assumed to be released on the following Monday?

A. I did not say it would increase the amplitude of the waves.

Q. Well, what did you say? [Pause.] Do you remember?

A. Oh, yes, indeed.

Q. Please answer the question.

A. I am considering the answer.

Q. You know the answer, don't you?

A. Yes. Do you mind repeating the question? Your colloquy has gotten me off the point.

NOTE.—The testimony for some distance back was then read. Witness: You covered quite a bit of ground. Do you mean what did I say about what? I do not want to repeat all the testimony about the waves.

By Mr. JACKSON:

Q. Read the last two questions to the witness.

A. There is no use in going back over that. You asked did I say so and so, and as to one I said no, and as to one I said yes, and then you asked what did I say: What did I say as to what?

Q. Read the last questions the witness cannot understand.

NOTE.—The testimony was again read.

A. I still do not know what you are talking about. Would you like the reporter to read the question of this morning?

By Mr. JACKSON:

Q. Is that a fair, honest answer?

A. Yes.

Q. You are not able to comprehend that?

A. I am unable to——

Q. Let us start all over again, and see if I can get at what you do understand.

1912 A. You understand if I answer you I am speaking for the record, and I do not want to make a guess at it.

Q. You did testify that, on your assumption that the Radford flow was cut off for 57 hours over a weekend, the river below the Radford dam site would be left without any of the flow from bove the Radford dam site remaining in the channel for a con-derable distance?

A. That is correct.

Q. Now, I asked you whether or not you said that that condition ould result in an increase in the amplitude of the waves which ou assumed to be released at the Radford dam site on the follow-g Monday; you said you did not; is that right?

A. That is correct.

Q. Now, what did you saw would be the effect of this condition ou assumed in the stream bed below Radford dam site after an ssumed cut-off of 57 hours upon the amplitude of the wave as-umed to be released on the following Monday at that dam site?

A. The fact that the flow at Radford was cut off for a period of 7 hours would entirely drain out of the river below, all the way own to the London pool, the water that had been released from adford the previous week, and would leave the river in substan-ially the position of carrying the water only from the remainder f its shed. Then, there being no trough or tail of the preceding ave for it to impinge upon, the first wave released from the Rad-ord plant on Monday would travel to the London pool and beyond ith a greater effect than would the waves released during the ntermediate days of the week.

Q. Well, when you say it would travel with greater effect, do ou mean it would travel with greater amplitude?

A. It would reach the London pool with greater amplitude and I believe volume.

913 Q. Do you mean also it would reach there more quickly?

A. I did not so say.

Q. Don't get nervous. I am just asking you.

Q. I am not nervous. Do you mean whether it would reach here more quickly?

Q. In your opinion?

A. I don't say there would be any substantial difference in the me of travel.

Q. What, in your opinion, is the effect, if any, of a relatively ry stream bed upon a wave discharged or initiated upon such stream bed in comparison with a wave discharged upon a sub-tantial base flow, so far as dampening out is concerned?

A. A dry stream bed would have a relatively larger dampen-g and dissipating effect upon a power wave than a stream bed ntaining a substantial flow. However, I have considered that my previous answer, and the fact would be that for the greater ortion of this travel the Monday wave released from the Rad-rd plant would be traveling not on a dry stream bed but on stream bed containing a substantial flow of water.

Q. Mr. Gerdes, you expressed an opinion that there would be certain fluctuations in the London and Marmet pools as the result of the release of the power wave assumed by you at Radford; am I right in understanding that, in giving this testimony, you did not assume the use of the London pondage? [Pause.] Can you answer the question, Mr. Gerdes?

A. Oh, yes; indeed.

Q. Please do so.

A. My original estimate was predicated upon the assumption of a substantial uniform pool level at London, inasmuch as the pondage now being utilized there is being so used under a revokable permit. However, the pondage at London is so 1914 small in comparison with the volume of the power waves which may be expected from peak load operation of the Radford power plant, that in my opinion no substantial or material difference would result if the London pondage were utilized in an effort to check this power wave.

Q. Regardless of your opinion about that, you did testify that you were assuming that the London pool was held steady, didn't you?

A. Was held reasonably steady.

Q. And, regardless of what difference it would make, your testimony was, therefore, based upon the assumption that the London pool was not used for pondage, wasn't it?

A. My testimony was based upon my experience and opinion, as I have stated.

Q. Will you please read the question?

A. My testimony this morning was based upon that assumption. My testimony now is, as I have stated, it makes no substantial difference.

Q. I want to get the basis of your assumption.

A. My understanding is that a change in condition to affect a change in results must be material and important.

Q. Now, you testified in this connection, Mr. Gerdes, that, on your assumptions with reference to waves at Radford, under present conditions, there would be a fluctuation of 1.2 feet at the head waters of Marmet pool at the London dam; is that right?

A. I said there was approximately 1.2 feet.

Q. The figures you give there deal only with the upper end of the pool in question?

A. That is correct.

Q. At the foot of the dam above the particular pool?

A. That is correct.

Q. I now want to direct your attention a moment to your Exhibit #229. You testified that in part this was a tracing from the record of an automatic recording gage, I believe?

1915 A. You have reversed my statement. I believe I testified this is part of a record, all of this is part of a record of an automatic recording gage.

Q. It was traced from the record of an automatic recording gage?

A. That is correct.

Q. Are you testifying everything on Exhibit #229 was traced off the record of an automatic recording gage?

1916 A. No, sir, but the graphs of the water surface were traced from the automatic gage.

Q. By that you refer to the three solid lines running across the exhibit?

A. And one dash line.

Q. Now all of these figures that appear on the chart, were they placed there by you?

A. That is correct.

Q. Take your figure of 11,000 c. f. s. how did you get that?

A. That was read from the rating curve for the gage at the upper end of the Marmet pool.

Q. Is that your best judgment of the discharge at that point, at that time?

A. No, sir, it isn't.

Q. What did you put it there for?

A. To indicate what the rating curve showed.

Q. You knew if the rating curve were interpreted as showing that it was misleading, did you not?

A. It would be misleading without an explanation.

Q. It would be misleading if it was assumed to show a flow of 11,000 second-feet, would it not?

A. I testified fully as to that this morning.

Q. Why didn't you explain it on your chart?

A. Because I expected to testify regarding it.

Q. Will you give your explanation of why you put 11,000 second-feet there?

A. To show that the fluctuation is more severe than one would calculate in a power wave study, to show the actual fluctuation is more severe than one would calculate in a power wave study, as the one made here, and which I described—this exhibit indicates
that when the water is placed in oscillation and goes freely
1917 up and down in the Marmet pool that just as described by
Col. Watkins, the results are even more than expected from a calculation—that is something you would not want to testify to without seeing it.

Q. What rating curve did you take that from?

A. One introduced as an exhibit.

Q. Tell me which one, please.

A. This one—Government Exhibit #117-a, labeled "London lower pool with Marmet in place."

Q. One of the curves testified about by Mr. Winn and Mr. Teeter?

A. I believe it was one of them.

Q. Don't you know that curve even if it were accurate, could only be used when the lower end of the Marmet pool was at the stage of 590?

A. That is correct.

Q. And it wasn't at that stage when the reading on the gage occurred from which you undertook to apply the curve?

A. I will refer you to a chart here, it refers to the London pool at that level, at that time.

Q. Does it show it above it?

A. A matter of 1/10 of a foot, not material for this purpose.

Q. Now you have another item of zero c. f. s. where did you get that?

A. That is at the dip of the fluctuation that went downward, that is, if my right hand is at the London dam and my left hand at the Marmet dam, between them is the Marmet pool. When the water was flowing from London to Marmet it flowed from right to left, and when the water was cut off it oscillated in the Marmet pool once downward to the right, that is, the place to which you referred, zero c. f. s., then upward again, and then downward again, and upward again, and downward again, and then upward, finally to a state of rest.

1918 Q. Now would you mind telling me how you got the zero c. f. s. flow?

A. That zero c. f. s. relates to the fact at that point the level of the Marmet pool at the London dam was below the crest of the London dam.

Q. Did you read that off of any rating curve?

A. No, sir.

Q. You just assumed that?

A. That is assumed from my judgment and experience.

Q. Just from your general experience?

A. There might have been a flow out of the London power house at that time. The zero c. f. s. is primarily put there to point out the fact that on the rating curve which is the condition for steady flow, that point represents an impossible condition.

Q. In fact, you don't know anything about the flow, but just put down zero anyway?

A. I put that down to point out the extreme oscillation of the Marmet pool.

Q. Did that have due regard to the flow in second feet to show the extent of oscillation?

A. Would you like me to describe the oscillation?

Q. I would just like for you to answer my question.

A. The engineer who plotted that curve, under my direction, pointed out this downward oscillation and said "this represents an impossible condition, what shall I do," and I said "call it nothing" and that is what we called it.

Q. That is the way you got the figures shown on Exhibit #229?

A. That points out that oscillation represents an impossible condition, for the state of steady flow in the Marmet pool.

Q. You have another figure, 1,400 second-feet, how did you get that?

A. That was derived from the same rating curve.

1919 Q. Plaintiff's Exhibit #117-a?

A. That is right.

Q. Referring to this so-called oscillation, you have been describing, and also to your Exhibit #230, at four o'clock in the afternoon of the 6th, you showed a dip of about $\frac{7}{10}$ of a foot.

A. That is correct.

Q. That is below pool level?

A. That is correct.

Q. That would be inaccurate as a measurement of the dip below the pool surface that synchronized with that dip, would it not—look at your exhibit #229?

A. I wouldn't say it was inaccurate. I would say the $\frac{7}{10}$ of a foot is measured from the normal pool elevation of the Marmet pool.

Q. And not the actual water surface that prevailed at that coincident time at the Marmet pool?

A. The Marmet pool at that time was in a state of oscillation, the summit of the oscillation may have been, and I wouldn't be surprised if it were, at some intermediate point in the pool between the London and Marmet dams; the automatic gage record at the Marmet dam shows that at that instant the water surface in the Marmet pool at the Marmet dam was some $\frac{2}{10}$ of a foot below the normal pool level.

Q. Turn to your Exhibit #230, the fourth figure from the top, which is intended to represent this four o'clock oscillation, the middle column shows the Marmet pool or elevation of the dam is above normal elevation, instead of below, doesn't it?

A. Apparently so, it appears that to correspond with Exhibit #229 it should have been drawn to a point $\frac{2}{10}$ of a foot lower.

Q. Should have been drawn more than $\frac{2}{10}$, should it not?

1920 A. I should say $\frac{2}{10}$.

Q. On your Exhibit #230 you have shown it above the normal elevation instead of below, haven't you? That is, the lower end of the Marmet pool.

A. Yes; it is a matter of some hundredths of a foot above, as shown on Exhibit #230, and without checking it, it appears it should have been drawn to a point 2/10 of a foot below the normal elevation of the Marmet pool, however, that is not material, or if material, I invite you to show in what way it is material.

Q. What was the rate of withdrawal from the London pool, as shown from your Exhibit #229?

A. Average 3,600 c. f. s.

Q. How did you find that out?

A. By taking the draw-down and applying the capacity of the London pool.

Q. What is the capacity of the London pool?

A. Approximately 900 acre-feet per foot.

Q. Can you tell me the area at elevation 614?

A. It is somewhere between 900 and 1,000 acres.

Q. Can you give me the areas for elevations 613, 612 and 611?

A. The area at 611 is in the vicinity between 800 and 900 acres.

Q. Don't you know what it is?

A. Not to a gnat's eyebrow. That is close enough for this purpose.

Q. That is your familiarity or as close as you have gone or close enough for your purposes for estimating the discharge?

A. Calculating the discharge.

Q. Now, Mr. Gerdes, what was the rate of change of inflow at the foot of the London dam?

1921 A. Into the London pool at the foot of the Marmet dam?

Q. Into the Marmet pool I said at the foot of the London dam?

A. If I understand your question correctly, the draft on the London pool indicates that the increase in flow through the London dam or power plant was 3,600 second-feet during the time I have described.

Q. Is that the rate of change of inflow into the Marmet pool?

A. I have made a valiant effort to answer your rather obscure question. I will have to ask you to redefine it.

Q. Will you tell me what was the rate of change, which involves time, doesn't it?

A. It would appear to.

Q. What was the rate of change in inflow into the head of the Marmet pool at the London dam?

A. Well if you wish to make your question more clear you might say between what times?

Q. Suppose you tell me what was the rate of change of the inflow into the Marmet pool below the London dam, which you assumed to cause the fluctuations shown on your Exhibit #229?

A. At what time?

Q. That would be the middle graph. Just before and around noon of the 16th of June, 1936.

A. The increase in flow through the London dam or power plant between approximately 8:00 A. M. and 2:00 P. M. on June 16, 1936, was approximately 3,600 second-feet. I thought I said that once before.

Q. What was the rate of change in inflow—what rate did the change in inflow increase per hour?

A. As far as can be determined from this graph it didn't increase at all, it started out with 3,600 and with one interruption around noon time, and then resumed shortly after
1922 twelve o'clock and kept it up until about two P. M. when it quit.

Q. Do you know on the days covered by your chart Exhibit #229, what was the rate of change in discharge at the foot of the London dam and into the Marmet pool?

A. Your question is not clear.

Q. Do you understand what is meant by rate of change in inflow?

A. The varying rate of flow is what rate of change implies.

Q. Any variation in flow, that might be an increase of 500 second-feet per hour, or 1,000 second-feet per hour, might it not?

A. As shown by this curve, the rate of change as you just defined it, wasn't much. The figure I gave you of 3,600 second-feet is derived from this drawn-down curve, and it appears the rate of flow out of the London pool into the Marmet pool wasn't far from that during the entire period. By not far from that I mean if it did depart from it, it departed either not much in amount or if greatly in amount for a short time only.

By Mr. JACKSON:

Q. Would you look at your exhibit 229 and tell me whether or not if your figures were right for the forenoon on the 16th you would not show a rate of change of around 6,000 second-feet an hour, being the difference between your figures, 4,600 second-feet, before you show the upward curvature of the curve, and your figure of 11,000 second-feet at the top of the curve.

A. If your figures are right for before noon——

Q. You would not show a rate of change around 6,000 second-feet, or doesn't your chart, if your estimates of flow are right, show that in about an hour before noon on the 16th the increase in flow was around 6,000 second-feet?

A. The figures 4,600 second-feet and 11,000 second-feet, shown on the middle graph, Exhibit 229, indicate from a reading 1923 of the rating curve for the lower London gauge an apparent fluctuation of 5,400 cubic feet per second.

Q. 6,400, is it not?

A. That is right, 6,400 cubic feet per second whereas, the drop in the upper curve indicating draft from the London pool was computed to show approximately 3,600 c. f. s.

Q. Average throughout the period?

A. That is right.

Q. Now have you finished your answer?

A. Yes.

Q. Mr. Gerdes, are the fluctuations in the upper end of such pool a function of rate of change in the inflow and the rate of change in stage, or not?

A. By fluctuations do you refer to rapid fluctuations such as these?

Q. I refer to what you have been talking about as oscillation in the upper end of the pool.

A. If you refer to these fluctuations in the upper end of Marmet pool they are functions not only a change in flow, but also of the physical dimensions and contour of pool, its relation to length, to width, and its depth, in other words, to more simply express it, how freely the water will slosh around in the pool.

Q. I asked you whether or not these so-called oscillations are a function of the rate of change in the inflow, or not?

A. The oscillations themselves——

Q. Just tell me yes or no and I will accept your statement.

A. It is not one of those kind of questions. Oscillations are functions of the rate of change of inflow to the pool among other things, but there are numerous other factors which may affect them, perhaps more important than the one you have mentioned, but the one you have mentioned is one that affects them.

1924 Q. Are these oscillations also, in part, function of rate of change in stage at the head of the pool?

A. The rate of change in stage as well as the stage itself in this case appears to be caused, in part, by these oscillations.

Q. Read the question. [Question read.]

A. The last answer is still good.

Q. Will you state whether in your opinion these oscillations at the upper end of pool are, or are not, in part a function of the rate of change in stage at the upper end of pool?

A. If you want a literal answer, I would say no. If you want any explanation of it, I will say that the rate of change in stage is in part a function of the oscillation.

Q. As I understnad it, these so-called oscillations or fluctuations in levels shown on Exhibit 229 were caused by operation of the power plant at London and Marmet?

A. I have no record here of operations of the Power Plant. They were caused presumably by operation of power plant but they may have been caused by manipulations at the dam.

Q. In any event they were caused by either manipulation of the power installation or the gate at the London and Marmet dams?

A. That is right.

Q. You testified that in your opinion the wave which you assumed would be produced by operation of the Radford project, would be worse than the wave shown in the 1930 test? Will you state briefly the basis of your assumption?

A. My conclusion was based upon my study of the 1930 waves, and the circumstances of the test and upon my knowledge and experience on river hydraulics.

Q. I am afraid I did not make myself clear. I was not wanting you to state what you assumed to be your qualification for your opinion, but I wanted you to state the fact that you assumed as a basis for the conclusion that the Radford wave, assumed by you would be worse than 1930 wave. I want to know what kind
1925 of a wave did you assume at Radford?

A. The wave I described in connection with my exhibit.

Q. Just tell me briefly about that?

A. The exhibit showing operation of Radford during typical week, Government Exhibit 226.

Q. Did you assume a wave with amplitude of 9,000 second-feet and duration of 11 hours?

A. That is correct.

Q. And volume of 8,000 acre-feet?

A. That is correct.

Q. That is, this was based upon your assumption that the Power Company would operate the Radford project so as to produce waves of those characteristics. Is that right?

A. That is correct.

Q. And you assumed that method of operation regardless of the season of the year or any other condition?

A. I did not.

Q. What variation did you make in your assumption of facts?

A. I made the study which is embodied in Exhibit No. 226, to show according to my best judgment, and from my experience and knowledge of the operation of public utility hydroelectric plants, in connection with the systems of those companies, what would be the best way viewed from the standpoint of the company, to operate the Radford Power Plant, and I have described that operation.

Q. The point I am getting at is regardless of why you assumed it, you did assume that the Radford plant would be operated so as to discharge waves with the characteristics stated by you a little while ago?

A. That is correct.

1926 Q. And that was the basis of your conclusion, that the effect of those waves, would, as you described it, be worse than the effect of waves in the 1930 wave test?

A. That is correct.

Q. And you assumed there were no considerations to deter the defendant from operating the Radford project in that way?

A. I may have misunderstood your last question. This method of operation shown on this typical low diagram, exhibit 226, I believe, I stated on my direct testimony, if not, if you wish I will state it now, that this represents typical operation during the greater part of the year. During flood season or during short periods when there was water available 24 hours a day, or substantially so, equal to the capacity of the Radford Power Plant, it would, of course, during these relatively brief periods operate in an auxiliary capacity of saving whatever fuel might be saved by utilizing this otherwise waste water.

By Mr. JACKSON. I move to strike out that statement of the witness and I will ask him to answer the question I asked, because I am sure he cannot remember it after making that long statement.

A. That were being produced, this 9,000 second-feet wave?

Q. Yes.

A. In my opinion——

Q. I am just asking you what you assumed, and not for your opinion.

A. I assumed and in my opinion there are no present considerations to deter the Appalachian Electric Power Company from operating the Radford project in that way.

Q. Now I want to direct your attentiton to Govt. Exhibit 228. Have you got it before you?

A. Yes.

Q. Does Exhibit 228 show all of the maneuvers of the movable dams?

A. I have not checked to see whether it shows all maneuvers, but I have checked it as to waves concerning which I testified.

1927 Q. You introduced the exhibit and don't you know whether it shows all movements of the movable dams, or not?

A. If you wish I will read the maneuvers of the movable dams at this time.

Q. I asked you if it shows all of them?

A. I don't know whether it does at this time.

Q. You don't know whether it does, or not, do you?

A. I don't recall at this time.

Q. You never did know, did you?

A. Yes; I think I did know.

Q. When did you know it?

A. Sometime in the past.

Q. When?

A. I did not record the dates.

Q. How did you find it out?

A. By reading the record of maneuvers.

Q. Where did you read the record?

A. In the report of the United States Engineer Department where they are kept.

Q. Where are they?

A. I think I have them right here. Would you care to have me read these maneuvers?

Q. No.

A. Then you are satisfied now, all right, I have here a copy of the record of the maneuvers to which you refer.

Q. Let me ask you this question, why does not your exhibit show all maneuvers of movable dams and why are some of them omitted?

A. I don't know whether any are omitted. If any are omitted it is because it was not pertinent or material to the purpose for which the exhibit was used.

Q. Will you produce the record of maneuvers?

A. Yes, sir; with pleasure.

Q. Just show them to me.

1928 A. Just wait over there and I will hand them to you.

Q. The sheet you have in your hand, is that the record?

A. If you don't mind, I will look at it to be sure of myself. (Witness examines record.) Yes, this is the record.

By Mr. Jackson. The witness has produced a sheet of paper bearing at the top the title "maneuvers of dams on Kanawha River during wave test, 1930," and I will ask to have it marked Defendant's Exhibit 543 for identification.

(Exhibit 543 marked for identification.)

Q. This paper which the reporter has just marked Defendant's Exhibit 543 is a record of the movable dams during the test of 1930?

A. I understand it to be so.

Q. You got it from the official records of the Government, didn't you?

A. From the engineer's office.

By Mr. THOMPSON. If your Honor please, that is an officia document and we do not care to have it left here.

By the COURT. Is it a part of the original record?

By Mr. THOMPSON. The engineers tell me it is a part of th original record.

By the COURT. They are entitled to a copy of it, but I do no think the original record should be put in here. You had bette have typewritten copies made of it.

By Mr. THOMPSON. What is Your Honor's pleasure about it

By the COURT. I think that typewritten copies should be mad of it and left here.

By Mr. JACKSON. Mr. Gerdes, defendant's Exhibit 543 fo identification is a photostat, is it not?

A. If you will let me look at it, I may be able to tell you (Witness examines Exhibit 543.) Yes, this a photostat.

Q. Cannot you say now from your examination of Exhibit 54 for identification that the movements of the wicket dams are no all shown on your exhibit 228 or exhibit 143 either?

1929 A. I don't see why I should guess at it. If you will le me compare it, I might be able to tell you.

Q. Mr. Gerdes, did you from your examination of defendant' exhibit 543 for identification, determine whether exhibit 22 showed all manipulations of the wicket dams?

A. I have checked it and I find that not all of the manipulations of the wickets during this period are shown on exhibit 228

Q. Only two are shown near the upper half and somewha to the right of center?

A. That is correct. However, I find, on a recheck there ar
no manipulations which would have any material effec
1930 on power waves four and ten, which were the ones I wa
chiefly interested in.

Q. Now, Mr. Gerdes~~, will~~ you tell me what was the amplitud of wave #4 at Lock #9, in second-feet?

A. Did I give that? on my direct testimony?

Q. I am not sure.

A. All right, then I will check it. I did not give you th amplitude of Wave #4, at Lock #9.

Q. Can you do so?

A. No; not from the data I have at hand here.

Q. Can you give me the volume of wave at Lock #9?

A. Not at this moment.

Q. Was there any effect at Lock #9 from Wave #4?

A. There was.

Q. What was it?

A. Gauge fluctuations of .5 of a foot.

Q. Isn't that amplitude of the wave in feet?

A. It is in feet. I understood you to ask the cubic feet per second.

Q. I also asked for it in feet. You have in your hand what you said was an official report from the U. S. Engineer Office.

A. May I correct you. It was not an official report.

Q. At least a report.

A. No, sir; it was not a report.

Q. Was it a preliminary report?

A. No, sir; it was not a preliminary report.

Q. You did have a book from which you took out the record of the manipulation of the wicket dams, didn't you?

A. I did.

Q. And that was a book that you got from the engineer's office at Huntington?

A. That is correct.

1931 Q. Will you produce that?

By Mr. Thompson. If Your Honor please, I object to that. He is asking him now to bring him an interoffice document, and he knows it is an interoffice document, and I do not believe it has any place here before this Court.

A. It is not even an interoffice document, it is just a bundle of compilations.

By Mr. Jackson. I think this data was introduced when Mr. Kramer was testifying, but let me ask him this question.

Q. Didn't you examine all of the data in the engineer's office dealing with this test of 1930?

A. I did not.

By Mr. Jackson. Now, If Your Honor please, a moment ago the witness had this very book in his hand and pulled out a sheet, and counsel for the Government objected to our having a photostatic copy made of it on the ground that it was an official record. Now I think maybe I can simplify the matter a little bit by this procedure, and I do not want to take but a moment with it.

I have in my hand a volume, which on the outside bears the title "Report of power wave, New and Kanawha Rivers." On the first sheet it says "Preliminary report on power waves, New and Kanawha Rivers, U. S. Engineers Office, Huntington, West Virginia, February 29, 1932."

By Mr. Thompson. Is there any name signed to that?

By Mr. Jackson. And I asked to have it marked for identification Exhibit 544.

By Mr. Thompson. I object to it being considered at all.

By the Court. What is it?

By Mr. Thompson. I understand these are studies made by the department, but it is an inter-office document.

By the COURT. I am not concerned with what sort of document it is, but I want to know if it has any purpose in here. Is that the result of any experiments he made in connection with the Government?

By Mr. JACKSON. If Your Honor please, here is a letter from Major Fred. W. Herman, now Lieutenant Colonel Herman, transmitting this document to us, and you will recall that it is on the release of the experimental wave study that was made in cooperation with the U. S. District Engineers Office, the U. S. Geological Survey, and the defendant.

By Mr. THOMPSON. What is the date of that letter?

By the COURT. March 7, 1932.

By Mr. THOMPSON. And that letter is addressed to Col. Scheidenhelm?

By the COURT. Yes, Consulting Engineer of the defendant here.

By Mr. JACKSON:

Q. I show you this book marked defendant's exhibit 544, and ask you to state whether or not that is the book out of which you just tore records of the maneuvers on the wicket dam?

By the WITNESS. (Examining book.) Some of this material at least appears to be the same as that in the book of computations and memoranda from which I took that sheet describing the operations of the wickets.

By Mr. JACKSON:

Q. Yes; that is the volume you produced here?

A. Did I produce it?

By Mr. THOMPSON. He didn't say he produced it.

By Mr. JACKSON:

Q. I thought it was here. You testified as to the effect of Wave No. 4, at Dam 9, and I call your attention to the sheet marked Wave 4, in connection with wave study originated above Ivanhoe March 12 to April 1, 1930, in Defendant's exhibit 544, and ask you to state whether or not that does not show that wave 4 was reported as undistinguishable at Lock 9?

By Mr. THOMPSON:

Q. Was your statement based on the page he is showing you now?

A. No, sir.

By the COURT. No, sir; but on the data on the bound volume there. Where did you get that data?

A. I might explain that I made my studies primarily from the two charts which were complete records of the waves. I looked over the mass of computations and the only thing that I can recollect that I paid attention to was a sheet of wicket manipulations,

which I gave to Mr. Jackson a moment ago. It is a study made by some engineer in the Huntington office and this is an office memorandum of the sort you frequently see and the study is
1932 unfinished. It says that it is incomplete, and I disagree heartily with a number of his findings. I made very little use of it. I looked it over in my study of the subject. I made no use of the consequential part of it. It had contained within it some basic data as to the maneuvers with the Weir Wickets, which I did use.

By the Court. What are you going to do with the paper in your hand, Mr. Jackson. Is it something in regard to the contradiction of the witness?

By Mr. Jackson. Yes, sir.

By the Court. You will show him a detailed compilation of some sort, made in the Engineer's office, and this is in contradiction of some statements he has made, which affects the weight to be given some statement?

By Mr. Jackson. Yes, sir. It is a record of the day and hour that the center of the crest or peak occurred at particular dams of Wave 4, which is one of the two waves he selected as examples and made the subject of his testimony. He testified as to Lock 9, and it is the observation of the engineers that collected the data that at Lock 9, the wave was undistinguishable.

By Mr. Thompson. If he was about to impeach the witness about some document or statement that he had made, all right, but here they bring in a document where we know nothing of the engineer that wrote it—we do not know who he was. The engineer says that it is totally incomplete and has errors in it and will have to be changed and write to Colonel Scheidenhelm to that effect, and now they seek to bring it in here to impeach this witness.

By the Court. Yes, sir; he said it was incomplete, but the record of the actual action of the waves is not incomplete, because these waves have come down and have been described under actual observation and the measurement of the wave is shown in the evidence and shows that it disappeared at a certain point downstream.

By Mr. Thompson. These observations are totally incorrect, because the Major in charge said they were not correct.

By Mr. Jackson. It looks like the Lieutenant Colonel would be helpful in solving this uncertainty.

By Mr. Thompson. I will read that part of the letter again: "You may find errors and inconsistencies in this, in which case, I will be glad for your corrections and suggestions, that the study may be made complete and correct. The engineers are continuing along the same line and will have further data in a few weeks."

By the Court. You may find inconsistencies——

By Mr. THOMPSON. Suppose they read a part of it, which is admittedly incomplete, and ask the witness if he did not testify in such a way, doesn't that make a record as if he was incorrect in what he stated?

By the COURT. That will not affect him. Here is a witness testifying on engineering knowledge and certain data that he has assembled, and he has stated certain conclusions, and has made a chart embodying those conclusions. The defendant proposes to show that there are in the records of the Engineer's Office in Huntington or in Cincinnati, whichever it is, a record of compilations and tests, on which he spoke, which shows something different from what he says. It goes to the weight of his theoretical testimony.

By the COURT. The only objection I see to it is this: Of course, it could not contradict the witness, if he did not make the record, but it can be used to this limited extent—the witness having testified and based his conclusion on certain things, may be shown records made by other persons, actually on the scene, and asked if that record shows otherwise, if it would influence his conclusion in any way.

By Mr. THOMPSON. There is no signature to show who made the record.

By the COURT. It was conceded that it was made in the Huntington office.

By Mr. THOMPSON. Suppose the greatest Engineer in the world said he made it, it might influence him, but suppose some subordinate gathered the figures that go to make it up.

By the COURT. I do not think that will influence this witness.

By Mr. THOMPSON. We ask for an exception to the ruling of the Court of testimony in regard to this record and also to the admission of it, for reasons stated.

By the COURT. All right, sir. Ask him if the record was otherwise, if there is any reason known to him to doubt the accuracy of his conclusions and judgment.

By Mr. JACKSON. Read the question. [Question is read.]

By Mr. JONES. There was something they wished to use on cross-examination and did not offer.

By the COURT. Yes, sir. Of course they will have to prove it, if introduced.

By Mr. JACKSON:

Q. You may proceed, Mr. Gerdes.

1933 A. May I say that—in the first place—that the record you show me is not the record of the wave itself. That is shown on the chart, Gov't. Exhibit 228. These are computations which apparently were made from tests of wave 4.

Q. Does this sheet on Wave 4, in defendant's exhibit 554, state that at Lock 9, that that wave was undistinguishable?

A. This sheet states——

By Mr. **Thompson**. It does not say who said that.

By the **Court**. He asked what was on the sheet—if that was on the sheet.

By Mr. **Thompson**. May we have an exception to the ruling of the Court?

By the **Court**. Yes, sir.

By the **Witness**. This sheet says it was undistinguishable at Lock 9; yes, sir.

1934 * * * * *

By Mr. **Jackson**:

Q. Exhibit 228 that you introduced indicates in the corner that it was made in the office of the Engineer in Huntington, does it?

A. Yes, sir.

Q. Does the fact that the sheet on Wave 4, on defendant's Exhibit 544, shows that that wave was undistinguishable at Lock 9, shake your opinion that you have expressed as to the adverse effect of Wave 4 at Lock 9, in these tests in 1930?

A. My judgment as to the influence this wave had at Lock 9, based upon the record of the wave itself, shown on Government's Exhibit 143 and No. 228, I believe—my judgment is based on, that and not upon any computations or deductions made by other people. If the Court cares to, he may look at the record of the Wave 4 itself on the sheet, Government Exhibit 228.

Redirect examination by Mr. **Thompson**:

Q. On cross-examination, you said that the waves from the Radford dam—some of them—would pass through Bluestone under certain conditions and go down the river, and you gave one example. Can you give any other examples?

A. Yes, sir.

Q. Give them?

A. There are a number of conditions, as I previously stated, that might operate to cause that. Without going through a thirty or forty year hydrographic study of the Bluestone, I will name a few of them that occur to me:

One condition would be where the flow at Bluestone was in excess of the power units that might be installed there and that water was being stored at Radford. The release from Radford reservoir, being through the power plant, the formation of waves, as I have described, which would go down New River and pass through Bluestone and over the spillway, as I have described. The flow of New River above Radford might be in excess of, say, 3,000 second-feet, but the excess over the release, whatever it

might be, let us say, 9,000 second-feet, for approximately
1935 ten hours, being stored at the Radford reservoir.

Another condition might arise when the stream-flow at the Radford reservoir was approximately equal to the regulated power wave released from Radford, but if the New River water shed were supplying sufficient water to Bluestone to again cause the water to be released from the spillway, the essential condition for the passage of the water wave through Bluestone to New River being for there to be free discharge—over the spillway at the time the power wave arrives.

Another condition would be when flood waters had been impounded in the Bluestone reservoir and were being released; the flow of the upper New River having been regulated at Radford, and the power plant operating in its normal cycle, as I described in Exhibit 226.

Still another condition would arise on week ends when, if we assume Bluestone might be supplying public utility load peaking and be shut down Friday afternoon and the wave would come in from Radford on Saturday or Sunday and go over the dam with the discharge of free water, if there be any.

These selections or examples are selected at random. There may be others.

Q. When the flow at Bluestone is 11,000 second-feet or more, is it possible that the Appalachian Electric Power Company could store water at Radford?

A. That is correct; yes, sir.

Q. You were asked by counsel on cross-examination with respect to the hatched figures at the top of the waves on Government's Exhibit No. 226, and he called your attention to the fact that on the first day the hatched part was much smaller or one third of the size of the second day, and perhaps the third day. How much would it change the picture on that exhibit if the Buck and Billesby and Reusens carried 35,000 kilowatts of peak each day of the week?

1936 A. This diagram, Exhibit 226, was drawn, as I stated, to present simply an informative picture of the typical operation of the Radford plant. If the Buck and Byllesby and Reusens plants were to carry a peak load of 35,000 kilowatts on Monday, it would simply result in moving the white block indicated as Radford down approximately 20,000 kilowatts on the load scale, withou' otherwise affecting it, and would not in any way affect the description of peak load operation of power wave production previously described by me.

Q. Mr. Gerdes, have you ever designed a hydroelectric plant?

A. I have.

Q. Have you ever had experience in working on plans of others being designed?

A. Yes.

Q. When is the determination made as to whether or not the plant shall be a base load plant or a peak load plant—at what time in the planning of the project?

The decision is made—let me say first, a hydro-electric plant, like other large and costly installations, is not built at random, and before a hydro-electric plant is designed, very careful consideration is given to the place which it will occupy in the system of the company planning it. In other words, what part of that company's load it will serve and the other functions it will fill; how it will fit into the scheme of the operations of the company, and I might say that the decision as to whether a hydro-electric plant is to be a peak plant or base load plant, is completely made and definitely committed when the plans for that project are finally decided upon.

That is considerably in advance of the construction of that plant. In the case of the Radford project, I would say that the plans were complete when the application was made to the Federal Power Commission.

1937 Q. Is the method of operation generally known or determined before the plant is built?

A. The method of operation as to peaking or base is decided upon by the responsible executives of the utility company building it before it is built. The operating officials who run it after it is built, have very little control over whether or not it is to be operated as a peak or base load plant. That decision is made before the plant is built.

Recross examination by Mr. Jackson:

Q. Could there be a condition where the Radford project would be responsible for an increase in height or discharge over Bluestone spillway without a corresponding consequent dampening of the Radford wave in its hypothetical travel through the Bluestone reservoir.

A. Will you repeat the question. (Question is read.)

Q. Are you a little uncomfortable?

A. No, sir. Your question is not very clear. That seems to be a habit with you. Will you read the question.

If the Radford wave—that power wave released from Radford—would reach the Bluestone reservoir at a time when the water was spilling over the fixed crest of the Bluestone dam—it would be dampened to some extent through the Bluestone pool—that is, it would have to pass down New River in the event the Bluestone was not there at all. There would be an increase in the discharge over the Bluestone spillway occasionally, by the arrival of this wave through the Bluestone reservoir at the spillway. The wave would be somewhat less at the Bluestone spillway than at the head of Bluestone pool, but I can say that dampening passing through Bluestone pool would be less than the corresponding dampening which would take place or which might take place in the passage down the corresponding section of the New River.

Q. That is, if there was no Bluestone?

A. Yes, sir.

1938 (Exhibit 231, being a letter dated March 1, 1928 from the Applachian Electric Power Company by Curtis, Mallet-Prevost, Colt & Mosle to the Federal Power Commission, was marked for identification.)

(Exhibit 232, being executive order authorizing the contruction of the Bluestone Reservoir Project on New River, West Virginia, was offered in evidence.)

(Exhibit 233, being a letter from William W. Belknap, Secretary of War, in answer to the resolution of the House, on February 3, 1871, House Document 110–, re James River and Kanawha Canal was offered in evidence.)

Defendant objected to the admission of Exhibit 233 on the ground that the same was irrelevant.

(Exhibit 234, being an excerpt from the Congressional Globe, pages 205–6, of December 16, 1872 in which is reported the Senate action authorizing the Windom Committee, was offered in evidence.)

Defendant objected to the admission of Exhibit 234 on the ground that the same was irrelevant.

(Exhibit 235, being a Journal of the House of Delegates of the State of West Virginia for the Eleventh Session, 1872–73, re James River and Kanawha Canal, was offered in evidence.)

Defendant objected to the admission of Exhibit 235 on the ground that the same was irrelevant.

(Exhibit 236, being Report of the Committee of the House of Representatives, containing Report No. 76, Forty-second Congress, Third Session, was offered in evidence.)

Defendant objected to the admission of Exhibit 236 on the ground that the same was irrelevant, and further reserved the right to object to the competency of the same.

(Exhibit 237, being pages 199 and 200 of the Congressional Record containing the proceedings of the United States Senate at a Special Session of the Forty-third Congress, 1873, was offered in evidence.)

Defendant objected to the admission of Exhibit 237 on the ground that the same was irrelevant.

(Exhibit 238, being a report of Major Craighill containing a report of Messrs. Hutton and Harris, entitled "James River and Kanawha Canal, United States Engineer's Office, Baltimore, Maryland, April 11, 1873," was offered in evidence.)

Defendant objected to the admission of Exhibit 238 on the ground that the same was irrelevant.

(Exhibit 239, being a letter from Senator Davis of West Virginia, dated November 12, 1873, to Belknap, Secretary of War, re James River and Kanawha Canal, was offered in evidence.)

Defendant objected to the admission of Exhibit 239 on the ground that the same was irrelevant.

(Exhibit 240, being a report on the James River and Kanawha Canal entitled, "Report of the Board of Engineers, March 18, 1874", was offered in evidence.)

Defendant objected to the admission of Exhibit 240 on the ground that the same was irrelevant.

(Exhibit 241, being Report 307, Part I, Senate, Forty-third Congress, First Session, by "Select Committee on Transportation Routes to the Seaboard", was offered in evidence.)

Defendant objected to the admission of Exhibit 241 on the ground that the same was irrelevant.

(Exhibit 242, being pages 4989–4992 inclusive, of the Congressional Record, containing the proceedings of the Forty-third Congress, First Section (1874) re the Windom Committee's report, was offered in evidence.)

Defendant objected to the admission of Exhibit 242 on the ground that the same was irrelevant.

(Exhibit 243, being Act of Congress passed June 23, 1874, re estimates and surveys on transportation routes to the seaboard, was offered in evidence.)

(Exhibit 244, being report of Major Craighill entitled "Third Subdivision of the Central Transportation Route" January 13, 1875, was offered in evidence.)

Defendant objected to the admission of Exhibit 244 on the ground that the same was irrelevant.

(Exhibit 245, being letter from the Secretary of War, etc., Senate Document No. 15, Forty-fourth Congress, Second Session, containing the reports of Major Craighill and Brig. Gen. Humphreys, was offered in evidence.)

Defendant objected to the admission of Exhibit 245 on the ground that the same was irrelevant.

(Exhibit 246, being U. S. G. S. Report No. 20, the Whitetop Area Virginia-Tennessee, was offered in evidence.)

Defendant objected to the admission of Exhibit 246 on the grounds that the same was incompetent if offered with reference to any feature of navigability and irrelevant if offered for any other purpose.

All of defendant's respective objections to the foregoing Exhibits (231–246 inclusive) were overruled and exceptions were duly taken.

1939 *Section 2. Defendant's main case.*

Mr. Abbot. If your Honor please, we have a location map, marked "Defendant's Exhibit No. 545," and counsel for the Government has agreed that it might go in as showing approximate locations, towns and places that will be referred to by witnesses, but it is not meant to be accurate with reference to the State lines, for instance, or minute locations of places.

They may be shown differently by the testimony of witnesses, but this is simply to enable us to follow the testimony.

Mr. Thompson. We have no objection provided it does not attempt to show the State line; it is the approximate locations of towns, rivers, and so forth.

Mr. Abbot. If your Honor please, they say that I said it was not accurate as to State lines, but I meant to say it was no evidence of State lines.

(Exhibit 545 introduced in evidence.)

C. Rufus Sangler, on Direct Examination, testified as follows:

I have lived all my life one mile north of Peterstown and will be eighty-eight years old October 24th.

I remember something concerning the time before the C. & O. Railroad was built from White Sulphur Springs down to Hinton. I hauled from White Sulphur down below Hinton, and through Lewisburg, for a fellow named Minafee, down below. He was a railroad contractor. We did the hauling on wagons which we loaded at White Sulphur Springs. We hauled right through Lewisburg, up by Blue Sulphur, and turned to the left at Blue Sulphur and went over the mountain down to Lick Branch, I think, where Minafee had his work. That is on New River, below where Hinton is now. At that time there was no town called Hinton. I think there was a man by the name of Hinton that lived there, and lived there before this road come down. I don't know how many teams were engaged in that hauling. My father was there with three two-horse teams
1940 and one four-horse team. I was driving one of the teams for my father. Before the C. & O. Railroad was built, the people in the neighborhood of Peterstown, the Narrows, Glen Lyn, and Rich Creek, got their supplies and got their products

market by hauling to Dublin Depot. I hauled to Dublin epot.

In the Civil War my father was a Wagon Master and General orage Master in the Confederate Army, I think, in the 45th egiment. His duties were to look after the wagons and teams nd supplies. I don't know how many teams or wagon trains e had charge of. I think probably he had charge of several rains. I think he had a Wagon Master for each train and a eneral Wagon Master to look after forage. He hauled food tuffs for the Army. I drove one of his teams from our place t Peterstown to New River Bridge, as they called it then, down Radford.

I recall when the Norfolk & Western Railroad was built down ew River and up East River. I don't know the date, but I emember I hauled a lot of stuff from Lowell to the Norfolk Western, between East River and Bluefield. I don't remember ow long I was engaged in that hauling but I suppose something ke two years. There were three or four other teams doing the auling with me. We kind of went together—a fellow named unn, and Williams and myself, and my brother. The road as so bad we could hardly haul. I remember a man named adler, who lived near where Glen Lyn is now. A man by the ame of Rhinehart and Sadler had the contract to build a piece f road, but I don't know just how much. I think my brother auled some stuff for them, and I don't remember about the ther. There were several teams doing this hauling on the road etween Lowell and East River besides ours. I don't remember ow many, but I should guess five or six—my brother and myself nd Charlie Dunn and Williams. I was engaged in that hauling onstantly during the time of that construction. I had a conract with Mr. Kitchpaw. While I was engaged in that hauling did not see any supplies boated up New River.

I recall that there was one stage line road through our place rom Red Sulphur to Dublin Depot. After the C. & O. Railroad as built to Lowell, the stage came right on through to Lowell. hey had some hacks too. I don't think there was any stage perating between Peterstown and Lurich after the Norfolk & Western was put in operation to Lurich. They had 41 pretty well stopped coming to the Red Sulphur. I think people who came for their health quit coming to Red Sulhur and went to White Sulphur. I think it would take us out five days to make the round trip from Lowell up the st River in hauling. Lowell is on the C. & O. on the Greenier.

The witness, on Cross Examination, testified as follows:

I have lived ~~at or~~ near Peterstown, within a mile of it, all my life. I was born there, two miles from New River. I cannot see the river from where I live. There was a road from Peterstown to New River in my youth, and I have forded it many a time. The road went up the river to Pearisburg after crossing the river. It then went to Dublin. It is thirty miles from Peterstown to Dublin. That was the only road to the river anywhere near there. From Peterstown to Glen Lyn was five or six miles. Narrows was above and I believe they call it six miles from the Narrows to Peterstown. It was ten miles from Peterstown to Pearisburg.

I recall when the railroad was built into Hinton. I suppose it was built from about the White Sulphur, but I don't know where it went. I don't know that there was any particular name to it. There was an old ferry down there that they called Pack's Ferry. Hinton was four or five miles below Pack's Ferry and there was a man named Hinton lived there, and they named the town after him. The railroad was built to Hinton. I don't know whether the railroad was built from White Sulphur or not but we hauled from White Sulphur. The White Sulphur I hauled from is on the Greenbrier—the other side of Union and Monroe.

We did not go by Hinton when we hauled. I expect it was forty or fifty miles when we hauled by wagon. We did not go by Hinton. We started at White Sulphur and came through Lewisburg, Blue Sulphur and turned to the left over the mountain to Lick Branch. I think Minafee had the contract there. We hauled to Lick Branch, down below Hinton. I could not tell you how far below Hinton we went, but it was on the right side of New River, going down stream. We did not cross New River in hauling to Lick Branch. The railroad was being built right there.

We hauled railroad supplies and powder, and, I suppose
1942 stuff to feed the hands on—flour and meat, blasting powder
and probably a lot of tools.

I don't know of any wagon road which went to Hinton from where we started to haul our stuff down the Greenbrier. I never took any. We went through Lewisburg and Blue Sulphur. The road we drove over was a bad one, built out of the hillside and you couldn't see the bottom hardly down in places. It was kind of dangerous and just wide enough for a wagon. Driving over this road was difficult and a man had to know what he was doing. After we left the main hills it was bad. The other road was in better shape and traveled by people.

I can't remember just how long we were doing that driving over there. I don't remember what time we were there. We stayed from the time we went there until about Christmas. We must have gone there early in the Fall and we did this driving maybe two or three months; I can't say. My father had three teams. There were two or three other teams maybe; I don't know.

I testified that the people got their supplies by wagons. The people I was speaking of were the railroad builders who had contracts with the railroad. I hauled for them, and these other wagons hauled for them also. This point at which they were building on Lick Creek was just along near New River. I expect it was several miles below Hinton. I don't believe I know where Sandstone Falls is, and don't remember ever seeing it, while we were hauling. We went and unloaded and went right back. It took us a whole week to make a trip. I don't think this point on New River, to which we hauled the stuff, could have been over fifteen or twenty miles below Hinton. It might be further and might not be quite as much. It was below Hinton, but I don't know whether it was below Sandstone Falls.

I spoke also of hauling from Peterstown to Dublin. I stated that I started at Peterstown with a wagon load of produce for Dublin. Dublin is not as far along as Radford from our place. We would cross the river two miles from Peterstown when the river was low enough to ford, and when it was not we went up the river a mile to the Hobb's Ferry. They called it thirty-one miles from Peterstown to Dublin. Dublin is not on New River. I don't suppose you could get to Dublin on New River. All we had to do to get from Peterstown to Dublin was to cross New River. He had been running that ferry there quite a while. I don't know how long it had been operating. I ferried it there
when I was fifteen or eighteen years old and it operated
1943 for many years after that. People that traveled that road
used this ferry. It was thirty-one miles from Peterstown to Dublin. We generally gave our horses plenty of time, and much of the time it took us five days to make the trip there and back. The road from Lowell was in bad shape. When it was rainy, the road got worked up so bad they couldn't travel it in places, and had to go around it.

To the best of my recollection, I hauled from Lowell when they were building the N. & W. We could bring the stuff from Lowell up the East River to where their contract was. Lowell was on the Greenbrier, twenty-four miles from Peterstown, considerably down from White Sulphur. I don't think Lowell was more than twelve or fifteen miles from Hinton. I have been from Lowell to Hinton on the train once or twice and did do a little hauling from Crump's Bottom up to Big Bend Tunnel above Hinton.

I have no idea of the exact time when I hauled from Lowell for the N. & W. It was a long time ago. I don't even know how old I was then. It was after I hauled for the C. & O.; how long after, I don't know. This was railroad hauling, the same as the other was.

I expect that there was a wagon road from Lowell down to Greenbrier to Hinton at the time I did the hauling from Lowell for the Norfolk & Western, I don't know. I remember hauling grain from Crump's Bottom to Big Bend Tunnel; there had to be a road to go up to it across the river at Greenbrier, that went up Greenbrier, where they were building the tunnel. That was not more than three or four miles. I don't know whether there was a road from White Sulphur down to the Greenbrier when I drove to Lake Creek. We didn't go by Hinton.

I don't think I was thirty years old when I did this hauling for the C. & O. I expect that was done over sixty years ago. I can't say.

The road from Lowell to East River was a bad one. It had got worked up mighty bad, and so much hauling over it cut it to pieces and we had to leave the road in places and go through the woods a piece. It was a dirt road. I don't think there was any other road from Lowell to East River at that time.

I don't think there was a town at Hinton until after the railroad was built. I don't know. The first Hinton they called
"Upper Hinton" and later the other was called "Lower
1944 Hinton." I passed there first when I was hauling that
stuff at Big Bend Tunnel. That was after I hauled from White Sulphur. I couldn't say whether it was after or before I did this hauling from Lowell to East River. They was building at Big Bend Tunnel, bought grain and hauled it from Crump's Bottom. They had some good bottoms and raised some corn, and sold it to some contractors, I don't know who they were. You could haul fifty or sixty bushels of corn on a wagon. If you had a good four-horse team you could haul forty or fifty hundred pounds. Sometimes we used six horses. Of course, we broke down sometimes. I don't remember about having to unload.

I never saw any boating up or down New River when I was hauling to Dublin. I saw the ferries, of course. Clark's Ferry was above there and one at Narrows tended by Clark. There was another up above there, I think it was Clark's, too, located on Chap Johnson's farm.

We were making trips to Dublin fairly regularly. I couldn't say, sometimes we might go every week and sometimes two or three weeks you know, just when we had stuff to haul off. At that time we did not have any other places to go beside Dublin. There was nothing at Narrows or Glen Lyn. We had stores at Peterstown and we could shop there. These stores obtained their supplies from Dublin. On our trips to Dublin from Peterstown we crossed the river on the ferry. I don't know just how wide the river is at this point, three or four hundred feet, I reckon. I may be away off. It might even be more. It was a pretty wide stream. It took five or six minutes to cross on the ferry. Of course, it depended a lot on the condition of the water. If the water was low, the boat would not run so fast and if strong it pushed it along. After crossing the ferry on the way to Dublin the wagon road went along the side of the river for five or six miles and bore to the right. I cannot give you the years I did this hauling to Dublin. I have never in all my life seen any boating on that river except the ferry boats.

The witness, on Redirect Examination, testified as follows:

When I hauled to Dublin, we forded the river when it was low enough to ford. Dublin was the nearest point from Peterstown, to and from which we did this hauling. We went to Dublin because there was a railroad through there. There was a
1945 railroad station, and the goods were ordered and wagoned to Peterstown. They went to Dublin first, and then, after the Lowell road was built, they went to Lowell. There was not any road over there then. I hauled this corn from Crump's Bottom to the Big Ben Tunnel by wagon.

W. H. **Spangler** on Direct Examination, testified as follows:

I was born in 1870, in Peterstown, Monroe County, and was living there when the N. & W. construction work was going on up East River. While the N. & W. was being built I worked for Charlie Dunn. He used me as a helper first and then I drove a team for him. I went on the wagon with him as his helper on a few trips.

Q. Do you recall who supplied the people working on the N. & W. Railroad up East River with their supplies?

A. I can give part, the part I was interested in. Charlie Dunn had three four horse teams and he supplied two companies, Griffith and Purcell, had a contract there, and he wagoned for them.

Q. Were they working on this river up above Glen Lyn?

A. Their contract was at a little station, Willowtown.

Q. Do you remember how far that is up the river?

A. That don't go up East River, you leave East River there at Glen Lyn, and this is the way the railroad goes around on the other side of the hill, I have an idea about three miles. [Indicating.]

Q. How long did he do that hauling?

A. Well they was at work there something between two and three years. I couldn't specify the exact time.

Q. Was it done pretty regularly?

A. Yes, sir; it was every week.

Q. And how long did it take to make your trip, the whole trip?

A. Well that was owing to the weather, good weather we could make a trip in a week.

Q. And if bad weather?

A. We didn't make one so quick, and we had the river to contend with, high water lots of times. 1946

Q. When it was high water how did you get across?

A. Had to lay still till it got down.

Besides the teams which Mr. Dunn had, my uncle had a team engaged in hauling supplies from Lowell to East River. My Uncle Allen Spangler and Coon Spangler had a team and Uncle Allen's boys, Bud and Routh, had a team, but not steadily. Fletch Spangler also had a team there. The Spanglers have done a lot of hauling in that section for a great many years. They were all teamsters at that time, as there was no way of transferring stuff but by teams. All my people were teamsters. I hauled about two years.

Q. How often or how long during that time were you on the road, were these wagons on the road hauling or getting back from hauling?

A. They was on the road all the time. Of course if the trip was short they wasn't on the road so long, and if long, you know they was on the road constantly, all the time this railroad work went on, they had to have their supplies.

Sometimes in making that trip, we would ford the river at Lurich or down below Lurich. Anyway it was above the old Shumate Home, a little ways from the Virginian Station. We would sometimes ferry across. On the New River side we were along the river about two and a half or possibly three miles from the Virginian Station to the mouth or where the bridge is across the river now, that is, from Rich Creek to Glen Lyn. While I was doing this hauling I never saw any supplies hauled by boat to the railroad or to the contractors working on the railroad. I recall a stage line from Lowell to Peterstown. The passengers changed at Peterstown. They had other teams there and one team was run from Peterstown to Lurich to meet each train. These teams went through Lowell, but they transferred their passengers off on to these hacks which were made to ford the river with. The line went from Peterstown to Lowell.

The witness, on Cross Examination, testified as follows:

1947 I can only recall the time when the C. & O. was built or was graded up to the Big Bend Tunnel: I think I was somewhere around eight years old. The C. & O. was being built for several years. They never got through the tunnel. Several years expired and after they got it driven it fell in. I don't think there was any traffic from Hinton east until the Big Bend Tunnel was finished, but I am not sure. Lowell is on the Greenbrier twelve miles, I believe, above the mouth of the Greenbrier. Hinton is at the mouth of Greenbrier. It was about twenty-nine miles from Glen Lyn to Lowell by wagon road. I have an idea it is about thirty or thirty-two miles from Glen Lyn to Hinton up the river. I know it was 16 miles from the mouth of Indian Creek. At the time I was hauling, there was a road from Hinton to Glen Lyn which you could take by crossing the river.

Q. Now at the time you were hauling, there was no road from Hinton to Glen Lyn, was there?

A. There was a road by crossing the river, you could come up there close to the mouth of Indian Creek, then ferry over the river and get on the other side and come up.

Q. Hinton was on the C. & O. railroad the same as Lowell?

A. Yes, sir.

Q. You never hauled anything from Hinton to Glen Lyn?

A. No, sir.

Q. The reason you did not was because there was no road that you could travel?

A. The road ran up on one side of the river, up here to the mouth of Indian Creek, and then it ran up on the other side, up to Glen Lyn, and they had a salt works there.

Q. Do you mean after you left Hinton it came on the left bank going down and crossed at Indian Creek?

A. No, sir; two miles of Indian Creek, but this road continued up there, then went up Indian Creek to Red Sulphur Springs.

Q. That is on the right bank of the river going down?

A. Yes, sir; that is right.

Q. And it is some four or five miles from the river to Red Sulphur Springs?

1948 A. Six miles, I think.

Q. Now you did not haul any supplies from Hinton to the Norfolk & Western, or from Hinton to Glen Lyn up that road, did you?

A. No, sir.

The route from Lowell to Glen Lyn was right over the mountain. There was not much road there then and there is none through that country yet. It was a very tough pull. We had four horses in good weather and six and eight, and sometimes ten and twelve, in bad weather. With four horses we hauled six thousand pounds when the roads were good. When the roads were bad we doubled the horses up and put on another team, and if they didn't get the load up, we put on another team. We never put ten horses on a wagon to make the trip from Lowell to Glen Lyn. Sometimes we would get stuck with a wagon in the mud and it would take eight or ten to pull it out and we would get these horses from the other teams, that is, from the other wagon. It would take a week in good weather to make the trip from Lowell to Glen Lyn and back, but we went up as far as Bluefield, which is fifteen miles beyond Glen Lyn. There were three camps up East River. I couldn't tell you the time took to take this trip in bad weather. We never took as much as two weeks on such a trip, but I would not be positive. It took more time on some trips than it did on others and especially when you struck these bad sections of the road with deep mud. We never stopped hauling in the winter time, but it took us longer.

I am acquainted with the wagon road as it existed at that time from Peterstown to Dublin. Leaving Peterstown we crossed New River somewhere up near Gly Lyn either by ford or ferry, and then went up river to Pearisburg. Then we left the river and had to go across several mountains, including Little Walker Mountain, Big Walker Mountain, and several others. There was the same kind of mountainous territory to cross as we had to go from Glen Lyn to Lowell, and the roads were just as bad. If I had to guess, I would say it is right around thirty or forty miles from Peterstown to Dublin, but I would not be positive about that. Dublin was not on New River. I think it was further than ten or fifteen miles west of the river. I have in mind that it was about twenty miles. Dublin and Radford are both on the N. & W. which crosses the New River at Radford. I am familiar with the New River
1949 country between Radford and Hinton.

Q. You know that prior to the time the New River division of the Norfolk & Western was built in by Glen Lyn and on up to Radford, you remember this road that you said you did some hauling on?

A. I didn't do any hauling from Radford.

Q. I mean at the time that division was constructed by Glen Lyn, prior to that time, there was no railroad between Hinton and Radford?

A. No, sir.

Q. And there is none now between Hinton and Glen Lyn?

A. No, sir; there is none now.

Q. And the C. & O. came into the New River Valley up New River until it struck Hinton and then it turned east and followed the Greenbrier?

A. Yes, sir.

Q. And the Norfolk & Western came from the West over in Tennessee, and I am talking about the main line that was constructed before the Civil War?

A. Yes, sir.

Q. And it came from the westward and passed through Pulaski or Martin's Tank then?

A. I don't know about that.

Q. I mean where Pulaski is now, then to Dublin and Radford and went on east from there. It did not go down New River, did it?

A. I couldn't tell you about it after it left Radford, I never was any further east than Radford.

The nearest station on the railroad to Peterstown was Dublin before the C. & O. or the New River division of the N. & W. were built. Prior to the construction of the C. & O., Dublin was the nearest. Lowell was twenty-four miles, and that is where I did my hauling. Lowell was on the C. & O.

I think they were working on the Big Bend Tunnel in about 1878. I was eight years old when my father died and my father had two four-horse teams, and I had two brothers who were hauling then from Peterstown to Dublin. A little later on, when they got this tunnel driven, they brought that stuff over the
C. & O. through Monroe County, and I don't know whether
1950 it was closer or cheaper, but they cut out the hauling to
Dublin. I did some hauling myself. I had a brother-in-law who had three teams there when they built the New River division of the N. & W. I figure I was about ten years or twelve years old then although I don't know just the year when the N. & W. was built.

The stuff I hauled from Lowell to Glen Lyn consisted of hay, corn, meat, anything in the eating line, and whiskey. They had a camp way back in the mountain. I hauled these across New River, and the farthest I came was right next to Bluefield. I hauled for at least two years, possibly three.

Q. Now you stated to Mr. Abbot on your direct examination that you saw no boating coming up to Glen Lyn while you were hauling across the river to Glen Lyn?

A. That is, you mean when I was hauling to the railroad?

Q. Yes; you did not go up and down along the bank of the river in making that trip, did you?

A. No, sir.

Q. You just crossed New River?

A. And I don't think I gave it to him that way.

Q. I may be in error.

A. I don't know, if I did, I was mistaken. We only followed the river from this Virginian station that is on the river now down to Glen Lyn. Then I was down on this river for about four or five years.

Q. Where was that?

A. On Crump's Bottom. My brother-in-law had that Crump's Bottom rented out, 1,000 acres, and I was there from the first of September until the first of June of the coming year, but I wasn't there the full year round.

Q. What year?

A. I couldn't tell you that.

Q. Was it before you did this teaming or after?

A. It was afterwards.

Q. Then you don't know whether there was any boating up by there or not, do you?

A. As far as I know there wasn't.

1951 Q. I am asking you if you know of your own knowledge? Or when you told Mr. Abbot that, did you mean that you just didn't see any in making your trips?

A. I never seen any there.

Q. I am asking you if——

By the Court. Let him finish his answer.

A. While I was on the river all the time, I never seen any.

Q. I am asking you about the answer you gave to Mr. Abbot, that when you did work, I wanted to know whether or not you saw any traffic going to Glen Lyn, when they were constructing the Norfolk & Western?

A. And my answer was I did not.

Q. At that time you were merely crossing the river, and you were not going up and down the bank of the river?

A. Only that distance I told you, about three miles.

Q. And that is above Glen Lyn, isn't it?

A. It is above Glen Lyn as you go up the river.

Q. If there had been any river traffic between Hinton and Shumate's Falls or between Hinton and Glen Lyn you would not have seen it unless you happened to be right at Glen Lyn when the boat came into the East River?

A. Not on that haul.

The country from Giles, Mercer, Summers, and Monroe was fairly good for grazing in those days. There was a sheep raising industry in that country and they raised a lot of cattle.

I have never had any business transactions or connections with the Appalachian Electric Power Company. When I crossed on the ferry I had to pay so I always forded the river if I could. We always forded when we didn't have anything in the wagon. We would ford if the water was waist deep on the horse and more.

The witness, on Redirect Examination, testified as follows:

Big Bend Tunnel fell in after it was driven the first time. The railroad was not operating through the tunnel at that time. It could have been operating east or west at the time but not through there.

I do not remember when the C. & O. was first built from White Sulphur Springs on down past Hinton. I don't know how
1952 far Dublin is from New River. In answer to a question by counsel on the other side, I think I said Dublin was twenty miles from the river. I was just guessing at that. I was estimating from Pearisburg Station, which is the closest point to the river. That is the twenty miles distance which I gave.

S. L. **Buckland** on Direct Examination testified as follows:

I live in Narrows, Virginia, on a little farm. I was born in March 1865. I have worked some for the Appalachian Electric Power Company for the last 15 years, off and on, but have never been regularly employed by them. I have worked on Government improvement along New River a little while in my young days when they were making a channel to run a steamboat through. I worked at what is known as Wiley's Falls.

I was raised about two miles above there at what was known as Squire Wiley's farm. It is on the right-hand side of the river going downstream. Round Bottom is on the left side of New River below Glen Lyn. I remember a store which was built at Round Bottom and was run by a man named Lewis Pine and John Monroe and Jim Wiley. This was the first store I knew anything about being run at Round Bottom. To the best of my recollection, that store was something like a quarter of a mile below where that branch comes down over the mountain and runs into the river. I believe the store was right on the lower side of the road.

Q. Is there anything there now to mark the place where the store used to be?

A. I don't know. Of course, if a man was well acquainted there, he might see something that resembled it; the old store is down. There is no store there now.

Q. Do you recall where there were some fruit trees now at Round Bottom?

A. Well, sir; there is two or three fruit trees, to the best of my knowledge, standing around close to where the store was.

Q. Is there a house across the river from Round Bottom?

1953 A. To the best of my ability, when I used to go to Round Bottom, I would say approximately four mile up the river from Round Bottom, and I used to be there frequently, and there was an old gentleman in my boyhood days named Pendleton that run a ferry there, and I would cross there, and it strikes me it was straight across from the house to about where the store was at Round Bottom, just on the opposite side of the river.

Q. That is, the ferry was right across the river between the Pendleton house and the store?

A. Yes, sir; yes, sir.

When I was a young man there was some grade work done on a farm known as the Bill Reid farm. That was below Round Bottom, just a little distance, in the range of a mile. The only work I did on the railroad up East River from Glen Lyn was to help out for the right-of-way on the Mustard Farm, later called the Gordon Farm. I worked for my uncle, Bill Wiley, cutting a right-of-way for the railroad, that is, taking the timber off and cleaning up.

While the railroad was being built, I took some few trips driving a team hauling supplies up to what was known as Griffith and Purcell's Commissary from the C. & O. Railroad Company. When we could cross the river by fording, we would ford. If that was not possible, there was a boat landing above and one below. You could cross either at Glen Lyn or what is known as the Adair ferry. It was on the Adair land. I was driving for Mr. Dunn. He had other teams. He had a contract for hauling these supplies for Griffith and Purcell, the contractors. There was a man named Williams who lived at Peterstown who had a team or two on that job and also a man named Spangler who had some teams but was not hauling for the same man. He hauled for a man named Kishpaugh who, I think, was a contractor. The hauling lasted for something like a year or a year and a half or longer, quite a while. The teams hauled provisions and stuff, dynamite, powder, ammunition, meat and bread.

Q. Did you ever engage in the stave business?

A. I made staves one whole winter near Pendleton's Ferry.

Q. Is Pendleton the same as might be called Pennington?

A. You have asked me a question I would hate to say,
1954 not knowing. Of course, I been knowing the people and
knowed the old gentleman, Pendleton—Old Uncle Billy, we called him. He was a very old man when I was a boy, but still ran the ferry himself, and he had a son called Young Ben that ran the ferry, and a son-in-law, Joe Meadows, but I would not say whether or not it was Pendleton or Pennington, or how it was pronounced.

Q. Did you ever hear the name pronounced Pennington?

A. I always speak broken language. Pendleton is all I would like to say, because not knowing.

Q. Did you ever hear anybody call him Pennington?

A. I don't know that I have, but I don't know that I haven't—only I just wouldn't say.

Charley John engaged in this stave business with me. That winter we made about 70,000 staves. Mr. Dunn, my partner, was handling the business end of this stave operation. He sold them to some man that was shipping them abroad. I think they were bought by some oil companies. The understanding between Mr. Dunn and myself was that we should deliver these staves to New River. He made arrangements with some man to boat these staves. We finally had to haul these staves by wagon to the Norfolk & Western Railroad at Lurich.

I know of some rafting which was tried in Virginia down the river by two men named McCorkle and Walker who came from Greenbrier. They tried to raft walnut logs. They aimed to put this walnut to Hinton to the C. & O. Railroad Company. They built these rafts at the mouth of what is known as East River at what they called Glen Lyn. None of the rafts ever got through that I know of. They would strike the shoals and islands and break up. I saw one tear all to pieces at a little island just below the Wiley House. A man named Alex Skeens was on the raft. He happened to catch hold of some willows and was rescued by George Dickerson and myself. We went in there and took him out in a place we called the "dugout." A man named Collins started with him on the raft but he got off at the upper end of Wiley's Farm.

Q. How many feet of tide was there in the river at that time?

A. You have asked me a question and I would not like to say,
but there was several foot and extra water in the river, but
1955 I would not like to say how many feet. That has been a
long time ago.

McCorkle and Walker had to stop trying to raft logs. There was no money in it. It went to the bad.

I got out many ties. I ran a tie job on Wolf Creek a couple of miles above Narrows for W. M. McCorkle. At that time the Norfolk and Western Railway was built and was buying ties. We wagoned the ties down Wolf Creek. I could not say how many we cut in that operation but we were on the job there something like two years. We bought one thousand acres of timbered land and worked everything we could into ties. They were not sawed ties but were what we called scored ties. They were good ones; they had to stand inspection.

The witness, on Cross Examination, testified as follows:

I haven't done any work for the Appalachian Power Company to amount to anything for three or four years. I was born in Peterstown. I lost my mother when I was small and my grandparents taken me and we lived in a radius of 400 or 500 yards of New River. I have lived at Narrows. I can see New River from where I live. Narrows Depot is not over 100 feet from the New River. We call East River seven miles from Narrows, down New River. Round Bottom is about eight miles from East River downstream. Round Bottom is only about eight miles below Glen Lyn now. It is seven miles from Narrows to Glen Lyn.

Q. How close is the farm where you lived to Glen Lyn?

A. It is 7 miles from Narrows to Glen Lyn. I live back of the Narrows.

Q. And Round Bottom is 8 miles below you?

A. Yes, sir.

Q. Round Bottom is 8 miles below you?

A. Yes, sir; from Narrows.

Q. It is 8 miles from Glen Lyn to Narrows, where you—from where you live?

A. I would make it about 14 or 15 miles down there. Yes, sir.

Q. Exactly. That was my addition of your figures about it.

I did not get to Round Bottom from my farm in those days very often. When I was growing up I went there often, but not in recent years. Sometimes I rode horseback to Round Bottom and sometimes I walked. The road was a very common
one on which the brush had just barely been cut out.
1956 They called it a road, but it was not really a road, but
they got over it in them days somehow or other. I don't think I ever saw a horse and buggy on that road. I don't think there was anybody there who had one to use on that road, but I saw horses and buggies at that time on other roads.

I was at Round Bottom last something like three or four weeks ago. I went there just to be riding. I went in an automobile with Mr. Abbot there (indicating). I could have located the boundaries of Round Bottom but I was not asked to do so. Mr. Abbot asked me if I knew a man by the name of Mr. Rufus Spangler and I told him that I knew him very well and had known him since I was a boy. After I got there I did not look over the situation. I did not do anything while at Round Bottom to locate the grocery store or anything else that I testified about. It was not necessary because I had traveled as I said, over that country seven or eight years in my boyhood. It had been several years since I had been at Round Bottom. I would not undertake to say how long ago it was. A man ought to be able to fix the place where the grocery store was when he has been in it a dozen times. If I saw the fruit trees I would know about them. Since you have asked me, I would say that I saw those trees on this last trip. I would say that Round Bottom has an area of some six or eight acres. I will not say whether Mr. Abbot and I were anywhere close to the grocery store or not. We talked about it. I told him I had been there in years past on different occasions. I think that the fruit trees are there but I would not say positively that they are or are not. They were there when I was in Round Bottom several years ago. On this trip with Mr. Abbot I did not go to locate the fruit trees and the grocery store. That was not my business because he asked me to go to Mr. Spangler's with him.

I testified about some grading having been done down along the river. Some was done right along by what is known as the Round Bottom. Some was a little above and some was a little below what is known as the Reed Farm. That was for a railroad which was never built. I can not tell you the year but it was in my young days.

I hauled logs for building the N. & W. Railroad, which was supposed to be started from Radford and to get into the coal fields. At that time they were building it up what was known as East River. The railroad came down New River and went
1957 up East River. It came down from Radford to the junction of East River and New River. There are coal beds up East River at Pocahontas. I never hauled on many trips from Lowell, but Mr. Dunn kept his teams there for perhaps a year and a half or two years. He and Mr. Williams were there for quite a spell. As I said, I hauled meat, bread, black powder, dynamite and material for making the railroad. I hauled to Griffith and Purcell. That was on what was known as the Reed Farm up East River. I crossed New River at the ferry, which was run by a man named Ambrose Owney. I think I hauled ten or twelve miles from the mouth of East River to the Reed Place. I could not recall the distance but it was up East River from Glen Lyn. I hauled supplies for the building of a railroad. The roads were very bad. In some places it would be nearly impossible to go over them, but as we always had several wagons, we would add teams enough to get through by taking a team from one wagon and putting it on another. Usually we had four horses to a wagon.

I don't think I went from Talcott to Hinton except by rail. I did not drive any wagons at this time over the road from Lowell to Hinton.

I made staves back from the river. Some of them I made in a radius of probably one-half a mile from the river and some of them probably three or four miles back from the river. At that time there was a large stand of timber from which staves could be made. We had a regular forest to cut on white oak. We were engaged in this stave operation one whole winter—from four to six months. It was after the N. & W. was built in there. Finally we had to ship the staves out on the N. & W. From where we got them near Pendleton Ferry it was between seven and nine miles to New River. We loaded them on railroad cars at Lurich. I don't know to what place we shipped them. That is the only stave business I know about. I have never known of any staves made along New River nor ties being cut and shipped down New River. We transported the staves to the railroad by wagon. I was one whole winter making these staves.

Several rafts were started down New River and one struck an island. I don't know whether this was Dickenson Island or Wiley
Island. It is about in the middle of the river. I suppose
1958 it amounts to one-half an acre. The last time I noticed it,
it was visible in the river. I have no recollection of any
raft ever going into Hinton solid without tearing up. I never went on a raft for any distance although I have been on rafts. It was too rich for my blood. Rafting was too fast a life for me.

Q. What about the boats during all that period, you never saw any boats on New River?

A. What kind of boats?

Q. Any kind?

A. Oh, yes.

Q. What did you see?

A. I saw different kind.

Q. Describe them?

A. Boats, skiffs, dug-outs, and bateaux I believe they called them.

Q. Keel bottom boats?

A. Well, now you have asked me something, keel bottom, describe what kind of shape?

Q. The same as a bateau, with a keel bottom, you know a bateau boat when you see one?

A. I don't know what they call one.

Q. You have seen them come up the river from the direction of Hinton to Glen Lyn?

A. Not to Glen Lyn.

Q. Where have you seen them come to?

A. Shumate Falls.

Q. Have you seen them go down the river from East River or Shumate Falls?

A. Not from East River.

Q. Have you ever seen them go down the river?

A. I have seen them go down to Shumate Falls.

Q. What did they have on them?

A. You have asked me a question I am not able to tell you at all, what they had on them, because I don't remember of examining one of those boats to see what they had on them.

1959 Q. What was the date this raft of logs hit on the island?

A. I couldn't tell you the date at all, but it has been several years ago. I was a boy. That was before I was married, been quite a while back.

Q. You say you saw boats come up to Shumate Falls.

A. I have known of them going up to Shumate Falls.

Q. Do you know what they carried?

A. No, sir; I don't.

Q. Weren't they building a railroad at that time near there?

A. No, sir.

Q. Didn't they carry supplies for that force?

A. I don't know, sir.

Q. Can you tell during what period you saw these boats come up to Shumate Falls?

A. No, sir; I can't give you the dates.

Q. What is your best recollection?

A. It was before the N. & W. Railroad was built, Mister. I can tell you that.

Q. That was before the chute was built thru Wiley's Falls, wasn't it?

A. No; that chute was made at Wiley's Falls at that time.

Q. When you saw the boats come up?

A. Yes, sir.

Q. Then the N. & W. was there, wasn't it?

A. No, sir.

I said I cut some ties on Wolfe Creek and hauled them in wagons to the Narrows. Wolfe Creek runs into New River at the Narrows. There was no portion of New River on which I could have taken those ties I cut because New River does not run in that direction. There was a railroad right to Narrows where I hauled those ties. I put them on the railroad at Narrows. I cut all of these ties on Wolfe Creek.

They tried floating those rafts at different times of the year. The raft hit the island along in the spring of the year as I remember. That is generally the time of high water. The high water was the cause of the raft breaking on the island.

1960 In my early days I don't remember ever seeing any boat at Round Bottom. I was there a good deal and when I was there I would stay practically all day. During the time I was there in my boyhood and up to manhood, I never saw a boat come or go from Round Bottom on New River. I saw a ferry boat or skiff there. The ferry boat would take teams across the river. I couldn't recall any boats coming up the river to Round Bottom. I probably was twelve years old when I first used to go to Round Bottom. I went there from the time I was twelve until I was twenty, as I remember.

The raft which was wrecked on the island in the high water was of walnut, which is about as heavy timber as we have I think. I would say hickory is the most difficult timber to handle.

The witness, on Redirect Examination, testified as follows:

I spoke of a man named Owney that ran the ferry at East River. On response to whether his name was Tony, will say I always called him Mr. Owney.

I said that some of the staves I cut were hauled to New River. We started to deliver them to the spot Mr. Dunn said to take them and we probably hauled 3,000 or 4,000 and quit. I had to take a wagon and team and go there and haul some of the staves away from where we had landed them to go down the river on this boat and put them on the wagon again and bring them around to Lurich.

I said in the beginning I was raised on my grandfather's farm, Squire Wiley's farm, on the right bank of the New River. Eight years of my life I was there all the time except when I went to the mill or did something of that kind. I was something like seven or eight years old when I went there. I just remember what they told me my age was when my mother died. After that my grandfather took me. After the eight years I was back there off and on.

Q. What I am getting at is when was it you saw these boats come up to Shumate's Falls?

A. Back in my young days, an old fellow by the name of Charlie Merchant, an old colored man, I would see him once in a while, maybe once a year, something like that, when I was 1961 small, and a man by the name of Buck Smith. I have been at Mr. Smith's home, he lived below what is known as the mouth of Indian Creek, and in my young days them was the only two boats I ever knowed of up New River, in my day.

Q. That was when you were a youngster?

A. Yes, sir.

Q. Living at your grandfather's place?

A. Yes, sir; my grandfather Wiley's.

Q. Do you recall whether there was any additional water in the river at the time you saw those boats come up?

A. They had to have some tide or they couldn't get up without some extra water.

Q. Would you say you saw them come up every year?

A. I wouldn't say because they might make a trip once a year or something like that, I wouldn't say, but it was very very seldom I ever saw a boat in them days, those were the two men. Now I have understood—if this gentleman won't interrupt me—that there was a bateau that was supposed to come from James River, I don't know where it came from, in the fall of '78, that was anchored on what was known as the mouth of Rich Creek, two miles from Peterstown, but I don't know whether that boat were there or not, I am not able to say, but I always heard there was a boat there.

Q. When was that in '78?

A. When that big flood come on New River, about one of the biggest floods ever known on New River, in the fall of '78.

Q. Can you give any idea of how many bateaux you have ever seen in Virginia on New River, or how many times you have seen a bateau?

A. I have been living, Mister, at Narrows forty odd years, and I disrecall that in Virginia, I don't reckon Giles County is out of Virginia, I hope it ain't, anyhow, and I have never saw one there.

Q. I was getting at how many times you saw a bateau at your grandfather's place?

A. Not often, now and then I would see Charlie Merchant or Buck Smith come up the river, maybe once a year or something like that.

1962 Q. How far did you say Squire Wiley's place, your grandfather's place, was from Round Bottom?

A. About four mile.

The witness, on Recross Examination, testified as follows:

Q. This partnership with Mr. Dunn, in which you say you did the work and he did the figuring, was that the transaction out of which the staves were brought to New River?

A. ~~That was the arrangement.~~

Q. I am identifying it, it was the one made with Mr. Dunn?

A. My agreement was made with Mr. Dunn.

B. C. LILLY, on Direct Examination, testified as follows:

I will be 57 years old this coming December. I live at Junta. I was born in the Pipestem District and have lived at Crump's Bottom. My father moved there when I was sixteen years old; in 1896.

I remember Colonel John Crockett. I was engaged in moving his household furniture from Crump's Bottom. As well as I can remember this was about the year 1899. It was moved on a boat; I hauled it out and put it on a bateau to go to Glen Lyn, and I went to Glen Lyn to haul it out. The furniture was loaded on one evening, and then the bateau left there that evening to go to Mercer's Salt Works. There was a load left for my wagon, and the bateau was supposed to go the next morning to Glen Lyn. I took the load to Glen Lyn and disposed of it, unloaded it on a platform and waited for the boat, but it never got there. I waited there until night for the boat to come, and it never got there. I stayed at the hotel and the next morning took the team and came down to see what had become of the boat. It was under the Falls, Shumate's Falls, three or four miles from Glen Lyn hung up there. I hauled the Crockett furniture off the boat all day. I did not take all of the furniture off the boat. The next morning they got over 1963 the Falls with the remainder of the load I did not unload, and came up to Jimmie Johnson's, an eddy, about a mile of the Glen Lyn Station, and I unloaded it the next day.

I know of no local name for the eddy at Jimmie Johnson's house. I never heard of a place in the river called the Sand Bar but there was a place I could get in with a wagon. That is where Mrs. Laura Johnson lived.

When the boat arrived at Jimmie Johnson's place, I unloaded the balance of the furniture into cars that had come from Radford. I hauled the furniture from the boat to Glen Lyn and I loaded it on the car. I removed all of the furniture from the boat after it got there. Alf Merchant was in charge of the boat and he lived near the mouth of Lick Creek, but just where I could not tell. It was at Mercer's Salt Works.

The witness upon Cross Examination testified as follows:

I was born in 1879. Before I moved to Crump's Bottom I lived in about a mile of Pipestem Post-office in Pipestem District. That was about four or five miles, or maybe six or something like that from New River. I was sixteen years old when I moved to Crump's Bottom about 1895.

I am familiar with New River from Crump's Bottom to Hinton and from Hinton to Glen Lyn. Of course I have been up and down and have seen the river. I have been up and down several times. I have been up the river from Crump's Bottom to Glen Lyn. I have been in the road, but I have not been on the river up there. I have rode on a boat, but not up to Glen Lyn.

I do know about, or pretty near where Wylie's Island is. As well as I can remember Wylie's Falls was close to where there was an old mill, about the Dickerson place. I could not tell you how far it is from Glen Lyn down to Wylies Falls, but they always called it ten miles from Crump's Bottom to Wylies Falls. It is a right smart step.

I know where Shumate's Falls is, if I mistake not, Wylies Falls is below Shumate's Falls. I could not just tell how far below Wylies Falls is Wylies Island, but right in there somewhere (referring to Exhibit 185). I do not know how far Wylies Island is below Wylies Falls; I am not familiar with it. Somebody may have pointed out Wylies Island, but it was not enough to 1964 attract my attention. I could not come out and tell you how far Wylies Island is above Crump's Bottom. I have not measured it. Maybe I could make a guess.

A raft moving from East River to Wylies Island would pass Shumate's Falls and would pass Wylies Falls if Wylies Island is below the Falls, but I cannot say. I do not know much about the river where the Falls is. I know that there is such a Falls there, but just exactly where they are located and how many miles, I could not say.

I am more familiar with the river from Crump's Bottom to Hinton than any other way. I know practically all of the shoals between Crump's Bottom and Hinton. I do not know whether Bull Falls would be the most difficult shoal to navigate between Crump's Bottom and Hinton. There is some fall in that place but I don't know whether it is the most difficult. Bull Falls is not exactly perpendicular, but more so than the usual.

Q. I ask you isn't it a fact that at what you would call ordinary summer low water, a row boat or a skiff can be propelled up-stream through Bull Falls by one man?

A. How do you mean by "can be propelled?"

Q. Polled up?

A. Run with oars?

Q. I am talking about polled up.

A. You would have to be a pretty good hand with a skiff.

Q. It can be done with a man familiar with the channel and a man who knows how to propel a skiff?

A. I don't know. I have never seen one propelled up there. All those I have known have been polled up. I wouldn't say a man couldn't do it.

Q. As a matter of fact, Mr. Lilly, if there was any perpendicular drop there, a man couldn't do it, could he?

A. There is a perpendicular drop, but there is a chute cut through. You couldn't get it out of that chute.

Q. I am directing your attention to the channel through Bull Falls: There is no perpendicular drop in the channel there, is there?

1965 A. No, sir.

Q. And that channel is about 30 feet wide, or 50 feet wide?

A. I don't know exactly.

Q. As a matter of fact, they used to take steamboats through that channel, didn't they?

A. I don't know, but I have heard it.

Q. That was the reason the channel was cut 50 feet wide, so steamboats could go through?

A. The channel was cut up there.

Q. As a matter of fact, Mr. Lilly, do you know as to the number of keel bottom boats that operated between Round Bottom and Hinton during the late seventies and eighties?

A. Since I come to New River, there used to be bateaux, about the time I first come to the river.

Q. You came there in 1895, didn't you?

A. Yes, sir.

Q. They were still plying the river between Round Bottom and Hinton in 1895?

A. At the lower end of the bottom and at the end of the bottom at Mercer's Salt Works was where I think that they did most of the hauling.

Q. That was after 1895?

A. Yes, after I come to Crump's Bottom.

I do not know whether at ordinary stages, or even at low water, a boat drawing fifteen to eighteen inches had any difficulty passing Wylies Falls. I am not familiar with Wylies. I am not familiar with Shumate's Falls. There were a lot of men down below who were familiar with the river, but I do not know whether any plied up there. If there was any boating done up there, I know nothing about it.

I loaded the Crockett household furniture at the upper end of Crump's Bottom above Harvey Falls. To the best of my remembrance that was in 1899. I do not know whether it was one of Squire Peter's boats. It was on Alf Merchant's boat. We 1966 had a man who lived at Mercer's Salt Works named Squire Peters, but as to his running a lot of boats I do not know. I knew J. H. Peters or Bud Peters the son of Squire Peters, but I never knew of him running boats on the river. I never knew a colored man named J. R. Smith or a man known as Emmett Smith.

Alf Merchant, a colored man, was in charge of the boat that moved the Crockett household furniture up the river. They always said that Alf Merchant was the owner of the boat. I could not say for certain how many men were on the boat. They usually carried two and the head on those bateaux, and he had four or six, and he steered it himself. I loaded one boat with Colonel Crockett's furniture. I don't know the length of that boat, but the average bateau was about fifty to seventy feet long or along there. I could not remember just what articles we put on the boat, but they were articles at his house. There was not a full boat load, but furniture does not load up like lumber. I do not think any members of the Crockett family moved by the boat. I think I was there when the boat started up the river that evening. The best I remember, the boat put out and started up the river that evening.

Q. How many were there?

A. I think four or five.

Q. Give us the names?

A. Merchant and one or two of the boys. One was John and Jim, as well as I remember.

Q. J. R. Smith, the colored man, was not on the boat?

A. I couldn't say.

Q. Was Andy Medley on the boat?

A. I don't know. I don't know who the crew were. It has been too long to remember. Some of them I didn't know. I don't remember just who the crew were. They had a boat crew and an extra crew in shoving up the river.

Q. How far from the river did Col. Crockett live? In other words, how far did you have to move his furniture?

A. From where I moved it to load on the boat, something
1967 like three-quarters of a mile or a mile.

Q. How many wagon loads did you make?

A. I don't remember, but my remembrance is I loaded the boat one evening.

Q. Did you make four or five trips?

A. I reckon so.

Q. Probably ten?

A. I couldn't tell you how many trips, but I loaded the boat.

Q. How many trips did you make from below Shumate Falls to Glen Lyn?

A. I don't know, but what I could haul one day.

Q. You hauled all one day and part of the next?

A. No, not part of the next. I hauled part of the next after they got up over the falls.

Q. That is what I say, and if you listen to me I think we can get along: How many days were you occupied in moving the furniture from Shumate Falls to Glen Lyn?

A. 1 day and a half going and a day coming home.

The distance from Shumate's Falls where I unloaded the boat to the car was about three or four miles, according to what they told me. I don't know how many trips but I took right smart stuff on the boat. I do not know who assisted me in unloading the boat. Some of the boat hands, I think. Maybe Robert Crockett, but I just do not remember now who. There was only the one boat engaged in this enterprise.

The road from Glen Lyn down to the point below Shumate's Falls where I unloaded the boat ran right down the river, right across, we forded East River at one time from Glen Lyn down the river. There was a road down the west bank of New River from Glen Lyn all the way down to Shumate's Falls and below. It was a road you could come through with a wagon, but it was not much road, but there was a road down to Crump's Bottom. You could drive over the road with a two-horse wagon.

Q. How much was left on the boat after you had taken off a portion of the load at the time the boat went through Shumate Falls and landed at East River? 1968

A. Well, I just couldn't tell you, but it must have been half unloaded and maybe more.

Q. About half unloaded?

A. Yes, sir. Of course I don't know exactly, but that is my remembrance. It was half unloaded. It lightened it up considerably what I hauled away. Maybe it was more.

Q. How long did you live at Crump's Bottom?

A. I have lived at Crump's Bottom, I don't know that I can tell you, but I lived in sight of it on the opposite side of the river ever since.

Q. You mean you live there now?

A. On the opposite side.

Q. You lived on New River?

A. Yes, sir, on the Crump's Bottom side, or on the forest hill side.

Q. Do you recall when the Norfolk & Western New River Division was constructed? That is the line that runs from Radford down to Glen Lyn, and then up East River?

A. No, sir; that must have been before I come to Crump's Bottom.

Q. That was before you came to Crump's Bottom?

A. Yes, sir.

Q. I ask you, Mr. Lilly, if it is not a fact that, as late as 1912, there were still a number of these keel bottom boats and bateaux plying New River by Hinton and the place you lived?

A. In 1912?

Q. Yes?

A. I expect there were.

Q. Do you know anything about the cargoes carried by these boats?

A. Well, they practically carried staves and lumber.

Q. And tobacco?

A. They never hauled no tobacco; no.

Q. You never saw any tobacco?

A. No. There was not any raised down about the Bottom since I have been there.

1969 Q. There was none being raised in 1895?

A. No, sir; not on the Bottom since I have been at Crumps Bottom.

Q. How about timber? Were they still operating above Crumps Bottom?

A. Yes, sir; there was timber cut in that country ever since I have been there, and is yet.

Q. That came down the river, some of it, in loose logs?

A. Yes, sir. They cut logs at Crumps Bottom.

Q. And some were rafted?

A. Yes, sir.

Q. And as you have stated, that was shipped by keel bottom boats?

A. Yes, sir.

Q. And cross ties?

A. Yes, sir; there were cross ties.

Q. Did you know a concern operating at Hinton by the name of James & Son?

A. Yes, sir.

Q. They cut an enormous amount of timber in that section, didn't they?

A. Yes, sir; I reckon so.

Q. And took it all down New River?

A. Yes, sir.

Q. Are you a relative of Bud Lilly?

A. Yes, sir.

Q. What is the relation?

A. Brother.

Q. Did he, or other members of your family, boat on New River?

A. Yes, sir; and there was another brother.

Q. What was his name?

A. Ed.

Q. He boated, too?

A. Yes, sir.

Q. And so did Bud?

A. Yes, sir.

1970 Q. Were you related to the Lilly family that was engaged in lumber operations on New River?

A. The Lilly Lumber Company?

Q. Yes.

A. We were related some, but I couldn't say how. It is distant.

Q. There was a Lilly Lumber Company operating in that community?

A. Yes, sir; at Hinton.

Q. When would you say, Mr. Lilly, that the greater portion, or the bulk, of the timber on New River between the Narrows and Hinton had been removed?

A. Well, I don't know anything much about the timber after you leave Crumps Bottom, when it was moved. Long after I come to the Bottom they moved it on all the time.

Q. Were they operating as recently as 1920 to 1925?

A. I don't know. There have been some saw mills in there; maybe, I think since that time.

There is no railroad between Glen Lyn and Hinton and the roads are not very good. We have a very good dirt road from where I live to Hinton, but in bad weather the road is almost impassable.

I have had no business transactions with the Appalachian Power Company and have never been in their employ.

By Mr. **Abbot.** If your Honor please, I want to move to strike out that part of the cross examination of this witness which was not responsive to the direct examination and it was not a matter of testing his credibility. It seems to me that they are endeavoring to bolster up their own case by every witness that we put on, and it is improper now for them to make our witness theirs or to attempt to make our witness their witness.

By the **Court.** I overrule it.

By Mr. **Abbot.** We save the point.

The **Court.** There is some basis for that, but as long as the evidence is in, I will let it stay.

The witness on Redirect Examination testified as follows:

The boat, after it went through Shumate's Falls, went to Johnson's—Jimmie Johnson's—is my understanding. It did not go to East River. That is just a little below the mouth of the East River. East River, you might say, is at Glen Lyn station. The Johnson house is on the left side just above the road and is something like a mile from Glen Lyn. The Bottom I have referred to was Crump's Bottom. I did not know very much about Round Bottom. Of course, I have heard them say that they would go up as far as Round Bottom. I have not been there to see them load, but they were supposed to.

1971 The witness, on Recross Examination, testified as follows:

The boat carrying the Crockett furniture landed something like a mile below East River. The mouth of East River is close to the station, and the boat landing was something like a mile.

James Adair, Sr. on Direct Examination, testified as follows:

I will be 59 years old the 4th of December. I was born just about a mile east of the Pearisburg Depot, on the north side of the river. I reckon I stayed there about a year, my father moved then to Kansas and stayed there about two or three years, and when I was about four years old we came back to Lurich, Virginia, what is now Lurich, Virginia, it was just a farm there. It had no name. That was about 1882 or 1883, I reckon. We lived at Lurich until I was about eighteen years old, then we moved two miles east of Lurich and lived there until I was, I reckon, 28 years old. Something like that, 28 or 29, and then I married and built a house and moved back to Lurich, and lived there about two years, then I moved from there to Narrows and lived at Narrows the balance of the time.

I taught school four years, four or five months each. The first term was about six miles west of Narrows, up Wolfe Creek. The next year, the second term, I taught about three miles below Glen Lyn, near Shumate's, they called the school house "Pig Tail," right in the lower end of the county. This was at Dr. G. A. Shumate's. Shumate's Falls is at the upper end of his farm. I taught school there in the fall and winter of 1898 and 1899.

I knew Col. John Crockett right well. He was at our house real often. He stopped there on his way to and from Radford. He was in the real estate business at Radford and stopped there real often.

Col. Crockett moved away from Crump's Bottom twice. The first time he moved away, I think it was in 1892, and at that time he moved by wagons, and my father had a contract for two teams and Mr. Spangler had a contract for eight teams, and we all went down the same day and brought him back; went down one day and came back the next, and loaded his stuff in
1972 a box car at Lurich. As I remember there were ten teams,
some two-horse, some three-horse teams and some four-horse. My father I know had one four-horse team. In leaving Crump's Bottom all the teams did not come exactly the same way. My father with his team came up the river to Harvey's Ferry, the upper end of Crump's Bottom, and across there, and the other teams, if I am not mistaken, went down across the Ferry at Crump's Bottom and went up the other side of the river from there. We all came up the right side of the river. We did not come to Red Sulphur. We left Red Sulphur off to our left, something like four or five miles, we came up through what is now Bozo, they called it Chestnut Hill at that time, that is, coming this way, leaving Red Sulphur off to our left, something like five miles. We came into the road at Peterstown, hit the road from Red Sulphur about a mile from Peterstown. The first two teams that arrived there forded the river at Lurich, at the horse ford one mile east of Lurich, but by the time we got there, we got a late start, and the river had risen from a rain the day before, and we had to drive up the river two miles to Hobbs Ferry, and cross there, but these first two teams forded the river,

Col. Crockett moved again about the winter I taught down at Shumate's "Pig Tail" school house; in the meantime he moved back to Crump's Bottom. He moved back to Crump's Bottom in the spring of 1895 from Radford. In the year 1898, and if I am not mistaken, it was in December, 1898, Col. Crockett moved back to Radford the second time. He moved from Crump's Bottom up to—he was aiming to go to Glen Lyn—they put his stuff on a bateau and pushed it up the river, trying to get to Glen Lyn, but did not get all the way to Glen Lyn. They got up to Shumate's Falls and worked there some time and could not get the bateau over, and they had a team along with them anyway, and they got another team from Mr. Shumate or Mr. Dickinson one or the other to help them move it from below the Falls to Glen Lyn. I would say that this was in December 1898.

One time I saw a fellow, by the name of Stuart, try to raft some chestnut oak logs down the river. The raft was built about two miles up the river above Narrows on the New River.
1973 I lived two miles down the river from Narrows, and by the time they got there the rafts were bursted all to pieces, and the logs floating all along the river, here and there, and some going on down. At that time I was living two miles east of Lurich.

I hauled staves awhile one year from down below Glen Lyn up to Glen Lyn. I think the staves were loaded on my wagon about a mile and a half from the river back on the hill above Round Bottom. We left Round Bottom and went directly about a mile and a half to the station. It would be hard to say how many people were engaged in hauling these staves, but there was about six or seven teams that would go together down in the morning and we would meet probably that many during the day coming from that country out, say fifteen teams a day down there. It was understood that these staves were for the Standard Oil Company. I was engaged probably two months in hauling these staves. I believe this took place in the year 1912.

The bateau that moved Col. Crockett's furniture was the only one I ever saw on New River in Virginia.

The witness, on Cross Examination, testified as follows:

I have lived at Narrows about twenty-seven years, well, not altogether. I moved back to Lurich a little while, about 1912. Narrows is about seven miles from Glen Lyn. Lurich is about two and a half miles from Glen Lyn. I am assistant Post Master at Narrows. I have never been employed by the Appalachian Electric Power Company.

Referring to the Stuart raft I suppose anyone would know it broke up on the rock in the river. I did not see when the raft broke, but I have seen plenty of rocks in the river. I did not see the raft break. I saw the raft before it left, and saw it down at my house, below the Falls broke up, wouldn't I know it broke up? I do not know whether Mr. Buckland saw the same raft as I did or not.

In 1912 I hauled some staves from the railroad at Glen Lyn, that is, on the Norfolk and Western. I hauled the staves from the mill about a mile and a half from the river, near Round Bottom. Round Bottom is in Somers County. I hauled the staves on a
wagon about nine miles to Glen Lyn. This wagon road
1974 ran between the mountain and the river, just barely room
for the road most of the way down there. I hauled staves over this road something like probably two months. That was all the staves I hauled along that road.

It is hard to say, when I first became acquainted with John Crockett, at that time he lived at Crump's Bottom and I lived at Lurich. He got in the real estate business at Radford, and going back and forth to Radford he always stopped at our house and usually some of his people would bring him up there, but when he wanted to go back my father would take him down to his place from our home. As well as I can remember Col. Crockett first moved from Crump's Bottom to Radford in about the year 1892. That was the time we moved him by wagon. Col. Crockett moved from Radford back to Crump's Bottom in 1895. I do not know who moved him from Radford back to Crump's Bottom, but he moved back by wagon.

Q. When did he come back up again from Crump's Bottom?

A. 1898.

Q. Is that the time he came on the river?

A. Yes, sir.

Q. Are you sure of that date?

A. Yes, sir.

Q. How do you fix it?

A. Because I was twenty-one years old that fall, lacked one month being old enough to vote in the election, when Teddy Roosevelt was elected.

Q. And Theodore Roosevelt was elected in 1898?

A. Yes, sir.

Q. Elected what?

A. President of the United States.

Q. The election was held in November 1898?

A. Yes, sir.

Q. Now as a matter of fact, in November 1898 Theodore Roosevelt was elected Governor of New York, was he not?

A. No, sir; he wasn't.

1975 Q. And in 1900 he was nominated with William McKinley on the Republican ticket?

A. I am not sure about the date. I have not looked that up.

Q. And McKinley was shot and Roosevelt first became President in September 1901?

A. I have not looked that up.

Q. And Roosevelt first ran for President in November 1904 and was elected President at that time, wasn't that the only time Roosevelt was ever elected President?

A. I have not looked up the dates.

Q. You say you know you made this trip in 1898 because you were not quite twenty-one, and could not vote for Roosevelt for President that year?

A. No, sir; I didn't.

Q. Isn't that the way you fixed this date of the Crockett moving, by Roosevelt running for President, that was the fact on which you fixed your date, wasn't it?

A. What time are you talking about?

Q. I am talking about the move on the boat in 1898.

A. That was in 1898.

Q. That is the way you fixed the fact of the date of his move?

A. Yes, sir.

Q. Now this was the boat trip he came up the river and you didn't go on that trip?

A. No, sir.

Q. You don't know of your own knowledge whether the boat stopped at Shumate Falls, do you?

A. Yes, sir; I know it.

Q. Were you there?

A. No; but I had evidence to know.

Q. You didn't see the boat stop there of your own knowledge?

A. No, I didn't.

1976 Q. You don't know how long it stopped, of your own knowledge, do you?

A. Well, no; not direct knowledge I don't.

Q. And you didn't move from the boat to where he went, did you, so that all the information you have given the Court was volunteered by you as second-hand information, from someone else?

A. You might construe it that way.

On this trip Col. Crockett moved from Crump's Bottom to Radford.

The witness, on Redirect Examination, testified as follows:

When I taught at "Pig Tail" school I was 21 years old that September. It was at this time that I saw the boat carrying Col. Crookett's furniture.

Q. Was there any physical evidence of the fact that the boat had hung up there?

A. Well I saw the tracks where they had hauled out of the bottom, come out of the bottom and turned to go up the river to Glen Lyn.

Q. What sort of tracks?

A. Wagon tracks.

Q. What did that indicate?

A. It indicated they had been hauling something from the river down there to Glen Lyn.

Q. The river where?

A. The river just below the Falls.

Q. From the river there through the bottom to the road?

A. Yes, sir.

Q. Were there many of those tracks?

A. Yes, sir; several of them, pretty well beaten down there.

Q. When was it you observed the wagon tracks after you saw the boat pass by the school house up the river?

A. It was on Friday afternoon, because Friday afternoon they always sent my horse for me, and I went home, and went
1977 up there, and didn't ride up any day but Friday.

Q. When was it you had seen the boat, how long before that time?

A. The boat was the day before, that must have been Thursday morning, something like ten o'clock in the morning, the boat went up past the school house.

Q. Was there a ford there?

A. No, sir.

Q. Was there a barn there?

A. No, sir.

Q. Was there any crop there to be moved?

A. If there had been they wouldn't have gone out the road, but come straight down the bottom.

Q. And were the wagon tracks—describe what the condition of those tracks was when you saw them on Friday afternoon?

A. They indicated the wagons had passed out of there during that day some time.

Q. Did you see any of that furniture being hauled away on wagons?

A. No, sir; I did not see any on wagons.

Q. In answer to a question I believe counsel said the first move was by wagon to Radford and the second move was by boat to Radford. Did you mean the boat went all the way to Radford?

A. No, sir. The boat didn't get up any further than Shumate Falls.

The witness, on Recross Examination, testified as follows:

Q. Mr. Adair, I understand you to testify now the boat didn't get up any farther than Shumate Falls. Do you want to stand by that statement?

A. As far as I know it didn't go any further.

Q. Do you know as a matter of fact after part of the furniture was taken off the boat went through Shumate Falls to Glen Lyn?

A. If it did I don't know it.

Q. You know all the other facts relating to this transaction, except that fact.

1978 A. I know they hauled this stuff out from there so why would the boat go on?

Q. I am asking if you know that fact, you taught school almost within sight of where this happened?

A. Within a mile.

Q. You saw the wagon tracks and know the incident, but you don't know the boat went on through Shumate Falls to Glen Lyn?

A. No, I don't know.

Q. Are you willing to swear you know it didn't?

A. Yes, I will swear to my knowledge I didn't know he had gone up there.

Q. Are you sure of that fact as any fact to which you have testified here this morning?

A. I had no way to tell or see or find out whether it had gone or not.

1979 N. A. **Kersey**, on direct examination, testified as follows:

I will be 82 years old September next. I was born in Pulaski County, on Max Creek. I lived there until 1886, except 5 years during the war, my father moved to Claybourne County, Tennessee, and then moved back to Pulaski.

I hauled iron from the Radford Furnace, the Macks Creek Furnace. I had a team there in 1880 or 1881, and hauled iron from the furnace to Dublin. After I stopped hauling I went to work in a blacksmith's shop there at the furnace as a helper. I hauled ore from Hiawassa station over to the furnace. The ore came from up the river, what they called Clark's Ore bank.

The ore was brought down the river from Hiawassa in what they called keel bottom boats. The ore was then unloaded at Hiawassa station. I couldn't tell how many teams were engaged in hauling the ore. Some days there would be four and five, and sometimes not so many. It depended upon how much ore came down by the boats. Sometimes they could not get a day's hauling. I didn't know where the ore was loaded on the boats, I just supposed they hauled it from the ore bank down the river. I don't know how far the ore bank is from Hiawassa. I guess it is about a mile or a mile and a quarter or a half or something like that. I couldn't say. I stopped hauling because my team died.

I never saw any iron hauled on boats on the river. I didn't live right on the river, but it was rumored around the furnace there they were hauling some from the mouth of Macks Creek down to the New River Depot. I didn't see any, but it was reported there they were shipping some from that furnace down to New River Depot, but I never saw them loading any because I wasn't down there. The blacksmiths did some work for the boatmen when I was a helper there. They put some spikes on the poles used to push the boats. It was reported around on the works that they were shipping some of the iron from that furnace by boats down New River.

At that time iron was being hauled to the railroad by wagons.

I don't think they ceased hauling iron to Dublin, because
1980 five or six teams were hauling the same time I was. The
iron I hauled I loaded at the furnace in my wagon and hauled it across the ferry to Dublin and unloaded it. There was a tram road to the ferry. That was several years before I hauled any, that road was a little tram road built down there, I reckon ten years, maybe, before I hauled any iron. They tore up this tram road and moved it away before I hauled any iron. They built a tram road down the river and pulled the little cars by mule and run the track in the ferry boat and pulled them out on the opposite side, and unloaded this iron on the opposite side of the river, and the teams would haul it to Dublin. They did that for a number of years, or for a year or maybe two years, and I don't know why they quit it, but they quit that and hauled it straight from the furnace to Dublin.

I quit the furnace in 1883 and went to Bland County. I moved to Bland County in the fall and moved back in the spring. I was there about four or five months. I came back in the spring of 1884. I got a job with Mills and Fairfax, sharpening steel to cut stone for the Hiawassa bridge. While I was living in Bland County the Radford or the Macks Creek Furnace went out of blast.

Q. Did it ever go in blast again?

A. Several years after I moved away from there, some fellow, so I was told. I don't know it to be a fact, leased that furnace, but I don't know about that.

Q. How long after was that?

A. I couldn't say because I was living in Pulaski then.

I left there in 1886 and the furnace was not in blast. The furnace was out in the fall or winter of 1883–84, or that is the way I have got it down in my recollection.

I cannot remember whether I saw any bateaux or keel boats on the river, besides the boats hauling ore from Clark's Ore banks to Hiawassa. I might have seen some, yes, I have seen several boats around there, but I don't know just what they were doing. At this time the railroad might have started.

When I was sharpening steel, they were working on the railroad grade between Pulaski and Hiawassa Bridge. 1981 They were grading along there, and also grading some when they were cutting stone for that bridge, they were grading on the other side of the river in a big cut there, they were grading out that the same time they were cutting stone. That was in the spring of 1884. I could be mistaken, but I think I am pretty close to it anyway.

I can remember several of the people who were hauling iron to Dublin. Tom Silvers is the one who hauled the same time I did, and Ed Richardson and Ross Cecil, and Fatty Morgan, an old colored fellow who lived in Montgomery County, but he had a team there. I think a fellow by the name of Bill Ratcliff had a team and hauled a little while, I don't know how long, not very long. The company had some teams there but I don't remember any of them hauling any iron. They hauled charcoal from up in the mountains. I think most of the teams they had themselves hauled this charcoal from the mountains. I couldn't tell how many teams were engaged in hauling iron to Dublin, at the time I was hauling. Some days some of the farmers around there would haul maybe a little while and then lay off a while and drop in and haul again. They did not haul regular, I don't think. I expect there was some five or six teams that hauled the iron but some did not haul regular.

Q. Do you remember Son Whittaker?

A. He hauled iron way before I hauled any. The furnace was in blast there for several years before I commenced hauling any.

Q. Do you remember Henry Vance?

A. Yes, sir.

Q. What did he do?

A. He hauled iron but several years before I hauled any, he didn't haul while I was hauling.

Q. How about a man by the name of Rhodes?

A. Well, he hauled before I did.

I mentioned some of these names who were hauling at the time I was hauling, but there was a whole lot more who hauled before that, but I don't remember. I never paid much attention to them because I wasn't hauling.

1982 The witness, on Cross Examination, testified as follows:

I suppose the Radford Furnace is about one mile or seven-eight's of a mile up from the river, or something like that. I have heard how far it was, but I couldn't state exactly,—something like a mile. I couldn't say how far Hiawassa is from the mouth of Macks Creek around that horse shoe bend I couldn't tell how far it was. It might have been four or five miles. I couldn't say, it might have been three or four, I don't know.

The Clark mine might have been a mile or a mile and a half from Hiawassa. The mines were not right on the river, the mines were back up on the hill away from the river, maybe half a mile. The ore was hauled from the Clark mines on wagons down to the river and placed on keel bottom boats. The ore was loaded above Hiawassa, and transported down New River to Hiawassa. The ore was then taken by wagon across the hill over to the Radford Furnace.

After the pig iron was manufactured it was transported back to the river, but not to Hiawassa. The iron was hauled from the furnace to Dublin by wagon. The wagon and iron were taken across the river by ferry. I believe the distance from the furnace to Dublin was ten miles. There were some small hills to go over and some of it was a pretty heavy pull. When it rained we had bad roads in those days. In one day's work, it was all a fellow could do, to haul a load from the furnace to Dublin and back home. I used a two-horse wagon and carried a ton of pig iron, or 2240 pounds, they put a long ton on. My recollection is that they paid us $2.50 per ton to carry it to Dublin.

Q. Now you say it was your understanding that some of the pig iron which was manufactured at the Radford furnace was hauled down to the river, placed on boats there and carried to New River Depot on boats?

A. That was just a rumor, just talk around the furnace that they were shipping some by keel bottom boats to New River depot.

Q. How far was that?

A. I don't know how far it was.

Q. Have you ever been down the river to Radford?

A. Not by the river, I haven't.

1983 Q. Now do you know anything about the operation of the Boom Furnace?

A. No, sir; only except by hearsay.

Q. It was operating in those days, wasn't it?

A. It did operate but I don't know what date it was, it was operating, I think, about the time I was working there at that Radford Iron plant.

Q. And it was located about the mouth, or somewhere near the mouth of Reed Island Creek?

A. It ran up the creek a piece, but I don't know how far it was.

Q. How far up the river above Macks Creek?

A. I couldn't tell you. I would have to guess at it.

Q. What would be your best proximation?

A. You mean Macks Creek?

Q. No; I mean from Macks Creek to the mouth of Reed Island Creek?

A. Around the river?

Q. Yes, sir.

A. I would say it was 10 or 12 miles, just guessing at it, I don't know for sure.

Q. You also understood, did you not, in those days, that the pig iron which was being manufactured at Boom Furnace was being transported down the river in keel bottom boats to New River depot?

A. That is my understanding that they were doing that, but I don't know it to be a fact.

I don't remember anything about the Barren Springs furnace, I mean I don't know whether it was in blast, or not. I have been up the river on the train and have seen Foster Falls. That is up almost to Ivanhoe. Foster Falls is above Macks Creek and Boom Furnace. They commenced building the Macks Creek Furnace or the Radford Furnace in 1867 I believe, or 1868, according to my recollection, just a couple of years after the Civil War.

Q. Is it your understanding that it operated constantly from 1867 to about 1883?

A. I don't know, but they were idle several times.

1984 Q. Just for short times?

A. Yes; and it might have been idle a time or two for a year or two, I couldn't say.

Q. In those days there was no way for the pig iron which was manufactured at Macks Creek furnace to be moved to the railroad, either to Dublin or New River Depot, except by boat down the river, or by wagon across these mountain roads?

A. I don't remember at that time when it was built, I don't think there was anything said about boating it, but they were hauling by wagon.

Q. I mean from that period on up to the time it went out of blast in 1883, there was no railroad up New River above Radford at that time?

A. No, sir; no railroad closer than Dublin.

Q. As a matter of fact, could you tell us when the first train went to Ivanhoe on the Cripple Creek Branch?

A. No, sir; I can't tell you.

Q. It was after 1884, was it not?

A. Yes, sir.

Q. It was in 1885 or after that, or up certainly until 1884 and the products of these furnaces either went to the railroad at Dublin or Radford by boat or by wagon?

A. There was no way to get it from over there except by wagon, from that furnace.

Q. Or by boat?

A. Or by boat. They hauled the materials to build the furnace on wagons from Dublin over there.

I can't say when the Boom Furnace commenced operation. I remember being up there shortly after they built it, but I couldn't tell you when it was. I think the Boom Furnace was in operation at the same time the Macks Creek Furnace was in blast. I couldn't tell you how long the Boom Furnace continued operations. Sometimes it would be in blast and sometimes I would hear the
1985 report that it was not in blast, or that it was idle, or something like that. I couldn't say whether there was a depression about the year 1884 or 1885 that might have caused the furnace to be idle. I don't know why they went out of business.

I have seen keel bottom boats and would guess them to be about 35 or 40 feet long. I don't know whether there were any keel bottom boats owned by the Boom Furnace and the Radford Furnace. I don't know they owned any. I never heard them claim they owned them.

I don't know who was supposed to boat this iron from Radford Furnace down to New River Depot. I never saw them loading it, and I can't remember the men that were accused of boating it down the river. I knew some of the men that boated, though. Watts Odell, sometimes he was up there in the shop, and Clabe Lawson and James Evans Owen, just men talking around there, and I would hear that they were the crew doing the boating, among others, but I didn't see them boating any. I don't think they worked for the Radford Iron Company. I don't know who they worked for. I think they did most of their hauling from the Boom Furnace, but I don't know who they were working for or who paid them. I guess the company paid them who was handling the iron shipped, whoever it was.

The output of the Radford Furnace I might say was 10 or 12 tons in 24 hours. I think they operated with one grade of iron at one time and I heard a foundryman say that made 35 tons out of a certain kind of ore in 24 hours, if that was when ore was mined right there at the furnace, but that mine gave out and they had to use ore from Clark's Ore Bank and Reed Island. They hauled some from Reed Island down there.

While I was sharpening steel to be used in cutting stone for the building of the Hiawassa Bridge the stone was cut right close to

the quarry and hauled down to the bridge. That was in 1884. The quarry was up back of Allisonia, about two miles. At that time they didn't move the stone from the quarry to the bridge site by boats. They didn't finish that bridge or that abutment there the first year when they started it, but a year after or maybe a year and a half after is when they finished the bridge. They got the stone up above the mouth of Reed Island from Howard's Quarry and boated it from there down to finish the bridge at
Hiawassa, they brought it from Howard's Quarry above
1986 there, and I sharpened steel to cut the stone up there too.

I think they were about a year and a half on that bridge after they started it the first time. That was about the year 1886, I reckon. They boated that stone from John Howard's Quarry, about the mouth of Reed Creek or above it, they boated it from there down to finish up these abutments at the bridge. I couldn't say how far Howard's Quarry is from the bridge site, a couple of miles or three miles, just guessing at it.

The witness, on Redirect Examination, testified as follows:

The stone was boated from Howard's Ferry down to the bridge site, they cut it up there most of it.

My understanding from the transaction of the business there at the furnace was that boating the iron was not successful there at that time. Because they had to haul it from above the river on wagons and they loaded it on the boats, and hauled it down to New River, and then haul it on wagon from there to the Depot, to be loaded on the cars, and it was too expensive.

J. J. Culbertson, the lessee or superintendent of the furnace on one occasion went away to New River because he said they got his iron mixed up down there and he had to go down and straighten up some iron which they got mixed up on the yard, but whetner it was mixed up with their own iron, the different grades of their iron or whether it was mixed with the grade of iron that was shipped from Boom Furnace, I don't know.

I couldn't say what the capacity was of the Radford Furnace or Macks Creek Furnace. While I worked there I understood they were making from 6 to 10 or 12 or maybe 14 tons, depending on how the furnace worked. Sometimes it worked bad and they couldn't get much out of it, and then they would go to work again and make a little more. I couldn't say what it would average.

H. Palmer Roberts, on Direct Examination, testified as follows:

I will be 87 years old the last day of September. I live at 229 Day Avenue, S. W., Roanoke, Virginia. I lived on New River
above Hinton at Pack's Ferry. We owned Pack's Ferry.
1987 We bought Pack's Ferry in 1882. I spent seven years there,
and in Hinton and at Red Sulphur.

In the year 1882 or 1883, I am not sure which, I attended a sale of some boats in Hinton. I didn't pay much attention to it and I didn't intend to buy a boat anyway, but some folks were there bidding on it. The Government was selling out the equipment—the bateaux used in the construction of the improvement. I bid on one. I happened to be there; I thought somebody would bid. There was a crowd there and I thought somebody had been drowned. I went there and I didn't know anything about boats being sold, but when I got there, they were selling them and the auctioneer was selling the last boat. He had already sold two before I got there. A fellow ahead of me bid $10, and I didn't want to buy the boat, but I didn't think he ought to have it so low, and I bid it up 50¢, and he bid on it and I thought I would run him up to $25 or so, although I didn't need it, and didn't want it, but when I bid $12 he quit bidding and so it fell in my hands. I got caught on the trick. I was at Hinton and the home farm was four miles up at Pack's Ferry, and I couldn't leave it there in Hinton. I paid four men to carry it or row it home. I takes four men to run a bateau and they charged me 50¢ a piece and it cost me $2 to get it up there.

The boat looked like it was in first class condition. That is, the man, when it was offered for sale, said it was practically brand new and it cost $125.00, and it was new because the paint inside of the boat was not even stained with mud, and in fact, they never used it. It was bought too late to make any use of it and then the appropriation gave out.

I was clerking for Mr. Riffe after that and I left the boat at home, and they used it on one trip load with hay, going to Hinton, 4 miles, and that was the only trip we made with it. We found it too expensive to fool with the boat, when we found that a two or four-horse team could make the round trip quicker than we could bring the boat back from Hinton to our home at Pack's Ferry. It takes about three hours to carry an empty boat home and we could make the round trip with a team in one hour.

The mouth of Bluestone is on the west side of the river about
three-quarters of a mile below Pack's Ferry. Our land
1988 extended a mile and a half down the river on the east side of
the river. The location of Pack's Ferry was not changed
after I left there. There was no use to change it. You couldn't make a road anywhere else, except in that particular place, because there was a gap on the west side where the road went into Raleigh County, whereas all on the north and south of that particular place, on the west side of the river, the mountain was steep and there was no place for a road. The mountains came down to the river on the west all the way from Bluestone to Hinton. From Pack's Ferry up to Bluestone, there is a path and that is all there

is and that is thrown up on the side of the mountain, because there is no place down there for a path of any kind in times of ordinary high water, and I guess that path was made there hundreds of years ago, because there is no path immediately on the river, because there are no flat places there in high water.

The witness, on Cross Examination, testified as follows:

My farm is on the east side of New River and Bluestone Creek is on the west side. It is four miles from my farm down the road to Hinton. It was a good road. The road was frequently traveled, it was the only road. There were roads leading to Greenbrier from the upper section of Monroe County, and so on, but that was the only road leading into the valley of the New River, because we couldn't have any roads on the west side, because being up in the mountains that came clear to the water. The road went up the river to our place. Of course, there were little variations, that is, the mountains and hills made the road turn some. My mother owned Pack's Ferry and we operated it ourselves.

We used a flat bottom boat on the ferry. Wagons and horses were carried on the boat. We carried all that traveled that particular road; that branched off from the road to Hinton that went into Raleigh County. We went to Hinton and all over into Raleigh County and Beckley and down towards Charleston. I suppose all of the dwellers and inhabitants of that region who
had to cross the river would use Pack's Ferry to cross and
1989 drive down to Hinton. We hauled all the travellers who
used the road to Raleigh County and to Beckley. A great deal of cattle was ferried across there from that county to Monroe County, where they had blue grass. I don't know whether there was any farm produce hauled, because those people had some other market I imagine. I couldn't say as to everything that was ferried across there, because we had a ferry-man and it was his business to ferry everything. I rode across on the ferry boat occasionally.

I attended the sale of the Government boats at Hinton. I bought the last boat that was put for auction. The boat I bought was about 50 feet long, and I don't know exactly the distance from side to side, but I imagine something like 8 or 10 feet. They were keel bottom boats or what was known as a bateau.

Q. You are familiar with the bateau type of boat, are you?

A. Yes, sir.

Q. You have seen them on the river, have you?

A. I could not tell you; I seen them going past, but I could not describe the boats going down the river, loaded with probably staves or something. I would only see the load, it is probable.

Q. You have seen bateaux going down loaded with staves, have you?

A. Yes, sir.

Q. As a matter of fact, bateaux moved back and forth past your place right often, did they?

A. Yes, sir.

Q. There was right much traffic on the river in bateaux in those years, wasn't there?

A. In certain lines of commodities, there was.

Q. What were the commodities?

A. Principally, almost exclusively, staves for making barrels. I never saw them loaded with cross ties. I had no occasion to make the acquaintance of any of the men that operated these bateaux. I never saw the Government boats till they were offered for sale. I knew that the Government had dredged the channel, but the dredging and improvement was done prior to my
1990 arrival on the banks of the river. I couldn't say how long it
had been since the Government ceased work; I know nothing about that; I never saw them at work. All the work where we lived was completed before we got there.

I found that I could drive a horse and wagon from my home down the east side of New River to Hinton faster than I could in a boat going down and coming back. The difficulty was in the time that it took to bring the boat up the river.

Q. How fast could it go down?

A. I don't know how fast the water carried the boat at all.

Q. You did not time it?

A. No, sir; I did not time it, but I know it took us longer to bring it back empty—at least it cost me more money to run it down there.

Q. What did you do with your boat?

A. I left it at home, tied up to a sycamore tree and at the time we moved away from there, I was doing business in Hinton with Mr. M. A. Riffe, who was a wealthy man there running a grocery business and he turned the grocery business over to me to go into the bank, and I never paid much attention to what the people were doing at home, and they did whatever they wanted to do with it.

Q. Well, what was done with it?

A. I don't know, because I gave it up and I didn't care what became of it, and I imagine, though I am not sure, that when we sold the farm to a man named Wycliffe, I think was his name, there from above Union, probably my father in law let him take possession of the boat along with the other things.

Q. So you never did sell the boat?

A. I don't know. I never sold it.

Q. You never sold it?

A. No, sir.

Q. And so far as you know, you just took it back to the farm and the boat was never sold, so far as you know?

A. No, sir; I don't know. I didn't feel interested in it, for one thing, because every time I had anything to do with it, it
1991 cost and I got shed of it as soon as I could.

Q. It was a great incumbrance and embarrassment to you?

A. Yes, sir; certainly; I was in the mercantile business and not a boatman.

Q. I had not asked you why you had not kept it, or why you were interested in it.

A. What is that?

Q. I say I did not ask you anything like that. Why did you volunteer the statement that you didn't care to have the boat and that it did not interest you and you didn't want it?

A. Because it cost me $2.00 an hour after I bought it, and I kept it awhile and made one trip and found that it cost more money to make a trip on the boat with our produce than it cost to go with two or four horse wagons to Hinton, and there was no use to be hauling down the river when we would have to hire people to bring the boat back and we had our own hands who were acquainted with horses and wagons, and they did not know a thing about boating, so every time the boat went down, we would have to hire hands to bring it up.

Q. The people at your place did not know anything about boating?

A. No, sir.

Q. And you did not either?

A. No, indeed.

Q. And you had to hire a boatman?

A. Yes, sir; every time we brought the boat from down there, we had to hire them.

J. B. **Talbot**, on Direct Examination, testified as follows:

I was born in Floyd, August 5, 1858. I left Floyd when I was fourteen years old and came to Rockford. Rockford is down the river below Radford, on the west or left side, going down. I liver
there two years. Then we moved to a place in Montgomery
1992 County, where we lived for about twelve months. It was
between Gap and West Mountains. From that place, I moved to Pepper's Ferry, where I lived about two hundred yards from the river for eighteen years. When I lived at Pepper's Ferry I boarded with the man I worked for. His house was two hundred yards from New River. His farm I worked on was located right along New River. From Pepper's Ferry, I moved to Radford where I lived about two years. After that, I moved to Back Creek in Pulaski County.

Q. When you lived at Rockford, did you ever see any bateaux or keel boats on the river?

A. I seen one just a few times—just a few.

Q. Do you know who was operating the boats?

A. The one I seen I knew who was operating it—Beverly.

Q. What Beverly was that?

A. It was Sylvester Beverly.

Q. Did he have anybody else on the boat with him?

A. He had four men there pushing it.

Q. And approximately how many times did you see that boat when you were living at Rockford?

A. I could not be positive, but it was not over four or five times, anyhow.

Q. It was not over four or five times?

A. No, sir.

Q. After you lived at Pepper's Ferry awhile, or while you were living at Pepper's Ferry, did you ever see any keel boats or bateau on the river?

A. No, sir; not ever; I never saw none until when I was in Rockford.

The witness, on Cross Examination, testified as follows:

Q. Rockford is below Radford on New River, is it?

A. Yes, sir.

Q. How far down the river from Radford?

A. A mile.

Q. A mile?

1993 A. Yes, sir.

Q. That would be somewhere in the vicinity of the upper horse-shoe, would it?

A. Yes, sir; a good piece from the horse-shoe.

Q. Was it below the horse-shoe or above it?

A. Above it.

Q. And you say you were there about 1872—is that about right?

A. I reckon so; I never kept no date of it.

Q. And you were there two years?

A. Yes, sir.

Q. And while you lived at Rockford, you saw these bateaux and keel bottom boats going up and down the river?

A. Yes, sir.

Q. Who owned the boats?

A. The manager of it was Beverly.

Q. And you say that he had four men poling the boat?

A. Yes, sir.

Q. Did you know any of these men?

A. No, sir; I did not; I only knew him; I was acquainted with him.

Q. Was he a white or a colored man?

A. He was a colored man.

Q. How old were you then—were you about 14 years old?

A. I come to Rockford when I was 14 years old.

Q. Do you know whether or not these men on the bateau blew a bugle as they came up and down?

A. Yes, sir; they always carried a bugle.

Q. Would they put into your place and get produce?

A. No, sir; they just passed on.

Q. They never stopped at your place?

A. No, sir.

Q. Did you ever hear them blow the bugle?

A. Yes, sir.

1994 Q. And you saw them take the boat both going up the river and afterwards when they came down, did you?

A. I did not see them go down. They would go down at night. That is when I heard the horn, but I did not see them.

Q. Oh, they travelled by night as well as by day?

A. Yes, sir.

Q. At that time, there was no railroad down at Glen Lyn, was there?

A. No, sir; there was no railroad then.

Q. There was no railroad between Glen Lyn and Radford, was there?

A. No, sir.

Q. And there was no railroad below Glen Lyn until you got to Hinton to the C. & O. Railroad?

A. No, sir.

Q. Do you know what these men carried on these keel bottom boats?

A. No, sir.

Q. You never did see?

A. No, sir.

Q. That was about the only way, wasn't it, up and down the river, to get your produce, by the keel bottom boats?

A. And with wagons.

Q. The roads were very very bad in those days, were they?

A. Yes, sir.

Q. Can you tell us anything about the size of the boats?

A. No, sir; I never paid any attention to them.

Q. Did you ever see any logging done in that territory at that time, or was that before they started going on New River?

A. Before they started it?

Q. Yes?

A. Yes.

Q. Were you living at Pepper's Ferry when the Norfolk and Western cut-off was constructed—do you know what I am talking about—the cut-off across Pepper's Ferry?

A. Yes, sir?

1995 Q. Were you living there then?

A. Yes, sir.

Q. There was a lot of boating done in connection with the building of that bridge there, wasn't there?

A. If so, I did not see it.

Q. They had a steamboat in there, didn't they?

A. I never saw a steamboat.

Q. You didn't see a steamboat when they were constructing the cut-off at Pepper's Ferry? You say you never saw it?

A. Yes; I never saw it. If it was there, I did not see it.

Q. You were at Pepper's Ferry at the time, were you?

A. Yes, sir.

Q. How close did you live to the river?

A. The house that I boarded at was about 250 yards.

Q. And you had the same opportunity then to observe the steamboat, if it was there?

A. Yes, sir.

Q. (Continuing.) That you had to observe keel bottom boats, of they were going up and down the river?

A. Yes, sir; if there was a steamboat there, I did not see it.

Q. And you never saw the steamboat or the keel bottom boats?

A. No, sir.

While I was living at Pepper's Ferry I would be at New River Deport two or three times a week. I never saw any pig iron on the shore or in cars at New River Depot. I did not see anything shipped coming on the water there. I saw no pig iron. I traveled the road between Pepper's Ferry and Dublin, it was where the state highway is now. The distance from Pepper's Ferry to Dublin was about 10 miles. The Pepper's Ferry cut-off was constructed some time after the Norfolk & Western was built down New River from Radford to Glen Lyn. I can remember when they were building the cut-off on the Norfolk & Western.

1996 The witness, on Redirect Examination, testified as follows:

I was talking about the road from New River Bridge to Glen Lyn. The only boat I ever saw was the one operated by Sylvester Beverly. I knew him. He came from Floyd.

WILLIAM INGLES on Direct Examination, testified as follows:

I will be 59 years old my birthday. I have lived at Radford since 1908, before that, I lived at Ingles Ferry. I am a nephew of Captian William Ingles.

Q. Do you remember an alleged steamboat that was built at Radford?

A. It was built at New River, I reckon, across from Radford.

Q. Do you remember such a boat?

A.—Yes, [illegible].

It was a heavy boat with an engine, an upright steam boiler. I think the boat was built by a fellow named W. C. Hodge. I remember the boat being operated up there, I have been on it. The boat had made several trips down between New River Bridge and Ingles Ferry. Ingles Fery is about three miles up the river from New River Bridge. They didn't seem to be able to get over Ingles Ferry—the Ingles Falls, and I have been on the boat when it would operate and get possibly two-thirds of the way through the falls and come to a stand-still and wobble and beat on the rocks and the engine paddle-wheel was damaged and they would draw it back. My father got interested in the boat, trying to get it over the falls. He practically wasted a whole summer's time trying to get the boat over the falls. I don't think they ever got over the falls, not to my knowledge. The attempt was made several times. I never saw any produce or supplies of any kind on the boat.

The witness, on Cross Examination, testified as follows:

I am the active vice-president of the First and Merchants National Bank at Radford. I have been connected with the bank for 36 years. That bank has no connection with Appalachian Electric Power Company. I was born at Ingles Ferry on New River. That ferry was named for some of my relatives. The ferry at first was operated by the County of Pulaski; it is operated at the present time by my mother. I would say that the ferry has been operated continuously since about 1760. Business on the ferry at the present is very light. The ferry is just below what is known as Ingles Falls. 1997

Q. You say that you made, or attempted to go or get a boat over the Falls—over Ingles Falls?

A. I was in that boat when it attempted to go over there; yes, sir.

Q. Have you ever gone over the Falls?

A. No, sir; I never did.

Q. What year was this?

A. It is hard to fix the time. I would say about 1893, to guess at it.

Q. You know, don't you, that a great many boats have gone over the Falls?

A. Of various sizes; yes, sir.

Q. You also know, don't you, that iron has been carried in boats down the river to New River and from above the site of the Falls some miles above?

A. That is a little too early for me to state that fact. I saw boats go down, but I don't know what they were loaded with.

Q. You saw boats come and go, didn't you?

A. Yes, sir.

Q. They came from some place above Ingles Falls, above there, didn't they?

A. Yes, sir.

Q. They came from near the mouth of Mack Creek, didn't they, or Allisonia?

A. That is my judgment; yes, sir.

Q. Have you ever seen them at New River Depot or Bridge?

A. I could not say I have. I have seen them pass home when I was at Ingles Ferry.

1998 Q. You have been to New River Bridge quite often, have you?

A. Not at that early date, at my age.

Q. How old were you then?

A. I was five or seven years old.

Q. You were not over four or five miles from the Bridge, were you?

A. I have been there many times later on, but not at that time.

Q. How long did you live at the site of this Ferry that you speak of?

A. I left there when I was 22 years old.

Q. What time of year was it that you say you could not get the boat through the Falls?

A. It was in the summer season.

Q. In low water season?

A. Yes, sir.

Q. And there have been times when there was much higher water than that in the river—in New River?

A. Yes, sir.

Q. Would you say, in the summer season, say July at the present time, that it would be possible for a boat to through Ingles Falls?

A. It would be mighty hard to get any sized boat through there.

Q. Did you make your trip, or attempted trip, through the Falls in July?

A. I could not tell you. It was in the summer season, though I know that.

Q. What was the size of your boat?

A. This ferry boat there—the steam boat—oh, I don't know how to describe it, but it was a pretty heavy boat.

Q. I am talking about the length and width, is all.

A. I will say it was not less than 40 feet long.

Q. Now, you say you could not get your boat through there and your father could not get his boat through there.

A. It is the same boat that I am talking about—it is the
1999 Hodge steamboat.

Q. A large steamboat?

A. No; I said the Hodge steamboat.

Q. After having lived on the river practically all your life, you know that boats have passed up and down the river through Ingles Falls, carrying various kinds of commerce over quite a long period of time?

A. Yes, sir.

By the COURT:

Q. How long did they keep the steamboat around out there?

A. My knowledge of it was just the summer that my father took hold of it and was working on the paddle wheels most of the time—just one summer.

Q. What did they use it for—excursions and as a pleasure boat?

A. They would have used it for that if they had made a success of it, but it was not a success.

By Mr. WILLIAMS:

Q. What kind of a boiler did the steamboat have?

A. An upright steam boiler.

Q. Do you know whether or not the boiler and engine were adequate for a boat of that weight?

A. In my judgment at this time, I think it was rather light for it.

This was the Hodge boat. I think it was built at Hodge's plant at New River. It is located just above the railroad bridge across there at Radford. I don't know what became of this boat when they got through with it at Ingle's Ferry.

I know when the Pepper's Ferry cut-off was constructed for the Norfolk & Western Railroad. I know nothing about the steam boat being run there at that time.

I own no stock in the Appalachian Electric Power Company. My sister owns five shares. I think none of the officials in my bank own any of that stock. They may have a few shares. The bank owns none.

William R. Gerald, on Direct Examination, testified as follows:

I live in East Radford. I am a retired Norfolk & Western engineer.

2000 I am seventy-two years old and was born in Giles County, on New River, a mile west of Eggleston Springs. I lived there until I was seven years old and then moved to Montgomery County, about a mile away from Walton and about one mile from New River. I lived there until I was fifteen years old, at which time I went to work on building the New River Railroad.

While I lived at Walton we did some farming on the New River bottom lands in Pulaski County. We farmed these bottom lands for several years and would ford the river in the morning and at night in a wagon. We were able to do this whenever the occasion required and we never had any trouble.

Q. Did you ever see any keel boats on the river, Mr. Gerald?

A. Well, I did see one going down the river.

Q. When was that?

A. That was along in 1875, when I was a boy working on the farm.

Q. When you were 15 years old, you say you went to building that railroad?

A. Yes, sir.

Q. What railroad are you talking about?

A. From New River Depot to Pocahontas.

Q. That is now the New River Division of the Norfolk & Western?

A. Yes, sir.

When I first began my work consisted of grading and laying ties and iron. I worked on this grading down at the tunnels at Eggleston before we laid ties. I was working for Mills & Rowland. When I laid the ties I worked for Buck, Crocker, Thomas, Butler & Dyerle. They were railroad company employees at the time. The contractors prepared the right of way and the Norfolk & Western laid the tracks. The first grading I did was done down at Eggleston. I continued at this until sufficient grading had been done so that they could commence laying iron from New River. Then I started to lay the iron and ties, which work was begun at New River Station and continued on until we reached Pocahontas on March 10, 1883. I was employed in that continuous operation from New River Station to Pocahontas.

2001 When I was grading at Eggleston I stayed in a shanty up on the hill there. I fed myself and did my own cooking. There was a commissary there which was supplied by wagons from New River Depot. Old man Robey was one of the men who drove these wagons.

I didn't see any boating to the commissary at Eggleston. There was nothing boated there.

When we were laying the steel on the railroad we had a string of camp cars and in one of those cars was a commissary which furnished us everything we wanted. They moved it right along up. Every time we moved we would lay a couple of miles of iron and we moved the camp car up with us.

The camp car was supplied with provisions by a material train which brought all kinds of iron and fish plates, and bolts and spikes and such as that; it supplied us all the way through. During that operation I never saw any supplies, commissary or railroad supplies, boated on New River. After I had laid the tracks to Pocahontas, I went to braking under a man by the name of Butler. That was on the railroad between East Radford and Pocahontas. I continued to work there for about a month or so, I suppose. After that they gave me a job of firing [illegible] work-train on New River, between New River Depot and Glen Lyn, Engine 37. I continued to fire on that train until the 13th day of March 1884, when the mines exploded in Pocahontas and killed 164 men, then things ceased a while. After that I came over to Central or Radford and fired extra a little while until they got things straightened out. I stayed over there until the 1st day of September, 1886. I was then promoted to an engine the first day of September, 1886. I ran the engine then for five years between Radford and Pocahontas.

The railroad in the beginning from New River Depot to Glen Lyn followed the river all the way down to the mouth of East River, known as Glen Lyn, and there we turned up East River. After I left New River Depot we struck New River at Back Creek, in Pulaski County. That is about three or four miles below Radford on the river. They moved the station down nearly on the river. It went over what was known as Schooler Hill.

2002 In 1899 they changed the road and cut through by Walton, and went by the Eskridge Farm, and cut a tunnel down there nine-tenths of a mile long and cut off that hill where we used a pusher. I ran as an engineer on that Division for five years. After that I took a passenger run on the 1st day of April, 1890 and ran it for 37 years up and down New River.

I never saw any trade or travel on New River, but I saw flat boats ferrying wagons and things across the river, and canoes up in the river—people fishing. I never crossed the river at Dry Branch. That is where the Giles-Montgomery County line is. The river at Dry Branch is about three-quarters of a mile wide. I have seen people out there fishing in them little rippies standing on the rocks.

Belspring is about four miles from New River Station. It is just below the point where New River Railroad hits New River after leaving New River Depot, down at Back Creek. After leaving New River Depot, we went up over Schooler Hill, and they had a station up there called Schooler, and it was about two miles from there to Belspring. Belspring is down the river from the point where the railroad used to leave the river. The railroad did not hit New River before you came to Belspring. It is about a mile below there at Back Creek. They had a long trestle. That part of the railroad now has been abandoned. The cut-off from Walton through the tunnel is there.

The witness, on Cross Examination, testified as follows:

I didn't work on the construction of the Norfolk & Western Railroad down at Pepper's Ferry. I was not down there when they built the tunnel. They did use boats on the river in hauling material for constructing the tunnels. I know that they hauled their sandstone from Walton Quarry. It was loaded on flats and brought to Schooler and unloaded on the ground and hauled by wagons down to Pepper's Ferry, and boated down to the abutments. I don't know whether it was a steam boat or not. I don't know anything about that.

When I was about 15 years old I worked on a farm and we forded the river in wagons, night and morning. I suppose the deepest place in the river was about three feet deep. I am 2003 positive it was not four or five feet deep. It might have been a little deeper, but I don't think it was so the water ever got in the wagon bed. I had stated before in a deposition that the lowest depth at that place was four feet. I was of the opinion at that time that the lowest depth was four feet.

Q. Didn't you say, at that time, you could cross it only at low water, and at high water you could not cross it?

A. No, sir; and you will not find it on that report.

Q. You didn't say it?

A. No, sir; it is not on there, and, if it is, I didn't say it.

Q. Did you used to see boats going up and down this river?

A. When—at what time?

Q. At any time?

A. No, sir.

Q. You never saw one?

A. I saw one boat go up or down, I don't remember which, when I was small, about ten or twelve years, when we were farming and ploughing corn there in the Pulaski bottom.

Q. Just one boat?

A. That is all.

Q. On what occasion?

A. I might have saw two, that has been a long time ago, and I didn't retain it in my mind.

Q. Where was this boat, and what did it look like?

A. It looked to me like it was about 50 or 60 feet long, going down the river, with one man sitting on the rear end, with an oar, and two or three darkies on it. They might have been white men, I don't know.

Q. Go ahead, describe it? [Pause.] Can you describe the boat?

A. No; I don't know that I could. It looked like a keel bottom boat. I don't know whether I saw more than one or two.

Q. Did you see what it had on it?

A. No, sir; I was not close to it.

Q. That is the only boat you ever saw, and the only time you ever saw a boat on the river?

A. That is the only time I ever saw a boat going up or down the river.

2004 Q. Were not you asked this question in your deposition at Radford: "Now, state whether or not you have ever seen any bateau on the river?" and didn't you answer "Yes, sir"?

A. Yes, sir; I certainly did.

Q. Let me read this question and answer: "Describe those boats?" Didn't you answer "The boat looked to me like about 60 feet long, and four men in it polling it up and down New River"? Did you say that?

A. Yes, sir. I don't think I saw but one boat going down the river, and I saw one coming up the river.

Q. That is two?

A. It might have been the same boat coming back; I don't know.

Q. Was it near enough to you?

A. The reason I saw the boat, they had a bugle horn on it, and blew it, and it attracted my attention.

Q. Did you live near the river at that time?

A. Right on the river.

Q. That is the only bugle horn you ever heard and the only boat you ever saw, besides this one you mention?

A. I say two, and I say two yet, and that is the only boat I saw going up and down the river, but I saw boats boating wagons and teams across the river.

Q. They are ferries, and I am not asking about that.

A. These were the only two.

Q. The ferries were not operated with bateaux. I am asking about bateaux. Were not you asked this question: "Where did you see such a boat?" and you answered "Below Radford." "How far below Radford?" and you answered "A couple of miles." You were asked "Did you ever see more than one boat?" and you answered "There might have been more; I never saw but one at a time. I will say one word to put you straight on the business: We lived in Montgomery County, and forded the river every day, and worked them bottoms over there, twice a day." Then were you asked this question: "Do you know if those boats were carrying anything?" and did you answer "It looked to me like they were loaded with some kind of lumber, veneering, or something of the kind from the banks. I was never close to them."

A. That is right.

2005 Q. On cross examination you were asked this: "From 1880 and as long as you have been around the river, subsequent to that time, have you ever seen a bateau carrying supplies on New River?" "A. Just as I told you, I saw a boat going up and down the river." "Q. You saw one boat?" "A. About once every week or maybe two." Now if you saw a boat once a week, over how long a period did you see a boat on New River, your answer was "about once every week or maybe two," now how long did you?

A. While I was farming. That was about fifty-seven years ago.

Q. Then you did see more than one or two boats?

A. I might have seen one or two or more. I could not say.

Q. When were you born?

A. I was born on January 1, 1864.

Q. Weren't you asked this question: "You saw one boat?" "A. About once every week or maybe two." "Q. Was that before 1880 or after?" "A. Before 1880." Is that correct?

A. Yes, sir; that is correct.

Q. And on Redirect Examination by Mr. Thompson, weren't you asked this: "Q. This place you speak about fording, could you ford that all the year around, in high water?" [Interrupted.]

A. We did. We put out a crop and hauled it across the river.

Q. Didn't you answer: "No; we couldn't; we couldn't ford it in high water. At times we couldn't ford it."

A. No, sir, I didn't.

Q. Do you swear you didn't.

A. I certainly never made any such statement as that. It must have been added.

Q. Do you now wish to change your testimony?

A. No, sir.

Q. What do you want to say about it now?

A. I don't remember making any such statement as that, only at certain times we could ford the river, is that what I said?

Q. I will read this again. Read it for yourself.

2006 A. I done read it, a copy of it, up home.

Q. How recently did you read it?

A. I read it about a week or ten days ago.

Q. I will read it again: "Q. This place you speak about fording, could you ford that all the year around, in high water?" "A. No, we couldn't we couldn't ford it in high water. At times we couldn't ford it."

A. There was times we couldn't ford it, but I don't remember making that—of course there was times you couldn't ford the river, when it gets swelled.

The witness, on Redirect Examination, testified as follows:

We went across the river there in the spring of the year and plowed the land and planted the corn, and in the fall of the year we cut it and hauled it out. In the event there was a flood we couldn't have crossed it. In '78 they had a flood that washed everything away up there. I suppose the river was normal when we were doing our fording.

I did not mean to convey the impression that we could ford New River when it was up. This deposition of mine which has been read to me was taken at the Court House some time ago. I don't remember the date.

Senator Noel and another gentleman came to my house to get me to give my deposition. They didn't stay very long and I didn't pay much attention to them.

The witness, on Recross Examination, testified as follows:

Q. When you gave your deposition, Mr. Abbot was there, wasn't he, the gentleman who has been examining you?

A. He was there with another gentleman, with a police justice.

Q. He was at your house?

A. Come up by my house.

Q. He was there when you were examined on the stand?

A. Yes, sir; he was right there, and Senator Noel was there, too.

2007 The deposition of William Robert Gerald, taken at Radford, Virginia, February 3, 1936, was then introduced out of order by the plaintiff.

The witness on Direct Examination testified as follows:

I am 72 years old and have lived in East Radford about 50 years. I was born in Giles County on New River in 1864 and lived at Eggleston Springs until I was 5 years old and then came to Waldon (then known as Brown's Tank), where I stayed about 12 years. I then moved to New River in 1880 and helped build the New River Road. The Town of New River is located across from Radford and in front of General Wharton's home. I worked for the Norfolk & Western R. R. for 51 years. I am a retired engineer now. My run was from Radford to Bluefield, from Radford to Williamson, from Radford to Norton, from Radford to Bristol and from Roanoke to Bluefield. My father was a farmer. I lived with him on the farms he rented until I was 15 years old. I was 15 when I began to work for the railroad.

Q. Now state whether or not you have ever seen any bateaux on New River?

By Mr. FORBES. This question is objected to because leading.

A. Yes, sir.

Q. Describe those boats?

A. The boat looked to me like it was about sixty feet long and four men in it polling it up and down New River.

Q. Where did you see such boat?

A. Below Radford.

Q. How far below Radford?

A. A couple of miles.

Q. Did you ever see more than one boat?

A. Might have been more, I never saw but one at a time. I will say one word to put you straight on the business. We lived in Montgomery County and forded the river every day, and worked them bottoms over there, twice a day.

Q. How deep was the river there?

A. We forded it with a team.

Q. How deep would you say it was?

2008 A. I don't know; I don't suppose the deepest part was over five feet. I don't reckon it was more than four feet, the wagon wouldn't wash around, we crossed it in a wagon.

Q. You crossed at a shallow point?

A. We crossed at the island.

Q. Do you know if those boats were carrying anything?

A. It looked to me like they was loaded with some kind of lumber, veneering, or something of that kind, from the bank. I never was close to them.

Q. How close would they go by?

A. Sometimes out in the river and sometimes close to the bank. It all depended on the channel.

Q. Did you ever know of the Government doing any work on the channel of the river?

A. I never saw it, my daddy said they made an appropriation for the channel.

By Mr. FORBES:

I move to strike out his answer as hearsay.

Q. Did you ever see any channel in the river?

A. No; I crossed below Radford and no channel ever put below Radford that I know of.

Q. I believe you said that you could see the boats from the shore?

A. Oh, yes.

Q. And you understood they were carrying lumber?

A. It looked to me like lumber.

Q. Do you know if these boats carried any farm products?

A. No, sir; I could not say.

Q. Did you ever see any boats that were run by other than man power on this river?

A. Didn't see any, they had some, but I didn't see them.

Q. How do you know they had some?

A. The reason why I know it—the City was dry, local option voted liquor out and everything of the City, and a man by the name of Morgan had a boat over there, they said you could
2009 take a boat over there and get liquor, but I don't drink liquor and never went about it myself?

By Mr. Forbes:

We move to strike out the answer because hearsay.

Q. Did you ever see the boat from a distance?

A. No, sir; it didn't come down any further than Dudley's Ferry. I was busy on the railroad working, and didn't pay much attention to such stuff.

The witness testified on Cross-examination as follows:

I forded the River every day when I was working with my father on a farm. We came down and forded straight across the River at the lower end of the Island. The farm was at the River bottom. The farm ran right down to the ford.

Q. Counsel asked if that was the most shallow place in the river. You don't mean that was the shallowest place on New River?

A. It was except down at Dry Branch, about a mile wide, and I could walk across there and not get my shoes wet.

Q. You are not speaking with regard to the entire length of New River?

A. No, sir.

I worked on the construction of New River Division of the railroad. I never saw any supplies brought down the River on batteaux for the purpose of this construction. I started working for the railroad in 1880.

Q. What were you doing then?

A. They graded the New River road over here and they had a construction train that hauled the material, and then the foreman would load the ties on the car and haul them along and then drag out the iron and spike that down, and when the material got a right smart piece from this train they had the track so the train come up and loaded this stuff and that is how they got supplies for building the road, the New River Road.

I did this work from 1880 to March 10, 1883 when the Road was completed into Pocahontas. After that I went to braking for a

Mr. Butler. I did this for about 2 months and then during the latter part of August 1883 I started firing. The 1st of September 1886 I was given an engine and the 1st of April 1890 I took a 2010 passenger run. I was along New River all of that time and saw it from time to time.

Q. From 1880 and as long as you have been around the river, subsequent to that time, have you ever seen a bateau carrying supplies on New River?

A. Just as I told you, I saw a boat going up and down the river.

Q. You saw one boat?

A. About once every week or maybe two.

Q. Was that before 1880 or after?

A. Before 1880.

Q. I asked you if after 1880 you ever saw one?

A. I never saw none after 1878 when they had the flood.

The witness testified on Redirect Examination as follows:

I spoke about a place some distance from my father's farm where the River was so shallow I could wade across it. I don't suppose I could wade across it there in high water. We could walk across there in 1881. We could walk across there in the spring, in June or July somewhere. That was in the summer rather than in the spring. That was during low water.

Q. That is the only year you remember when you could do that, isn't it?

By Mr. **Abbot**:

We object to your leading the witness.

A. No, sir, several years the railroad had to cut a canal out in the river to get water to put in the tank at Dry Branch.

Q. How wide is the river at that point?

A. Somewhere in the neighborhood of three quarters of a mile wide, I reckon.

I did some construction work on the railroad. The road started from New River and went west. We stayed on the River until we got to Glen Lyn, then we went 26 miles up East River to Bluefield. We stayed right on the River until we got to Glen Lyn. Sometimes the River would wash the track out when it was high. We could not ford at this place I spoke of when the water was high. At times we couldn't ford it. We crossed the River on a wagon in April and May and planted the corn and hauled it back over home in Montgomery County.

2011 A. **Moore**, on Direct Examination, testified as follows:

I live three and a half miles out of town on the Rocky Mountain Road. I was born in Johnson County, Tennessee, on the 26th day of September, 1856. I moved to Allisonia on New

River in 1878 or 1879. I have lived at Allisonia on New River. I don't remember exactly how long I lived there but some 30 years or more.

I remember the Boom Furnace. I didn't work for that company, but I worked right close to the furnace. My father was an iron maker, and that is how we happened to be there. We lived on Smith River in Franklin County. We went there after the freshet that washed our dam out. A short time after that we went to Pulaski County, and started up an iron works there on Little Reed Island. Our forge on Reed Island was between a half and three-quarters of a mile from the mouth of the river, the two Reed Islands came together, Little Reed comes into Big Reed just before it enters into New River, and it was just above on Little Reed Island. I suppose that was two miles or a little over below Boom Furnace.

We hauled iron from Boom Furnace. I hauled for old man Windle. I was boarding there and drove his team a right smart time, hauling it over to Dublin or rather to Possum Hollow, We would then dump it there and an old farmer would haul it on into Dublin. The drive was too far and I know of several teams that hauled iron at the same time. There was a four-horse team of Frank Smith, he hauled before we commenced, and Mr. John Windle had a team, and his two sons had a team each, and I hauled a short time with them. I knew the old settlers, that is, the Howards who lived up there. I couldn't say positively whether they hauled any iron. I understood several parties hauled at different times, but it has been so long back it is hard to remember anything about dates or anything else.

I have seen iron boated down there. I don't remember when that was, it was somewhere in the 80's I reckon, they were boating there at different times; I saw one and maybe as high as two boats at the mouth of Reed Island, loading iron. I didn't see that for very long. It was different times. It didn't
2012 seem to get along very well and the boats disappeared,
I don't know what became of them, whether they washed away or anything about them. This boating might have continued a year or more, off and on, but I couldn't say because it did not interest me, I was not concerned in any way, it was not my business. It might have been six months more than a year, but it was not a regular thing, on account of the condition of the river and so on, they would make a trip and then maybe you wouldn't see them for two or three weeks. This might have happened within a period of less than eighteen months. I am not positive, it has been so far back.

After the boats disappeared the iron was hauled away on teams. It was hauled to Dublin. I have understood some probably went to Pulaski but I don't know about them. This I know about went to Dublin Station.

Q. And that was after the boating ceased?

A. No boats there. It had been some time. I don't know where the boats were. I didn't see them or know of them. I don't know if they washed away or what.

I was there when the railroad was opened to Foster Falls, I suppose in 1886. I helped to put in the pier, all the stone across at Howard's Ferry, and put in the pier at Reed Island Bridge, where this iron was loaded, the west pier. When the railroad was opened up I don't know how the iron was hauled away then, you see that branch ran by Reed Island, they hauled the iron down there, I suppose, when they got to shipping, they might have stored the iron up, I don't remember. Of course after the railroad operation began it was hauled away on the railroad. I was there before the Boom Furnace was built. I know when it was started, but I don't remember the year it did start.

Q. Do you remember when it stopped after it started operations?

A. I suppose the Virginia Iron, Coal and Coke Company operated that furnace after it went over into their hands.

It ran pretty continuously. It would go about nine months and then have to blow out for a new hearth. I was employed
2013 after the furnace started for old man Sam Crozier, and followed prospecting and developing mine ores. As far as I know the Boom Furnace never shut down or stopped operating for other causes than normal operating causes. When I left Allisonia, they had not been operating for some time. I have been away from Allisonia about twenty years. They stopped after the Virginia Iron, Coal & Coke Co. took that property over, as they did all the others, the Graham and Robinson and Reed Island Company. I couldn't tell how long it has been since they took it over, but they operated it several years when Graham & Robinson went out, and transferred that property to the Virginia Iron, Coal and Coke Co. The Boom Furnace operated some time after the Cripple Creek Division of the Norfolk & Western Railroad opened up. They operated some time after the railroad was built up there, that started up all the work there, the mines and everything. That continued a number of years after the railroad was put in operation.

The witness, on Cross Examination, testified as follows:

I moved to Allisonia in 1878 or 1879.

Q. These things you have testified about on direct examination, they are, as you recall, that is, the best of your recollection?

A. I am positive of these things. I am not positive of the dates, but the statements I make I am positive of them.

Q. But as to the dates and length of time, it is rather difficult for you to say?

A. I won't make a statement unless I know. I am positive when it comes to a fact.

Q. You did tell Mr. Abbot you were rather vague as to exact dates and periods of time?

A. Yes, sir, lots of things I can't recall exactly the time.

Q. Did I understand you to say you transported pig iron by wagon from the Reed Island furnace?

A. We picked it up on the other side of the river. I never hauled except from the house on the other side. I hauled three or four months for old man John Windle.

2014 I was not hauling from the furnace to the river. They would go up and get this iron from across the river and we would haul it down to this old farm in Possum Hollow and he would transfer it to Dublin, to the railroad. I don't remember any pig iron having been hauled to any station except Dublin. I understood some had been taken to Pulaski.

Q. But you never heard of any being hauled to any other station?

A. No; I didn't.

2015 Q. And, as a matter of fact, there wasn't any?

A. I couldn't say that, or how many teams hauled there. I know the ones I saw and hauled with, and from the same house, there was three there.

Q. Three teams?

A. Yes, sir.

The daily output of the Reed Island Furnace was supposed to be about eight ton, but I don't think it made it; one of them little charcoal furnaces.

I couldn't tell exactly when the furnace started operating, it was some time in the 80's, and it was when the furnace started that this boating was done, I think, but I am not positive about the dates, because I don't know, it has been so long ago and nothing in the world to concern me about. I had no concern in it, and had other business of my own to tend to. I saw some of the pig iron transported from Reed Island Furnace but to have seen all, I would have had to be right at Howard's Ferry and my business was not there. To have gotten at the facts I would have had to be there every day all day long.

The transportation I have spoken about on the river, that is, transporting pig iron, was only the times I saw the boat, and hearsay of the men boating, telling me at different times of trouble they had on the river making their trips to Radford.

I knew two of the men personally that were boating, a man named Lawson and O'Dell, and they would tell me different times what occurred on the river.

There was only two places on the river, between Reed Island and New River, I knew nothing about. One from the mouth of Max Creek to the Appalachian Dam, and the other is there at Crump's Bottom, the mouth of Indian Creek, to Glen Lyn, but every one from Kanawha Falls I have been over. I know all about the river from Ivanhoe on down to the mouth of Max Creek, then from Max Creek to the Appalachian Dam I don't know, but I do know from the Appalachian Dam to Glen Lyn, and from Crump's Bottom I don't know anything about, and from there on to Kanawha Falls.

Q. I will ask you if it isn't a fact in the year 1882 if there was not transported from Reed Island furnace to New River Depot, by keel bottom boat, 900 tons of pig iron?

2016 A. Well, I don't know what tons it was, but there was iron transported at that time, along about that time, but as to the amount I don't know nothing about that.

Q. I will ask you in that same year if there wasn't transported in exactly the same fashion, on the same river, 256 tons from Radford furnace to New River depot, that is Max Creek furnace?

A. I don't know about that.

By the COURT. All those figures been put in evidence?

By Mr. AIKEN. They are in evidence. Government Exhibit No. 39.

By Mr. ABBOT. We don't think hearsay an engineer puts in a report is proper evidence.

By Mr. AIKEN. It is in the record.

I know very little about Max Creek Furnace. That furnace was built when I went there and running, and it was hearsay as to how some iron went away from there. I never heard anything about boats. I have heard remarks made by the teamsters, reliable men there, that they had seen six mule teams cross the ice at the Max Creek Furnace with a load of pig iron for Dublin Station.

There was very poor roads in those days. The number of horses used in teaming the iron over the rough places in the road between the river and Dublin, depended on the tonnage they had on. Two horses usually carried a ton. In bad weather, rainy weather, or snow, the roads were practically impossible, they were rough.

I don't know about their using the river at those times, to take the pig iron to the railroad, but I would see some of them in there and would hear them talking about going down and how long it took them to go down and back up the river, but as to knowing it personally, I don't know.

I couldn't say positively when the first train went up Cripple Creek Branch, to Ivanhoe. I was there and helped to put in the new bridge across Reed Island. I suppose that was around 1884-
1885 and 1886. I was right there when the bridge was fin-
2017 ished. I helped to complete the bridge. I worked for the
Phoenix Bridge Company and then I went from there to Tennessee to work for the same company.

The Mack's Creek Furnace went out of blast some time before the Boom Furnace went out. I don't know positively when the Mack's Creek Furnace went out of existence, in fact they had nothing to run on, they had no good ore of any kind, but I am not positive. When the ore ran out at the Reed Island Furnace, in fact, I don't know that it ran out entirely. I don't know why the Virginia Iron, Coal & Coke Company stopped that furnace, they were getting ore there from Rich Hill, and that has ore yet. Half of that belonged to my brother in-law.

I recall a mine on New River in those days, known as the Clark Mine. I don't think ore was transported from that mine, to Hiawassa, by keel bottom boats, they were flat boats. It was only a mile or so that they came down the river and then took it on down to the ferry, or that is what they told me, I didn't see that. I know they were hauling out ore and I know about the times, but I don't know that I noticed the boats, but if there was any, it was not hauled on keel bottom boats, it was flat boats. It was on the river, but I don't suppose it was over half a mile and then they crossed on the other side and unloaded and hauled it to Mack's Creek Furnace. I remember that, from the Clark Mine, but it was on flat boats. I saw the boats, but I don't reckon there was more than one. It didn't take much to transport them only about a quarter of a mile, then they hauled by wagon to Mack's Creek. They would haul a ton or two on the boats at a time, coming from the mine. They loaded it on there and took it down. I don't suppose it was over half a mile. They landed on the other side of the river and then they took it to Mack's Creek. That was my understanding.

I don't know the tonnage of the keel bottom boats that plied between Reed Island Furnace and New River Depot. They were not ten-ton boats. Ten tons would put them on the rocks. I understood they were six tons. I heard them speak of loading it, and I understood it was six tons, but I am not positive, and
I seen them pushing them down there. It took a full day
2018 if we had no bad luck to go to Radford, and two days if
we had good luck to push back. There were three men on the boats going up. I never knew who owned these boats and

I don't know whether the Reed Island Furnace leased them or not, Mib Odell and Clave Lawson were two of the best boatmen, and possibly Floyd Tipton and James Evans Owen. But Odell and Lawson I knew.

I don't know that I ever saw two boats go to Reed Island for that ore during that time, but of course, I was not there at the wharf where they loaded it all the time. I had no business there, but the time they were putting those piers in there I hauled stone across where this iron was loaded at the landing at Howard's Ferry.

I don't know whether part of the stone that went into the bridge at Hiawassa was carried by boat, they might have done it. I had nothing to do with that bridge. I was speaking of the bridge across Big Reed Island. I don't know where the stone came from and I don't know and was not there when the bridge at Hiawassa was put in. But I know where the other came from. I hauled a big lot of it across there.

Isaac Huff on Direct Examination testified as follows:

I live near the old Boom Furnace and am running a little store there now. I am 78 years old and was born in Carroll County, about four miles east of Hillsville.

In the fall of 1882 I came to the New River Country, to what is called Dry Pond Mountain, near Boom Furnace. At that time I went to work in a saw mill. They were building up that boom furnace and there was a little village there and we sawed lumber first for that. I was working for the furnace company. I worked there something like six or eight months. I then went on the railroad below Allisonia, where they first went to work grading that road. As well as I can remember I worked there two or three months. I then went back to the Boom Furnace, on Little Reed Island Creek. Little Reed Island Creek and Big Reed Island Creek come together about a quarter of a mile before they run into New River.

When I went to Boom Furnace most of the pig iron 2019 from this furnace was being hauled by wagon to Dublin. The rest of it was being hauled to Martin's Tank, which is now Pulaski. This hauling was kept up more or less until trains began to run to Allisonia. After that time the iron was freighted on the railroad.

Q. Mr. Huff, after you came to the furnace was any iron boated down the river?

A. Not to my knowing.

Q. You would have known it if there had been any, wouldn't you?

A. Yes, sir.

Q. Did you know whether any ore had been boated?

A. I heard talk of it, but that is all I know.

Q. That was before you came to the furnace?

A. Yes, sir.

Q. When you were up there at the sawmill getting out this lumber, did you have anybody work for you who had boated, or not?

A. I heard them talk that they had.

Q. Who were they?

A. One was Clave Lawson and one was Tom Bland, and I think one was named John Brown, a colored man, and Tom Brown was a colored man.

That was while I was working up in the mountain at the saw mill before I came to the railroad and then later went to the furnace. The company kept about four or five four-horse teams. I would take these teams from the stables in the morning. Some of the teams would haul coal and some would be put on hauling the iron. Mr. W. R. Tipton, the superintendent for whom I worked would give the instructions as to where the teams would go. I carried out his instructions. I cannot recall any one else hauling iron, except Mr. Frank Smith, who ran his own team. Mr. John Windell who lived at Allisonia, also hauled some iron.

The Booth Furnace closed down and stopped operating about the first of the World War, along about that time. Sometimes the furnace stopped several times before that when they put in new hearths or in-walls. The furnace operated pretty regularly after I got there until the railroad came in. By that I mean that the
furnace would go on for seven or eight months and then it
2020 would have to blow out while they would put in an in-well,
or new hearth. That would be just the natural repairs from the operation of the furnace. It never stopped when they did not have to make repairs unless as a result of high water. Then they would bank the furnace and hold it for a week or ten days. Outside of that it kept going all the time. I can't recall that the furnace stopped on account of hard times, while I was there. The only time I do recall that the furnace stopped was on account of high water, replacing a hearth or making some necessary repairs.

The witness, on Cross Examination, testified as follows:

The company had five or six four-horse teams. On some days the teams would all be engaged in hauling charcoal and then maybe the next day or two they would be hauling iron. It took about as much of the team's time hauling charcoal as it did hauling iron. The iron was moved by wagon. If the iron had been moved by boat, it would be necessary to haul it on wagons from the furnace down to the river.

Q. You say you moved to Reed Island Furnace in 1883?

A. In the fall of 1882.

Q. I understood you to say that there had been a big lot of iron boated down the river just prior to the time you got there and according to your recollection there was none afterwards. Is that right?

A. Not after I got there, to my knowing.

Q. What were your duties there?

A. Looking after the placing of the men in the furnace. We had what we called a filler to fill the furnace and a gutter man to take the iron out, and a keeper, who put in a twelve hour shift on each one.

Q. So you were busy around the plant itself?

A. Most of the time.

Q. How far was it to the river?

A. A couple miles or maybe a little more.

Q. You could not see the river from the furnace?

A. No, sir.

Q. Now you have stated that most of the pig iron which was transported by wagon went to Dublin. Is that right?

2021 A. Right at that time, until the train came to Allisonia.

Q. I say up to that time it was transported by wagon?

A. Yes, sir.

Q. And you say there were some that you think went to Pulaski probably later?

A. Yes, sir.

Q. Those are the only two places that the iron was transported to by wagons?

A. At that time.

Q. Now what time are you referring to, 1882 when you arrived there, to when?

A. 1882 and 1883.

Q. And 1884?

A. My recollection is that the railroad came to Allisonia in 1886 and when it was completed then we hauled there.

Q. Then between 1882 and 1886 Pig Iron was hauled by wagon to no place except Dublin or Pulaski?

A. I cannot recall. Most of it was hauled to Dublin and to what we called Martin's Tank at that time.

Q. That is now Pulaski?

A. Yes, sir.

Q. You were there and you knew where the iron was going?

A. Yes, sir.

Q. And you know that none of it went on the river. Is that right?

A. Yes, sir.

Q. I will ask you if you ever heard that in the year, 1882, the very year you moved to Reed Island Furnace, if 900 tons of pig iron did not go down New River on keel bottom boats, to New River depot?

A. I never heard that.

By Mr. **Abbot**. If Your Honor please, that is not a fair quotation of the hearsay information contained in the engineer's report and it happens to be in the record and I would like for Your Honor to read it.

2022 By the **Court**. Where is that?

By Mr. **Abbot**. In the annual report of the Chief of Engineers for the year 1883, which is for the fiscal year ending June, 1882.

By Mr. **Aiken**:

I will hand Your Honor a copy of it so that you can read it. (Copy of said report is handed to the Court.)

Q. Mr. Huff, you say you do not recall anything about that?

A. No, sir.

I know nothing about the operation of the Mack's Creek Furnace. That is seven miles below there. Hiawassa is two miles below Allisonia. There was no iron shipped from Reed Island Furnace by the Norfolk and Western until 1886 or later. The roads in those days were very poor. It was a tough pull for a four-horse team to pull two tons of iron. It was every bit of twelve miles from the furnace to Dublin and it was over some considerably hilly county. I now live right there at the old Boom Furnace, right in a half a mile of the place. I have lived in that neighborhood from the time I came there, for about 54 years. I have occasion to see the river every few days. I have to walk or ride two miles to see the river. I have no interest or stock in the Appalachian Electric Power Company.

By Mr. **Abbot**. If Your Honor please, I want to call your attention to this engineer's report that Mr. Aiken has been referring to here. It is dated May 21, 1883, and is from Wm. Proctor Smith, Assistant Engineer, to Lt. Col. Wm. P. Craighill, United States Engineer, and there is this statement in it: "Something over 900 tons of pig iron were shipped from Reed Island furnace, 26¾ miles above New River Bridge, to the Norfolk & Western Railroad, at the latter point, and 256 tons from Radford furnace, 18 miles above the bridge."

It does not say how it was shipped, or when it was shipped, or over what period of time it was shipped.

2023 The witness, on Redirect Examination, testified as follows:

After 1886 the iron from the Boom Furnace was shipped over the Cripple Creek Branch of the Norfolk and Western. Before the Cripple Creek Branch was put in operation the iron was shipped from Pulaski, (Martin's Tank) and Dublin over the Norfolk and Western.

I came to this saw mill to saw lumber in the fall of 1882 and stayed there for six or eight months. Then I went to Allisonia and stayed there for two or three months. After that period of time I went to Boom Furnace. The saw mill was running when I came to it in the Fall of 1882. I didn't see any iron shipped on the boat while I was working on the grading at Allisonia. The railroad bed I worked on ran from Allisonia to the river and it went across the river to Hiawassa. I was in sight of the river all the way along there.

By Mr. Aiken. If Your Honor please, in view of the statement made by Mr. Abbot a little while ago, although I think it is inappropriate to engage in any argument or controversy at this time, I do want to say in answer to his statement, that the question I asked the witness was not predicated, or did not refer to the Report of the Chief of Engineers. I merely took the data from the exhibit to test the witness' knowledge of the situation, but I will call this to Your Honor's attention in this report of Wm. Proctor Smith to Lt. Col. Wm. P. Craighill, which is dated May 21, 1883:

"I have the Honor to submit the following report of operations on the improvement of New River, Virginia and West Virginia, for the fiscal year ending June 30, 1883."

2024 J. H. Knode on Direct Examination, testified as follows:

I will be 80 years old on the 26th of October. I live four miles northwest of Pulaski City. I was born at what is now called Poplar Hill, about eight miles east of Giles County Court House, Pearisburg, in Giles County near the river. I could not say positively how long I lived there, I was eight or ten years old, anyway. I then moved over to the lower end of Back Creek in Pulaski County, about two miles from Parrott. I was then about two miles from the river. I stayed there until I was about fifteen years old. I then moved to what is known as Dunkert's Bottom, and lived there about twelve years. After that I moved to where I now live, four miles west of Pulaski.

I remember very distinctly when the Government was improving New River. I had a job with the Government at the time they were cleaning up the river. When I went with them they were working on the channel at Ingles' Falls, near where the electric dam site is now. I worked up the river with them to a little above Allisonia. We camped on an island at the mouth of Peak Creek. The foremans and men interested in the Government work were camping there. That was the year of the big flood, 1878. I think that was the fall of the year—probably the last or middle of September, or it might have been nearly the 1st of October—right near that time—there came a terrible wet spell of rain and the river was at high tide, and the men that had charge of the work would not risk my watch, but they had me take their watch, and they put up a stob at the river, with figures, and asked me to look after it and report every 30 minutes to headquarters. And at that time, there were about 30 or 40 encamped on the island. I reported the condition of the river at each time in 30 minutes, each time on the mark, to headquarters, and I don't remember now exactly the height of that stob, but it was put there and the figures on it were plain, and I remember the last time I reported, I had reported the river over top of the stob—no figures were to be seen. Then 2025 they ordered me to wake up everybody in camp; take the tent clothes from the tent—there was a tree in the middle of the island, and wrap the tent cloths around the tree; order a bateau—we had one close there—brought up, and every man was ordered to get in that boat, and then, when we got the tents wrapped around the tree, each man got in the boat and then they received orders for no man to speak above a whisper, except the man that was the manager of the boat. In the lower end of the island was a sycamore tree, and I would say that there was a fork up about 12 feet, and so dark it was, you could not see anything—not hardly see your hand before you—The head oar of the bateau went, in the dark, into the sycamore tree and the boat came to a sudden standstill, and I can remember as if it had happened today on each side you could see houses and straw ricks going down—it was a bulk; you could not see them going—you could see a bulk. The reason I remember as well as I do, they ordered for no man to speak above a whisper, and there was a nigger on the boat that was not considered extra bright, and he was praying for the niggers and the white folks, too. I remember that distinctly. There were other boats tied up at different places on the river.

This island was on one side of the river, right nearly on one side; and these boats were loading stone and was tied up on the other side of the river. These boats on the other side of the river broke loose, but didn't break loose until the next morning after day-light. Consequently the river was raising slightly up until after daylight the next morning. It was 11:30 when we went out of there, I remember, and those boats broke loose and

I was two miles below at my home where my father lived, and those boats came along; we could not catch them then.

Later on I taken a force of men and gathered up such Government property as would be of any account, from there to Hinton, after the river went down. I recall finding one boat at Dry Branch; it was, possibly was not a quarter of a mile—but some several hundred yards from the river. I did not find any other boats which were any good. There were four boats that we used for gravel boats. We found them, one at Dry Branch, one at Narrows; one was torn all to pieces—it had a small derrick on it. There was a tide in the river when we went down, there had to be, or we could not have gotten down.

2026 Q. Do you remember going through the falls at the Giles and Montgomery lines?

A. Yes, sir; the most dangerous falls between where we worked and Hinton.

Q. Did you go through all right?

A. We took our baggage out and carried it down and let two men take a boat through. They didn't let more than two men on it.

Q. After you got the property down the river, what did you do—who did you turn it over to?

A. What did we do?

Q. With the property that you gathered up from the river?

A. We turned that stuff over to somebody at Hinton. The name I cannot recall.

Q. Who was that somebody?

A. Some fellow that we turned it over to that had to be responsible for it—he was a Government agent.

Q. Did you do any work on the channel there after that?

A. Yes, sir; I worked part of two years on the channel in West Virginia.

Q. Did you do any boating down there while you were in West Virginia?

A. Yes, sir; after they abandoned the work in the State, I went to work the balance of the season for up until towards Christmas. We young fellows then always had to come home to take Christmas. We lived in another State, and a man named Tom Quinn was boating and he hired me.

Q. How did that happen?

A. I found him stalled in the falls.

Q. What falls?

A. Bull Falls, and I don't know—I reckon maybe I wanted a job, and I said "Can't you get over here"—and he asked me if I would help him over the falls, and I said—I suppose I wanted a job—I said: "Yes." Well, he was loaded a little—he had about, oh, 1,500 pounds of merchandise of some sort and he had two men shoving, and I put these two men on one side 2027 of the boat and I took the other side, and I put him up over there, and when I got the boat through, he proposed hiring me. Well, I was looking for a job, of course, and I hired to Quinn. That was Tom Quinn, an Irishman; I worked for him ten days, I reckon, and payday come and he could not pay me. Well he proposed to rent his boat, and I rented it, and then I went to boating for myself, what time I did boat.

I would say I boated for myself a couple of months. I didn't do any good with the boating. There was nothing in boating. We hauled from Bull Falls to Hinton. We did not try to take the boat up the river with anything in it. I never tried to go up into Virginia with the boat. No, sir, no, although it seems to me a man named Fowler wanted me to come up there and get a load but I never tried it. I never tried to go over the McDaniel's Falls or Harvey's at the upper end of Crump's Bottom.

After I finished up my boating at Hinton, I went back to Pulaski, my old home. After that I undertook to boat from Reed Island—Allisonia rather below the mouth of Reed Island to New River Bridge. At that time I was going to boat pig iron. I had four boats and was running three men to the boat—I had about 12 men in my employ. I kept that up about two months. I don't know whether it was that long; not longer than that. After giving it a thorough trial, I decided there was not money enough in it to pay my men and leave anything for me, and I abandoned the job. I thought I could make ordinary expenses but I found I could not do it. Those boats were built to carry four tons, but we could not carry it. The river was not deep enough, for one thing, and, besides that, if there was a tide in the river, and as rapid as that river runs with a tide in it, and a boat with four tons of iron on it—if you happened to have an accident and were not a good swimmer, you were gone, and the men would not risk their lives on a boat loaded too heavy in that kind of a tide. Many times going down the river we would be stuck on the gravel and have to unload. By unload I mean throw out enough so that the boat would rise off the gravel and go. That was the only way to get them along there. When the boats would stick in the ridges, all that we could do would be to throw the iron out. Once in a 2028 while, we would knock a hole, but we never had anything serious, of course, that is not serious enough that we would come close or near to losing our lives, but it was natural when a boat loaded with iron on the river, striking a rock, would cut a hole in it. I have had holes knocked in my boat by striking rocks, but I never had one to sink altogether. We would unload it.

I undertook to bring 100 bushels of corn which I had sold to Rives Tipton, the Boom Furnace operator, up the river on boats. I put about 10 bushels of corn to the boat. These bateaux were made with race boards on them, 2½ to 3 feet apart, and the men that shoved the boats had to walk on them with the pole in the water and the pole on their shoulders. If you covered the race boards with anything, you could not walk up the race plank, and, as swift as the falls were in that river, there was not any use to try to take a boat up, except to pull up the race plank and put your shoulder against the pole and buck the river. By that I mean put your shoulder against the pole and reach down and get hold of the race plank. I have seen them pull it nearly off the bottom.

We threw the iron out at various places between Allisonia and New River. I had some kind of an understanding—I don't remember exactly—and I taken the iron out of the river and took it to Snowville, and swapped it for castings. I got the iron by driving an ox wagon in the river and loading it on.

I cannot recall exactly the year I made the contract with Mr. Tipton to boat the iron, I believe it was 1882, it might have been 1881; it was not later than 1882, I am sure.

I suppose I kept this boating up a couple of months. It might have been longer but I will safely say that a couple of months was all I could handle it.

After I quit boating I lived right on the river at Dunkert's Bottom and farmed. That is about three miles above Ingle's Falls.

Q. Did you see any more boats hauling iron after that, Mr. Knode?

A. No, sir, I did not see any more boats hauling iron that I worked on for anybody aside from Mr. Tipton.

Q. And you lived on the river afterwards, did you?

A. Yes, sir; I farmed up there; I married and lived there, until I bought a farm where I live now.

I have done some rafting of logs; they used to cut logs along
the river, after or probably before this boating was done
2029 and rafted them to New River, and a man by the name of
Hodge had a saw place. There was five or six logs laid
side by side and a cross piece was put on the end and it was hooked together with hickory or grape vines, and this was called a span. If you had ten spans in it, you had fifty logs. From where they cut them up New River, the most difficult Falls was known as Ingle's Falls, near the dam site, and they would make these rafts during the week, and get them together, and on Saturdays or weekends, they would taken them to New River, and these men would put the logs in the water and I have on occasions worked on the river and they got me to head them through Ingle's Falls, and they gave me $1.00 a raft to put them through there.

Q. Was there any difficulty in getting them through the Falls?

A. Yes, sir. It took good work to get them in there. These little sluices were cut by the Government and were cut near the middle of the falls and the head of the falls was about at the left hand side coming this way, and you had to go around the island and go to the middle of the river to get into the sluices, and it took right fine work to get the raft out; otherwise, they would be tore all to pieces, of course.

We would wait for a tide, if we could get it. We couldn't always do it, but when we had big logs or wanted for success in rafting them down the river, we would be glad for one foot,—for a one foot tide in the river, and sometimes then we would lose them logs—they would be torn all to pieces. I have had some torn all to pieces. I have had them caught in the falls sideways with me and have had them turn endways—a ten foot log. You had to watch what you were doing. We used to bore a hole in the log, about five or six feet high, and put our dinner buckets and coats there, and sometimes in the falls, there wasn't any dinner buckets and coats. I have ridden a log down there once, and there was nothing to the log but one cross piece, and that was about the only thing that kept me from drowning.

I remember Ellison's Ledges. One of my men got married while I was boating iron, and of course, he was the manager of one of the boats, and he had taken his wife down the river four or six miles on this load of iron. She never had seen a river, and you men may not know, but Mr. Draper knows [indicating] that Ellison's Ledge, is high and dangerous, and when we ran into the ledge, this fellow, Godbey, that got married, he
2030 rubbed a rock too hard and the boat cracked like it was busted in two and his wife fainted, and he turned the oar loose and grabbed her and might have drowned all of us. Most any man would do that but it was a dangerous situation for me. I was running right behind him and would have tried to pick them up if I could, but I don't think I could, as fast as I was going. The boat finally got through and didn't break open until he got sort of straight, and then I guess he got his oar and straightened up.

I would say these boats were between 45 and 60 feet long, and they were I suppose across the top seven feet or seven and a half feet and come to a narrow edge at each end, made in rounded shape. And at the time—I want to make this statement, I believe it should be told—at the time I did this boating, there was not a foot of bonded surface road at all in the county at this time. The old State road was there, but these rocks were never crushed, and the road was never bonded, and it was in the winter time, and the only reason I can give about this job of boating, was because it was impossible to haul iron to Dublin over a mud road at that season of the year, and the Company thought—they had never done anything up to this time—the company thought at this time, in regard to this iron, that we could get it over there without having too much expense to them, and if it was otherwise possible, I would not have gotten the job I had. The old State road was built but the rock was never crushed; the road was never bonded. I built forty miles of rock road myself and I know what the road was at that time and the State road was built by hand and it took a good team to pull an empty wagon over it. The younger people don't know this, but it is a fact. When you undertook to haul iron when the ground was thawing, over a mud road, they could not do that, and the iron was made of a charcoal process, that was a great deal more valuable than it is made of stone coal.

When I found out they could not pay me enough to justify me—enough to pay my men, taking half in money and half in goods—that is what I was getting—they didn't pay all in money—half money and half goods, I proposed to put it under the circumstances. I had a contract with Rives Tipton. Under this contract I was to pay my men half in money and half in goods.

2031 The witness, on Cross Examination, testified as follows:

I had a contract with Rives Tipton, the general manager of the Boone Furnace Iron Co. on Reed Island Creek. The Radford Furnace was down the river on Mack's Creek. I would say it was twenty some miles from Boone Furnace to Radford, or New River Bridge. I would say the time I took the contract to boat iron, was between 1880 and 1883. I can not be as positive as I would like to be. It was four years after the big flood. That was after the Channel was made and I had the Channel from the mouth of Big Island Creek to New River Bridge. I had a Channel through some shoals and riffles.

I cannot recall what the contract called for per ton of iron. The pay came to me half in goods and half in money. I do not know whether any one else was bidding for that contract at that time, as far as I know there was no one. I could not say positively, but I will say I boated two or three months; I will be safe in saying it was two and a half months. The boats were supposed to carry four tons. I don't know how many tons I carried. I loaded when I had a little tide, I loaded four tons and might have come through with four, but I don't remember. I usually made trips with less than four tons. The four boats made two trips a week, to Radford and back. The boats were not tied together, we ran as a fleet at the same time. Twice a week the four boats went to Radford and back. We made 24 trips a month. At New River Bridge we put the iron on the bank of the river; it was hauled twice—once from Boone Furnace to Allisonia and then it had to be hauled again, it made it expensive. I didn't make any money.

Only once did I carry anything else on the boats; when I sold the 100 bushels of corn to Tipton.

I found that I had bid too low on the contract. I was mistaken in what I could do with the boats. That was where the trouble was. I don't believe the men would have stayed with me at the price I gave them. I was not getting enough myself to justify it.

Q. You could not divide up the goods and money?

A. No, sir.

Q. They wanted higher wages?

A. Yes, sir.

2082 The trouble, in my judgment, was with the boats, I had the idea that I could make the boats pay me out but I could not do it. I think it was in 1882 I did this boating; that is as near as I can come to it.

I never saw others boating there on the river then. I have not seen any since then. I have talked with some men that have claimed they boated pig iron there, but I never saw them. I heard that they had boated for several years, but I don't know of my own knowledge about it.

The great freshet I have spoken of was the great flood, and I always thought it was in 1878. It was the greatest flood on New River; it never has been that high since. The boats floated a long ways down the river at that time. We gathered them out of the drifts and took them to Hinton. We took, I think six; not over 5 or 6 boats to Hinton.

Q. When you did that, was it high tide?

A. You mean gathered up the boats?

Q. When you took them to Hinton?

A. Ordinary, not extra high.

Q. Did you say that unless you had a high tide, you could not take them there?

A. We could not have gotten safe through the ledges there.

Q. Don't you know, as a matter of fact, that boats would go on all tides up the river and down and have done so.

A. There is not much boat service on that river, brother.

Q. Don't you know that boats have gone up and down on that river?

A. I have seen them—I could not swear to anything about boating except what I did myself.

I was boating around Hinton two or three months. In 1880 or 1881 I boated staves from Bull Falls to Hinton. I never saw any other boat down there. This boat of mine was the usual size of the bateau boat—about 45 or 50 feet long and 7 feet wide, tapering at the ends. We hauled 900 staves at a load.

We ran for two months and made three trips a week from Bull Falls to Hinton. Sometimes we didn't have staves to haul, and when we were short of loading, we hauled loose hay, not
2033 baled. We operated the boat in November, probably in October or the last of November. There was no ice on the river during that period. There was enough water in the river to operate the boat. We delivered the staves at Hinton to a man named Dunkhart. This all happened after I rented the boat from Quinn. That was the man I think they called Captain Quinn. I do not know where Shanklin's Ferry is. Captain Quinn was running no other boat on the river, but this one, that I knew anything about.

Q. Didn't you give a deposition in this case at Radford?

A. I think so; yes.

Q. In that deposition at Radford, were not you asked whether or not your contracts to haul pig iron from the Boone Furnace was a profitable one?

A. I think so.

Q. Didn't you answer to the effect that it might or might not have had something to do with your abandoning that work?

A. Well, I don't know.

Q. I will read you this question: "The reason why it was not profitable was because you bid too low on the job?" and your answer was, "That might or might not have had something to do with it. Yes; it did have something to do with it. I could not make a success because I couldn't haul enough." Is that, or not, your answer?

A. Yes, sir.

Q. You say that might or might not have had something to do with it?

A. Yes; I might have bid too low. As I said a while ago, that was partly the trouble, and the chief trouble, the way I felt about it, is I couldn't understand what I could do with these boats. It was my first experience with boats in New River. I had rafted logs, but had not tested them out.

Q. How long had you rafted logs?

A. For ten years, off and on.

Q. On New River?

A. Yes, sir.

2034 Q. Where?

A. On the upper end of Dunkards Bottom to New River bridge.

Q. During the period of ten years you were rafting logs?

A. Yes, sir; eight or ten years at different times.

Q. Did you confine yourself to that kind of work?

A. No; not altogether. I farmed on the river, and rafted logs on the weekends.

Q. How long would it take you to bring a raft of logs from Dunkards Bottom to New River bridge?

A. If I had good luck, not over ten hours.

Q. On week-ends you would raft logs, over a period of ten years?

A. Yes; You understand I was farming, and when they wanted me to take a raft they would notify me on Ingles Falls, and I charged them a dollar a raft to put them through there.

Q. You had fairly good luck over a period of ten years?

A. There was not anybody on the river who would risk their lives through but me.

Q. You got your rafts through?

A. Sometimes.

Q. And kept it up for ten years?

A. I didn't get all through.

Q. But you kept it up for ten years?

A. Yes, sir.

Q. And you made a dollar every time you took a raft down?

A. I was acquainted with the river. I was right much acquainted with New River from Allisonia to Huntington, or to get into Huntington, either to Kanawha Falls, and my experience with the river, I got a good deal of it out of Tug River. I built right much of the cut-off between Kanauga and Kenova, and we boated the cement from Levisa, Kentucky, up to Kanauga, and it was not more than half the river that we are into consideration now. To stand on the bank and look into Tug River, it is hard to tell which way the river runs. We did it in flat bottoms, and 2035 we could haul ten tons up the river, which surprised me, and it was sandy bottom.

Q. You say that this was smaller than New River?

A. Not more than half as big.

Q. What sort of logs did you raft down?

A. I rafted logs all the way from ten inches to fifteen or twenty.

Q. How large would the rafts be?

A. Some as many as 45 logs.

Q. What kind of timber?

A. Not much oak, but poplar and pine.

Q. For whom did you raft the logs?

A. For men along the river. H. B. Howe, for one man, that owned a large estate in the Dunkards Bottom section. I don't know, but I might recall some others that had lesser work done.

Q. You have seen other logs on that river besides yours, haven't you?

A. Yes.

Q. You have seen other logs on the river besides yours?

A. Yes, other rafts went down.

Q. As a matter of fact, there was considerable rafting logs on the river?

A. Yes; several people rafted logs. People who had new ground would have logs.

Q. In addition to your rafting logs, there was quite a general rafting of logs on New River in the section you speak of?

A. Yes.

Q. About what distance is that you rafted?

A. What?

Q. What distance?

A. I can't recall exactly.

Q. Eight or ten miles?

A. I would suppose it would be an average of ten miles, I reckon, about ten, taking it all on an average, or about that.

2036 Q. In the rafting of these logs, would you pass the present site of the proposed Appalachian dam?

A. Yes, sir.

Q. Do you know where that is?

A. Yes, sir.

Q. Have you seen it recently?

A. Yes, sir; it has not been so long; I was there a month or two ago.

Q. Do you know the site I speak of?

A. Yes, sir.

Q. Did you notice the cofferdam?

A. Yes, sir.

Q. Do you know the place I speak of?

A. Yes, sir.

Q. Have you seen men working around it?

A. I didn't see them at work, but I was there two or three different times. The day I was there, it was a holiday, or something, and they were not doing anything.

Q. This domestic and infelicitous accident you speak of between a man and his wife is the only accident you know of between Allisonia and Radford, is it not?

A. Who is that?

Q. This accident you speak of?

A. Yes, sir.

Q. That is the only one?

A. I knew a couple of fellows getting drowned in Giles Falls down below.

Q. They are the fellows who were drunk, weren't they?

A. Yes, sir.

Q. Going back to this man and his wife in that boat on that occasion, as a matter of fact, nothing happened to the boat except it scraped along the ledge and made the timbers crack, and made the wife afraid?

A. Yes, sir.

2037 Q. Her husband was a boatman?

A. Yes, sir.

Q. And there was no reason why there should have been an accident?

A. No.

Q. In telling that, you are not trying to give the Court and the record the impression that this was a serious or dangerous place?

A. No.

Q. As a matter of fact, the boat scraped along this ledge, and the timber cracked, and the man's new wife got scared and screamed; isn't that it?

A. Yes, sir.

Q. And he rushed and seized her, and let the tiller go?

A. Yes, he forgot about the boat.

Q. So the accident was due to the romantic character of the honeymoon trip?

A. Yes.

Q. There is nothing about the accident that indicates traffic is dangerous on that river, is there?

A. I will tell you about the traffic now? A boat loaded, in my experience, is like a car running down a hill: The heavier the load is, the faster the boat will run, undoubtedly, in my experience; and you could not get very many men to promise you that they would work for you on a boat on a tide in New River, because it runs down hill; and it runs rapidly. I know what I am talking about. I have worked there, and I know, and the only thing about it, if that boat is loaded and it is not controlled just exactly right, your life is at stake, if you can't swim, and that is what they knew. The danger with a boat is that when it is loaded and it strikes a rock in New River, and it is not in keeping with the sluice and the current of the water, it will break right in two in the middle, and, of course if it is loaded with pig iron it is not going to float.

2038 Q. You did not have a boat broken in New River, did you?

A. Well, I had a pretty good accident that looked dangerous to me, was this fellow on his bridal tour.

Q. With his wife?

A. Yes.

Q. That is what I asked you in the first place. You say there were no roads up there?

A. Oh, no; there were no roads. The sorriest roads you ever saw, and in the winter time, when they were trying to haul over them, they were cut all to pieces.

Q. People had to come down by river?

A. Oh, well, they had to come over the best that they could.

Q. When did the roads come in there—the better roads?

A. When did they improve the roads?

Q. Yes.

A. Well, the hard road improvement commenced in 1911 in our county. I built 40 miles of hard surface road in the county. I have no idea that if those roads had been in the shape that they are, and this iron had to go to market, that they would have ever worked the boat at all, but the boat was the only solution when they couldn't haul it over the mud road.

Q. The boat was the only solution?

A. It did not prove what they thought it would be.

Q. That is in your experience in your business?

A. Yes.

Q. As to other men going there and carrying pig iron by the hundreds of tons, you can't say?

A. No.

Q. You are not undertaking to tell the Court that other men did not make a profit on it, are you?

A. No.

Q. You are not saying about that?

2039 A. It looks strange I didn't know about that.

Q. You do not mean to tell the Court that your experience in not making money is to give an indication of the experience of others?

A. No. I don't know what they did.

The witness on Redirect Examination testified as follows:

The boat I had around Hinton was called the Wild Goose. It was Quinn's boat. The rafting I have referred to began at the upper end of Dunkard's Bottom. That is at the end of the long pool above Ingles' Fall. There was a gravel there known as Moore's gravel. It was in the upper end of that long pool and there was a riffle about where the rafts were put in—about a mile above. I would say they would average about five rafts a month—maybe not that much; about 40 or 50 rafts would be as many as they would put in there in a year.

Q. Did you have any accidents with these boats that you were boating the iron with?

A. Nothing serious that I know of. When any of these boats would rub a rock hard, they would naturally spring a leak under the timber.

Q. Did the boats do that?

A. They did do that, yes, sir.

Q. How often would they do it, Mr. Knode?

A. I just can't say exactly, but many times, you know. It is like many other jobs: I have handled different kinds of jobs, and if you don't get a man who understands his business, you are likely to have some more accidents than a man who understands his work. Many times I have knowed boats to be broken up like in places where the falls were not so bad, by men being careless in running the boats. It is like operating a car: In operating a boat, you have to be a skilled man to operate it on New River. When you are over one ledge, you are in for that many more. I have rode across New River many times on horseback.

Mr. Williams. I move that the statement that he "has rode across New River" be stricken.

The Court. He is fortifying his position. He can explain what he means as he goes along.

Mr. Williams. The witness was asked about an accident, and he said, "I have rode across New River on horseback without an accident."

The Court. He did not answer it that way, but he said when you go over one ledge you are on another, and he has indicated a number of ledges, I presume, and I presume he wanted to fortify it by saying that he could ride across.

By Mr. Abbot:

Q. When you were asked to describe a bateau, you said it was seven thirty wide; what did you mean by that?

A. What is that?

2040 Q. How wide were those bateaux—the keel boats?

A. I couldn't say to the inch, but, in my judgment, they were seven and a half to eight feet wide on the top, and they keeled down to three feet in the bottom, the timbers were. Between these race planks that you walk on to shove it up the river, the race planks were about three feet apart.

Mr. Abbot. We have no further questions.

By the Court:

Q. Mr. Knode, you said just before you rented Tom Quinn's boat, he asked you to help him up the river with it?

A. What?

Q. The time you said you helped Tom Quinn get the boat up the river, you said you got on one side and two men on the other?

A. That is right.

Q. Did you get out in the water, do you mean, or on these tracks along the side.

A. Do you mean on the race planks?

Q. Yes.

A. He was loaded with merchandise a little in the middle, and you had to walk up against the timbers, up and down the boat, to get a foothold up on the race plank. I put these two men up there, and I knew how to catch it there, and I told them "when we shove down to the stern of this boat, I want one of you fellows to help Quinn keep the boat from going down the river until we could get started in the head, and I drilled in the head, and I let the other man come up, and he shoved on one side and I on the other. That put them up over the falls.

Q. You stayed in the boat?

A. Yes, sir.

2041 F. B. Kegley, on direct examination, testified as follows:

Q. Mr. Kegley, please state your full name, age, and residence?

A. My name is F. B. Kegley, age 59, residence Wythe County, Virginia; Postoffice address, Wytheville.

Q. Mr. Kegley, where were you educated?

A. I was educated in the common public schools of the County and in the private preparatory schools for college; a graduate of Roanoke College, Salem, Virginia, in 1900; A. B. Deg. continued to study at Roanoke College, receiving M. A. Degree in 1901.

Q. What degree did you receive in 1900?

A. A. B.

Q. What did you do after your graduation from Roanoke College?

A. Taught in high school at Wytheville the session of 1901–02, and returned to Roanoke as instructor in English and History 1902 to 1905. I was granted a Harrison Scholarship, University of Pennsylvania, and did graduate work there 1905 and '06—one session.

I had in mind a continuation of study for Doctor's Degree, but, while there, I took a special course in History under Dr. E. P. Cheyney.

In the summer of 1905 my father died, and we had a considerable farming interest, and there were youths in the family, and I had to return. I was at home that summer and continued in the farming business and my studies there, and looked after the business and the education of my young brothers and sisters.

Then I taught in Wytheville High School again, history and English, 1907 to 1910, being interested in agricultural work as well as educational work.

I became Agricultural Agent, or County Agent, and did extension work in Wythe and Washington Counties 1910–1912, and returned home and retired to the farm and books, and continued my study of history from that time to now.

Q. Mr. Kegley, have you made any special study of the history of southwestern Virginia settlement and the early routes

2042 of trade, transportation, and travel to and from such settlements?

A. Yes.

Q. Will you state briefly the nature and scope of your studies in that field?

By Mr. THOMPSON:

Q. May I ask what that document is you have?

A. It is notes.

Q. Notes from histories?

A. Yes; history, and what I am giving you.

I would like to add one other thing as to education, if I may; I have been studying history with a view of writing or developing a book now in the press. It is in printers' hands except the last chapter.

Q. May I ask also if those are your own notes?

A. Yes; absolutely.

For the last ten years I have done necessary research work for inscriptions on highway markers for the counties of southwest Virginia—these metal markers that are placed along the roads.

By Mr. JACKSON:

Q. Will you state briefly the nature and scope of your studies in connection with the history of southwest Virginia settlements?

A. My interest has been chiefly in the early history of the southwest. I have tried to get at the facts. I have examined the source books rather than secondary histories, and checked them with the historical writings that have been published.

Q. Did you work on any thesis during the course of your college days?

A. I planned the thesis at the University, the thesis for the Doctor's degree. The subject of that thesis was the history and development of Southwest Virginia.

Q. You referred to some writing: Have you written anything for publication on the history of southwest Virginia?

A. The writing I have done is the preparation of the book I suggested—The Virginia Frontier.

Q. What is the stage of your work on that?

A. That is practically finished. There is some work on the last chapter yet.

Q. Is there one or more volumes involved?

2043 A. I anticipated a series of volumes. The first is Extension of the Frontier, the extension of the frontier towards the southwest.

Q. Mr. Kegley, is this first volume of this history in the hands of the printer, or not?

A. Yes.

Q. Just generally, what does it cover—the field?

A. The extension of the Virginia frontier from the beginning, the early Colonies, towards the southwest. It is a rather de-led study of land grants and settlement of people and the ıtes traveled, and especially the development of the settlements, history of the local James River and Roanoke valley.

Q. Have you collected the material for another volume?

A. A great deal of the material is further west, since that is my me territory, and was worked out and collected before I cen-ed on this section. This settlement antedates that. A great ny of these people moved up into New River and the Holston gion, and in order to understand that I was studying this down re.

Q. Does that second volume, for which you are collecting mate-l, cover New River?

A. Yes, sir.

Q. When was New River discovered?

A. In 1671; the expedition was sent out and sponsored by Col. ram Wood, to Fort Henry, and by Batts and Fallan.

Q. What name was given to the river at that time?

A. They called the river that they found Woods River, for sponsor of the expedition, Abram Wood.

Then there was a great deal of interest in the extension of the ony at that time, by historians and map makers of England l France.

This New River appeared on the maps of the period. So that accepted generally, I think, as the explanation of the name w—it was named New River, and then it came to be the New er, and then New River.

he whole river, Kanawha and New River, were considered one river, sometimes called the Great Kanawha, but in later periods the lower part of the river became to be distin-
4 guished as the Kanawha or Great Kanawha—the Great Kanawha to distinguish it from the Little Kanawha, an-er river going into the Ohio, and the upper part above the junc- of the Gauley, has been designated New River.

. When did the settlement of the New River Valley begin, Kegley?

. So far as the records or dates can be obtained, in the summer fall of 1744 and 1745. Actual land grants were made under veys beginning in the fall of 1745, and the people were on the und—there were quite a number of people on the ground—ore actual records.

. What were the sources and general trend of movement of lers into New River Valley?

A. The first people were Pennsylvanians. Just as in the Shenandoah Valley, the Pennsylvanians worked through the Appalachian Valley to the southwest, and came across the James, through the Roanoke Valley, crossed the divide, the Alleghany Divide, about present Blacksburg and Christiansburg, touching the river directly west, and those earlier settlers are found, of course, on the near slope, the first slopes that they came to, and along the bends of the river from Dunkards Bottom down to the mouth of Neck Creek. There were groups of people along the river and in the better creek bends further west. They were seeking the rich tracts of land and big springs.

Q. Have you described the location of the first settlements along New River now? You mentioned some of them; I don't know whether there are any others?

A. I suggested the big springs; they were at the big springs, which were necessary for home places.

By Mr. Thompson:

Q. What do you call the big springs?

A. The unusual springs they selected first.

Q. That is no specific spot?

A. No; just like any family would; they couldn't dig wells, and they didn't at first, and there are many good springs in this southwest section. It is rather noted for that. These first home places were at these big springs. The broad meadows and in the
2045 creek bottoms lateral to the river, some of the best land is on these creeks, either where the creek comes into the river of further back towards the head of the creek. They found the best land—more especially at Horse Shoe Bend, below Radford, and Dunkards Bottom, above Radford, on Neck Creek and Back Creek, now in Pulaski County, and on branches of Reed Creek and Cripple Creek and Bingmans Bottom and Poplar Camp, just below the lead mines in Wythe County.

By Mr. Jackson:

Q. Was Draper's Meadow one of the first settlements?

A. I thought I mentioned that.

Q. In the days of the early settlements, what were the routes of trade, travel, and transportation along the New River?

A. The earliest known route traveled was from the lower Virginia over the Blue Ridge towards the Cherokee Nation and the upper branches of Eastern Tennessee and western North Carolina. This trail was known to the English settlers as the Traders Path, a pretty well defined path. Across New River there was a ford, paralleling it a short distance above Reed Creek. That route is further south—parallel routes going in this same general direction.

Another further north and practically parallel was by the south branch of the Roanoke. The Roanoke divides just west of Salem, one branch called the South Branch and the other the North Fork. There were trails or routes of travel by both forks, and when they came to this fork they might go either way. The route up the South Branch crossed the river about Dunkards Bottom.

Q. When you say "the river" do you mean New River?

A. New River, yes. They would go by what is now Christiansburg, and from Dunkards Bottom it extended by Dublin Hollow, old Dublin Hollow, west over the divide between the waters of the New River and the Holston.

Still another route further north came up the Catawaba Valley.

By Mr. THOMPSON:

Q. Where is that?

A. Catawba Valley is in Botetourt. Catawba Creek empties into the James River north of Buchanan. The old crossing down there was known as Looney's Ferry, and from there they came on up to what is known as Old Amsterdam in Botetourt County.

2046 That was the extension of the old Indian trail through the valley.

At Amsterdam this old trail divided, one branch extending west—that is very near the Catawba Ridge. It went up the Catawba, and went down North Fork of Roanoke.

The North Fork of Roanoke forms a hook. It goes down west from head of Catawba and turns east and this trail went west down the North Fork to the dividing ridge, and then went up over this ridge to New River to Draper's Meadows, and then on to the river.

That North Fork road, as we call it, connected with this South Branch road I was telling you about a few minutes ago that went up South Branch and on up the North Fork.

The other division of that valley trail, coming through Shenandoah Valley and Amsterdam, swung south across the Roanoke Valley by the Great Lick, the present Roanoke City, and extended on south into Carolina.

That became the great road from the Yadkin Valley, in Carolina, to Philadelphia, and it was an important trail.

That is one of the reasons people came through the valley into this section: it was a pretty well defined Indian road, and a road followed generally by people coming south from Pennsylvania and Maryland.

Now, we have got the trail and path over here: we have got the route from South Fork and by Salem and by Christiansburg, and then further north from Looney's Ferry by Amsterdam and to Catawba.

Going back to the present Augusta County, from Staunton the settlements extended west, as well as south west, and they struck these western rivers like the Cowpasture and the upper James. Up about Clifton Forge there were a number of important settlements along the James River there. They crossed Craig Creek Valley and also the Catawba. They might come up the Catawba Road and might come up Craig Creek.

In case they went up Craig Creek, they would go down Sinking Creek, and then to Walker's Creek, and then down river.

By Mr. JACKSON:

Q. By "river", do you mean New River?

A. Yes, sir, and there they might go up Walker's Creek or swing down the river to the mouth of East River and to
2047 the west up East River towards the headwaters of the Clinch.

There are a number of these parallel routes of travel through each one.

2048 We can carry that still further—from present Clifton Forge, and they would go out through the present Monroe County, to Rich Creek.

Q. You said that this route, after coming to Walker's Creek, divided, one branch going along west, along Walker's Creek, and the other branch down to East River: Where did this branch that went from Walker's Creek to East River run with relation to New River?

A. It followed down the river. They branched off down the river.

Q. Did this route from Walker's Creek down to East River follow the land or the water?

A. We are speaking of overland travel.

By Mr. THOMPSON:

Q. What period?

A. The earliest period.

By Mr. JACKSON:

Q. Do you mean by that, the routes you have been describing are land routes?

A. Yes, sir.

Q. Mr. Kegley, state, as briefly as you can, how the New River was crossed on those routes?

Before stating where these routes that you have described crossed New River, will you state the sources of your information?

A. The sources for the early exploration or discovery of New River are the journals of the expeditions printed in First Exploration of the Trans-Alleghany Region, by the Virginians, 1650 to 1674, by Alvord and Bidgood.

By Mr. THOMPSON:

Q. That is, two of them wrote it?

A. Yes, sir; it is a book of joint authorship.

By Mr. JACKSON:

Q. Is that a publication of journals?

A. I believe I prefaced it with that remark.

Q. How is this collection of early journals regarded among historians as to reliability?

A. The journals speak for themselves.

Q. I am asking whether or not historians regarded these journals as credible, or not?

A. Yes.

Q. Now, will you proceed to state authoritities that you
2049 have considered in arriving at your testimony in regard
to these earlier routes of trade and transportation and the places of crossing New River?

A. My first authority on location is land records themselves.

Q. What land records, and where are they?

A. Petitions for land first and then the grants of land by Councils and Government, and records in the Virginia Land Office, and surveys and deeds and orders of courts of the local counties—first, Orange and Augusta, and later Botetourt, Fincastle and Montgomery. We have the records preserved. Then Montgomery and Washington.

Q. Have you examined any old road records, or are these the ones to which you refer?

A. Road records come in the orders of the courts, petitions for roads, and, as at the present day, they quarreled about where they should be.

Q. Have you studied any maps or journals dealing with these subjects?

A. Maps are a favorite of mine. I studied early maps, and especially maps setting forth the extent of the Indian settlements in America, and British maps are valuable, and definitely locate certain routes of travel.

Mitchell's map of 1755 is especially valuable. If you want the complete title, it is Mitchell's Map of the British and French Domains in North America, dated 1755. It was made and produced about the time of the quarrel becoming so acute between England and France about the colonies.

Q. Have you studied any histories of the early settlements?

Q. Of course, a great deal of history has been written. Those histories are, we consider, secondary sources. Now, if you care for a line of histories in the southwest section, I will be glad to give them to you.

Q. Not so far as I am concerned.

Mr. **Thompson.** Yes, we would like to hear them.

A. Starting with this book of Alvord and Bidgood for the period of exploration, and then following with Waddell's Annals of Augusta County, and Chalkley's Abstract of the Records of Augusta County. If you are not acquainted with this, it is a three volume publication. It is published by the Daughters of the American Revolution. It contains abstracts of the Orders of courts, one volume; abstracts of the deeds and wills and court judgments; and the other volume is pretty generally taken
2050 up with decisions, cases in court. There was a great deal of legal controversy about some of the early land titles. That is considered a very valuable work. It is a firsthand source of material.

Q. In connection with these roads, did you, or have you, examined or studied the Colonial Assembly Records, or records of the House of Burgesses?

A. Yes, sir. Henning's Statutes at Large are a good source for this early period, and the Journal of the House of Burgesses. Those things are all good sources. And then following on we have Morton's History of Rockbridge County, covering that period; also Morton on Monroe County, Alleghany County, Bath County, Pocahontas, Preston and quite a number of counties. Then farther west we have, covering the whole period, Summer's Annals of Southwest Virginia, which is a publication giving abstracts and orders of Court, deeds, land surveys—land surveys should be first—Botetourt, Fincastle and Wythe, that is the original stuff, just like the original records like Chalkley, then Summers again, "The History of the Southwest, Washington County."

Q. Have you examined any of the Journals and letters of early settlers and travelers?

A. There are journals of travelers into this region, and through it to Kentucky. There are depositions that bring out facts about travel and military expeditions.

By Mr. **Thompson**:

Q. He asked if he had examined them.

A. Yes, sir.

By Mr. **Jackson**:

Q. Will you state how New River was crossed by these routes of transportation you have already described?

A. New River was crossed by fording, as they came to it, if they could find a ford.

They did cross it on boats. They had ferries where they needed them. They came to the river and where they had developed a crossing, but they naturally found fords first.

Q. Please indicate, briefly, some of the principal crossings, the location of them? 2051

A. Let me read you this: "By fords at first, but later ferries were established." Most of the traveling public used these crossings in their western migration for settlement.

By Mr. **Thompson**:

Q. Are you reading a quotation?

A. No, sir; my own statement.

A. (Continuing.) And later they used these crossings for the transportation of their products to eastern markets with reference to increasing trade and travel along these routes. Ferries were established at most of the fords. Main roads crossed at mouth of Wilson, Daughton Ford, near Independence in Grayson County, Island Ford in Grayson County, Porter's Ford and Ferry near Ivanhoe, Wythe County, at the Lead Mines in Wythe County, at Herbert's, later Jackson's Ferry; the road toward Carolina south from Wythe County, at Barren Springs, Howard's, Allison's, Jones, 'Kinkous', Towe's, Godbey's, Dunkards Bottom, Ingles', Taylor's, below Radford, Pepper's, Cowan's, Brown's Farther down [interrupted].

Q. These are all below Radford, are they?

A. Yes, sir; these latter ones, Goodwin's, Snidow's, French's, Adair's—French's is about the Narrows and Adair's below the Narrows at Shanklin's, Pack's, and Bowyer's.

By Mr. **Jackson**:

Q. Mr. Kegley, what was the earliest industry on New River?

A. The earliest industry was the mining of lead, manufacture of lead on New River in present Wythe County, and present Austinville. Lead has been produced there from about the year 1756, and was used through the French and Indian War, and for the local inhabitants' individual use, and for the Revolutionary War, and for the war between the states.

Q. Do you know what was the route of transportation in early times to and from the Lead Mines?

A. The Lead Mines were on the river above the crossing of the Trader's Path I spoke of, and it went out from there over, the road developing from that toward Richmond and Petersburg, and it also went by Ingles' Ferry, Christiansburg, Buford's Gap, east of Roanoke.

2052 By Mr. THOMPSON:

Q. Are you now describing a continuous road?

A. Yes, sir; toward Lynchburg, from the upper river, the Lead Mine region.

Q. From the Lead Mine down to Ingles' Ferry and then to Christiansburg?

A. Yes, sir.

Q. And then to Lynchburg.

A. This general route that is still traveled.

By Mr. JACKSON:

Q. What was the relation between this road east from the Lead Mines as far as Snowville and New River, how were they situated with respect to each other?

A. They followed practically parallel, with the river; they swung away at places over some of the ridges, but when it came to Snowville, that is the east side of the river, it would extend either to Christiansburg or south toward Petersburg, over the Trader's Path, on the west side of the river from the Lead Mines. It came down across Ingles' Ferry.

Q. Mr. Kegley, do you know what the routes of travel from the upper settlements on New River to those lower down on the river were in the early days?

A. From the upper settlements Reed Creek and Cripple Creek present Wythe County, and from present Pulaski County, any passing down the river on the west side of the river would have been across the ridge between Back Creek in Pulaski County, and Walker's Creek, went through what is known as Shannon's Gap, Walker's Creek makes a bend and swings north some distance, thence down Walker's Creek and came to what is present Pearisburg and on through the Narrows.

Q. What was the relation between the road you mentioned through the Narrows and New River, in the matter of location, how were they located with reference to each other?

A. Like I stated, it followed practically parallel with the river.

Q. Mr. Kegley, in this connection, did you consider or study any historical sources or authorities beyond those you have already mentioned?

A. Any authorities?

Q. Yes.

A. Oh, these I gave you, Mitchell's map for the location of
the Trader's Path, the Preston and Virginia papers, the
2053 Draper manuscript collection, and the letters of the
State Historical Society of Madison, Wisconsin, are valuable letters.

That is a valuable source of material.

Q. Are those original documents?

A. Original documents of various kinds. In this connection "Johnson's Middle New River Families" [interrupted].

Q. Is that families or settlements?

A. It is settlements, and also Harmon's Annals of Tazewell County, and Pendleton's History of Tazewell County, also are very good authorities.

Q. What was the line of communication and travel in early days connecting the valley of the Kanawha River with the upper valley of the James River?

A. Let us think of it going the other way. Connecting the upper valley of the James with the Kanawha or lower valley west, the earliest trend of settlement and travel was that way. This was always the route traveled in that direction say from present Covington, mouth of Dunlap's Creek at Jackson's River, extending over the Alleghanies toward Ohio, and that route has been developed first with primitive roads and then improved roads, and practically the same route is used yet, and known as the Midland trail.

Q. Can you state what was the western terminus of that road in the early days, before 1800?

A. Aiming at the lower Kanawha Valley the road, the first road, seemed to terminate about Kelly's Creek.

Q. About when was that constructed, if you know?

A. The record of construction is about 1786.

Q. You said the western terminus was at Kelly's Creek. Where was that?

A. About twenty miles above Elk River, above present Charleston.

Q. Well does history disclose how travelers proceeded, if at all, farther west from Kelly's Creek, in the early days?

A. Numerous references are made to using the river from that point on, they might continue the road, in fact continued on to Elk Creek, and finally to the mouth of Big Sandy and also to Point Pleasant, but there was travel on the river.

2054 Q. You said the river; what river do you refer to?

A. The Kanawha River.

Q. Mr. Kegley, during the period say prior to 1860, what were the traveled routes from the upper New River valley to the east?

A. That would be practically the same development we spoke of, with a road to Wythe by Pepper's Ferry, thence to Blacksburg and Buchanan connected with the Jackson River, that road was improved, and then from Wytheville to Newbern, across Ingles' Ferry—Newbern is the old county seat of Pulaski County—Pulaski city is on the railroad farther north, across Ingles' Ferry, thence to Lynchburg, that was improved—the Salem-Lynchburg turnpike, and finally macadamized, and there were other roads; the road to Cumberland Gap, down East River, and thence to Blacksburg, that was improved, and became known as the Old Cumberland road, they called these roads the "old stage roads," the "Baltimore road," and "Market road" and so on.

Q. This Cumberland road after it came down East River to New River, then it went to Blacksburg from East River toward Blacksburg—what was the relative position of this road and New River?

A. For that distance the road was not parallel but it was the same general direction; it was following east, the road runs rather northeast; the river runs practically north there I guess.

Q. For the period say prior to 1860 what was the situation with reference to lines of transportaion from upper New River down into the lower New and Kanawha River valleys?

A. These routes, of which we spoke before, went through the turnpike stage of development.

Q. I mean the location, if you have not already described that.

A. It was the same route known now as the Newbern-Red Sulphur turnpike, from Newbern to Red Sulphur Springs?

Q. Did it go any farther down than Red Sulphur Spring?

A. That road was developed and followed a few years later by extension, and that was known as the Giles, Fayette, and Kanawha turnpike.

Q. Can you give the location below Red Sulphur, what route did it take?

Mr. Thompson. Are you testifying from what you have 2055 learned from history prior to 1860?

A. I get it from the maps of the raods, from the histories of the counties through which it passed, and I can show you a map of the road if you want it.

The location of that road along the route of the road mentioned, thence down Indian Creek crossing New River at Pack's Ferry; thence along the west side of the New and Kanawha River to the Ohio, by the way of Fayette Court House and Charleston, where it connected with the Midland trail, the two roads came together there at Charleston, and the old Midland trail crossed the river there and joined this Kanawha and Fayette turnpike, went on to Big Sandy, and later a road went on to Point Pleasant, and still another road, or rather a cross road connecting those two, known as the Princeton and Red Sulphur Turnpike, coming down Lick Creek, crossing New River, that was farther south.

Q. Mr. Kegley, in the period prior to 1860 what was the situation with reference to the through roads on the east side of the New River from the upper James river valley?

A. There again the James river and Kanawha turnpike had been completed from the Jackson river to the great falls of the Kanawha following the course of the present Midland trail, and a road had been completed up the Dunlaps Creek by way of old Sweet Springs and Union, connecting with roads leading to the Red Sulphur Spring. My authority for that is Morton's Monroe County and Alleghany County."

Q. What, if any instances does history record of the use, or attempted use, of New River in early times as the means of travel or transportation?

In answering that question, just name the instances so as to identify them, if there are any?

A. The earliest illustration of the use of New River, or the waters of New River, for traffic or transportation, is the attempt of John Peters Salling, the early spelling seems to be Sally.

Q. What is that date?

A. 1742.

Q. What historical evidence is there of the trip of John Peters Salling or Sally in 1742?

2056 A. We have the journal, the transcript, of Salling, describing his experiences in travel on the river.

Q. Is that journal of Salling's generally accepted by historians or not?

A. The journal speaks for itself. Any original document of that kind is accepted by historians. You cannot do otherwise.

Q. Mr. Kegley, just state very briefly the route followed by John Peter's Sally and his experience as disclosed by history?

A. In the account of this, the attempt is indefinite on the point of entering New River and leaving it [interrupted].

By the COURT. What is the answer?

I said it is indefinite as to where he entered the river and where he left it, no way to fix exactly from the wording of the journal; the description of his experiences on the river are definite.

Q. State briefly what they were?

By the COURT. Approximately about where did he enter?

A. The interpretation of Virgil Lewis' history archives of West Virginia Historical Society, says about the middle of the river, is the term he used, here about Blacksburg or Radford, and came out through the Roanoke valley.

By Mr. THOMPSON. Did he state Blacksburg or Radford?

A. I don't know, he used those words. Mitchell terms that the middle of the river, and that has been the theory of historians, as far as I have learned, they came out through the Roanoke valley.

By Mr. THOMPSON. In this journal does it say the Roanoke valley?

A. No.

(Colloquy of Counsel.)

By the WITNESS. This was in the year 1742 and undertaking to explore the western country.

By Mr. JACKSON:

Q. What, generally, was his experience on the river? Did he leave the river or what did he do?

A. Why not read this excerpt?

Q. You have a quotation from which you would like to read?

A. Yes, sir.

Q. What is the quotation from:

A. From this journal.

2057 Q. From Salling's journal?

A. Yes, sir.

Q. Will you read the part you deem pertinent to the point?

A. In this journal he said: "On the 16th of March" [interrupted].

By Mr. THOMPSON:

Q. What page of the journal is that from?

A. I do not have the page.

By Mr. JACKSON:

Q. Mr. Kegley, I show you an issue of the Virginia Magazine of History and Biography and ask if that is a reprint of the Sallings' journal, issue of April 1922?

A. It is.

Q. Will you read the quotation you deem pertinent?

A. I don't think you will find it different from the other.

Q. What page of the magazine is that on?

A. Page 213, April 1922. "On the 16th of March 1742, we set off from my house and went to Cedar Creek, about five miles where is a natural bridge over said creek, reaching from the hill on the one side to the hill on the other. It is a solid rock, and is 203 feet high, having a very large, spacious arch, where the water runs through. We then proceeded as far as Mondongachate, now called Wood River, which is 85 miles, where we killed five buffaloes and with their hides covered the frame of a boat; which was so large as to carry all our company and all our provisions and utensils, with which we passed down the said river 252 miles as we supposed, and found it very rocky, having a great many falls therein, one of which we computed to be thirty feet perpendicular, and all along surrounded with inaccessible mountains, high precipices, which obliged us to leave said river. We went then a southwest course by land 85 miles where we came to a small river and there we made a little boat, which carried only two men and our provisions. The rest traveled by land for two days and then we came to a large river where we enlarged our barge so she carried all our company and what ever loading we had to put into her."

Q. Have you completed the quotation you wish to read?

A. This is Fairfax Harrison's article, subject, "The Virginias on the Ohio and Mississippi, 1742."

2058 Q. What you have read, however, is a quotation from the Salling's journal?

A. Yes, sir; Harrison gives the introduction to the journals of Howard, Hayward, and Salling and then gives the quotation.

Q. At the end of the quotation you have just read, there was a reference made about coming to a large river. What do historians record as being the river mentioned?

By the COURT. Have historians given any consideration to that diary or journal and made an attempt to figure out what that second river was that he mentioned?

A. You mean the large river?

Q. Yes.

A. He says in the next sentence or gives some interpretation of where it was: "We went down this river 250 miles, tolerably good passage," so he must have referred to the Kanawha and Ohio. You asked me about historians generally. I want to say this is frequently quoted and I think all historians use it as an illustration of experiences in exploration.

Q. Is it generally believed the river mentioned was the Kanawha or the Ohio?

A. Yes.

By Mr. JACKSON:

Q. Now in addition to this trip of General Peter Sallings (Salley) in 1742, does history record any other instance of use or attempted use of New River, in early times, for trade, transportation, and travel?

A. The next illustration of travel on the river comes in the reports of the Commission on the James River Canal project.

Q. What Commission was that?

A. The so-called Marshall Commission appointed by the General Assembly to investigate the possibilities of connecting the waters of James River with the western waters, of New and Kanawha, and this comes in the report of Moore and Briggs, surveyors or engineers.

By Mr. Thompson:

Q. You say the Marshall report comes in there?

A. The next example comes in the report of this commission and then following that experience the Moore and Briggs report
2059 made under the Board of public works of Virginia.

By Mr. Jackson:

Q. Now, you have mentioned the Salley trip and the survey of the John Marshall Commission, which is in evidence, or the report is in evidence here, and the survey of Moore and Briggs in 1819 or their report which is also in evidence here. Does history record any other instances of use or attempted use of New River in the early times as means of Trade, transportation, and travel?

A. Those are the two instances of travel recorded.

Q. Two, you say?

A. Yes, sir; the Salley trip and this Commission, and the account of Moore and Briggs or their report, and that would be three.

Q. Now Mr. Kegley, does history record instances of other trips in early times down the New River Valley or from the region of upper New River. Just answer that yes or no?

A. Yes, sir.

Q. State whether or not history discloses an expedition against the Shawnee Indians authorized by Governor Dinwiddie in 1756, during the French and the Indian War. Just answer that question yes or no.

A. Yes.

Q. Please state briefly the nature of that expedition, the route it followed, and the means of transportation employed?

A. It was in February 1756, that Governor Dinwiddie, then Governor of Virginia, authorized and planned against the Shawnee Indians an expedition, whose chief town was near the mouth of the Great Kanawha.

This expedition was under command of Major Andrew Lewis, who assembled the men designated to go at Fort Frederick.

By Mr. Thompson:

Q. What are you reading from now?

A. I am reading a statement of my own.

Q. Is it a digest from some history?

A. Yes, sir; various histories.

(Colloquy of Counsel.)

By the Witness. Leaving Fort Frederick, at Dunkards Bottom on New River, they went west through Burks Garden, now in Tazewell County.

By Mr. **Jackson**:

Q. Would that be over land?

2060 A. Yes; then to the east fork of Big Sandy, generally known as Tug Fork.

By Mr. **Thompson**:

Q. Where is that?

A. In the present McDowell County, West Virginia, just north of Tazewell County. That was the next valley they came to. They then went through Burks Garden to the east fork of Big Sandy, and after they proceeded down this stream for a time, the expedition disbanded because of difficulties.

Q. Where does the Big Sandy come in?

A. This is the east fork of the Big Sandy, and the Big Sandy comes into the Ohio.

Q. It does not come into New River?

A. No, sir; the idea was to get back to the Ohio.

By Mr. **Jackson**:

Q. Will you please state some of the historical sources which you studied in connection with this expedition of 1756, authorized by Gov. Dinwiddie against the Shawnee Indians.

A. The Dinwiddie papers themselves are published and give the letters and orders to the Commander of the Expedition, suggesting a method of carrying it out. Aside from that, we have the diary or journal of William Preston, who was one of the Captains of the Company. This journal is published in Johnson's History of the Middle New River Settlements, and that is taken from the Draper Manuscript Collection, but it is printed in this history of the Middle New River Settlements by Johnston. If you want the page you can get it.

By Mr. **Thompson**:

Q. Will you give us the page?

A. No; I cannot give it to you right now, but we have it here.

By Mr. **Jackson**:

Q. Did you find anything about this expedition in the journal of the House of Burgesses?

A. The journal of the House of Burgesses contains a number of statements and records in regard to the conduct of the men on this expedition and the difficulties encountered. It shows further why they disbanded.

Q. Does history record an expedition of Virginians against the Indians on the Ohio River in 1774?

A. Yes.

2061 Q. Will you please state briefly the nature of that expedition, the route which it followed and means of transportation employed?

A. That is generally termed the point Pleasant Expedition. This expedition was brought on because of the hostility of the Indians following the advance of the settlements towards Kentucky, in years from 1768 to 1774. As the settlements were advancing, the Indians were aroused, and this expedition was planned by Virginians against the Indians on the Ohio River, to meet them for combat. The soldiers from the southwest were commanded by Col. Andrew Lewis, the same man, but he was a Colonel at this time, with Col. William Christian in charge of the Fincastle troops. The Fincastle troops were from Fincastle County, which then included the territory west of Alleghany Ridge, New River, Holston, and Clinch settlements, and Kentucky. The place of rendezvous for the western division was at William Thompson's, on Back Creek, now the Cloyd Plantation in Pulaski County.

Q. Where is that with reference to the river?

A. That is not far from New River—within a few miles of the river. From that point they proceeded down the Valley of the New River, by land, carrying their provisions on pack horses, but their course was generally parallel with the river, which they crossed——

By Mr. **Thompson**:

Q. Are you reading from some history now?

A. No, sir; I am reading an outline I have here.

By Mr. **Jackson**. Go ahead.

A. They crossed New River and proceeded towards Greenbrier.

By Mr. **Thompson**:

Q. Can you state where they crossed the river?

A. No, sir; but the camp on the Greenbrier was known as Camp Union, about the present Lewisburg. They proceeded on towards Ohio, fording the Gauley River, and came to the mouth of Kelly's Creek, about 20 miles above where Charleston is now.

By Mr. **Jackson**:

Q. The mouth of Kelly's Creek is on what river?

A. On the Kanawha. I believe they said they came to the Kanawha at Kelly's Creek. A few days later when they arrived at Elk River the officers were requested to report the number of men in their respective companies, who were willing 2062 to be employed in making canoes, and all tools were ordered to be put in working order. Two brigades of horses were sent back to Camp Union for flour for the men who were employed in making the canoes.

By Mr. Thompson:

Q. Was this on the Kanawha River now?

A. On the Elk River.

Q. It was not on New River?

A. No, sir. The next day the scouts for the mouth of Kanawha launched their canoes. They were scouting for information. Two days later the troops most accustomed to conducting canoes were ordered to be collected and the canoes fitted out for receiving their loadings with all possible dispatch. Proceeding down the river, a Sutler's Canoe overset and two guns and some baggage were lost.

Two canoes that were fastened together were overset and 27 bags of flour were floating.

By Mr. Jackson:

Q. Now will you please state what historical sources, if any, you studied in connection with that trip, in addition to that, not heretofore mentioned?

A. The authority for this Point Pleasant Expedition are letters and journals, and original documents printed in what is called Dunmore's War; they are documents taken from the Draper Manuscript, collection and date by Dr. Thwaites and Louise Kellogg. The full name of this book is the Documentary History of Dunmore's War.

By Mr. Thompson:

Q. Was that called History of Dunmore's War?

A. Yes; it is documentary history of Dunmore's War.

By Mr. Jackson:

Q. May I just interrupt you a moment here, to ask if these documents are compilations of original letters and journals?

A. Yes.

Q. Were those journals and letters written by the men who were on this expedition?

A. Yes, sir.

Q. Are they generally accepted by historians as trustworthy evidence of this expedition?

A. Yes.

2063 Q. Mr. Kegley, does history record a trip made by Charles Johnson of Botetourt County and one John May to Kentucky about 1790?

A. It does.

Q. Is there any historical account of that trip?

A. We have Johnston's own account of that trip to Kentucky in company with John May.

Q. And has that account been published?

A. Yes; we have this account which has been published. Do you want the title of that?

Q. Yes; give the title.

A. The title for that publication is "Incidents attending the capture, Detention, and Ransom of Charles Johnston, of Virginia," published by J. and J. Harper, in 1827, and a reprint by the Burrows Company in 1905.

Q. Is Johnston's account of his trip to Kentucky in 1790 generally accepted by historians as a trustworthy account of that trip?

A. It is his own account.

Q. Mr. Kegley, will you describe briefly this trip, the route followed by Johnston and May and means of travel which they employed?

A. Johnston said "we proceeded by the usual route to Greenbrier Courthouse——"

By Mr. **Thompson**:

Q. Are you quoting now from some document?

A. From Johnston's book.

Q. What page?

A. I haven't the page.

By Mr. **Jackson**:

Q. Mr. Kegley, is the book here?

A. I don't think I have that book here. It is available, however, in Roanoke if you want it.

Q. Now will you please proceed with your quotation?

By Mr. **Thompson**. I would like to know the page from which you are reading. Will you produce the book?

A. I cannot do it now.

By Mr. **Jackson**. We will do it if we can.

By Mr. **Jackson**:

Q. Mr. Kegley, please proceed.

A. Johnston says "we proceeded by the usual route to Greenbrier Courthouse, where the town of Lewisburg has since
2064 been built, which place we left about the 8th or 10th of
March. The country between that place and the Kanawha River, on which we were to embark, was then destitute of inhabitants, and the distance, about 80 miles. We toiled on through a dreary country and unpleasant weather for two or three days longer and then arrived at Kelly's Station on the great Kanawha. There we contracted for one of those heavy, clumsy, slowly moving structures, at that time employed on the Ohio for the conveyance of travelers and their property to the western settlements." That is all that is pertinent to this question.

Q. That quotation which you read refers to Kelly's Station. Have historians been able to locate that definitely?

A. Yes.

Q. Where was it?

A. Kelly's station is at the mouth of Kelly's Creek about 20 miles above Elk's River, above Charleston.

Q. Earlier in your testimony I think it was about the Dinwiddie expedition of 1756, you made some reference to the Big Sandy River. Will you tell me whether the Big Sandy River flows into the Ohio above or below the Kanawha River?

A. It is below the Kanawha River.

Q. Does History record a trip by Moses Austin from Austinville, Va., to Missouri and Texas in 1798?

A. Yes.

Q. What is the historical evidence, if any, of that trip?

A. We have an account of that trip from Austin's Journal printed in an introduction to the Austin Papers which were published as a report of the American Historical Association in 1919, edited by Dr. Barker of the University of Texas.

Q. Is that journal an account of the trip written by Moses Austin himself?

A. Yes, sir.

Q. And does it record his observation during the course of that trip?

A. Yes, sir.

2065 Q. And is that journal accepted by historians as reliable and credible evidence with respect to that trip?

A. It is acceptable, it is his journal.

Q. Is it accepted as reliable?

A. Moses Austin was certainly a reliable man.

Q. Will you please state briefly the route followed by Moses Austin and his party, and the means of transportation or travel employed?

A. In this journal he says that he and his family and certain other persons, with nine loaded wagons and a coach and four horses left Austinsville and took the road to Morris' Boat Yard on the Great Kanawha, having started the trip on the 8th day of June 1798.

By Mr. Thompson:

Q. Are you reading from his journal?

A. No, sir; from a summary of my own.

This Morris' Boat Yard is Kelly's Station, at the mouth of Kelly's Creek. Morris succeded him at that place. He further says that on the 4th day of July, he entered the Ohio, and arrived at Kaskashaia on the 8th day of September, sick and debilitated to such a degree that out of 17 persons that arrived, two only could walk on shore from the barge.

By Mr. **Jackson**:

Q. Did any of the usual routes of trade and travel from or through the New River country, in early days, to Kentucky and Ohio, lead through the Kanawha Valley?

A. Yes; there were different roads of travel to Kentucky.

Q. Did any of them lead through the Kanawha Valley?

A. Yes, sir.

Q. Will you describe that route of trade and travel briefly, and the means of transportation employed?

A. The early road to Kentucky went by way of Ingle's Ferry through Cumberland Gap, and another went by Fort Pitt down the Ohio, and still a third generally used for travel, they used the route that went down the Kanawha. They might either go on down the Kanawha by land or by water.

Q. Where did they reach the Kanawha?

A. They reached it over that western road from James River across on down.

2066 Q. At what point did they reach the Kanawha?

A. The road came to the river at Kelly's Creek and at Charleston.

Q. At that point, what was the means of travel from the east?

A. The means of travel from the east was overland.

Q. From that point on what were the means of travel?

A. They either went by water or by land from that point.

Q. Mr. Kegley, was there any fort located at Point Pleasant in the early days?

A. After the battle of Point Pleasant, a number of soldiers continued to be stationed there and garrisoned the fort, which was called Fort Randolph.

Q. When was it established?

A. In 1774.

Q. How long was it garrisoned?

A. That was continued from the Revolution as long as there was any hostility along the Ohio.

Q. How were supplies for Fort Randolph transported to Point Pleasant?

A. The garrison was generally supplied with flour and salt by boat from Fort Pitt; that seems to be the general way they supplied this fort and others on the Ohio.

Q. Did I ask you earlier what were the means of transportation to and from the lead mines in the earliest days, or not?

A. You asked about the routes to the lead mines. The only history we have on that is the overland route; the one over the so-called Lead Mines Road, which lead to lower Virginia by formerly the Old Trader's Path, and the other over Ingle's Ferry—the road by Christiansburg and Salem.

Q. Have you finished your answer on that?

A. Yes, sir.

Q. Mr. Kegley, did Thomas Jefferson visit New River in the early times?

A. Thomas Jefferson, after he was Governor of Virginia, visited the New River and the lead mines. He had been interested in the lead mines.

Q. What was the date of his visit?

A. 1780?

2067 Q. Did Jefferson write a description of New River as he observed it at the time of his visit?

A. Yes, sir.

Q. And was that description published?

A. Yes, sir; it was published in his "Notes on Virginia"—Jefferson's "Notes on Virginia," pages 11 and 23 and 24.

Q. What is the reputation of Jefferson's description of New River among historians? Is it generally accepted by historians?

A. I would say that Jefferson speaks for himself.

(Colloquy of Counsel.)

By Mr. JACKSON:

Q. I will ask that the question be read.

(The question is read.)

A. Yes, sir.

Q. Will you please read Jefferson's description of New River in 1880, as it appears in his "Notes of Virginia?"

By Mr. THOMPSON. You mean 1780?

By Mr. JACKSON. Yes, sir; 1780?

A. (Reading:) "The Great Kanawha——

By Mr. THOMPSON:

Q. Are you reading a quotation?

A. I am reading from notes.

Q. You are reading notes?

A. His notes—his Diary—his description of the Great Kanawha. [Reading:] "The Great Kanawha is a river of considerable note for the fertility of its lands, and still more as leading towards the headwaters of James River. Nevertheless, it is doubtful whether its great and numerous rapids will admit of a navigation, but at an expense to which it will require ages to render its inhabitants equal. The great obstacles being at what are called the Great Falls, 70 miles above the mouth, below which are only five or six rapids, and these passable, with some difficulty, even at low water. From the Falls to the mouth of Greenbrier is

100 miles, and thence to the lead mines 120 miles. It is 280 yards wide at its mouth."

By Mr. JACKSON:

Q. Do historians identify the Great Falls referred to by Jefferson?

A. The Great Falls of the Kanawha are understood to be the Falls below the lower falls.

By Mr. THOMPSON:

Q. Did Jefferson say that?

A. No, sir; he said the Great Falls were about 80 miles from its mouth.

Q. Does that mean 80 miles from the Ohio River?

A. Yes, sir. He says the distance on the river to the Great Falls was 70 miles.

2068 Q. ~~Then~~ this description that you are reading is a description as you saw it from Jefferson's Diary—his account.

A. No, sir; it is a quotation.

Q. Is it the river from the Falls down to Point Pleasant?

A. Yes, sir.

Q. (Continuing.) that he is referring to?

A. The distance—"the great obstacle begins at what are called the Great Falls 70 miles from the mouth." I thought that was clear.

By Mr. JACKSON:

Q. Mr. Kegley, is there any other quotation from Jefferson's Notes on Virginia with respect to the Kanawha, which you regard pertinent to the point. If so, read it.

A. Jefferson gives a good description of the lead mines on page 24. He says: "From the furnace, the lead is transported 130 miles along a good road leading through the Peaks of Otter to Lynch's Ferry, or Winstons on James River, from whence it is carried by water about the same distance to Westham. This land carriage may be greatly shortened by delivering the lead on James River above the Blueridge, from whence a ton weight has been brought on two canoes. The Great Kanawha has considerable falls in the neighborhood of the mines. About seven miles below are three falls, of three or four feet perpendicular each; and three miles above is a rapid of three miles continuance, which has been compared in its descent to the great falls of James River. Yet it is the opinion that they may be laid open for useful navigation so as to reduce very much the portage between the Kanawha and James Rivers."

By Mr. THOMPSON:

Q. What page is that?

A. Pages 23 and 24.

By Mr. JACKSON:

Q. In your historical researches, have you encountered any other early descriptions of New River?

A. I found a description in Morse's Universal Geography?

Q. Published when?

A. It was published at Boston in 1802.

Q. Is that georgraphy regarded as entitled to any credit in the description of conditions there?

2069 A. It is a universal georgraphy, describing different countries in the world and America by States. This is under "Virginia."

Q. Will you read a description of New River as given in Morse's Universal Geography, published in 1802?

A. This is the quotation: "The Great Kanawha is a river of considerable note for the fertility of its land, and still more, as leading towards the headwaters of James River."

By Mr. THOMPSON:

Q. What page is that?

A. I do not have the page.

Q. Will you produce the volume, that you are reading from?

A. I can, but I cannot right now.

Q. Will you do that?

A. I cannot do it now.

Q. Well, after you get through.

By Mr. JACKSON. We will endeavor to get it for you.

By Mr. THOMPSON:

Q. At the noon recess?

A. No, sir.

By Mr. JACKSON. We will try to get it.

By Mr. THOMPSON:

Q. We would like to have it for our cross-examination—before we start our cross-examination.

A. (Continuing.) "Its headwaters interlock with those of Holston and Roanoke, and from a considerable distance from its source it is called New River. It is doubtful whether its great and numerous rapids will admit a navigation, but at an expense to which it will require ages to render its inhabitants equal. The great obstacles being at what are called the Great Falls 90 miles above the mouth, below which are only five or six rapids, and these passable, with some difficulty at low water. From the Falls to the mouth of Green Briar is 100 miles, and then to the lead mines 120. It is 280 yards wide at its mouth. The principal branches of the Great Kanawha, as you ascend it, are, Louis, or Coal Creek from the West—Elk, 60 miles from its mouth—Gauley River, more than 100—Green Briar, nearly 200. These three latter from the East."

Q. You are reading—that is practically a restatement of what Mr. Jefferson said, isn't it?

A. Yes, sir.

2070 On cross-examination, testified as follows:

Q. You stated that you come from Wytheville. Is that correct?

A. Wythe County, near Wytheville. That is the post-office address.

Q. Are any of your relatives employed by the Appalachian Electric Power Company, or have they been in recent years?

A. No, sir.

Q. Is there not a Mr. Kegley, who lives in Wytheville, that is an attorney employed by the company?

A. There is an attorney there named Kegley, but I don't know that he is employed by them.

Q. You don't know that he has ever been employed by the Appalachian Electric Power Company?

A. I do not.

Q. Is he a relative of yours?

A. Yes, sir; he is a cousin of my father.

Q. You were educated in the public schools in Wytheville, were you?

A. In Wythe County.

Q. And then you went to Roanoke College?

A. Yes, sir.

Q. And you got a degree of A. M. there?

A. A. B. and A. M.

Q. And then you took a degree of A. M.

A. Yes, sir.

Q. And then you went to the University of Pennsylvania?

A. Yes, sir.

Q. And you went there to get your Doctor's degree?

A. Yes, sir; I went there to study. I planned a Doctor's degree.

Q. And you spent two years there?

A. One year,

Q. And you did not get your Doctor's degree there, from the University of Pennsylvania?

A. No, sir; it takes three years.

Q. Wasn't that because they would not take your credits?

A. No, sir. My father's death necessitated my staying at home. They offered me a Fellowship to continue my studies.

2071 Q. So you went back home, did you?

A. Yes, sir.

Q. To Wytheville County?

A. Yes, sir.

Q. And you became an instructor in English in 1902 to 1905, at Roanoke College?

A. In English and History.

Q. Does Roanoke College give a Doctor's degree?

A. No, sir; they do not. They give a D. D., but they do not give a Ph. D.

Q. Could you not have gotten your Ph. D. degree during that time?

A. No, sir; I was teaching.

Q. Couldn't you have done it at the same time?

By Mr. JACKSON. We object to that, because he said they did not give that degree at that college.

By the COURT. I think he meant that he might have gotten it elsewhere.

A. I could not have very well done that and do what I did.

Q. I believe you have never received a Doctor's degree?

A. No, sir.

Q. How long did you state you had been farming?

A. I have been on the farm since 1912.

Q. And during that time you have been a farmer?

A. A farmer and a student.

Q. Can you be a farmer and a student at the same time and delve into matters of this kind?

A. Yes, sir; I have given most of my time to that—I have given most of my time to study, unfortunately for the farm.

Q. You have been telling the Court about the Draper collection?

A. Yes, sir.

Q. Draper was a resident of this part of the country before the War, was he?

A. No, sir.

Q. Isn't he the man that took it to the University of Wisconsin?

A. Yes, sir.

Q. And he came to this part of the country, didn't he?

A. Yes, sir.

Q. And did he collect all these various manuscripts that he could get?

A. Yes, sir.

2072 Q. And didn't he leave and go to Wisconsin?

A. Yes, sir.

Q. After the War?

A. Yes, sir.

Q. And didn't he leave all these documents with the University of Wisconsin?

A. Yes, sir.

Q. Have you been to the University of Wisconsin and gone over these documents?

A. Yes, sir.

Q. When?

A. I was there in the summer of 1908.

Q. How long did you stay there?

A. Six weeks.

Q. Do you mean to tell the Court that you could go over all those documents——

A. (Interrupting.) No, sir.

Q. (Continuing.) that are in that collection and make a study in six weeks?

A. They have an index of these documents—a comprehensive index, that gives a statement of the document—what they are and a brief description of them and this is published and known as the Preston-Virginia Papers, and from them you can tell exactly—not exactly, but you can tell what letter or document if it pertains to Southwest Virginia, and I have photostatice copies of that collection pertaining to Southwest Virginia, particularly of the Draper manuscript collection.

Q. Don't those who are considered historians and writing about this part of the country go to the University of Wisconsin to make such study?

A. No, sir; you can tell as much about it without going as you can if you go, especially if you have photostats of the documents.

Q. You don't have photostatic copies of everything up there, do you?

A. No, sir; everything that is there does not pertain to Southwest Virginia.

Q. Do you tell the Court that you have photostatic copies of everything up there?

2073 A. No, sir.

Q. That pertains to Southwest Virginia?

A. No, sir; I said a great many things.

Q. And there are a great many things you have not got, aren't there?

A. Yes, sir; there are some sure; I have gotten those things that seem most important.

Q. You say that you have written a book consisting of two volumes?

A. No, sir; one volume, so far.

Q. And it is with the printer now?

A. Yes, sir.

Q. Who is the publisher?

A. The publishers are the Southwest Virginia Historical Society and the printer is the Stone Printing and Manufacturing Company of Roanoke, Virginia.

Q. And are you paying for the publication of that book?

A. No, sir; it is a subscription arrangement, a cooperative project.

Q. By that arrangement, don't you agree to have a certain number of copies for which you will pay?

A. No, sir.

Q. Who is paying for it?

A. The subscribers.

Q. Have persons subscribed already for it enough to pay for the publication of it?

A. Practically; yes, sir.

Q. How many have you got?

A. I don't know the exact number; I don't handle that; about three hundred fifty.

Q. And that is all the work, as I understand you, that you have done, with respect to historical studies—you have written a book about this part of the country.

A. That is not all the work. I have done different kinds of work. I have done this research work and study and it has taken a lot of time.

Q. Do you speak as an independent historian or are you employed by the Appalachian Electric Power Company?

A. I am absolutely an independent historian.

2074 Q. And you are not retained by them in any way?

A. No, sir.

Q. You spoke of having read the records in regard to James River and the Kanawha Canal. What records did you read with respect to James River and the Kanawha Canal?

By Mr. Jackson. We object to that because he did not state that he read the record.

By Mr. Thompson. I have it in my notes here that he read the record.

By Mr. Thompson:

Q. Did you read any?

A. I have read Marshall's Report—the report of the Marshall Commission.

Q. That report of the Marshall Commission, that was, I believe you said, the first account, or the first historical account going down the river?

A. No, sir; I said it was one of the first.

Q. That was what year?

A. 1812.

Q. 1811 or 1812?

A. Yes, sir.

Q. Do you recall—have you read the history of Summers County, West Virginia:

A. I have Summers County.

Q. Have you read that?

A. Yes, sir.

Q. Do you recall a trip down the river, as stated in this history, by a person named Loami Baldwin in 1817?

A. Yes, sir.

Q. You did not give that in your examination in chief, did you?

A. No, sir.

Q. Did you forget it?

A. I read that.

Q. Let me read this page to you (reading). "The New River country was visited by Chief Justice John Marshall, the Great Chief Justice of the United States, with other commissioners, who explored that stream in 1812. The report of these commissioners is a most interesting document.

An exploration was also made by Laomi Baldwin and party in 1815, in a boat 50 feet long, from the mouth of Howard's Creek in Greenbrier County, and down Greenbrier River to its mouth at Foss, a mile east of Summer's Courthouse; thence they turned up New River and proceeded to the mouth of Indian Creek; thence they returned down the river to the present site of Hinton, and thence on down New River to its mouth."

2075 Q. (Continuing.) Do you remember reading that particular part?

A. Yes, sir.

Q. Why didn't you state it on direct examination?

A. There is no objection to stating it. That could go with the report of Moore and Briggs.

Q. That would make four expeditions in these early days?

A. Yes, sir.

Q. I believe there is the Baldwin Expedition; the Marshall Expedition; the Moore and Briggs Expedition; and one other expedition which is the Sally expedition. Is that correct?

A. Yes, sir.

Q. And the Sally Expedition went down the River a distance of 250 miles in boats?

A. I didn't say that. They said as they conceived it.

Q. As they understood it?

A. Yes, sir.

Q. You accept that as credible?

A. No, sir. I think they did not know how far they went.

Q. I thought you were giving historical statements and you did think they were credible.

A. I was giving the historical statement they made.

Q. Some of these statements that you have read you have not exactly believed. Is that right?

A. Some particular phrases I might wonder at.

Q. You did not state anything about any phrases that you wondered at when you were giving your statement in answer to questions by counsel on the other side?

A. I gave the account as it was made. I gave the quotations.

Q. We are to understand—the Court is to understand, that you do not necessarily believe in all the facts in the statements that you have read here this morning?

A. As to that particular phrase, I think there might be some question.

Q. If you don't believe that, what other particular phrases are there that you don't believe in?

2076 A. I don't know. I don't recall any particular phrases now.

Q. Thomas Jefferson referred to the distance from the mouth of the Ohio up to Kanawha Falls, or the mouth as 70 miles?

A. Yes, sir.

Q. Do you agree with that?

A. That seems to be accepted, with the figures varying in different reports. Some say 85 or about 85, and some 70.

Q. Don't you know that it is 97 miles from the mouth?

A. I don't know how far it is exactly.

Q. When you accepted Jefferson's statement, you accepted it on its face value for historical investigation, didn't you?

A. I accepted it as Jefferson's statement gave it to you as that.

Q. What do you think of the statement from a historical point of view?

A. I could not say without measuring the river.

Q. Couldn't you go to Governmental sources in the State?

A. You might question some of the others.

Q. But you did not make a check. You have never tried to apply present-day data to check on any of these historical statements?

A. On any of them—I didn't say that.

Q. What is the answer?

A. I did not say that.

Q. I am asking if you did?

A. Yes, sir; I applied checks.

Q. But you did not in the case of Jefferson's statement?

A. No, sir.

Q. What checks did you make?

A. Well——

Q. (Interrupting.) Well, for example, let's take the Marshall report. Did you make any check on that?

A. You mean personal observation?

Q. Yes?

A. As to the accuracy of every statement?

Q. Yes, sir.

A. No, sir.

2077 Q. You didn't make any?

A. I took the report at its face value.

Q. And you took the other reports at their face value?

A. What else could you do?

Q. Is that what an expert historian does—take reports at their face value?

A. You would as an original document. If you based a conclusion on it, with a view to correcting it, you would have to check it.

Q. You have given a list of a number of trade routes?

A. Yes, sir.

Q. Have you made a check of these—an individual check with respect to those?

A. Yes, sir.

Q. What ones?

A. I have been over most of them personally.

Q. You have been over them and checked them with respect to the historical data that you have read here?

A. Yes, sir; I personally inspected them.

Q. You testified that there was a settlement at Dunkard's Bottom away back in approximately 1744.

A. I know definitely that it was there in 1745.

Q. Wasn't that the chief settlement in this whole district?

A. It was one of the chief settlements. There is a difference of opinion about that. It was one of the first. There were other settlements further down the river. There was a settlement at Draper's Meadows.

Q. Where did the Dunkards come from?

A. From Lancaster County, Pennsylvania. It was a religious sect in Lancaster and it has quite an interesting history.

Q. It has a very interesting history?

A. Yes, sir.

Q. And that was one of the few settlements that stuck there and was successful?

A. It stuck until it was molested by the Indians.

Q. Pennsylvania is in what direction—Lancaster—where is Lancaster, Pennsylvania.

2078 A. Lancaster is southwest from Philadelphia.

Q. It is very far in the eastern part of Pennsylvania, isn't it?

A. Yes, sir.

Q. And slightly southwest of Philadelphia?

A. Yes, sir.

Q. In getting to Dunkard's Bottom, they would be travelling, wouldn't they, in a direction that would be almost perpendicular to the direction of New River?

A. Generally; yes, sir, that general direction.

Q. So, in going to that New River settlement, there was no necessity for them either to go up or down New River?

A. No, sir; I think they took the attractive piece of land when they came to the river.

Q. That is an attractive piece of land?

A. Yes, sir.

Q. You say?

A. Yes, sir.

Q. Do you know whether or not the Dunkards used boats on the river?

A. No, sir; I don't know.

Q. You don't know that they did not, do you?

A. I found no reference to any boats used.

Q. You could not say that they did not use boats?

A. No, sir; I would not attempt to say that they did or did not, because there is no way to tell.

Q. So far as history is concerned—this history that you speak of, they may have gone up and down the river in boats?

A. They might.

Q. I believe you said that—I am not sure if I am correct—that there was established close by a ferry?

A. Yes, sir.

Q. The establishment of a ferry would indicate that the river had considerable depth for a period of years, wouldn't it?

A. Yes, sir.

Q. And that ferry was used by people going east and west?

A. Yes, sir.

2079 Q. What ferry was it?

A. The first ferry that was there was known as Scaggs' Ferry, above Ingle's Ferry, about Dunkard's Bottom. The old road kept south from Christiansburg along the ridge and crossed above the mouth of Little River and up the old Dublin hollow and came out at Newbern. You know the contour of the land there. It is easily understood why it was there at this place of Scaggs', who was one of the pioneers and had land along the river there at the same time the Dunkards were there. Scaggs sold out to a man named Whitt, who was one of the early pioneers, and the old Whitt Mill is still there at the mouth of Meadow Creek.

Q. When do you place that, what year?

A. About the ferry there, 1745 or 1750.

Q. Did the ferry continue there for many years?

A. Not very many.

Q. It moved down, did it?

A. It was succeeded by Ingle's Ferry.

Q. And that continued to be Ingle's Ferry?

A. To the present time.

Q. So that people coming east and west would naturally cross at Ingle's Ferry, would they not?

A. Yes, sir.

By the COURT. I notice on several of the maps of that section that you are speaking of that it is referred to as Dunkards' Bottom and on others as Dunkert's Bottom?

A. It is Duncards'—is the local spelling, but it is properly D-u-n-k-a-r-d and pronounced with a "T."

By the COURT. It is not a family name?

A. No, sir; it was a religious sect.

By the COURT. Yes; I am familiar with it.

A. They are good people.

Q. I wondered if it was the same name?

A. Yes, sir; they are a good people.

By Mr. THOMPSON:

Q. You located a number of ferries on the river, I believe?

A. Yes, sir.

2080 Q. I want to ask you about Reed Creek. I believe you said there was a ferry there?

A. Yes, sir; a ford and a ferry at the mouth of Reed Creek, known as Carter's Ferry. It was Tom Pierce's at first and he owned a tract of land there. Those ferries there are in the pools. Every ford had a ferry. You could not cross sometimes.

Q. And those ferries were for people crossing going east and west?

A. Yes, sir.

Q. And the migration at that time was towards Kentucky?

A. Yes, sir; Tennessee and Kentucky.

Q. And from the west—in other words, the migration came from the east and crossed the river to go to the west?

A. Yes, sir.

Q. So that there was no reason for people going up and down the river in the migration?

A. No, sir; there was not much reason.

Q. Because you said there was a ferry at Horseshoe Bend?

A. The first ferry there was at the mouth of Tom's Creek. That comes in as an order of the Court for a road in there—in the Orange County Order of the Court.

Q. Where would that be located?

A. It is located at the mouth of Tom's Creek, just west of Blacksburg or Drapers' Meadows, and the road comes to the river and they have a little island there and forded the river and had a ferry too, and the ferry is now known as Cowan's Ferry. Adam Harman lived there also and got a survey of 500 acres in 1750.

Q. Is that known as the Whitethorne Ferry?

A. Yes, sir.

Q. That was used by people going east and west, was it?

A. Yes, sir.

Q. You spoke of one at the Lead Mines?

A. Yes, sir; there was a ford up there, and a ferry.

Q. And that was for people coming there from what part of the country?

2081 A. That was the main Carolina route. They had a turnpike road from Wythe Courthouse to Danville, across there at Thorne's Ferry. That was Lynch's Ferry and they forded the river at the Falls at the mouth of Mill Creek, but used the ferry—there was a ferry there at Charles Lynch's and a tract known as the Lead Mine tract at the mouth of Mill Creek, and they asked for a franchise there. That was in 1787.

Q. That was continued, was it?

A. That ferry is still there and belongs to the land on the west side of the river. Later on, Thomas or James Newell got that land and he was superintendent at the Lead mines after the Austins left, and one of the successors claimed the ferry. The matter was put in Court and the decision was that it belonged to the land on the west side.

Q. Is that all the ferries that you gave on your direct examination?

A. Did I give all the ferries?

Q. Yes. You gave Reed Creek and Dunkard's Bottom and the Horseshoe and the Lead Mines.

A. I didn't know that I gave them all.

Q. Were there any——

A. (Interrupting.) I gave a number on down the river, on down, the main ones.

Q. As far as Bowyer's Ferry—that stretch of road came from Covington to Lewisburg and from Lewisburg to Bowyer's Ferry?

A. There was at one time a road that crossed there that connected with the road between Giles and Fayette and Kanawha Turnpike to the James River and the Kanawha Turnpike. It led across the mountain and crossed the Greenbrier and went to Bowyer's Ferry.

Q. That is what we would term a mesa or tableland, isn't it?

A. On the west side of the river; yes, sir.

Q. And was an easy route to get through?

A. It was not easy. Your Miller says it was hard to get through, but was the shortest route.

Q. If you had gone down the Greenbrier and down the New River, you would have been taking two sides of the triangle instead of one?

A. Yes, sir.

2082 Q. When you went by wagon?

A. Yes, sir.

Q. So it was easier to take the shorter trip by land?

A. I guess so.

Q. You spoke of the route from Wytheville down to Ingle's Ferry and across there and went over to Blacksburg. What was that road?

A. You mean in connection with east and west travel, or north and south?

Q. Both?

A. East and west was by Pepper's Ferry and Ingle's Ferry and you swung around to Salem or Buchanan. This North road was on the West side and went through Giles county by Pearisburg.

Q. That road started from Wytheville, did it?

A. Not necessarily. There would be other roads in the system. They called the East and west road the great road. Any road would lead off and one road led from Pepper's Ferry.

Q. That road was back from the river?

A. The one over the road to Back Creek.

Q. How far back?

A. I would say five miles from Cloyd's plantation, where he crossed the mountain Belspring.

Q. And it never gets nearer than about five miles from the river?

A. It gradually comes to the river.

Q. In between that road and the river, there was a great deal of settlement, was there?

A. No, sir; it is pretty rough in there.

Q. There was Dunkert's Bottom?

A. This was up the river from there.

Q. Wytheville is how far from New River?

A. From the Lead Mines?

Q. No, sir.

A. That is the closest place; it is about eight miles across there.

Q. It is about that distance from the river on this road?

A. No. The road from Wytheville towards Newbern, would practically follow the river. It gets to the bend at Rad-

2083 ford—Dunkert's Bottom—and the river swings back. That is the point I thought you wanted the distance, where the road turns off coming up to Wytheville.

Q. How far is that road back from the New River as it comes down?

A. From Wytheville.

Q. Yes.

A. The distances differ; eight or nine miles.

Q. My question may not be clear. Between that road and what is known as New River, there was quite a big settlement?

A. Settlements along the river; yes, sir. That is above the creek.

Q. Those people along the river could have used the river for boats, if they saw fit, could they not?

A. Yes, sir.

Q. This Lead Mine has been running without closing down since 1744, has it not?

A. No, sir; 1750.

Q. It has never closed down?

A. It has been in continuous operation so far as minerals are concerned.

Q. It has been a tremendous producer?

A. Yes, sir.

Q. And it is a very large plant today, isn't it?

A. Yes, sir.

Q. And it is operating today?

A. Yes, sir.

Q. And so far as is known they have not run out of sight of the ore vein?

A. No. They say the mineral extends down.

Q. They have what they call a lode deposit—an enormous deposit?

A. They make zinc now, instead of lead; they make zinc oxide.

Q. Mr. Kegley, have you made any study of the historical papers in the Virginia State Library?

A. Yes, sir.

Q. Relating to New River?

A. Yes, sir.

2084 Q. Have you made a very thorough study?

A. Yes, sir; generally of southwest Virginia.

Q. And it has been extensive?

A. Yes; and New River was a good part of it.

Q. I believe you said you were familiar with the report of Chief Justice Marshall?

A. Yes, sir.

Q. Did you ever read the report?

A. Yes, sir.

Q. Did you read this particular part of the report in Government Exhibit 189, page 22:

"The boat which conveyed your commissioners, passed from the mouth of Greenbrier, to the place where their expedition terminated, without being taken out of the water, except at the Great Falls of New River, and at the Great Falls of the Kanawaha. It was navigated in the usual way through all the other difficult places which abound in New River, except two—both below Bowyer's Ferry. Through these it was conducted by ropes.

"The boat was not laden, nor was it empty. In addition to the number of hands usually employed in navigation, it carried between two and three thousand weight. The greater part of this burthen was taken out in the most difficult places; but in many of considerable magnitude, it remained in the boat. Where the vessel was guided by ropes, the necessity of resorting to this expedient was occasioned solely by the intervention of rocks, which can be removed.

"It is also worthy of notice, that this voyage was performed by boatsmen, who, having never before seen the river, were reduced to the necessity of selecting their way at the moment, without the aid of previous information." Now, in your examination in chief, you did not make any comment with regard to what was in this report, did you?

A. No.

Q. Wasn't this an interesting fact with respect to New River?

A. Yes, sir.

2085 Q. Were you, in this examination or study, simply considering the question of roads and not the river?

A. No. It was the transportation facilities in use.

Q. Then, if you were, why didn't you call attention to that?

A. That was not in use. That was a special experimental test. I would not consider that a way of travel or traffic.

Q. Yes; but it was not only a trip to make an investigation, but it was to make a solemn report to the Virginia Legislature, wasn't it?

A. Yes, sir.

Q. You spoke of the Salley trip?

A. Yes.

Q. Don't you think that this was a more important trip than the Salley trip?

A. It was, perhaps, more important.

Q. Then, why didn't you mention it?

A. I did mention it. I didn't go into detail on it to decide it.

Q. Do you know the men that made this report—that is, their history or their record?

A. Yes; some of them.

Q. James Breckenridge?

A. Yes.

Q. Wasn't he an outstanding character?

A. Yes; so considered.

Q. He was so considered?

A. Yes.

Q. And William Lewis?

A. William Lewis was a good citizen. They were all prominent men.

Q. And James McDowell?

A. Yes.

Q. And William Caruthers?

A. I don't know much about William Caruthers, but it is a good name.

Q. And Andrew Alexander?

A. Yes, sir.

2086 Q. Do you know whether or not there was a map attached to the report of John Marshall?

A. There was.

Q. Have you ever seen that map?

A. I have seen a print of it.

Q. Where did you see that print?

A. In the State Library.

Q. What time did you see that print?

A. I have seen it this summer. I saw that print in connection with a study of Lynchburg, for an article on "Old Lynchburg since the Centennial Celebration."

Q. As a matter of fact, isn't there only the original map in the Archives at Richmond?

A. No; they had some prints. Mr. Hall said that the Board considered them important enough to have prints made.

Q. Is this Exhibit 189-A the print you refer to?

A. It looks like it. I think so.

Q. Are you able to read that writing in the lower right-hand corner?

Have me to read it:

"Although the great falls of New River are 23 feet in one place—the difficulty of making this part of the river navigable is not so great—by pursuing Richmonds Mill run the gradual fall is not more than 1½ inches to the rod—boats can descend this falls with great safety if the quantify of water is sufficient—and the water may be increased or diminished at pleasure by a low dam and gate of the falls; injury by flood can be avoided by a dam little more than 100 feet in length & 10 feet high—it is said the river is so wide above the falls it never raises that height—a path way can be made on the margin of the canal, the boatmen can tow a boat up this fall with small loads & if they are heavy laden a horse can be used here with great ease and safety—or if preferred the place is well suited for making locks."

Did you read that particular section on that map?

A. I read practically the same thing, I think.

2087 Q. But you did not consider that when you considered the possibilities of highways in the State of Virginia, did you?

A. I was speaking of the highways in use.

Q. And you did not consider that they could be a highway in use?

A. It could be. It is a possibility of taking care of the report and the opinion for it.

Q. What was the date of the Jefferson notes?

A. 1780.

Q. And this was much later, was it not—the report of Marshall?

A. Yes, sir.

Q. And wouldn't you consider the report of Marshall much more valuable than the notes of Jefferson?

A. In the description of the river, do you mean?

Q. Yes.

A. Well, I don't know that I would. I was specially interested in Jefferson's notes, because it was a description of the lead mines.

Q. Do you consider Jefferson's notes as accurate as the John Marshall Report and the map?

A. The description of the lead mines I guess is accurate.

Q. It is nothing like in as great detail with respect to the river, is it?

A. No.

Q. That is, the John Marshall Report is in much greater detail, is it not?

A. Yes.

Q. And the Jefferson report was not made for any public body, was it?

A. It was made for dissemination of information.

Q. The Marshall report was made on a legislative request, was it not?

A. Yes.

Q. Now, I call your attention to plaintiff's Exhibit No. 32, being the Moore & Briggs report of 1819, which is already in evidence, and which is a report of the Board of Public Works to the General Assembly of the State of Virginia. You have read that report?

A. Yes.

Q. Have you read it with care?

A. Yes.

2088 Q. Do you recall this particular passage on page 13:

"The examination, levelling and survey of which, from the mouth of Greenbrier, up to the mouth of Sinking Creek, was commenced on the 5th of the seventh month 1819.

"This is truly a noble river. Notwithstanding it was presented to us as being remarkably low, yet it afforded a superabundance of water for every purpose of internal navigation. The fall in this part of the river, considering the mountainous country it passes through, is comparatively moderate. The principal falls are, the Bull Falls, McDaniel's, Anderson's, Wylies, Neilley's, and Peter's mountain falls: None of which has ever been improved in the least degree; yet we ascended them all with our boat; though, in two or three instances, with considerable difficulty, after taking out our baggage, stores, &c. The breadth of the river from 2 to 300 yards, and the length of this section 55 miles 58 perches.

"The fall and description of each mile, and the estimates of expense for effectuating a good sluice navigation of 2 feet, at all times, are a follows:" Then it sets that forth in detail. Did you take this into consideration when you were considering the possibility of the highways in the State of Virginia?

Mr. Jackson. Objected to. The witness has not testified that he considered the possibility of highways.

A. In connection with that, I did not say anything about the surveys of these roads. At the same time they made the survey of the river, they made a survey of two roads.

Q. Why did you refer to the upsetting of the canoes in the Lewis report?

A. Do you mean in Point Pleasant?

Q. Yes.

A. It was done simply to show that they were using the water. I had no special point in the fact that they upset.

Q. Was that any more of a historical expedition, or an expedition worthy of your note, than the one by Moore & Briggs?

A. Yes. That is one of the most interesting occurrences in American history, that Point Pleasant expedition, resulting in the defeat of the Indians.

2089 Q. You spoke of two expeditions of Lewis?

A. Yes.

Q. One, you said, started from Dunkards Bottom?

A. Yes.

Q. What was the rendezvous of Lewis in that particular expedition? Who was he trying to meet?

A. The rendezvous was Fort Frederick. They were working west.

Q. Where was Fort Frederick?

A. At Dunkards Bottom.

Q. Wasn't there an expedition that went to Lewisburg?

A. That was a later expedition.

Q. How many people were in this first expedition?

A. Supposed to be a thousand, but not so many—probably six or seven hundred.

Q. They had horses?

A. Yes.

Q. Did you ever hear, back in history, of their shipping horses on the boats on the river, that they had at that time?

A. No.

Q. So, they had to go on land, didn't they, if they were going to take their horses?

A. They would not have had to take the horses if they had gone on boat.

Q. You would have to use horses in pursuing Indians, wouldn't you?

A. No.

Q. They did take the horses?

A. Yes; and they had provisions and wagons. They brought provisions there in wagons.

Q. Didn't some of the soldiers have horses, too, to use?

A. Yes.

Q. And didn't they have a great many horses?

A. I don't know how many horses, but they had horses.

Q. Did you ever hear of an expedition going down the Mississippi, by the French, or any expedition by British, in the
2090 northern waters, where they had horses and soldiers going on boats down the river?

A. I don't know that I have.

Q. You are sure you have not?

A. I do not recall an incident of that kind.

Q. This second expedition you speak of, where was it?

A. It was aiming at the Ohio—along the Ohio.

Q. Where did it start from?

A. It started from different places—different counties. Companies were made up in these counties.

Q. Where were they to meet?

A. The western division out here through the Holston Valley, and the New River volunteers were to meet at William Thompson's.

Q. Then where were they to go?

A. To proceed down the river towards the Ohio to meet Lord Dunmore.

Q. Where would they meet him?

A. They didn't know. Dunmore had proceeded north.

Q. As a matter of fact, he came from the north, didn't he?

A. Yes.

Q. Isn't it a historical fact that they were to meet at Lewisburg?

A. I don't know that.

Q. And didn't they meet at Lewisburg?

A. The Botetourt troops and Augusta troops met at Lewisburg.

Q. And they all had to cross the river, didn't they, and go up towards Lewisburg to meet Lord Dunmore?

A. Yes; that was Camp Union. It was a get-together at Camp Union. It was the natural way to travel.

Q. They could not get there by going down the river?

A. Not to Camp Union, but they could have come down the Ohio.

Q. I am asking you if it is not a fact that they did meet at Lewisburg?

A. Botetourt addressed the troops, and the camp at Lewisburg was called Camp Union.

Q. I am asking about Lewis' troops: Didn't they cross the river and go to Lewisburg?

A. Lewis' troops were never on the west side of the river. They were from here and from Botetourt and Bedford.

2091 Q. So that expedition was on the east side of the river, wasn't it?

A. Except the western counties. Christian's men were on the west side.

Q. Let us see if we can get this straight.

A. William Christian had the men from Holston and Clinch and the upper New River.

Q. You get beyond my depth when you begin to speak of Holston.

A. That is in Tennessee.

Q. That is in Tennessee?

A. The head is in Virginia, in the Counties of Smith and Washington.

Q. About where is Lewisburg?

A. It is down here [referring to the map].

Q. Now, take the Lewis troops; where did they start from?

A. They started from here and Fincastle and Botetourt and Bedford.

Q. You mean Roanoke?

A. Yes.

Q. Roanoke is over 40 or 50 miles from New River, to the right, isn't it?

A. Not quite.

Q. So there would not have been any point in their going down New River?

A. No, sir.

Q. So they went practically straight north to Lewisburg?

A. They went like this [pointing on the map].

Q. When they got to Lewisburg, there would not have been any point in coming to New River?

A. They went down the Gauley River.

Q. So what they did was to go down the Gauley River?

A. Yes, sir.

Q. Then they came to Kelley's Creek?

A. Yes, sir.

Q. Which, I suppose, is a short distance below Kanawha Falls?

A. Right there [indicating on map].

Q. There would not have been any point in their going on the river, would there?

A. Certainly not.

2092 Q. Now, then, I would like you to show the Court from this map where this main highway that you have spoken of was constructed, where it was located—that is, this highway that went from, I believe let us say Salem to Wytheville. Now, will you give us a line on that as to where that is?

A. Here is Reed Creek; Wytheville is not all the way up, but a little more than half the way up Reed Creek. Here is the direction [pointing at map]. Here is Radford, and it came towards Newbern, and this is Peak Creek. Ingles Ferry is a little above.

Q. So you are pointing in a direction on the map almost directly east, are you not, with respect to New River?

A. Northeast.

Q. When you get to New River, you cross what was known as Ingles Ferry?

A. Yes.

Q. Then, from there, where did you go?

A. To Salem.

Q. And Salem is directly east, is it not, from New River?

A. Yes.

Q. And about 30 miles, or something like that?

A. Yes.

Q. So there would not have been any point there in going up and down the river, would there?

A. No.

Q. Now, let us take the next one that you gave us.

A. Toms Creek Crossing and Peppers Ferry?

Q. That is right.

A. Just another crossing lower down. Blacksburg is here [indicating on map].

Q. Your pointer is pointing at a place directly east of the river and almost and a little north of where Peppers Ferry would be?

A. Yes. At that point the road came up the north fork of Roanoke.

2093 Q. That is from the east?

A. Yes; and another came from Catawba, this way [indicating]. They joined there, and one trail came up the point there, Lovers Leap. They struck the river at the mouth of Toms Creek.

Q. And Toms Creek is a short distance below Peppers Ferry?

A. Yes.

Q. Four or five miles distant?

A. Yes. That road divides at Price's Fork.

Q. So, when you approach on this road, you approach diagonally to the river?

A. Yes.

Q. In fact, every one of the roads or crossings which you have described as approaching from east to west were in a diagonal line?

A. That is all I was trying to do, was to show where the road crosses the river.

Q. There would not be any point in going up and down the river when you crossed the river?

A. No.

Q. You spoke of General Austin leaving this country and going down to Texas?

A. Yes.

Q. He was up, as I understand, at Austinville?

A. Yes; at the Lead Mines.

Q. Tell us in what direction he went?

A. He doesn't tell which road he went. He went down on this side by Christiansburg, or on this side, and got on this Newbern road, down Walker's Creek, and, in that case, he would have come into the Narrows and Glen Lyn. That road comes like this [indicating on map].

Q. In other words, that road is, in a sense, parallel to New River?

A. Yes. He would have gone down there and gone on to Gauley.

Q. How far is that road, approximately, from New River, that you spoke of?

A. I think the mouth of Neck Creek is here. What is this up here?

Q. Walker's Creek.

2094 A. Here is Neck Creek and Back Creek. I would say the road at Cloyd's starts off at Dublin, and it is about five miles. Newbern is pretty close to the river.

Q. It comes to Newbern?

A. It then turns to the left.

Q. That is several miles back?

A. Yes, sir.

Q. Now where did that road you speak of cross New River, about the Narrows?

A. It crossed at Pearisburg and went over Peters Mountain or through the Narrows, and up Rich Creek.

Q. And then they crossed on the right hand side of the river going down?

A. But also a road that went down the left side, down to Glen Lyn, a road there yet.

Q. You don't know which side of the river they went?

A. No, I don't. I don't think that came out in the report. They left Captain Thompson and went down Rich Creek, and when they got there it looked like it was necessary to cross at Narrows. A letter in there from William Christian at Rich Creek, telling how they were getting along, said the mouth of Rich Creek, and then they went on up by Union.

By Mr. Jackson:

Q. Is this the Austin trip?

A. I was talking about the road.

By Mr. Thompson:

Q. As I understand you say you don't know which side of the river Austin went?

A. No, sir.

Q. Did you make an investigation of the Statutes of the State of Virginia with respect to New River?

A. With respect to the general settlement of Southwest Virginia. I used Henning's Statutes pretty freely.

Q. Did that include the James River?

A. Sure.

Q. Did you make a thorough study of the history of James River?

A. Yes, sir; I began with the development of the settlers on James River.

2095 Q. Did you read the legislation by the Act of February 24, 1923, providing for a canal and a road, from upper navigation on the James to the upper navigation on the Kanawha, with power in the Commissioner to erect dams and reservoirs for feeders for the canal?

By Mr. **Jackson**. May I interrupt a moment? If you want the witness to have sent in the Austin papers I will have to ask leave for him to telephone, because Mrs. Kegley is on the phone and reports she doesn't find them, and wants some further instruction if she is to locate them.

By the **Court**. I think he could go to the phone.

By Mr. **Thompson**. I don't think we will need them now.

By Mr. **Jackson**. That also applies to the Morses Universal Geography, 1882.

By Mr. **Thompson**. I don't think we need those.

A. That was the quotation, practically the same.

Q. Did you read the Act of March 8, 1824, providing for further surveys for the Canal Route?

A. I think so.

Q. And the Act of January 24, 1827, ordering surveys for a canal between the Roanoke and New River?

A. Yes, sir; I have.

Q. Did you read the Act of March 19, 1838, authorizing a bridge across New River on Price's turnpike to Cumberland Gap, reserving the right to improve the navigation of said river in any manner that was deemed advisable?

A. I don't recall that Price's turnpike—say that was 1838?

Q. Yes.

A. That is when that turnpike was authorized by Blacksburg.

Q. Did you read the Act of March 16, 1850, where the New River Manufacturing Company was incorporated?

A. I have read that.

Q. You read that.

A. Yes, sir.

Q. In Pulaski County?

A. Yes, sir.

Q. Did you read the Act of March 2, 1853, appropriating money and making loan to the James River and Kanawha Company, and requiring the company to define "the action to be taken by such company in the location of their water line from or near Covington or Clifton Forge to the Ohio River?"

A. Yes, sir.

Q. Going back to the Act of March 16, 1850, did you read Chapter 62 of the Code of 1849 making unlawful any dam obstructing 2096 navigation, and providing for the obtaining of authority of the Court of the County on condition that the dam be constructed in such manner as to improve navigation?

A. No; I didn't read that.

By Mr. JACKSON. I object because irrelevant and immaterial, and not proper cross-examination.

Q. Did you read the Act of March 5, 1856, Incorporating the New River Navigation Company "for opening and improving the navigation of New River from the Central Depot of the Virginia and Tennessee Railroad to the Wythe lead mines in the County of Wythe?"

A. I think I have.

Q. Did you read the Act of January 29, 1858, Incorporating the New River Navigation Company, which gave authority for the improvement of New River with power "to do whatever may be necessary to effect the improvement" and with "the privilege of renting, selling, or using any water power or other advantage."

By Mr. JACKSON. Objected to as irrelevant and immaterial, and not proper cross-examination.

By Mr. THOMPSON. Have you read the Act of January 15, 1802, reserving to the State from all patents issued by the State the ownership of the bed of this stream, and of others in the western part of the Commonwealth?

A. Yes, sir.

By Mr. JACKSON. I am objecting, but Mr. Thompson is characterizing statutes as to what they mean. If relevant, we assume they will be as they stand on the statute books—it is his characterization.

By Mr. THOMPSON. If counsel objects to that, we can send and get the books. We have them all here, I think.

By Mr. JACKSON. I merely say I don't concede the correctness of your characterizations.

By Mr. THOMPSON:

Q. Have you read the Act of December 18, 1861, Laws of the State of Virginia, 1861–62, page 72, appropriating $30,000 for adoption of such measures as might be necessary to remove the obstructions to the navigation of said stream by sluice, in such manner as would accomodate the transfer of military stores in bateaux from some point near the Central Depot on the Virginia and Tennessee railroad to the mouth of the Greenbrier River; have you read that?

A. Yes, sir. I might add that most of my later connection, that is my information or reading in regard to it, came in connection with a study of the transportation facilities for old Lynchburg in connection with an article I was asked to prepare for the Sesquicentennial celebration, travel on the canal and old stage routes, etc., that was my contact with those.

Q. In this history of the Middle New River Settlements by David Johnson, to which you referred, did you note in that document there is a reference to a Salling trip made down the river in 1730?

A. No; I don't recall it.

2097 Q. You don't recall it—have you got the book here?

A. I have the journal.

Q. The history of New River Settlements by David Johnson—also a trip made in 1742 by Salling, St. Clair, and Hinds?

A. No; I don't.

Q. Also an expedition in 1748 by Thomas Walker and Col. James Patton on New River?

By Mr. JACKSON. I object to the question. If you are going to ask the witness if that is shown in the book you had better show it to him in the book.

A. I am acquainted with Walker's; yes, sir.

Q. What was his trip?

A. A trip of exploration, two trips rather to the southwest.

Q. Were they on New River?

A. They crossed New River.

Q. Did he go down New River?

A. I don't know he did. He didn't say he did.

Q. All it does say is he crossed New River.

A. He was working to the southwest, went on to the Holston, Clinch, and to Kentucky.

Q. I believe you quoted from Jefferson's notes on the State of Virginia, published in 1787?

A. Yes, sir.

Q. Did you quote this part of that statement of his: "Yet it is the opinion that they may be laid open for useful navigation so as to reduce very much the portage between the Kanawha and James River?"

A. Yes; I did.

Q. Did you read that here?

A. Yes; I did.

Q. I believe you said you read the history of Summers?

A. Yes, sir.

Q. Do you consider it a fairly accurate history?

A. As far as I know. I have not had occasion to check on it.

Q. That main highway you spoke about that came from the east and crossed at Ingles Ferry, there was a bridge across the river, wasn't there?

2098 A. At one time.

Q. And that bridge was there before the Civil War?

A. Yes, sir.

Q. That bridge was destroyed during the Civil War?

A. Yes, sir.

Q. And subsequently a bridge was built a little farther down?

A. Been bridges farther down, and a bridge there now.

Q. So traffic going back and forth across that river went across the bridge, did it not?

A. It did while I was there I presume.

Q. Wasn't there a bridge built at Pepper's Ferry before the War?

A. I understand there was.

Q. Do you know what happened to it?

A. No.

Q. Washed away, wasn't it, by a flood?

A. No sign of a bridge there now.

Q. I believe you said you examined a number of deeds in various counties?

A. Quite a number of them.

Q. What counties did you examine deeds in?

A. My study began with [interrupted].

Q. Along New River let us say.

A. Of course you have to go back even to Orange, Augusta, Botetourt, Fincastle, Montgomery, and Wythe.

Q. What was the purpose of your investigation of those deeds?

A. To understand and locate the early settlements. I made a specialty of that, the land grants, people to whom grants were made, and the location of the roads; that has been my interest, the most careful part of the work. I began with the settlement of Borden's tract, that is the upper part of Rockbridge County, a little this side of Lexington.

Q. That was too far away from the river.

A. That was my beginning of investigation of land grants, and I worked it from there west practically from Lexington, west to Bristol, the early part I have a great deal of that mapped out, the actual land, the whole neighborhood.

By Mr. **Thompson**. We rest so far as the cross examination is concerned, but we would like the opportunity to examine these books, and if we find something we think important, to have the right to recall this witness for further cross examination.

By the **Court**. What books?

By Mr. **Thompson**. The books from which he has quoted.

By Mr. **Jackson**. The books are here available, and we would have the other two only counsel said they didn't want them.

Note.—Whereupon the following books were handed to counsel for the Government: First Explorations of the Trans-Allegheny Region—Alvord & Bidgood; The Virginia Magazine of History and Biography, April 1922; Notes of Virginia, by Thomas Jeffer-

son; Johnston's Indian Narrative; Virginia Historical Collection, Vol. III and IV, inc. Denwiddie Papers, Vol. I & II; Annals of Augusta County, By Waddel; Wisconsin Historical Publi-
2099 cation, Preston and Virginia papers. on redirect examination, testified as follows:

Q. Counsel for the Government asked you about a trip by Sallings or Sally in 1742, which he said was mentioned in Middle New River Settlement by Johnston. Is not that the Sallings trip about which you testified and quoted from his journal?

A. I think so.

Q. That was 1742, was it not?

A. Yes, sir.

Q. Counsel also asked you whether or not Sallings made a trip down New River in 1730, and I direct your attention to page 230 "Trans-Allegheny Pioneers" and ask if that refreshes your recollection as to whether Sallings made a trip in 1730, or merely crossed the river?

A. Sallings came from Germany in the year 1732, came to Virginia from Pennsylvania, near Balcony Falls, got his first land in 1740, and lived there as a reputable citizen and died there, and he is the only man that is placed on Fry and Jefferson's map.

By Mr. Thompson:

Q. That is not responsive to the question.

A. This 1730 can't be right, he was not in Virginia at that time.

Q. Then you are contradicting the book?

A. I am contradicting that date, 1730, that perhaps was picked up, I don't know, but Sallings wasn't in Virginia at that time.

Q. Are the other dates correct?

A. There might be others, but I happen to know that.

Q. Regardless of the error in the date, down the river or across it?

A. The same trip——

Q. I think the book says.

A. It says "John Sallings was captured on James River, crossed New River. He was probably the first white man to cross it."

By Mr. Jackson:

Q. You were asked about a trip by Walker about 1758.

A. Thomas Walker and party crossed New River.

Q. Was that merely across or down New River?

A. His destination was Holston and Clinch. He didn't talk about going down New River.

2100 Q. Do you remember if he traveled by horse?

A. By horse.

Q. Do you remember anything in the historical accounts about him swimming New River?

A He jumped ~~his horse in New River and~~ didn't look for the ford—said he jumped the horse into the river and swam across.

Q. In your cross-examination something was said about the expedition of 1774, having horses and hence not being able to travel by water. Did the expedition of 1774 travel by water after it reached the Elk River on the Kanawha?

A. Apparently it did, in part at least.

Q. Some discussion about where these various units or companies or troops started from on that expedition, and you said the Western Division was at the Cloyd plantation. How far was that from New River?

A. I presume about five miles.

Q. Can you point out on the map about where it was on New River? How high above the river?

A. Above Eggleston and Little Neck Creek, comes in about here [indicating on map], they both drain rich valleys there, very early settlers there, and this Horse Shoe Bottom was a very fine tract of land, and another up here on Neck Creek, two brothers settled at these places, and Col. Cloyd lived on Back Creek, and the very earliest maps we have shown roads leading from there, crossing Pepper's Ferry, Ingles' Ferry, traveling in that direction. The map of 1820, the Woods map, made by the English surveyor, with a view of making a state map of the counties, the first state map made, shows that distinctly, these cross roads from Ingles Ferry to Col. Cloyd's, they formed a funnel effect for travelers starting north in case they wanted to go down the river.

By Mr. Thompson:

Q. That was about five miles back?

A. I think it was.

By Mr. Jackson:

Q. Mr. Kegley, you were asked about how close the road from Wytheville down New River ran to the river. Can you tell me how close the road is to the river at Draper?

2101 A. Newburn was pretty close to the river and Draper was close.

Q. How far would you say?

A. Well, the river bends at Delton, but I don't think it is more than two or three miles.

Q. How close to Mac Adams?

A. Unless there is a bend, I would think it is further than that. I never examined that particular road.

Q. Mr. Kegley, on cross examination counsel developed that the history which you were writing and which you said was now in the hands of the printers, was being published as a result, or at least it was accompanied by a subscription list for the book. Will you state whether or not the subscribers to this book or for this history, are among some of the colleges and universities of this country?

A. In that respect, the Southwestern Historical Society issued the prospectus giving an outline of it.

Q. All I want you to tell me is whether any of the subscribers to the history are universities and colleges?

A. They are, many of them. I think Mr. Turner told me he had 75.

Q. Can you name some of them?

A. From Universities in the north, east, south, and west.

Q. Name a few?

A. Boston and New York, Virginia and Kentucky—there are quite a number of subscribers from Kentucky, from Historians. The Filson Club, the most exclusive historical association in the Mississippi Valley, and some in Illinois, but I cannot be absolutely accurate about that now.

Q. Any in Michigan and Wisconsin?

A. Yes, sir; the Historical Library in Detroit, the University of Wisconsin, and the Wisconsin people have been mighty good to me in this matter, they have gone to a lot of trouble to photostat things and send me what I want. I have John Buchanan's journal, describing a trip out here to take possession of this country and make land entries, etc. Practically all of the original papers that we have, have come in one way or another.

2102 The witness on re-cross examination, testified as follows:

Q. Has any one of these colleges or universities seen your history?

A. They only have a prospectus.

Q. You spoke about Boston. What institution in Boston were you referring to?

A. The Library.

Q. Do you mean the library or University. I thought counsel asked you about Colleges and Universities.

By Mr. **Thompson**:

Q. Now in New York, what University or college?

A. I cannot be as positive about those subscriptions as I would like to be because I have only incidentally seen them.

Q. And all they have seen is the prospectus?

A. Yes, sir.

Q. You spoke about the Walker expedition. And you gave a description, as I understood it, in your cross-examination of probably a thousand men that were in the expedition.

A. The Walker expedition?

Q. Or was it the Lewis expedition? Counsel asked you when you got down to the place on Kanawha River, at Kelly's Creek, and I want to ask you if it is not a fact that the party that went down the Ohio was a very small part of the expedition?

A. Yes, sir; it was proportionately a small part of the number I presume, but there is no way to tell exactly how many took to the water. They were floating provisions there, and the main thing, I think, was to handle that.

Q. Now you were speaking of this expedition of Salley, and you referred to the history of the Middle New River settlements, by Johnston, as a very authoritative document.

A. Yes, sir.

Q. Would you mind reading the last paragraph on page 8 into the record?

A. "So far as known between the date of the discovery of this River by Col. Woods and Captain Henry Batte in 1666, Thomas Batte and party in 1671, John Salling, who was captured by the Indians, and carried over the river to the west thereof in
2103 1730, Salley, Howard, and St. Clair in 1742, Dr. Thomas Walker, and his party, in 1748-50, are the only white men that had seen or crossed New River, or penetrated this vast wilderness country prior to 1748, unless it were the three men whose names are hereinafter mentioned.

Do you want any comment on that?

Q. No.

A. That 1730 is presumably taken from that other book. Salling was not in Virginia at that time.

2104 E. C. GANNAWAY, on Direct Examination testified as follows:

I am 70 years old, live at Draper and was born in Speedwell, Wythe County. I lived there 14 years. I then moved to Delton, in Pulaski County, that was in the year 1880. I lived in Delton until 1886. I was at Delton constantly during that time, practically all the time. I was at school part of the time, in 1882 and 1883. I went to school at Trinity College, at Durham, N. C.

I knew Reese Tipton well. Mr. Tipton was not a relative of mine. He lived at the Boom Furnace, or Reed Island Iron Company. That's on Reed Island, but it was in the vicinity of Delton.

I observed some boating on New River when I lived at Delton. In 1881 there was some boating on New River. I don't think it lasted more than 8 or 9 months. I am positive. They were boating pig iron. I can remember two boatmen that were engaged in that work, who afterwards worked for my father. Clave Lawson, a white man and John Thomas Bland, a negro. The iron they were boating was loaded at Allisonia, at the mouth of Reed Island, or two Reed Islands, where they ran together there. I only saw five boats. I remember five different boats. I don't know whether there was any more than that or not.

Prior to the time the iron was boated on the river, it was hauled away from Reed Island Furnace by mule teams, to Dublin and Pulaski. The teams going to Dublin came by my house. They did not come by my house going to Pulaski. After the boating ceased, they put the teams back on again, the mule teams. The iron was hauled to both Pulaski and Dublin. That was prior to the building of the railroad or the putting in operation of the railroad to Foster Falls. The railroad did not go to Foster Falls until 1886. That railroad is called the North Carolina Extension, but at that time it was the Cripple Creek Railroad and it belongs to the Norfolk and Western.

I left Delton in October 1886, and went to Draper. No portions of that railroad, between Pulaski and Foster Falls 2105 were put in operation prior to opening up the entire railroad in 1886 to Foster Falls. They didn't haul any freight. They ran work-trains and things like that, but no freight was hauled.

I never went to the Macks Creek Furnace or the Radford Furnace when it was in operation. I don't know anything about that at all.

I do not remember any other boatmen that were on those boats, except those two men, and the way I happened to know them was they worked for my father after those boats were discontinued. I probably knew John Knode, but I don't know anything about him working on the boats or anything of that kind. I think I knew him. I knew Campbell Beverley. He is living yet. I do not know whether he had anything to do with this boating. I don't think he did, I am not sure about that. I knew Bud Whitt. I don't know whether he had anything to do with boating, or not. He used to run a ferry below my place.

The witness on Cross Examination testified as follows:

I was 16 years old when I moved to Delton. I entered Trinity College when I was nearly 15 years old, but when I entered Trinity I was living at Speedwell. I attended Trinity College for three years, I entered in 1880, and was there through 1883, that is, during the school session but I was at home three or four months of the year. I went to Trinity in September and remained there, with the exception of my vacations, until the first of June. I was only on New River from June to September during those three years.

I would say Reed Island Furnace is about 18 or 20 miles up New River, from New River Depot. I lived about seven miles from the furnace. I lived about a quarter of a mile or something

like that from New River. The iron was loaded into the boats that went down to New River Depot, at the mouth of Reed Island and at Allisonia. I think they were loaded at both places. These loading places were about five miles from my home. I
was not down at the loading place at all, where they
2106 loaded the iron. Of course, I would pass by there, and
I saw iron piled up there, and they loaded it on the boats there. I did not work or have any business with the Reed Island Furnace. No member of my family has ever worked for or had any business connections with the furnace.

Q. And all you know about their operations is what you either observed from being in the locality or from what you have heard someone else say?

A. I saw the iron myself.

Q. You were not in a position to state from general observation very much about when those shipments were made, or how much was shipped?

A. No, sir.

I was not there when the Government's Channel improvements, from New River Depot up to Allisonia, and beyond, were done. I know what my father told me when the Channel was made there and that a certain amount of money was appropriated by the Government to do this work. I moved to Delton in 1880.
8 As far as I know at that time all the Channel improvements
that were ever made on New River by the Government, were completed. I never saw any of it. I never saw them working at the Channel at all. I am not able to tell when the Channel was completed.

All the pig iron which was shipped from Reed Island Furnace by boat, was shipped in the year 1881 or in the spring of 1882. I saw no boats after I came home from Trinity in June 1882. I know that the teams were put back in 1882 and there were not more keel bottom boats on the river. If I had been at home I would not have been in a position to see the boats every day. When I was at Trinity I would not be on the river once every nine months. The school held for nine months. I did not know what was going on on the river while I was at Trinity, that would include the same period from 1881, 1882 and 1883. There were not boats running during my vacation in 1883. Of my own knowledge these boats were transporting pig iron on New River, in the summer of 1881, that would be the positive time.
During that period they dispensed with all hauling by
2107 teams. I don't think there was a team hauling into Dub-
lin. There may have been some teams running into Pulaski. I am not sure whether practically all of the iron hauled by wagon from Reed Island Furnace went to Dublin, because if

anything, it was a little nearer to Pulaski. I think the hauling was pretty well divided. I know of no reasons why teams would have been hauling to Pulaski and not hauling to Dublin, except they started grading the railroad, and after the railroad started to grade, the roads to Dublin were in terrible condition, because they hauled all of the supplies for that road, but they did not start until 1883, I believe.

As far as I know, while boats were hauling to New River Depot, there was no transportation by wagons from Reed Island. I don't know what they did with the teams. The furnace company owned the bateaux or keel bottom boats. I don't remember seeing a team hauling iron while they were hauling by boat—not during that time. I did not see any teams doing anything else in connection with the furnace. They might have been hauling charcoal too. No, I don't believe they hauled any charcoal from my section. They got the charcoal, after the railroad was started, they loaded it at Draper. They loaded coal for a long time at Draper, that was in 1886.

There was no transportation of pig iron by the railway, on the Cripple Creek Division of the Norfolk and Western until after 1886. There was no transportation of any kind of freight until the train ran to Foster Falls, except for the benefit of the contractor and some work trains. I recall when they constructed the bridge over Reed Island Creek and the bridge at Hiawassa on the Cripple Creek Division. That was before they got to Foster Falls; it must have been 1884 or 1885. I was there at the bridge that crossed the river. I drove a team after I came from college. I hauled for Mills & Fairfax, the contractors. I think they were putting in the abutments at that time. I do not remember seeing them transport stone from Howards Quarry to the bridge. I paid no attention to any work except from the bridge down this way.

I know very little about transportation on New River by boat. Just what I told you is all I know. I do not know anything about logging operations and timber operations on New River, in that vicinity.

2108 The witness, on Redirect Examination, testified as follows:

Delton is a mile this side of the Hiawassa bridge, across the New River, that is, on the north side about a mile down the river from the bridge. It is one mile down the river from the bridge. I didn't live over a quarter of a mile from the river. My house was not in plain view of the river, there was a hill between my house and the river. Part of the hill belonged to my father and part of it to Mr. Nunn. My father also owned property down toward the river. Lawson and Bland worked for us during the time they were grading the railroad, and that was in 1884, I guess. Prior to that time they had been boatmen.

I went home in the summer of 1882. I got out of college about the first to the fifth of June each year, and I came straight home after commencement. I would go back to school about the middle of September. I did not come home for Christmas at any time while I was down there. I saw no boating of iron on the river in the summer of 1882. I was at the river during my vacation. I spent a good deal of time at the river fishing and swimming, like a boy does in the summer time, I spent a large part of my time there. When I was home I worked on the farm, and did work for those contractors, some, in the meantime.

The witness, on Recross Examination, testified as follows:

The furnace was running in the summer of 1882, it ran practically all the time, except when they closed down for repairs. I did not keep in close touch with the situation around the furnace. All I know is that it was running. I never did see the plant at Macks Creek Furnace. I never was there, until that furnace was practically pulled down. I don't think the Boom furnace was larger than the Macks Creek Furnace. All of those furnaces were practically the same size.

2109 N. B. HARVEY, on Direct Examination, testified as follows:

I will be 72 years old the last day of this month. I was born in Montgomery County, at Meadow Creek. I lived there until I was 23 years old. From there I moved up near Christiansburg on the Fultz place, 6 miles above Christiansburg. I lived there about one year, and then moved to Radford. I lived at Radford about 2 years. I then moved to Crumps Bottom, and lived there 2 winters and one summer, about 18 months. When I left Crumps Botton I went back to Meadow Creek in Montgomery County and lived there 5 years. I moved to my present farm at Werno, in Pulaski County, in November or October 1909.

I knew Col. John Crockett. I became acquainted with him in Radford, I believe in 1893. He was in the real estate business and I rented his farm in West Virginia. I moved to his farm in Crumps Bottom, in Summers County, by wagons from Radford in October, 1893. The farm is on New River. I rented his farm at Crumps Bottom that winter and the next summer and the next winter. Mr. Matthews was there when I moved to Crumps Bottom. He had it rented before I went there. Mr. Matthews moved away from there by wagon to a farm in Giles County. I helped him move. When I moved from Crumps Bottom back to Meadow Creek, I moved by wagons.

While I was living at Crumps Bottom I now and then observed boating on New River. I saw different kinds of boats on the river. Sometimes somebody would come along in a skiff, and somebody would come along in what you called a keel bottom—a great big boat—40 or 50 feet long. I didn't see in the boats, but looking at them, some of them were hauling potatoes, apples, or corn and things like that. I saw it now and then. When the river was up—had a tide, you would see them, and when it was down, you didn't see them. I had occasion to make use of boats some, not very much, while I was down there. I customarily went to the market to take my produce with a wagon and got the supplies home the same way; took down something and brought back what we wanted in the wagon.

2110 Q. Did you ever make use of the boats?

A. Yes, sir; sometimes.

Q. Do you remember whose boat you used?

A. I don't remember who the boat belonged to, but I used to make arrangements with Mr. Meadows at the Salt Works.

Q. What did Mr. Meadows do there at the Salt Works?

A. He run a grocery store.

Q. Was that the same store that Mr. Peters ran?

A. If Mr. Peters ran it, I don't know anything about it.

Q. It was the same store at the place there?

A. Since you mentioned the name Peters, I think he owned the boat kept there.

Q. You made arrangements with Mr. Meadows, did you?

A. Whenever I wanted anything took down, I would go to see him.

Q. Did he take things down which you would have to have taken on the boat?

A. When the river was so they could; yes, sir.

Q. Was that a condition in your agreement with him?

A. Yes, sir.

Q. What do you mean when you say "when the river was so that he could"?

A. When they had a tide.

Q. Did you ever engage him to haul anything for you and he failed because the river was not in condition to do so?

A. Yes, sir. I sold my lease and I had four or five thousand bushels of corn, and I went back in July and August and shelled the corn and I went to Hinton and sold it up there to be delivered at a certain time, and I went and saw this man about his boat and asked him about hauling it for me—And I asked him to haul it down there, and he said, "I will haul it if the river is so I can." I agreed to take the corn there at a certain time, and, when he didn't come, I took it in the wagon. I hitched up the mules and took it in the wagon.

2111 Q. You made an engagement with him to haul the corn at a certain time and he did not appear?

A. The river was so he could not haul it and I took it with the mules.

I didn't see many different boats on the river—many different boats, going up and down the river by Crumps Bottom, while I was there. I think most of them was just one boat that I saw when the river was up—would go down and maybe come back. I judged that it was the boat I would rent from Mr. Meadows. It might have been a different boat, but I judged from the people and the way it looked, that it was the same boat.

The occasion for my moving away from Crumps Bottom, was that Col. Crockett's house burned down in Radford, and he wanted to come back to Crumps Bottom, and he came and asked me what would I take to leave, and I told him, and he gave it to me. The salt works that I talked about, was Mercers Salt Works at Lick Creek.

The witness, on Cross-Examination, testified as follows:

I will be 72 years old the last day of August. I am the brother of Lewis W. Harvey, who testified in this case for the Government. I was born at Meadow Creek, in Montgomery County. It is south of Radford. Meadow Creek does not run into New River, it runs into Little River about two miles from the mouth of Little River.

I lived in Montgomery County about 23 years, on what was known as Meadow Creek. I couldn't see New River from there. I was often on New River: I had two sisters, one on one side and one on the other. I stayed one winter with them there. They lived at Ingles Ferry. During those 23 years my brother Lewis was there with me, as boys we worked on the farm and played together. We made some trips together. I was not with my brother all the time and couldn't say that whatever he saw I would see, but I was with him a fair enough portion of the time.

After the 23 years I went to Fultz place, which is 5 or 6 miles west of Christiansburg. That is away off from New

2112 River, not far off, but farther than I was before. I lived there about two years. I then went to Radford and lived there 18 months or two years. I then left Radford and went back to the farm on Meadow Creek. I was then about 25 or 26 years old. I stayed there about 5 years. I then left that farm at Meadow Creek and went to Crumps Bottom, to another farm. I stayed at Crumps Bottom about 18 months. I had my own team to move, but I had to hire others to help me. I had 6 or 8 horses. I stayed 18 months at Crumps Bottom and then went back to Meadow Creek on the farm. I moved back that time

y own teams and didn't hire any others. After I came
rom Crumps Bottom, I lived at Meadow Creek about 4
ears. I then moved to a place known as Dry Valley, in
omery County, between where I lived and Radford. It
ser to New River; it would not be more than one mile
t across. I couldn't see the river from there. I stayed
Valley for 13 years. I then moved to my present resi-
t Werno, in Pulaski County. I have lived at my present
ce for 27 years; I moved there in 1909.
e no relation or connection with the Appalachian Electric
Company. There is an attorney for the Appalachian Elec-
wer Co., who has been my attorney. He is Mr. Draper. I
nployed him in some law cases. He has been my attorney
an once. He has been my counsel ever since I have been up
for 27 years. He is still my counsel.
ved to Crumps Bottom—I don't know whether it was the
rt of November or the last part of October, but along there,
. I left there in the spring of 1895, in April. I was at
s Bottom all the summer of 1894 and part of the spring of
The farm is alongside of the river. I could see any boating
river there; when a boat passed up and down, if I was
, I could see it. I had a pretty bad road from Crumps Bot-
Hinton. It was 16 miles from Crumps Bottom to Hinton.
nd you used a wagon some and a boat some?
es, sir.
know you are trying to give me your best recollection:
ou undertake to say what proportion of the time you used
boat and what proportion of the time you used wagons?
A. Used wagons right much—most of the time.
Q. What times of the year did you use a boat?
Vhenever I wanted it, if I could get it.
Vhen you could get it, you used it?
es, sir.
ou found the boat preferable, did you?
he boat would take three or 400 bushels of corn or wheat
you had a team, it could not take so much.
Vhat did the boat carry for you?
carried corn.
id it carry wheat?
o, sir; I raised wheat, but it was not any account. I could
it and so I ground it up and fed it to the hogs.
Vhat did you raise for the boat to carry?
orn.
that all?
hey carried one load of apples for me, once.

Q. And you say about 400 pounds in weight it would carry?

A. It was 400 bushels of corn, not pounds.

Q. What would the wagons carry?

A. It depends on whose wagons and horses it was.

Q. It depended on the size of the wagon?

A. I hauled 110 bushels one time.

In case of bad weather, you could haul on a wagon, if you had team enough; you could move anything you had on it. You had to put on more horses.

With a good tide, the boat could go from Crumps Bottom, selling my stuff, to Hinton, in four hours.

I saw boats going up and down the river. I didn't know whether it was the same boat or several boats. It was a long boat, 40 or 50 feet long. Some called them keel bottom boats. One of them had 15 men on it. Most of the men were sitting down, but coming back they were all working. I judged the material I saw on the boats to be potatoes and apples, depending on the season.

2114 Q. During the period that you lived on Crump's Bottom, you saw boats carrying produce?

A. At different times of the year.

Q. You mean in the spring, summer, fall, and winter?

A. Yes, sir.

When the boats came back they looked like they were empty to me, if anything was in them, it was so little I couldn't tell it.

I did not have a store at Crump's Bottom. The landing place that shipped my stuff, was right in the front of the house. The boats did not stop there generally, not unless you stopped them. The boats had no bugle or horn on them. I heard them blow a bugle, but I thought they were just playing; that was not a common thing. I had a contract with a man named Meadows, a white man, I forget his first name.

Q. And your contract with him was that—what was it?

A. I don't know. I just got him to take what I had. I don't know what the contract was.

Q. Tell what you remember about it?

A. I don't remember anything about it, only I asked him to take stuff for me, and if the river was so he could, he would carry it; if not, he could not do it.

It was a verbal contract. It was as good as any other contract. Mr. Meadows lived in the building where he had his store, at the Mercers Salt Works. Way back in war-times, salt was produced there, but not when I was there. The store was right on the bank of New River. He didn't have a boat, ~~someone else~~ had the boat, and he was sort of the in-between man. He would negotiate with me for the boat. I couldn't tell who had the boat. He, Mr. Meadows, was a sort of broker, and did not run the boat himself.

Q. Over how long a period did you have this agreement with him or contract, with Mr. Meadows, or whatever his name was, to handle your produce by boat?

2115 A. I just know when I had a load of something, I would ask him——

Q. (Interrupting.) You do not understand the question. Over how long a time did that run, for the summer or for a year or what time?

A. Just for a day. If I had something to go to Hinton today, I would go to him about it.

Q. I understand that—you had a right to go to him. But did that agreement between you and him to haul this stuff continue while you were at Crump's Bottom, during all the time you were there, you could get the boat?

A. No, sir; not unless he wanted me to have it.

Q. Assuming that he wanted you to get it, you could get it?

A. They kept it for hire, yes, sir.

Q. Did anybody else hire the boat?

A. I don't know.

Q. Other people lived there, did they?

A. Yes, sir. I don't know about that.

Q. What did he haul for you?

A. The only thing he hauled for me was apples and corn.

Q. How many miles above Hinton was your farm?

A. Sixteen miles.

Q. He had to pass over Bull Falls, did he?

A. Yes, sir.

Q. And he did pass over Bull Falls?

A. Yes, sir.

I had a crop of corn in 1894, but he hauled it for me in 1895. I cribbed it up in the winter and hauled it in the spring. I don't think he hauled anything for me in 1894, maybe he hauled a load of apples. The whole farm which I had at Crumps Bottom had 1,600 acres, but it took in some mountains. I had the whole Bottom. A lot of people lived back in the mountains but they
2116 had nothing to ship. I had about 400 acres of bottom land
and was the only one on the Bottom. My corn crop was about 200 acres. I reckon I made about 40 bushels to the acre, and I had 200 acres. I had a big crop.

I moved away in the spring of 1895, and never lived in Crumps Bottom again. I suppose Mr. Meadows was still there with his boat. While I was there, he used the same boat, I think. I cannot recall his changing boats. As far as I know he had the one boat when he made the 16 mile trip to Hinton. I think he used the same boat when he went down and back through Bull Falls, for that period of 18 months. I knew Squire Peters, I forget where, I couldn't tell you where he lived. He might have owned a store above there, I don't know. I don't know that he had a fleet of boats on the river.

Q. During the 23 years that you lived on or near New River, on the river, with your brother, Lewis, near your sister, who lived across the river above Radford and between Radford and the mouth of Little River, didn't you often see boats on New River, coming and going down to Radford and back up the river?

A. No, sir.

Q. None at all?

A. Yes, sir; I saw them. But you said "often." I saw them now and then.

Q. What do you mean by now and then?

A. I was not there all the time.

Q. But you were on the river a good deal?

A. Yes, sir; off and on.

I expect I was on the river a little more than my brother, Lewis. I didn't see boats on New River, coming and going past the mouth of Little River to Radford and back above the mouth of Little River, carrying pig iron. I never saw a boat of iron on it in my life. I didn't see boats carrying grain for the mill. The mill used to belong to old General Wharton. I have never seen
2117 pig iron hauled to the wharf and unloaded at New River Depot.

The only boats I saw above Radford was when I ran a livery stable in Radford, nearly two years, and old Captain Moore would ship us corn and we would buy it from him and he would deliver it when he had a tide in the river. He would run it down to Radford by boat. He would haul it from his farm where they are building the dam now. He lived at Dunkerts Bottom, above the mouth of Little River, the other side. If you went across the mouth of Little River, across New River, and went back up-stream, it would be about one mile to Moore's Farm. It would take you past the present site of the Appalachian Company dam. I once was past the site of the Appalachian Company's proposed dam two or three days ago. I saw the coffer dam on the river. I might have seen boats tied up there, but I didn't notice them. There is so much stuff piled up there. Rock piles and every sort of thing. There was evidence of work being done. I have seen this man Moore haul his corn, from a point above the site of the Appalachian Dam on a boat down to Radford, when the river was up. He would haul it on a keel bottom boat, or bateau. These shipments went on all the time, whenever the river was up, if we wanted it, we would go up. Any boat that went to Moore place had to go by the proposed site of Appalachian Dam. The boat went over Ingles Falls, both up and down the river.

Q. If you were there, as you say, a little more than your brother, were not you in position to see as much of the boats and the navigation on that river as your brother Lewis?

A. No; because he rode alongside of the river up to his farm on the bank.

Q. He lived closer?

A. He didn't live closer, but he rode alongside the bank.

Q. Why did you say you saw the river more than he?

A. I lived on the river and was crossing backward and forward all the time traffic'ing and trading and fooling around like that.

2118 The witness, on Redirect Examination, testified as follows:

I don't know whether the Mr. Meadows at the salt works was Mr. Joe Meadows. I used to know him pretty well when I lived there, but it has been so long I have forgotten.

Captain Moore lived up there on the Mebane place, which is the lower end of Dunkards Bottom. I don't know whether he owned that boat. I was crossing back and forth around Ingles Falls every day or two, but I never lived there. The boat which hauled Captain Moore's corn was the only bateau I knew anything about. The others I didn't pay any attention to. I was not concerned in it, and did not pay any attention to it.

I had no standard contract with Mr. Meadow about hauling my stuff from Crumps Bottom. When I wanted something hauled, I would go to see him, to see whether he could do it, and what he would charge me for it.

The witness, on Recross Examination, testified as follows:

I have said I had no business with the others and therefore I didn't know about them. I don't know whether there were others.

2119 **W. R. Hundley**, by deposition, on Direct Examination testified as follows:

I am 84½ years old. I was born in Roanoke County, Virginia, about 5 miles east of Salem. I moved from this residence to Montgomery County, on the Estridge farm. At the age of 6 I moved to Snowville, about 10 or 11 miles south of Radford, on Little River. Little River empties into New River about 4 or 5 miles, 4 anyway, from Radford. Snowville is 4 or 5 miles from the mouth of Little River, where it empties into New River. I lived at Snowville from that time until I was in my 21st year. I left Snowville and went to the Kanawha River, a little town about 17 miles above Charleston. I went from there to Elizabethton, Pennsylvania, and lived there in that town and surroundings probably a year and a half. I returned to Virginia in 1876 and came to Snowville. Snowville was my home from that time until 1894, when I moved to East Radford. I have lived at East Radford ever since. I was away about a year and a half when I moved to Roanoke, but returned to Radford.

Mr. ABBOT. If your Honor please, that is as far as we care to read in the direct examination.

Mr. WILLIAMS. I ask then, your Honor, for the privilege of having the Government read from this point to the point Mr. Abbot desires to read again.

The COURT. Yes.

Mr. ABBOT. Of course, if your Honor please, that is subject to our exception?

The COURT. Yes.

The following portion of this deposition was introduced by the plaintiff:

It was something like 1912 when I went to Roanoke. I have lived in and around New River from the time I was 6 years old to the present time, except the time I was in Pennsylvania. I am not familiar with New River, not so familiar. I have not been on it. I have looked at it. I was on the railroad
2120 about 23 years, up and down the railroad, in sight of New River. My familiarity with New River consists of seeing it.

Q. What did you do with the railroad?

A. I was foreman, building bridges, stations, etc.

Q. Across New River?

A. No, sir; on the railroad, had nothing to do with the river at all.

Q. State whether or not along about 1877, 1878 and 1879, along in there, there were bateaux operating on New River.

Mr. ABBOT. We object to that question because it is leading.

A. I think about 1878 there were several bateaux built at a little town adjacent to Snowville, Graysontown. I think five or six bateaux were built at that point.

That is about 8 miles from Radford. I saw them building these bateaux. They were about 60 feet long, about 8 feet wide, and they would draw about 4 feet of water, I would think. They had a round keel bottom. I would say they would draw not more than 18 inches, when empty. I expect probably they were a year in building them. I don't know what would be their capacity in tons, just guessing at it, would say about 3 tons, something like that. I don't know how many of these bateaux were built. They were run from Graysontown on New River. I came down on one. We had a Sunday School picnic and a new bridge built across New River, and wanted to have our picnic at this bridge. The

bridge was between Radford and Snowville, across Little River, about 4 or 5 miles from Radford, and one of the boats was completed by the time we wanted to have our picnic and they agreed to take us down to the bridge on the bateau, and we were brought down from Graysontown in one of the new boats. I would guess there was about 50 in the boat, quite a number of children. It was a Sunday School picnic, I would say the trip was something like 10 miles. There is a considerable bend there from Little River to New River. I think Graysontown is something like 10 or 11
miles above the mouth of Little River where it flows into
2121 New River. The other bateaux were brought down Little
River. Little River is a tributary of New River. The
boat that took the Sunday School picnic went on down New River, and the picnic crowd was taken back in wagons and buggies to Snowville. From the mouth of Little River the boat went right around the bridge. We ate our dinner at the bridge. I don't know that I ever saw a bateau on New River at all.

Q. Where did they go?

A. They were used on New River, but I wasn't about the river, I was at home.

Mr. Abbot. We object to his telling what he doesn't know of his own knowledge, and move his answer be stricken out.

I have seen several bateaux taken away from Graysontown and I rode away in one to the bridge on the picnic. The bridge is a quarter of a mile, something like that, from the mouth of the river. We didn't go on down the river at all. We got off our boat at the bridge and had our picnic and were taken from there back to Snowville in wagons and buggies.

Q. Did you know the bateaux were being built for use on New River?

A. That was the report.

Mr. Abbot. We object, and move to strike the answer out.

Q. Do you know what traffic the bateau carried on New River, what kind of merchandise?

Mr. Abbot. We object to that question. The witness stated he had never seen a bateau on New River.

A. I only heard it carried—in the first place, it undertook to carry the iron ore from Max Creek furnace from New River to the depot and carried some of the iron down there and seemed to be a failure, but that is only hearsay, I only heard they used it for that purpose.

Mr. Abbot. We move to strike the answer out that part that is based on hearsay.

Q. Let's see how you heard this. How did you hear it?

A. Just general talk.

Q. You mean in the community?

A. Yes, sir.

Q. That the bateaux were carrying first iron and then farmer's produce?

A. That was the report.

Q. Up and down New River?

A. Yes, sir.

Mr. Abbot. We object to the questions as leading, and to the answers because based on hearsay.

2122 The furnace where the iron was used was something like two miles or two and a half miles from New River at a point I would say opposite Dublin, on New River. Dublin is about 7 or 8 miles, about 8 miles up the river from Radford.

There are farms along New River above Radford. The farmers raised in those days pretty much of everything that was raised on a farm, corn, wheat, oats, cows, horses. There was no railroad from Snowville and vicinity and from the mouth of Little River at New River down to Radford in 1877, 1878 and 1879. The railroad at that time was the Norfolk and Western Railroad, Lynchburg to Bristol. It came through East Radford. That railroad was built I think in something like 1850 and 1851. From the time I knew, the railroad was at East Radford. The railroad crosses the river here at what we call New River. It crosses the river at the same point it used to cross it.

The bateaux I saw built at Graysontown, were built by a man named Adam Craft. These boats were built by hand labor. There were two saw mills near Snowville, one at Graysontown and one at Snowville. There was quite a bit of timber standing on the hills at that time, a little ways out, not right near the towns, but a mile or so out.

I knew a man named John Coffey. I do not know whether he worked on these boats. I hear he says he did. I didn't see him working on them.

(Defendant objected to the statement of the witness as being hearsay evidence and moved to strike it from the record.)

There was a report about the Government making a channel in New River. I did not see the work being done, but I saw the imprint of the channel after it was made, you could see that. The only one I could see was probably a quarter of a mile above the railroad bridge a little sluice and the riffle upstream. I do not know how far up the channel went. I would have to guess at the year it was built. I would say the channel was made in 1866 to 1870 between those days somewhere. I knew J. R. Lawrence. He worked on this work quite a little while, pretty much all the time they were dredging this river. I would guess the Government work was carried on for a year.

The iron ore was converted into iron at Macks Creek Furnace, that is about two or two and a half miles from New River, just east of New River, about I would say something like 20 2123 miles above Radford. I worked at the furnace myself for about six months, about the year 1869 or 1870, about that time. That was before the bateaux were built. I worked there when a young man, then I left this country and was away four or five years. They were making iron. I was there as a carpenter. We built a dwelling for the superintendent and did quite a bit of work around there. I saw the processes of the furnaces. The iron would come to the furnace in the form of crude ore. This ore was taken from the mines up New River, from the mouth of Macks Creek that ran down from the furnace. I don't remember any iron ore below that, I don't remember about that. While I was working there the ore was hauled from the river by teams. I don't know how they brought it down. I don't know whether it was brought down the river or hauled by teams from the mines. The mines were close to the river but many miles above Macks Creek. I don't know exactly how far. I don't suppose the Macks Creek Furnace operated after 1876. I left this country in 1872. The furnace itself is something like two or two and a half miles back from the river. No matter how the ore was brought there, it had to be hauled from the bank of the river to the furnace. I do not know where the iron was shipped to from the furnace.

(The following portion of this deposition was introduced by the defendant.)

The witness, on Cross Examination, testified as follows:

I started to work for the Norfolk and Western Railroad in 1899. I believe I took my foremanship. I was a foreman and took charge of my work in the year 1899, but I had worked for the railroad before that, I can't remember just off-hand when I did commence, but I commenced before that.

The railroad down New River was called the New River Railroad and subsequently called the New River Division of the Norfolk and Western. It was an independent branch at that time from New River to Pocahontas. I worked for the company at the time that road was built. We had a frame yard for the purpose of framing bridges for this New River 2124 road, and I worked on that. I was there at that point for about 20 or 21 months framing these bridges, and as we framed them, as the grade was completed and the bridges called for at certain points, we would ship them out by work trains, as the road was being built. All of the bridges for that railroad were framed in our yard at Belspring. I framed every chord from New River to Pocahontas, except the chord in two bridges, one at Wilson's trestle and the other at Back Creek trestle. Wilson's trestle is gone now, but it was just as the road went over this hill going over to Belspring. The Wilson trestel was over a dry hollow. I don't know who framed the timbers for these two bridges. They were framed before I took my position there. Both of these trestles were in Pulaski County.

Belspring is about four miles due north from Radford, one-half a mile from the river I guess. The timber that was framed was received there by team. I do not know whether any was received by water. I think I would have known if it had been received by water. I was foreman over a gang of men that did the framing part on the bridges. I was there constantly during that time. All of the chords were shipped out on flat cars on the railroad. That includes all the bridges and trestles from New River to Pocahontas, with the exception of the two trestles I have mentioned.

There was quite a bit of timber sawed across the river from Belspring, hauled over by team, and the chords we framed came from some other point by train. I don't know where they came from.

The bateaux I saw being built at Graysontown was after the channel was made in the river by the Federal Government, and the trip I made down Little River was also after the channel was made.

While I was working as a carpenter at Mack's Creek, I saw them hauling the ore there by teams. I never saw any of it hauled on the water. It all came there by teams. It could not have come any other way. There may be a mine about 300 yards from the furnace now. There was none at the time I was there. I don't know what the mines up the river were called, they were just mines opened up by whoever owned the ore in the mountains. I couldn't tell
2125 you just where they were located. There were several different points. There was one or two shipping points right close to Allisonia. I don't know how far. Another little town above that, I forget the name of the town, several mines opened up not far from this place, I couldn't tell you just where they were. I did not see any ore taken out of mines up the river and hauled there at that time. All I know, is that I was working there on some buildings and the ore was hauled by wagon.

From 1876 to 1894 I was constantly along New River coming to work and going home. I was in sight of this river while I was working. Pretty much of the time I spent in Radford. I was observing the river all that time. I came down the river, four miles coming to my home, I came in sight of the river, probably half a mile from the river. During all that time I never saw a bateau on the river.

The following portion of this deposition was introduced by the plaintiff:

The witness, on Redirect Examination, testified as follows:

The time I worked at the Macks Creek Furnace was when I was quite a young man, long before I saw the bateaux built. Macks Creek comes into New River on the right hand side, coming down. The iron ore could have been hauled all the way from the mines by team, because there was a wagon road along the right side of the river. The mines were on the same side of the river. I don't know anything about the condition of the road. They generally used four-horse team.

We framed the bridges and trestles at Belspring. The timber was not very close to Belspring. The timber put into the trestles, and the braces made for the bridges was brought across the river, was sawed over in the hills across the river from Belspring and brought across there. It was probably brought across by ferry boats, I didn't see that done.

The following portion of the deposition was introduced by the defendant.

2126 The witness, on Recross Examination, testified as follows:

I suppose this road on the right bank of New River which I referred to is one of the oldest roads in this part of the country. It goes to the lead mines in Wythe County. I don't suppose the road has a name. There is what was known as the lead mine road, a road that runs north and south, coming from Lynchburg by Christiansburg, by Snowville, and through to Radford furnace, or close by, that is what was known in this country as the lead mine road, a public road for years and years. I don't know how far it went. It was a very old road.

The following portion of this deposition was introduced by the plaintiff:

The witness, on Redirect Examination, testified as follows:

At the time I worked there I had never been up this road above Macks Creek any distance. Everything that I have said about the road beyond Macks Creek on the road is hearsay, but from Snowville to Macks Creek I was well acquainted with it, because I walked over it every two weeks, going from my home. The general course of the road would follow New River all the way along here, ten miles out in the country, but not above Macks Creek. I don't know anything about it above Macks Creek.

2127 **John G. Osborne**, on Direct Examination, testified as follows:

I am 84 years and 8 months old. I was born in the City of Philadelphia. I came down to the New River section in January, 1880, with the New River Railroad Company. That company had charge of building the road from New River to Glen Lyn. When I came down to this section I went directly to Pearisburg and lived there until July, 1881. I then moved my headquarters over to Eggleston Springs. I was at Eggleston Springs I think about a year during the construction of that division. Then I moved back to Pearisburg, where I lived until December 1883. I then went to Radford and have lived there ever since.

I came down to the railroad company to be with the engineering force. That not being ready I acted as auditor and paymaster until the work began. The work began in July, 1881. I was then division engineer and worked from Radford to Walker's Creek, about 20 miles, including the two terminals. About six miles of this division was on New River, it left the river at New River Station, and crossed over Schooler's Hill. It then came back to the river at Back Creek and then ran right along the river all the way to Walker's Creek.

That division of the railroad was constructed under contract. Mills and Rolland had the contract for the first 38 miles, and they also had the contract for laying track all the way. They gave this up and the railroad company took it over. They gave up the contract for laying the track after they had laid about 36 miles down near Glen Lyn.

My duty with reference to the contractors was to see that the work was being pushed and done properly. My duties required me to be out on a part of the work every day during the whole period.

The contractors had the main commissary at Eggleston Springs, on the opposite side of the river from the Springs. That commissary was supplied mainly by teams from New River. These teams were owned by the contractors and they were driven by a man named Robey. The contractors were supplied with their tools and materials by these teams.

2128 Clark Bridge Company, of Baltimore, built the bridges on that work, that is, they had the contract. They had a commissary at Belspring. It was their principal framing ground for the bridges. The bridges were of yellow pine and it came in and was taken out there to the framing ground.

I think the timbers for the first two bridges after they were framed were hauled by team from the framing yard. They were the bridges over Back Creek, and the bridge over Dry Branch, and the bridge over Walker's Creek, about 30 feet. These bridges were in Pulaski County and comparatively near New River.

The members for the other bridges were shipped by rail to the bridge sites after the track was laid. There were a good many little trestles in there, the timber for which was gotten locally from the mills. The location was right close to the bridge site. All of that framing was done there. This timber was hauled by wagons.

After Mills and Rowland completed all of my division, that is, the grading and laying of the tracks, I moved my headquarters back to Pearisburg and took charge of the track laying, and the erection of stations and tanks, and so on. The company took the tracks over October 7, and I was with that until we got it finished to Pocahontas, March 10, 1883. When I took charge of the track laying October 7th, about 36 miles of track had been laid. That was down near Lurich. I had charge of laying the track from that point on to Pocahontas.

Mills and Rowland used a work-train for getting materials to the point where needed and supplying the men as the work progressed. They started laying the track about New River depot. The men engaged in doing this work for the contractors stayed at different points, mostly, I think, at the commissary at Eggleston and Belspring, and after the company took over the track they had camps that continued all the way to Pocahontas.

During the time of the construction of that road, I did not see any use made of the river for hauling material or supplies. Mr. Mills told me that Clark Bridge Company had used the boats
for shipping some bridge iron down to the framing
2129 grounds at Belspring and that he was going to try ship-
ping some of his stuff to the commissary at Eggleston.
I don't know how long after that, about a week or ten days, he told me it had not been at all satisfactory, and he had stopped it.

I never saw anything transported on the river. I saw one of the bateaux at New River evidently loading, but I did not examine closely. After the completion of the road to Pocahontas, my duties were division engineer and trainmaster on that division. We were ballasting and getting the road surfaced up for operation. The railroad was put in operation in January, 1883, to Winona, now Pearisburg. I think it was extended to Long Falls, now called Ada. Ada is the first station this side of Bluefield. I think it was opened there the latter part of March, but I am not sure about that date, and it was operated to Pocahontas in May, 1883.

Q. Now, when you became—what was it? Division Engineer and trainmaster?

A. Yes, finishing the construction and ballasting and surfacing the road and erecting stations and tanks and that kind of thing, and then trainmaster in operating.

Q. Where were you located during that period of time?

A. I was located at Pearisburg until, as I said, December 1883, when I was transferred to Radford.

After I went to Radford, I was engaged over the whole line. I was around New River Depot and New River Bridge a good deal during that period. I was around that part of the railroad some most every day, I think. During that time I did not see any material of any kind being boated in and around New River Bridge.

Our railroad did do some construction work along New River in West Virginia. That was done in 1880—probably some in the latter part of 1879. I would go down there from month to month to pay off the hands. That was not being done under contract but by day work—and checking the commissary.

The Walton cut-off on the Norfolk & Western was started in 1899. I had charge of that work for Walton & Luck, the
2130 contractors. The stone for the abutments was shipped by rail from Falls Mills to where the Peppers Ferry road crosses the railroad, about two miles from Peppers Ferry. It was hauled then by team to Peppers Ferry and from there it was loaded on scows—flat scows—and ferried across the river, and down the river to the bridge site. The river between Peppers Ferry and the bridge site was one of these pools that exist in New River—a long stretch of the river.

I had something to do with the construction of the boats used in that work. A man by the name of Hodge was building the boats at New River. One of them was rigged up with a little stationary engine, a vertical boiler and paddle wheel. I was on that boat when it was floated down the river from Hodge's mill at New River Bridge to Pepper's Ferry. The condition of the river at that time I think was just a little full, but I am not sure about that. These boats were flat boats, flat bottom, just like the ordinary ferry boat. During the trip of this boat down the river we had several stoppages, and running ashore, and would have to lead it off.

After I went to Radford, in December 1883, I had charge of the Radford Yard. It extended from down near Plum Creek, on the east, to New River on the west. I remember Col. Crockett. He lived originally at Crumps Bottom, but moved to Radford, and lived on 8th Street. He lived there two or three years, I believe, and then his house burned. That must have been between 1893 and 1894, but I am not sure about that.

The witness on Cross Examination testified as follows:

I was born in 1851. I cannot say of my own knowledge that the main line of the Norfolk & Western from Bristol east had been constructed at that time. I don't think there was a railroad in that country at that time. I think the Virginia and Tennessee road up at this end was finished about 1856. As far as I know, that was the first railroad in that country. It ran from somewhere over in Tennessee, about Bristol, and crossed New River at what is now Radford and then proceeded east on through Roanoke.

2131 I believe there was no railroad coming into that country until the time the C. & O. came up New River as far as Hinton and then bore up the Greenbrier eastward.

Until the New River Division of the Norfolk & Western was constructed, there was no railroad parallel to New River below Radford, as far down as Hinton. That distance by the river I think is 85 or 90 miles. I would not say that the New River Valley between Radford and Hinton was very well settled in 1870.

Prior to the time the New River Division was constructed, which was between 1881 and 1883, the only means of transportation present for the settlers was by wagon or by the river. The wagon roads in those days were very poor roads. I would imagine it would take somewhere from four to ten or twelve horses to transport any considerable load by wagon in bad weather. In very bad weather there were big ruts, and so forth.

The western terminus of the New River Division was at Pocahontas. Pocahontas is about fifteen miles northwest of Bluefield. The only portion of this division that paralleled New River was after it struck the river about Glen Lyn and proceeded south upstream to Radford. The railroad ran up the river from Glen Lyn to Back Creek. By railroad and across the hill Back Creek is about 6½ miles below Radford.

The timbers for the trestles for these small streams were practically available right on the spot, especially the big one at Back Creek. The trestle at Dry Branch was about a quarter of a mile from the river. If any of this timber used in either of these trestles had been transported on the river, it would have been necessary to transport it from the river back to the site of the trestle.

Q. Now, you spoke of the concern which constructed the bridges?

A. Clark Bridge Company.

Q. And what bridges did they construct?

A. They were supposed to construct all of them.

Q. All of them?

A. Yes, and a part of the trestle work, too.

Q. And it is your information that the Clark Bridge Company did use New River?

2132 A. I was told that.

Q. You told about it on your direct examination?

A. Yes.

Q. They used New River to transport their material from the railway station to the site of the bridge?

A. Yes; some bolts and castings for the bridges.

Q. In other words, some iron?

A. Iron, yes.

Q. And I believe you said that you discussed the situation with Mr. Mills?

A. Mr. Mills, the contractor.

Q. And he contemplated using the boats himself?

A. He said he would try it.

Q. And then, in about a week or ten days, he said that he had not?

A. He had tried it.

Q. It was a short time?

A. A week or ten days later.

Q. Do you know anything about the river, or did you know anything about the conditions on the river, from Hinton up to Glen Lyn at that time, in 1880, 1881, and 1882?

A. No; except what I saw when I went down to Crumps Bottom.

Q. When did you go down to Crumps Bottom?

A. In 1880.

Q. 1880?

A. Yes; I went down to pay off the force.

Q. You went down there one time?

A. Several times.

Q. I ask you if you do not know that it is a fact, Captain, that along about 1881 or 1882, while they were constructing the Norfolk & Western along at Glen Lyn, or just prior thereto, when you have told about some building in connection with the Norfolk & Western in West Virginia, that there were four 2133 or five keel bottom boats regularly plying between Hinton and just below Shumate Falls, carrying supplies for the Norfolk & Western?

A. No, sir; I do not.

Q. You don't know that?

A. No.

Q. You are not testifying that they were not, are you?

A. I don't know that they were not. Supplies for the Norfolk & Western?

Q. Yes, for the very concern for which you were working?

A. For the contractors?

Q. Whoever was building the railroad?

A. No; I don't know.

Q. I will ask you, after your suggestion, don't you know that there were four or five keel bottom boats, along about that time, hauling supplies from Hinton to a point in Virginia just below Shumate Falls, for the contractors who were grading for the Norfolk & Western?

A. No, sir; I do not.

Q. You don't know that?

A. No, sir.

Q. I had understood you to say that the Norfolk & Western constructed its line and contracted for the grading; am I right in that?

A. Yes, it was all under contract.

The construction of the cut-off at Walton or Peppers began in 1889. At that time there was transportation of material in scows on the river. There was a little boat they had rigged up with stationary engine and paddles. This steamboat was about, I suppose, 30 feet long and 10 or 15 feet wide. I did not know Mr. T. W. Coleman. I am quite sure that they did not haul 25 or 30 tons on that boat. 30 tons would have put that boat on the bottom. The boat was going through from Peppers Ferry to the side of the bridge in one of the pools on New River. This pool would be anywhere from six inches to ten feet deep. There was one place which was right shallow. I don't remember 2134 how shallow, or where, but they had to pull through carefully. I don't know whether there was some work done in the channel to permit the steamboat to take its tonnage through that particular place. The depth of this pool varied. I expect in some places in the channel it was 8 or 10 feet deep. I don't know how many of these pools there are on New River. There are some, but they don't hold the same depth all the way through. There are some shoals and rapids.

I moved to my headquarters to Radford in December, 1883, and have been there ever since. It was then Central City or Central Depot. I had charge of the yards there until 1897. I only know in a general way about the traffic incoming and going out from Radford prior to 1883, but I am familiar with it after that time.

I know when the Cripple Creek branch was completed as far as Ivanhoe. It was just about completed when I was transferred to the Western Division, had just opened it before I took charge and the construction was going on beyond that. The first regular traffic began in 1886 to Foster Falls, but not to Ivanhoe until sometime in 1888, I think, 1887 or 1888. I don't remember just when it was opened to Foster Falls first, I wasn't over on that end of it. It was opened to there first. Hiawassa, with respect to Foster Falls, is north of Foster Falls, between there and

Pulaski, it is just after you go down the hill from Pulaski across New River. The grading was done and the road completed from Pulaski south and went through Hiawassa first. I didn't say there was traffic by Foster Falls before there was by Hiawassa. I said it was opened to Foster Falls—the first time I think—1886.

I have a little block of stock in the Appalachian Electric Power Company.

The witness on Redirect Examination testified as follows:

I am a voter and taxpayer of the City of Radford and a paying client of the Federal Government. The railroad company had jurisdiction over all of the construction of the New River Division of the Norfolk & Western and let the contract. But the Norfolk & Western or the New River Railroad Company was not buying any supplies or furnishing any supplies or itself
2135 using any supplies down there until I had charge of laying the track. I did not have charge of getting the material and supplies for the railroad when I began laying the track. All of those supplies were ordered by the Chief Engineer and came in on the road, the rails and splices and switches and such things, and the cross ties had all been made and piled up along the road. Those supplies came in over the railroad from New River Depot.

The witness on Recross Examination testified as follows:

With reference to the transportation by boat at Peppers Ferry, the boat was loaded at the ferry and then went across the river and about three-quarters of a mile down.

Robert C. McWane, on Direct Examination testified as follows:

I am 63 years of age, was born in 1873. I am a mechanical engineer. I do not own any common or preferred stock, or debentures of the Appalachian Electric Power Company. I am not employed by the Appalachian Electric Power Company.

Q. Does your wife or any of your children, your grandchildren, brothers, sisters, aunts, uncles, nephews, nieces, or any of your relatives, so far as you know, own any securities of the Appalachian Electric Power Company, American Gas and Electric Company; or are any of them employed by either company, or any of them, so far as you know, have any financial interest in either company, or have any promise of any financial interest in either company?

A. Not that I know of.

I was born at Wytheville, Virginia. I lived there until I was fifteen. I went from Wytheville to College at Milligan, Tennessee, where I spent two years, and the following two at Bethany, West Virginia. In the meantime, my family had moved to Bluefield, and I joined them there. I remained in Bluefield about

two years. I then went to Bristol, Tennessee, as superintendent of the Bristol Foundry and Machine Company,
2136 owned by Major A. D. Reynolds. I then went to New York, with a pipe brokerage firm, M. J. Drummond Company. I remained in New York nearly three years, until 1899. In April or May, 1899, I went to Radford as Resident Manager of the Radford Pipe Works, the General Manager of which was my brother H. E. McWane, of Lynchburg, Virginia. I remained at Radford until September, 1901.

I have never seen a bateau on New River. I am the same Mr. McWane that owned a gasoline driven boat mentioned by witnesses.

Q. Will you state how you happened to acquire that boat?

A. During my residence in Radford, I became quite intimately acquainted with a first cousin, Walter Dudley, who was born at New River Depot, and who had lived on the river all his life, and he told me about the money that had been spent on the river by the Government in dredging channels above Radford, and suggested that we build a power boat and enter the river transportation business, attempt to develop some river transportation.

At that time I was employed by the Radford Pipe Works, but soon afterwards the Pipe Works closed on account of financial difficulties of the Virginia Iron, Coal and Coke Company, the owners, got into financial difficulties, and they closed all their plants, including the Radford Pipe Works, and my position with them was ended. I was out of a job at the time we built the boat. The Radford Pipe Works is located on the banks of the river, about two miles west of the Radford station, not East Radford, but Radford station.

Q. You could see the river from where you worked at the Pipe Works?

A. Yes, sir.

Q. What made you think it was feasible to engage in the transportation business on New River?

A. The river looked fairly navigable to me, and no reason to think we could not operate a boat successfully, from my view point of the river. I had never been up the river above Ingles' Falls.

2137 I mean I had seen the river from the bank. I certainly did have a different impression when I got out into the river. The boat was built just behind the Radford Pipe plant on the bank of the river. We built the hull upside down and turned it over and slid it sideways into the river and then built the superstructure. Walter Dudley did the actual building, and I was the handy man a good part of the time, and he also employed another man when he had parts to handle too heavy for one man.

Q. Had Mr. Dudley ever done any boating on the river?

A. Not to my personal knowledge, only from what he told me, and I considered him a very good mechanic and he proved it.

The boat had a sharp prow and blunt stern. It was approximately fifty feet long, maybe fifty-one or two, I don't recall the exact dimensions, and seven and a half to eight feet beam. The hull had a flat bottom, built along the lines of the old river bateau. We have carried as many as twenty-five or twenty-six passengers, not including the crew of three. The draft of the boat when it was light or empty, was very shallow, only four or five inches. The heaviest load ever carried was wheat, and my best recollection is we took thirty bags at a time, two bushels to the bag. I have not figured that out as to just what the weight would be. I would say that the boat with that load drew ten or twelve inches, not over twelve inches.

We had the boat on New River, a little over a year, or about a year from the time it was completed. We started to build it in July 1900, thirteen or fourteen months after I came to Radford, and we finished it in September 1900. It was on the river for approximately one year—until September 1901.

Q. What have you hauled with this boat as you recall?

A. We hauled very little except one car load of wheat for the Grayson Mill at Snowville, above the mouth of Little River, and we made, as I recall, eight or nine trips in handling that wheat, I should say fifteen or eighteen tons altogether, and we also carried several cargoes of lumber from just above the mouth
2138 of Little River to Radford, probably a mile and a half to two miles above, and I remember one cargo of shingles we brought down.

Q. You say you brought several cargoes of lumber?

A. Yes, sir.

Q. How many did you mean by that?

A. Not over five.

Q. How far is the mouth of Little River above Radford?

A. Five and a half miles approximately.

Q. Did you haul any other wheat than this one car load?

A. No; no more, because we found we could not handle it profitably.

Q. Mr. McWane, what did you intend or plan to haul with your boat when you built it?

A. We knew of this mill at Snowville, and they got most of their wheat by rail at Radford, and hauled it up by wagon to Snowville, and we thought we could save them money by boating it up from Radford to the mouth of Little River and in that way shorten their wagon haul by five miles or more.

Q. And did you have in mind there was any other commodity to haul?

A. We knew there was several small lumber mills in that district, quite a few shingles, and products of that kind produced by them up in there, and we figured we could possibly develop a business by bringing those down to the railroad.

Q. Hauling wheat up and bringing those back?

A. Yes, sir.

Q. But as I understood you, you never actually hauled more than this one cargo of wheat?

A. That is all.

Q. Did you ever haul any passengers, carry any passengers?

A. Yes, we took several. I don't recall how many, but several parties, excursion parties, picnic parties, some to the foot of Ingles' Falls and some over the Falls, used the sluice-way or channel.

2139 When the water was just at the right stage for us to go through the channel I suggested to my wife on one occasion she make up a party of her women friends in Radford, and we would give them an outing on the boat, and we took them up over the Falls to the mouth of Little River and on the way back we encountered some engine trouble, in the middle of the river, before turning into the landing, which was a few hundred yards below the Radford station, and the engine stopped, and we had to resort to poles to get to the shore and we worked frantically and just made shore, at the head of the rapids if we had ever gone over there, there would have been a tragedy.

Shortly after we launched the boat we invited a number of prominent business men in Radford, including Governor Tyler, who lived in Radford at that time, to make a trip with us, and that trip we only went up to the foot of Ingles' Falls. The purpose of that trip was purely a publicity stunt. We wanted to get all the publicity we could in the beginning of our enterprise. That was not only a publicity stunt, but to lay the foundation for our subsequent request, quite a few of them were asked that they write to our Congressman, Major Otey, and get his assistance in securing a Government appropriation to clean out the channels and restore the river to navigability.

We issued a little hand bill or printed announcement with a picture of the boat on it, and attempted to do a little local advertising. We prepared a petition to Congress and had quite a few people sign it, all we could get in a short time, including Governor Tyler, and quite a few letters written in addition to that, and we sent them to Washington to Major Otey. We saw a little item in our local paper a few weeks afterward covering some proceedings in Congress, at which Major Otey had offered this petition, and he had been practically laughed off the floor. The resolution we were advised, presented by Major Otey was defeated.

Q. Was there any work, if you know, done on any point of the river during the time you were at Radford?

A. There was several dangerous obstructions in the channel through Ingles Falls and Dudley and two or three other 2140 men got in there before we made our first attempt to climb the falls and removed these rocks or rolled them to one side and cleared the middle of the channel, was all that was done.

Q. You mentioned a moment ago it was your desire to have the navigability restored, what did you mean by that?

A. Rebuilding the wing walls and deepening of the channel, so as to slow up the current.

Q. You said deepening of the channel——

A. Yes, so as to get more water in it, and enable us to get through in low tide, which was sometimes not possible.

Q. Can you describe the method of getting the boat upstream through Ingles Falls?

A. Well, we used the engine, sometimes we could go—depending upon the stage of the water—could go all the way through on the engine power, depending on the stage of the water, and other times we had to have help from poles, when the water was high and the current swift.

We would always have someone with us to pole, we had the boat equipped with poles. We had a big hefty negro, who was an old bateau boatman, to do the poling. I don't know just how frequently it was necessary to assist the boat by poling through the falls, but it was often necessary, I will say that.

Q. Did you ever see any obstructions in the river?

A. I can see them yet, I have seen them for the last thirty-five years.

Q. What are those obstructions?

A. Rocks and more rocks.

Q. Were you ever grounded?

A. No, but we were rocked, wasn't any ground under us, it was solid rock.

We had the boat at Radford from about September 1900 until sometime in September 1901. In September 1901 we de- 2141 cided we had made a financial and mechanical failure of it at Radford, and decided to take it to Hinton, West Virginia, in the hope of being able to either sell it or operate it profitably on a stretch of eight or ten miles of still water we understood was available above Hinton. We operated it at Hinton for only a few days. I will say probably two or three weeks.

I went to Lynchburg from Hinton within a couple of days and left the boat in Dudley's charge, and he wrote me that he was unable to do anything with it and I sold it in Lynchburg to a Mr. Eades—John Eades.

To build the boat cost me approximately $1,100. I was out of employment at the time I built the boat. I had saved this two or three hundred dollars during the year I was in Radford, during the year I was with the pipe work, and I borrowed $800 from the Radford bank through the influence of Captain Ingles, and that is how I financed it.

I sold the boat to Mr. Eades for $65.00. I had it loaded on flat cars at Hinton and shipped to Lynchburg by freight and he paid the freight and paid me $65.00. He used it as a tug to tow sand boats from the Glamorgan pipe plant in Lynchburg, up to Reusens, empty, and loaded there. Reusens is about six miles above Lynchburg. That is on a canal, there was a short stretch of canal available for traffic at that time, the old James River canal.

As I recall, this trip was made to Hinton between the 15th and 20th of September 1901. I would say the stage of the river on this trip from Radford to Hinton was five or six feet flood tide. We did not go down to Hinton as soon as we had decided to do so but waited for the flood tide before we attempted it. It would be rather hard to describe this trip. It was just one series of chute-the-chute all the way down, over one falls after another. In some places we made a sheer drop of five or six feet and struck the water with such force that I was fearful many times that we would jar the engine loose from the beams and put our power plant out of commission. On this trip we saw the same kind of boulders we had encountered higher up the river.

We got down the river all right, with the exception of one more or less minor accident, we stove a hole in the bottom
2142 striking a rock after shooting one of the falls. This hole
was back near the stern in the engine room, slightly above the water line or about the water line. We did not merely knock a block out of the boat but we splintered the oak plank in the bottom. After splintering this plank, we didn't ship much water, only when she would rock from side to side, and we pulled in to the bank and got out and dragged the stern around upon the bank a few inches so as to get it out of the water. I don't remember getting into the water myself. Dudley got out; he was always equipped with hip boots and he waded in and did most of the heavy work. Dudley nailed a block on the inside and caulked around it and made temporary repairs. Pulling the boat

out and repairing it and getting it back, probably consumed an hour or a little more.

I was at a romantic stage and I called the boat by my wife's given name, "Altha."

Q. Was it because your wife was fond of the boat?

A. (Witness laughs.) I had rather not answer that question, please, sir.

Q. Do you have any records now, this little bulletin or dodger that you say you got out?

A. No, I haven't been able to find any scrap of record for many, many years.

Q. Do you have any idea what happened to them?

A. I suspect that my wife destroyed all of them.

Q. Why do you think she would destroy them?

A. Because she didn't feel greatly complimented by the outcome of the adventure.

We did not make the trip from Radford to Hinton in one day. We stopped with a farmer living near the mouth of Indian Creek some 15 miles south of Hinton, 15 miles up the river. I don't remember the exact distance, but I know we did not make Hinton that day, we stopped at a farm house on the right bank of the river near the mouth of Indian Creek. Mr. Dudley and myself went all the way to Hinton with the boat.

On this trip Dudley and I had a man along to help us in case
we met with accident, but I do not recall his name. He
2143 was not in charge of the navigation of the craft. Dudley
was the pilot all the way.

I don't recall ever having gone as far up the river as Towe's Ferry from Radford on the "Altha." I did not know the place by that name if I did. I never did take the "Altha" up the river with a bateau in tow. We did not engage in the barter of merchandise for produce. If I am privileged to elaborate on that a little, I might say that on our return trips from up the river, Dudley usually landed me on the Radford side, took the boat across the river to the New River depot side where it was tied up over night. There was a little grocery there and we may have taken a few groceries for him up into the country above Ingle's Falls and traded for produce but it didn't happen on more than one or two or three occasions. We were not engaged in the produce or grocery business.

The witness on Cross Examination testified as follows:

I am 63 years old. I was married in 1897. I was born at Wytheville, which is near Reed Creek, a tributary of New River. Wytheville is approximately an hour by train from Radford. I moved to Radford as manager of the Pipe Company in 1899. For two years after leaving Radford, I remained in Lynchburg and then went to New York. I left Radford in 1901. I left Radford before I sold the boat. I left Radford for Hinton with the boat. I never came back to Radford to live. I have visited there. I now live at Ridgewood, New Jersey. I didn't move my family away from Radford until the latter part of October 1901. I was leaving Radford permanently at that time. My brother was at Lynchburg as manager of the Glamorgan works and he suggested that I come there with the idea of possibly giving me something to do. I went to work in Lynchburg with Mr. E. C. Wiley, a mechanical engineer and stayed there approximately two years.

Q. So when you left Radford in September of 1901 on your boat, going to Hinton, you were leaving Radford for good as far as you knew?

A. The idea was that we were to sell the boat in Hinton, if possible, and if not I was to sell Dudley my part, my
2144 interest in the boat, and he was to operate it.

Dudley had no interest in the boat. I paid him wages for most of his work. He had a small interest—we never really drew up any written contract as to the interests.

When I lived at Wytheville I was 15 years old. Following that time and until I left on the boat for Hinton from Radford, I was not in and around New River. I was never on New River but once in my life before going to Radford to work for the pipe works.

In April or May, I think, 1899, I took my family to Wytheville where my mother and father were living at that time, and left them and I went to Radford to get the work started and find a home for them. I was the local manager of the pipe works there. The pipe works was owned by the Virginia Iron, Coal and Coke Company. I left the pipe works in June 1900. I didn't resign my position with the company, it went into bankruptcy and everybody connected with the plant was out. Then I began looking about for something else.

I lived at Radford continuously from April 1899 until June 1900, before I embarked upon this enterprise of the boat. During that time I was never in the river, but I was near it. I had an opportunity to investigate and see it. After observing the river, from April 1899 to June 1900, I decided to construct the boat and to operate it on New River. The boat was built right on the banks of the river. The boat was built by Walter Dudley with assistance. I paid for the building of it, but I didn't personally build it. I had never built a boat or bought an engine for a boat. I had never operated a boat or operated an engine. I had never had any experience handling a boat on a stream. At that time I knew nothing about New River or its channels.

The engine for the boat was bought from Fairbanks Morse Company of Chicago. We didn't make any calculations as to what engine would be adequate for this boat. The boat was approximately 50 feet in length and about 7½ to 8 feet wide. The boat drew 4 or 5 inches when empty and 10 or 12 inches with a load of 2 tons or 2½ tons. I don't recall that we attempted to carry more than 2½ tons. There was a very short deck in prow to cover the gasoline tank, which was mounted 2145 in the prow of the boat. It was a gasoline engine. The deck in the prow was three or three and a half or possibly four feet long from the bow—the arch of the bow to the prow. There was a canvass roof built on a frame supported by posts secured to the gunwale and the middle or approximately the middle of the hull was an enclosed cabin with windows along the side, three or four windows. There were really two cabins, there was an engine room in the stern, possibly six feet long, running lengthways of the boat and there was a space of possibly 10 or 12 feet before the main cabin started, and that was about 12 feet long, and the remainder was open and only enclosed with curtains when it was necessary to enclose it. This passenger cabin was 12 feet long and the same width of the boat, with seats running lengthways on each side of the boat. We had a stove to heat it, we could sleep on the benches on either side, they were about 15 or 18 inches, I think they were rather narrow, but we could make down a pallet on them. We had used it several times when we went up above Ingle's Falls and decided to spend the night. The engineer's cabin was about 6 feet long, a small engine, it was a single cylinder, vertical engine, and didn't take much room. It was an eight-horse power engine, and I would say it weighed 300 to 350 pounds.

In paying for the construction of the boat, I sometimes paid Dudley in cash and at other times I would give him an order on a grocery store and I paid the grocer. I paid for the material. I paid $800 for the engine. That is what I got the loan for, to buy the power plant, I had the money to build the hull. The power plant included the plans and specifications for building the paddle wheel and also included the shaft and bevil gears for operating it. The Fairbanks Morse people furnished us a little sketch showing how it was to be installed, they furnished instructions for installing it in the boat. Dudley and I installed the engine. Dudley before this time had never built engines before and installed them. My heavy financial loss was on this engine.

The first trial trip on the boat was sometime in the fall, the latter part of September or early October. The water is 2146 low in June, July, August, September, and sometimes October, as far as I remember, to the best of my recollection. We made the first trip in the boat to Ingle's Ferry, to the foot of the falls. The boat was empty. I went on this trial trip with Dudley and his father-in-law, Mr. Hedrick, who was with Dudley most of the time and helped him to build the boat.

We built the boat to carry passengers or produce, whatever we could make a profit on.

We went above the falls several times before we had the business men's trip. We would go through the sluice way, through the channel, near the middle of the river, when we went through the falls. As I recall the sluice way was near the middle of the river, I won't be positive as to that, it may have been a little to the right. Somewhat to the right, as you come down the stream, to the left as you go up, as I recall, it was a little nearer to the Radford side. I would say that the sluice way at Ingle's Falls was 10 or 12 feet. The width was rather difficult to determine on account of the condition of the walls. The walls had been washed in and boulders were lying scattered through the sluice way, and the water caught those rocks and whirled and twisted them around in different directions and it was rather difficult to accurately fix the width of the sluice way. The rocks were tumbled over in the sluice way. The rocks in the center of the channel had been removed.

When these rocks had been removed we went to Ingle's Falls. We operated the boat possibly a month before we took the business men's trip. We hauled no paying cargo at that time. We took some of our friends, just to show them the boat and try the boat out. It was a pleasure trip.

Almost the first trip we discovered that the engine was not carrying the boat as it should. Doubt began to enter my mind the first trip when we entered the falls and got about the middle and almost came to a standstill, and the wheel churning the water and the current racing by and roaring over the rocks on both sides and I began to think probably we had made a mistake. It was obvious that the engine was not pulling the boat through against that downcoming current. We rubbed rock almost continuously on all our trips, but there was no serious obstruction. On our first trip the boat was traveling almost
2147 empty. We later carried as many as twenty and even more up to the falls.

We began to realize when we reached Ingle's Falls on our first trip that our engine was mechanically inadequate. The necessity for helping the engine by pushing the boat depended upon the stage of the water. There were times when the boat would go up fairly well and there were times when we had to help it, when the river was high, what you might call flood tide, that is considerably above normal, when the current was very swift, we would have to help.

The lumber we used on the bottom of the boat was three-quarters to seven-eighths inches, oak. I would say the whole boat would weight a ton and a half—3,000 pounds or possibly a little more. We hauled as many as 20 *ro* 25 people on the boat.

On the trip we made with the business men, on the advertising project, creating interest in the river, we circulated a paper and sent it to our Congressman. The paper requested that an appropriation be made sufficient to clear out the sluice way and rebuild the walls so as to carry more water into the channel and if necessary build small locks where it was absolutely essential and the current was too swift. I asked for everything I thought we could get. There were 8 or 10 on this business men's trip, I don't know how many. We went to the foot of Ingle's Falls. We didn't attempt to go through Ingle's Falls.

Q. Following the business men's trip, you used the boat for the entire year until you took it to Hinton in 1901?

A. Not the entire year. It was tied up practically three months during the winter. The ice conditions in the river were such that we could not operate.

Q. You did operate up to the time of the ice conditions and resumed operations sometime in the early winter or spring of 1901?

A. Yes, sir.

Q. And operated all through that summer of 1901?

A. Not daily, because we did not—sometimes a week would pass that we did not make a trip for the reason that we had nothing to do and gasoline was expensive and it was expensive to operate.

2148 Walter Dudley operated the boat, I never did operate it. The set-up of the crew was Walter Dudley, skipper, and myself as first mate and engineer; and Dudley's father-in-law as second mate; and Harvey Gunn, the big negro as stevedore and boatswain. We had four on the boat, sometimes we had a crew of three. Harvey Gunn was the pole man on a bateau in the old days. He had been a pole man on a bateau on this stretch of the river from north of Little River to Radford, when he was a young fellow and the channel was first improved, I don't know just how old he was at the time he worked for us, but he used to tell us his experiences in poling boats up and down the river.

I had never seen a bateau when I built this boat. A bateau had been described to me by Mr. Dudley. He had seen them on New River. He lived there all his life.

We had picnics and excursions and carried goods of various kinds. The wheat that we carried was for Grayson's mill. Jim Grayson had a mill at Snowville and we carried that wheat there in 1901. That was a single carload—15 or 16 tons, a minimum carload. The wheat was hauled from Radford. The siding was near the West Radford Station—there was a little lumber mill plant there between Radford and East Radford and they had a siding, and I remember that is where the wheat was loaded. We took it to the mouth of Little River. We made 8 or 9 trips with the wheat over Ingle's Falls.

We had gone several miles further than the mouth of Little River in the boat. We went more than a mile above the mouth of Little River on these trips. We were not carrying anything up there on these trips as I recall. We brought down a little lumber—4 or 5 cargoes of lumber from the mills back in the hills there.

I think I remember a man by the name of Till O. Meredith. I heard him speak of cutting and shipping lumber on bateaux down the river.

I cannot tell you what my first month's receipts or income was on the boat. I kept a record of it, but it is gone.

We had about 10 or 12 aboard at the time we made the ladies' excursion trip. That is the time we came near to having a disaster, the engine stopped.

2149 Q. It was, as a matter of fact, the mechanical difficulties in the operation of the boat with this small engine were such that you finally had to give it up?

A. Yes sir; the mechanical and physical difficulties; yes, sir.

Q. If the engine was larger, you could have operated more easily than you did up the river?

A. Possibly.

Q. And even with this inadequate capacity, you made trips up the river through Ingle's Falls and beyond?

A. Yes, sir.

Q. And carried many people and considerable produce?

A. Yes, sir; but always with the help of poles.

Q. You did operate the boat from September 1900 to September 1901?

A. Yes, sir; with the exception of the times I spoke of.

Q. With the exceptions of the times you spoke of—the winter time when the river was frozen.

A. Yes, sir.

Q. How much of a cargo of wheat were you carrying each time in carrying wheat, in pounds or bushels, if you can give it?

A. Twenty or twenty-five bags.

Q. How much would each bag weigh?

A. I think there were two bushels to a bag.

We carted the wheat from the railroad siding to the landing. So far as I remember, the wheat came in on the Norfolk and Western. It came from the west somewhere, because Mr. Grayson was buying western wheat at that time. It was not local wheat; it was not Virginia wheat. It came from out of the state.

I carried the cargo of shingles to Radford from several miles above the mouth of Little River. I don't recall but one load of shingles. The shingles did not belong to us; I don't know who they belonged to. We simply unloaded them and they were taken by the parties to whom they were consigned. We
2150 did not put them on the railroad track, they were evidently for local consumption. The railroad did not run from Radford up New River at this time. There was a siding to the pipe works from Radford, as far as the pipe works. The railroad went up Cripple Creek. I never was in that country and I don't know anything about it. We carried several cargoes of lumber on the boat. We got the lumber above the mouth of Little River, near the mouth of Little River, and hauled it to Radford. We hauled this lumber on 4 or 5 occasions.

Q. When you came to sell your boat and leave Radford, how many went down to Hinton with you?

A. As I recall, there were four men on the boat.

Q. Do you remember Whit Coleman—T. W. Coleman?

A. I don't recall his name.

Q. Do you remember that he went?

A. Yes, I am satisfied he went, if he said so. There is no question about that, and Mr. Grayson, and Mr. Dudley, and I.

Mr. Dudley did the steering of the boat to Hinton. I don't recall Mr. Coleman doing any, he may have done some in the still waters. I would not say Mr. Coleman was mistaken, if he says so, but he did not steer over the falls, because Mr. Dudley would not trust the wheel to anyone.

I don't recall the name of the falls. I didn't make any effort to fix names of the falls in my mind. The trip seemed a continuous trip of falls to me. None of us had made this trip before. There were pools of considerable length on the way to Hinton on New River, but they did not impress me so much as the falls. I do not know the location of the place where we had the six foot drop. I cannot locate it with reference to some point on the river. I cannot say whether it was in Virginia or West Virginia, or near Glen Lyn or Narrows, it was somewhere between Radford and Hinton. I don't know which side of the river it was on; it may have been in the middle.

On several occasions on these smooth stretches of water, before we reached the falls, Mr. Dudley, who seemed to know about it, would run into the bank and get out and walk down maybe a quarter of a mile and view the falls from below and pick
2151 his route over them. It was new to him, none of us had ever been there. We may have seen this 5 or 6 foot drop, but that was the only way to go over. We did go over, and how! There were several of these falls. Mr. Dudley did not get out and look at all of the falls—occasionally he did.

Q. You testified about some board on the boat being stove in some place above the water line—where?

A. On the side where the curve begins.

Q. That was the only actual accident to the boat on the entire trip, was it?

A. Yes, that was the only accident. We struck other rock—scraped over them, but there was no damage.

Q. Outside of that, your trip was without mishaps whatever.

A. There was considerable excitement, but no mishaps.

Q. When you came to the falls of five feet drop, was there any other place in the falls that you could have gone down or through except where the drop was?

A. I don't know; if there had been, we did not have time to find it after we started over them.

Q. And you did not stop to find them—you did not tie up at all?

A. No, sir.

I don't know how far it was above Hinton, or how far below Radford that we had this five foot drop, it was during the trip—possibly around the middle of the day.

We reached the mouth of Indian Creek in the evening about four or five o'clock. We left Radford about eight or nine o'clock in the morning, about 8:30 in the morning, and reached Indian Creek about five o'clock in the evening. That was in West Virginia. I don't know the distance from Hinton to Radford. I suppose we traveled about 65 or 70 miles the first day. It took us an hour or so or a couple of hours to go from Indian Creek to Hinton. We had good water all the way. We did not rush into Hinton. Between the mouth of Indian Creek and Hinton, we must have gone over Bull's Falls, because it is below Indian Creek.

2152 The witness on Redirect Examination testified as follows:

I am a mechanical engineer. Mr. Walter Dudley was a very good mechanic.

I should think we took no more than 35 or 40 trips from Radford to the mouth, or above the mouth of Little River.

I would say the stage of the river when we went from Radford to Hinton was 4 or 5 or 6 feet. I don't know just what. We had no means of measuring the stages of the river. We had no gage. There may have been a gage, and possibly was a gage on the abutment of the New River wagon bridge, but we did not notice it before we left. We did not know what the stage was, but Mr. Dudley took a chance because he thought there was sufficient water to get him to Hinton. There was at least 4 or 5 feet of water above normal.

On the first trip I made to Ingle's Falls, I had perfect confidence in the engine being built to carry the boat over a reasonable current, but it just began to dawn on me that the current was just too strong; that we could not, without some change in the structure of the sluice way—that we would not be able to make that falls under our own power. At that time, we figured that if we had a much more powerful engine and loaded the boat too heavily, we would not have room for any cargo, because the river was so shallow in places. With the increased draught we would get to the point where we could not carry very much cargo.

Harvey Gunn who assisted in poling the boat weighed about 200 or 220 pounds, over 200 pounds. Mr. Hedrick, Mr. Dudley's father-in-law, was the other pole man on the other side of the boat. This boat had a wide gunwale, probably eight inches wide, so that you could walk from one end to the other, but no room for one pole man to pass the other on the return trip, so the paddle wheel had to hold all that the poles took before the pole man could get back to the bow and start his return trip, and frequently the paddle wheel would not hold and we would lose possibly half of what we had gained with the poles. That is the reason it took so long to navigate some of the falls. We did not try to climb any of the falls except Ingle's or any sluice ways. We did not attempt to go any further up.

2153 The witness on Recross Examination testified as follows:

It was a flat bottom boat. It not being a keel bottom boat, on that spread, we could carry a much larger cargo than a keel bottom boat.

We frequently scraped the bottom, because the river at that time was very muddy, owing to the washing of iron ore up in the upper stretches of the river at the ore mines. They were washing ore and dumping the waste into the river and that muddied the stream so that we could not see the bottom and we could only judge; and Mr. Dudley seemed to have an unusual ability to judge the depth of the water over an obstruction by the ripple on the surface, and yet even with that, we frequently scraped these boulders. Mr. Dudley had had long experience on that stretch of the river as a boatman.

When I decided to take the boat from Radford to Hinton, I waited for a high tide. There were some rains and they produced an abnormal rise in the river. We had a rain like that in the spring. There was a rise from every normal rain. It was a rain that caused the river to rise when we went to Hinton on the high tide, rains up in the mountains.

2154 At this point Wendell Forbes, attorney for defendant, introduced the following Exhibit, which was read into the record:

Defendant's Exhibit No. 547. Four pages; namely, page 848 of the Congressional record for January 10, 1901; page 1001 of the Congressional record for January 14, 1901; page 1002 of the Congressional record for January 14, 1901; and page 1096 of the Congressional record for January 16, 1901.

2155 **Frank P. Turner** on Direct Examination testified as follows:

I am 61 years old and live at Roanoke, Virginia. I am civil and structural engineer for the Norfolk & Western Railway. I am principal assistant engineer of that railroad.

I have made an investigation of the records of that company, to ascertain certain dates when certain parts of this road were put in operation. The records contained in the annual reports of the president and board of directors to the stockholders each year during the period of this construction, which cover the time between 1850 and 1856, indicate that the main line of the Norfolk & Western between Lynchburg and Wytheville was completed through to Bristol in 1856—completed and operated to Bristol, Virginia, in 1856. The exact date of that was October 1, 1856. The record shows that a part of that line was completed and placed in operation through to Big Lick, which is today called Roanoke, in the latter part of 1852. It was completed to Salem, Virginia, December 15, 1852. It was completed to Big Spring, now known as Elliston, August 10, 1853. The track was laid within three miles of Wytheville, 136 miles from Lynchburg, as contained in the report of October 25, 1854. The chief engineer's report, as also contained in this particular annual report dated October 18, 1855, states the track was finished 13 miles west of Wytheville. In the report of October 29, 1856, the statement is made that the road was completed and in use October 1, 1856, to Bristol, Virginia.

The annual report mentioned is a report of the president and board of directors to the stockholders, which covers the conduct of the work during any particular year. It names the officers,

directors, a brief description of the property, the income, the expenses, financial statistics, improvements of all kinds, and many other classes of information. This is a report which the officers of the company make to the stockholders annually of their conduct of the business during the past year. These reports are printed each year in pamphlet form, and the particular
2156 ones to which I refer, after a number of years, are
grouped together in book form, with the original printing, and bound together in book form. These are based on the data gotten from the engineer's office with reference to construction matters. These reports state that the road from New River Depot to Pocahontas, Virginia, was open to traffic in May, 1883, and from New River Depot to Winona, near Pearisburg, in January 1883.

With the exception of slight improvements where curvature may have been reduced, and with the further exception of one low grade line near Radford that was constructed during the years 1899 and 1900, the road to Pocahontas is essentially on the same location as it was originally.

With reference to the low grade line near Radford which I mentioned, when the road was first built, it left the main line at New River Depot and ran in a northeasterly direction on the north and west side of New River; it crossed over the hills, and extended in a general northward direction until it touched New River again at Back Creek.

During the year 1899 it was determined to build a low grade line, and, thereby, avoid the heavy grade crossing the hill opposite Radford, and this low grade line would follow New River, beginning at a point about two miles east of Radford, turning down New River, whereas the road towards Bristol turned up New River.

This line was constructed between 1899 and the latter part of 1900 on the location down New River, crossing New River, about between 4 and 5 miles below Radford, passing through a tunnel and continuing from that point on the west side of New River along its left bank until it joined the original location at Back Creek. At the time that cut-off was built it was called the low-grade line from Crab Creek to Back Creek. It was also called the Walton connecting branch. The name of that tunnel is Pepper tunnel. It is known as Pepper tunnel today. The bridge across New River is known as Pepper bridge and Pepper's ferry is about one mile south of this tunnel and bridge. Pepper's ferry is up stream. From the annual report of June 30, 1901,
2157 the following has been taken: "New River connecting
branch opened to traffic October 11, 1900." That refers to that so-called low-grade line.

The records taken from the annual report of December 31, 1886, show that the Cripple Creek extension 22.5 miles, Pulaski to Foster Falls, was placed in operation October 6, 1886. The record does not indicate that any part or section of that road was placed in operation, prior to that time. The record indicates that during the year 1884 after the work had been started in 1883, from Pulaski to a point near Ivanhoe, a distance of about 47 miles, that work was suspended during 1884, on account of financial conditions; was resumed December 1, 1885, and completed and operated by October 6, 1886. The record showed that at the time of suspension the grading had been almost completed over the 22.5 miles, but it does not indicate any part had been operated. I am unable to say that any tracks had been laid. From my investigation I did not see any statement in the report showing any tracks had been laid.

The following notation appearing on Defendant's Exhibit marked for identification 548, showing when the parts of the Norfolk & Western Railroad I have been talking about were placed in operation are correct: "From Radford to Wytheville, placed in operation October 1, 1856." This is correct according to the record in the annual report of the railway company. "From New River Depot to Pearisburg, placed in operation January, 1883, and completed line to Pocahontas was placed in operation May 21, 1883." These dates conform to the information I have found on the official records of the company. On the section from Pulaski to Foster Falls, which shows placed in operation October 6, 1886, that information is correct, according to the official records of the company.

The witness on Cross Examination testified as follows:

I think the work commenced on the Cripple Creek branch in 1883. There was then an interruption of the work for about one year, in 1884. As I recollect it said that the interruption was due to financial conditions. I did not examine that report with any degree of care to follow that up.

2158 Q. You understand from that, do you not, it wasn't directed to any particular financial condition of the company, but to financial conditions generally throughout the country, which did not justify the going forward with the project at that time?

A. I could not say just what brought that about.

Q. That was your understanding?

A. Yes, sir.

Defendant's Exhibit No. 548, being a map entitled "Railroads in relation to New River showing approximate locations and dates of completion," offered in evidence.

J. B. Snethlage on Direct Examination testified as follows:

I am 39 years old and live at Hawthorne, New Jersey. I am a civil engineer, associated with Daniel W. Meade and F. W. Scheidenhelm, Consulting Engineers, New York.

The line and the notation "placed in operation 1873" appearing on the map marked Defendant's Exhibit 548 refers to the year in which that part of the C. & O. Railway shown on this map was placed in operation. The part of the Chesapeake and Ohio Railway shown on that map is along New River; a small part along the Greenbrier River, from Lowell past Charleston, in the State of West Virginia. I derived the information for putting on that map that part of the line which was placed in operation in 1873, from a book entitled "History of the Chesapeake and Ohio Railway Company," by James Poyntz Nelson, Special Engineer of Valuation, dated February 24, 1927, and printed by the Lewis Printing Company, Incorporated, Richmond, Virginia.

The witness read the following from page 1, first paragraph of the book referred to above by James Poyntz Nelson: "The story of the Chesapeake and Ohio Railway Company, its subsidiaries and antecedents as contained in the testimony of James P. Nelson, Special Engineer, Valuation, at its Valuation hearing February 24, 1927, before Examiner Conway of the Interstate Commerce Commission, at Washington, D. C., in Valuation Dockets 457-477."

2159 I have not read all of that book.

By Mr. Abbot. While I don't mean to be testifying, Mr. Nelson was, I think, about the oldest engineer in the service of the Chesapeake & Ohio at the time of the valuation hearing, and he had worked on practically all of the original construction of the Chesapeake & Ohio, and he prepared that history, which was read into the record and it is the history of the railroad company as appears in the Valuation files of the Interstate Commerce Commission, and is published by the company.

The information I have been speaking about was obtained from that book on page 16 and page 29. Page 16 states that the successful "Linking of the waters of the Chesapeake with the waters of the Ohio was completed January 29, 1873, when the rails from the west and the east were connected." On page 29 it is stated: "In 1873 it was possible to put trains over the line on the New River Canyon but the work of construction was by no means completed."

The witness on Cross Examination testified as follows:

This chart, Exhibit No. 548, was prepared under my direction. I believe that the location of the various lines of railway down the New River below Hinton, that is from Hinton, down to the Kanawha, is as accurate as can be shown.

The line going across the chart on which is the inscription "Placed in operation 1873" has reference to that portion of the Chesapeake and Ohio up the New River to Hinton, and thence up the Greenbrier and has no reference to the Virginian Railroad, which line it crosses near the center of the chart.

2160 A. A. L. Mathews

DIRECT EXAMINATION

Q. Mr. Mathews, will you state your full name and residence for the record?

A. A. A. L. Mathews; Blacksburg, Virginia.

Q. What is your present occupation?

A. I am in the Department of Geology in the Virginia Polytechnic Institute, Blacksburg, Virginia.

Q. Where were you educated, Mr. Mathews?

A. I received my Bachelor of Arts Degree from the Iowa Teachers State College in 1907.

In 1924 I received Master of Arts from Leland Stanford Junior University, Stanford, California.

I have completed all the work required for the Doctor of Philosophy Degree from the University of Chicago with the exception of my final examination. My thesis, which was on a geology subject, has been accepted and published in 1929.

In both Stanford University and University of Chicago my major work was in the Department of Geology.

Q. What did you do after you graduated from Iowa State Teachers College in 1907?

A. After teaching in secondary school, I was instructor at Miami University, Oxford, Ohio, during the period from 1911 to 1915.

From 1915 to 1929 I was professor of geology in the University of Utah, Salt Lake City, Utah, with the exception of the school year 1927-28, when I was lecturer in geology in the University of Chicago.

In 1929 to 1931, I was professor of geology in Oberlin College, Oberlin, Ohio.

From 1931 to 1935 I was occupied with various occupations in geology, a part of the time doing commercial assignments, and at different times acted as field geologist for the State Geological Survey of Virginia.

2161 Since 1935 I have been in the Department of Geology at the Virginia Polytechnic Institute.

Q. Have you any specialty in the field of geology, Mr. Mathews?

A. I have specialized in stratigraphy. That is that branch of geology which deals with the composition and structure of the rocks which form the earth's crust. That branch of geology which deals with the ore position of the rock strata is also called structural geology.

Q. Mr. Mathews, have you had published any papers or articles upon professional and scientific subjects?

A. Yes, in 1925 an abstract of my paper on Low Angle Unconformatives in Eastern Utah, was published by the Pacific Coast Division of the Geological Society of America.

In 1929 my Doctor thesis was published as Walker Museum Memoir, volume 1, No. 1.

Q. Anything further?

A. In 1930 (I think it was 1930 or 1931) an abstract was published of my paper on the Thrust structure of Central Wasatch Mountains, by the Geological Society of America.

In 1934, I think it was, an abstract was published on my paper on New Lights on Giles County Structure, by the Virginia Academy of Science.

Previously, I think in 1930, a paper of mine of the Narrows section, Virginia, was published by the Ohio Academy of Science.

In 1934, the Virginia Geological Survey published Bulletin 40, my report on Marble Prospects of Giles County, Virginia.

In 1935, an abstract of my paper on Further Lights on Giles County Structure, was published by the Virginia Academy of Science.

I have various other publications, some of which have been referred to by men of my profession.

Q. What, if any, field experience have you had in geology?

A. Besides the field work in the Virginia Geological Survey, I have served as field geologist for several private individuals and corporations in the States of Utah, Wyoming, California and West Virginia.

Q. Are you now engaged in work for the Geological Survey of Virginia?

2162 A. There are occasions during vacation when the Geological Survey of Virginia engages me in field work.

Q. You referred to your study of geology in Giles County; State whether or not that was work for the Virginia Geological Survey?

A. My first assignment in Virginia was to study, map and reports on the geology of Giles County, Virginia. The results of this work are nearly completed and will be published as a bulletin by the State Geological Survey.

Q. In your study of the geology of Giles County, did you have occasion to become acquainted with New River?

A. I did.

Q. And what section of New River did you have occasion to come acquainted with?

A. I studied intensively that section that is included in the undary lines of Giles County.

Q. In that study, did you have any opportunity to observe d study the relation of geological factors to the physical characteristics of New River?

A. I did.

Q. Did this study have anything to do with the suit in which u are now testifying?

A. It did not. I made this study for the State.

Q. Mr. Mathews, have you stated fully the part of New River hich you studied?

A. No. It was my privilege, as geologist for the State, to study lationship immediately outside of the boundary, but no conderable distance from the boundary line of Giles County.

Q. What determines the physical characteristics of New River?

A. The physical characteristics of New River are determined the geology of the area through which it flows.

Q. Please explain, Mr. Mathews, how it is that the geology of is region is controlling with reference to the characteristics of New River?

163 A. In the region along the river, extending for about 35 miles up the river from Glen Lyn, in that region the eology is of such nature that the relationship between the eology and the physical character of the river involve two priary laws of nature. One is that in their down grade or down ill movement, rivers always seek the easiest course. The other that a river does not widen its bed or channel laterally until has attained its ultimate and relatively flat grade.

By Mr. Thompson:

Q. Do you mind saying that again?

A. The other is that a river does not widen its bed or channel terally until it has attained its ultimate and relatively flat rade.

The first of those, I think, needs no explanation. The second eans that, given time, a river will eventually adjust itself to e geological environment and will adopt for itself the easiest ourse which is available.

By Mr. Jackson:

Q. Will you explain what is the easiest course for a stream follow, in this geological sense that you have defined?

A. In a region where the rock formations are near the surface, nd especially where those formations are of hard or resistant rock, the easiest course is to follow the trend or direction of the dipping strata. Those streams usually follow along out-cropping strata which are relatively easy to erode, and remain away from strata which are relatively hard or resistant.

Whem, however, streams which have rather steep gradients or slopes are forced by physical conditions to cross out-cropping ledges of resistant rock, the streams, in general, will do such crossing at right angles to the trend of the rock strata. That is, in other words, if the rock strata is this way [illustrating], the river flows this way [illustrating], at right angles to the trend of the strata.

Q. Has this second geological law that you have mentioned any bearing upon the present condition of New River?

A. No. New River is what we geologists call a young stream.
That is, it has not yet completely adjusted itself to the
2164 geologic environment. It has not yet cut down through
its length to such level that it has a low gradient or slope.
It is still in the process of cutting down vertically through these
rock strata.

Q. Is there anything unusual about the geological environment of New River, this 35 mile section upstream from Glen Lyn, or the Giles County lower line?

A. From the standpoint of the geologist, the geologic environment of New River is markedly unusual. The region has been folded and faulted—that is broken. At one time, millions of years ago, the rock strata now represented in the area were horizontal, but, due to the great earth forces exerted during the geologic ages, the rock strata were folded, twisted and broken. So intensive has this warping and breaking of the rocks been, that various rock strata, which normally were at the bottom, so to speak, have been thrust up and over rock strata which ordinarily would lie uppermost.

This particular area of New River has been the scene of four predominant breaks or faults.

Perhaps the most unusual thing about the geologic condition in the region in point is the concentration of the folding and faulting within the relatively narrow area—that is the distance from Glen Lyn up stream to the south limit of Giles County. Elsewhere, northeastward and southwestward from the area and away from New River, there are these same faults, major faults. But in that area they are much wider apart. In other words, the faulting away from New River is less concentrated.

Q. Mr. Mathews, what is the result of such folding and faulting, so far as the physical characteristics of New River are concerned?

A. As is frequently the case with faults, the faulting in this area has resulted in the tilting of the rock strata, and, due to the concentration of the faultings, the strata are largely tilted to a very steep degree. In many cases they approach the vertical. The prevailing slope of the strata is downward, in a southeastward direction. This means that such slope or dip is southeastward.

By Mr. THOMPSON:

2165 Q. That is from northeast to southeast?

A. No, sir. The slope of the rock strata is towards the southeast. It would be from northwest to southeast. This means that such slope ~~or dip~~ is southeastward—that is prevailing in this 'ection in an up-stream direction.

By Mr. JACKSON:

Q. What, if anything, does that condition or situation have to do with the physical characteristics of New River?

A. In its flow, the water of New River moves along and up the slopes of successive rock strata or ledges, and frequently falls over the upper or out-cropping edges of these ledges. In many cases, the falling over of outcropping edges is practically sheer or perpendicular. This is especially true where the water flows over the top of a stratum which is relatively resistant and which lies upstream adjacent to and from the strata which is relatively non resistant.

In other words, this results in a river with numerous ledges of rock strata, some partly submerged, some exposed, which are substantially vertical or standing on end, and which extend across the stream at right angles to the line of flow, this condition results in a stream with numerous submerged ledges, forming shoals, rapids, and falls.

Q. What is the composition or character of these strata which you have described as relatively resistant?

A. They are sandstone, limestone, dolomites, flint beds, and so forth. These are more resistant than the shale or shaley sandstone or shaley limestone found here and there. Generally, the out-croppings of the resistant rock strata extend at right angles across the stream.

Q. Is there any geological reason for the fact that this strata extends at right angles across the stream?

A. Yes. That is due to what I have already referred to as a primary law, namely, that when forced to cross a resistant rock strata, the steeply sloping streams generally do so at right angles to the trend of the strata. That is a usual phenomenon in nature.

By Mr. **Thompson**:

Q. When you speak of these sandstone and limestone and dolomite regions, are they the ones you say are resistant?

2166 A. They are resistant.

By Mr. **Jackson**:

Q. What, if anything, is unusual, geologically, about this situation you have described in this section of New River that you have studied?

A. First the concentration of the strata which dip fairly steeply and are composed of resistant rocks; second, the fact that the prevailing slope is downward in an up-stream direction rather than in a down-stream direction.

By Mr. **Thompson**:

Q. Upstream instead of down-stream?

A. Upstream. The slope of the strata is downward in an up-stream direction rather than in a down-stream direction.

In the case of most streams flowing over sloping rock beds, the slope or the dip is downward, in a down-stream direction. Here, however, the reverse is true.

By Mr. **Jackson**:

Q. Mr. Mathews, can you give any instance where the effect of these geological conditions is shown in the profiles of New River?

A. The greatest concentration of out-cropping ledges with steep slopes, and composed of resistant material, exist in the vicinity of the Big Falls in the uppermost Giles County line and in the vicinity of the Narrows.

By Mr. **Thompson**:

Q. What do you mean by the Big Falls?

A. The falls in New River between Gap Mountain and Walker's Mountain.

By Mr. **Jackson**:

Q. Are those known as the Walker Mountain Falls?

A. I never heard them so designated.

Q. All right.

A. One day, from a point on the right side of New River above the Virginian Railroad track, opposite Dry Branch (that is the stream); I counted, by looking down the river, 86 riffles. 45 distinct riffles or falls were counted in the first $^{7}/_{10}$ of a mile below the ferry at McCoy.

2167 Q. That is 45 what?

A. 45 riffles were counted down-stream.

Q. Mr. Mathews, what effect, if any, do these geological conditions you have described have upon the depths of water?

A. In general, immediately upstream from a riffle or fall, the water is relatively shallow; while immediately downstream where relatively nonresistant rock has been eroded, the water is somewhat deeper.

Q. Mr. Mathews, you referred to New River as a young river; will you explain a little more fully as to that?

A. New River is young in the sense that its valley and bed have not yet attained their final form and level. On the other hand, so far as concerns the existence of the stream in this geographic vicinity, New River is very old. There are few rivers on the American continent which have existed for a greater length of time. Historically speaking, New River is old. Physically speaking, New River is young. The latter fact is evident by the limited number and extent of flood plains.

Q. Will you explain a little more fully what you mean by your reference to the limited number and extent of flood plains?

A. The stream is still engaged in cutting or eroding downward; its slope is still steep, thus it still has velocities of flow so high there is little or no opportunity for cutting out enough widths of the stream bed so that a flood plain can build up.

Q. Mr. Mathews, in the course of your study of the geology of New River in this thirty-five mile section in Giles County, did you take any photographs?

A. Yes, sir; I took several photographs.

By Mr. Jackson:

I produce an album of photographs, containing twenty-seven photographs, marked 1 to 27, respectively, and ask to have the album marked as Defendant's Exhibit #549, for identification.

Q. Mr. Matthews, I show you a book of photographs marked Exhibit #549 for identification, and ask you whether those photographs were taken by you?

A. They were taken by myself.

Q. All of them?

A. All of them.

Q. And approximately when were they taken?

A. The majority were taken in the summer of 1931.

Q. And are those legends under the photographs intended merely to show the location of the picture and the direction in which the camera was pointed?

A. That is all. The numbers refer to the album number.

Q. Were these pictures taken by you for the purposes of this case?

A. They were not. They were taken for the State of Virginia.

Q. And do those photographs in Exhibit #549 marked for identification, numbered 1 to 27, accurately and truthfully portray the scene which met the eye at the time and place where those pictures were taken?

A. They do.

Photographs marked 1 to 27, respectively, were introduced in evidence and marked Defendant's Exhibit #549.

Q. Mr. Mathews, in taking these photographs, did you have any occasion to cross New River?

A. I did.

Q. And how did you cross New River?

2168 A. I crossed New River by bridge, on a ferry, and at one time I waded the river.

Q. Where did you wade the river?

A. In the vicinity of Dry Branch.

Q. How deep was the water where you waded the river?

A. At the deepest place it was a little below my knees.

Q. And on that particular occasion, did you recross the river?

A. I did.

Q. And how did you recross it?

A. I waded back.

Q. Now, Mr. Mathews, will you take the album of photographs, Exhibit 549, and beginning with #1 state what those photographs show?

A. Photograph #1 was taken from the Virginian Railroad bridge, above Glen Lyn, looking downstream. The photograph was taken to show the evidence of suggestive upheavals of the earth in this area, and the result of New River cutting down through those upheavals. In the center part of the photograph is a line that appears to be the contour of the distant mountain. At the top, near the skyline, is a level. That level represents the elevation of the surface that New River flowed over at that time. Since that time it has cut down to its present position.

Q. How long ago was it New River flowed at that level?

A. Well, we geologists refer to geologic time in terms of geologic time. That level is what is known as the Tertiary peneplain.

Q. Is that in the order of hundreds of years or thousands, or what?

A. No, it would be millions of years.

Q. Does that picture #1 show any riffles?

A. It does show some riffles in the immediate foreground, above the bridge.

Q. Have you finished with Photograph #1?

A. Yes, sir.

Q. Turn now to Photograph #2.

2169 A. Photograph #2 was taken at the first bend of New River, above Glen Lyn. It was taken for the express purpose of showing how rock strata trends across the bend in the river. It can be seen by this photograph that the strata trends completely across the bend of the river, thus the river cuts across the same strata twice.

Q. Will you now turn to Photograph #3?

A. Photograph #3 was taken a little distance below Lurich. It is looking downstream. It is at the opposite end of the strata that was represented in the preceding photograph. Here it can be seen that the rocks stick up almost vertically, in a southeasterly direction.

Q. Proceed to Photograph #4.

A. Photograph #4 was taken especially to show New River Valley in the Narrows. You can see in the distance that the river occupies practically the complete width of the nitch or gorge formed by itself. In the foreground are several islands. In this picture one can observe five different rapids.

Q. Will you turn now to Photograph #5 and explain that photograph?

A. Photograph #5 was taken a little above Rich Creek, probably a little less than one mile. The direction is across the river toward the southwest. This shows resistant strata outcropping on the opposite bank. It is the type of strata that forms ledges and outcrops across the river.

Q. Turn to picture #6, if you have completed with #5.

A. No. 6 represents the lower outcrop of the lower falls in the Narrows, where the resistant strata is dipping in a southeastward direction, or in an upstream direction.

Q. Is the dip steep or otherwise?

A. The dip is relatively steep.

Q. Will you proceed to describe #7?

By the Court:

Mr. Mathews, in Photograph #6 the mountain side—there seems to be streaks or lines there—is that the outcropping strata there?

2170 A. It is your Honor, and that cut by the Norfolk and Western exposes the general inclination of the rock strata.

A. No. 7 is the upstream portion of that lower section. Here again the rocks dip in an upstream direction.

Q. What kind of rock is that?

A. That rock is resistant ledges of sandstone.

Q. Go ahead with #8.

A. #8 is a picture showing the falls of New River.

Q. Where?

A. In the Narrows.

By Mr. THOMPSON:

Q. Is this the big falls?

A. No, this is not the big falls. These are the falls of New River in the Narrows below Narrows, Va.

By Mr. JACKSON:

Q. Will you proceed?

A. These falls are formed by very hard and resistant sandstone, what we geologists call the Clinch sandstone. Here again all of the strata are shown to be dipping upstream.

No. 9 is the lower bed of the preceding falls, just a closer view of them.

Note in the right hand corner of the picture that the water running over the outcrop falls almost vertically.

No. 10 is another view of the falls in the Narrows. The camera is pointed a little upstream showing the complete width of the falls in the Narrows.

No. 11 is another view taken from the northeast bank of the river, looking toward the southwest of the falls at the Narrows, where we have practically the complete outcrop of the Clinch sandstone, which forms these falls.

Note again that all the strata represented in the picture shows a southeastward dip or a dip upstream.

2171 Photograph #12 is the lower portion of the rapids, above the falls at the Narrows. Here again is a resistant stratum of sandstone that is dipping upstream, and here again the water flowing over the upper edges of that stratum, falls almost vertically.

No. 13 is a general picture of the rapids above the falls of the Narrows. In each of the lines crossing New River there are, or there was at this particular time, almost vertical falls.

In No. 14 we have a little different situation. This picture is taken at the west end of Pearis Island, at Bluff City, Virginia, where the rock strata dip downward in a downstream direction. The river flowing across the upper edge and running down the downstream dip of the stratum.

You will note in this picture that the break in the water is very much wider and much more gentle than shown in the preceding pictures.

Q. Has that anything to do with the tile of the stratum?

A. It is due to the tilt of the stratum, this is the type of fall or rapid that usually occurs in rivers elsewhere.

Q. Is it typical of this section of the river?

A. It is not typical of this section of New River. It is the unusual feature in this section of New River.

Q. Will you proceed to the next photograph?

A. The next picture was taken just below Klotz.

By the COURT. At what point is Klotz? I never heard of it.

A. Klotz is downstream, and across the river from Ripplemead. It is on the road between Ripplemead and Kimbleton.

Q. How far below Ripplemead?

A. I would think about a mile and a half or two miles.

By Mr. THOMPSON:

Q. Where is Klotz?

A. It is on the northeast side of New River downstream from Rippelmead, Virginia, a distance of one and a half to two miles on the road from Ripplemead to Kimbleton, Va.

2172 A. This picture was taken primarily to show what is meant by "entrenched valley or stream." That is, it shows that at one time that level at the top, not the mountain in the distance, but the level at the top, New River flowed over that level, and made it, and after this last large uprise New River was caught in that meander and has never since been able to get out of that channel. At a matter of fact those curves represent the position that New River attained at the time it flowed over the level referred to. In this picture you will notice, with the exception of the immediate foreground, that the stream occupies practically the entire width of the valley.

By Mr. JACKSON:

Q. How much higher was the old level, the extent of those uplifts you spoke about?

A. That is quite a story.

Q. Just briefly.

A. In the general area after the folding and faulting was planed down (after the folding and out faulting of that region under discussion), this is, it is assumed to have been plained down, with New River as one of the agents, then there was an uplift of the general area for probably hundreds of miles.

Q. To what extent in feet, can you say?

A. To a rise of approximately 1,000 or 1,400 feet, and then there was another period of quiescence. The New River and tributaries wore down again to a new level, and then another uprise for a distance of over 2000 feet, and now New River and its tributaries are cutting down through the second major uplift.

Q. Will you now describe what photograph #16 shows?

A. Photograph #16 was taken to show the condition of the rock underneath the surface at Ripplemead, Virginia, during or at the time of the construction of the new highway bridge at that locality. In that particular area are limestones that are very soluble and this crane broke through a ledge of limestone and down into one of those sub-surface caverns.

2173 Q. No. 17.

A. No. 17 shows the rapids just below Berton, at Berton, Va., where again the resistant rock outcrops across the river almost at right angles to the general flow of the river. Notice in this picture that the dip of the stratum is very much steeper than the dip of the strata in the preceding photographs.

Q. In which direction?

A. It dips upstream.

Q. Now turn to No. 18.

A. No. 18 is the upper member of that rapids and it shows how the rocks outcrop in general across the river.

Q. You say the upper member.—

A. The upper member of the rapids shown in the preceding picture.

The next picture shows the lower member of the rapids.

Q. Is that No. 19?

A. No. 19. You will notice in this photograph that the rock appears to be hollowed or moth-eaten, although these rocks are slightly soluble they are still resistant to the erosive forces of New River. This also shows the attitude or dip of the rock better than the preceding picture. That is upstream.

Q. Now No. 20.

A. Photograph No. 20 shows the outcrop forming a part further upstream of the rapids. This is at Berton, Va., and here again the rock strata trend across the river at right angles.

No. 21 shows a view of the falls and rapids above Berton, Va. In the distance is the gap between Gap Mountain and Walker's mountain. It is in that gap that the big falls are located.

No. 22 shows the big falls of New River in the gap, at the southernmost boundary line of Giles County, Virginia. The outcrops of the rock across the river show the very high inclination of the rock strata.

Q. You refer to the strata shown on the mountain side?

A. Yes, sir.

2174 No. 23 is a close up view of the big falls on New River at the Gap.

No. 24 shows the portion of the falls at the Gap, where you will see in the foreground of this picture that the water over at least a part of the outcrop falls perpendicular or vertical.

Q. You said a portion, which portion?

A. Near the right hand side, and also near the left hand side.

Q. Looking which way?

A. The observer's right hand side.

Q. I am talking about the picture, which way is it looking?

A. The observer is looking across and slightly upstream.

No. 25 is another view of the more westerly portion of the falls at the same locality. You will note in this picture that large boulders have been broken off from the outcrop and occur on the downstream side of these outcrops.

No. 26 was taken especially to show the relation of the river where it flows across a relatively nonresistant formation. Even here there are certain rock strata which are sufficiently resistant to form outcrops completely across the river, although at this place the river is somewhat widened.

Q. What are the nature of those rocks?

A. The nature of the rocks are somewhat resistant sandstone strata imbedded in shales.

Q. Proceed.

A. No. 27 is a view of New River which was taken near the mouth of Dry Branch, looking upstream from that point, toward Parrott, Virginia, in Pulaski County. You will note in this picture there are many falls and rapids along this section.

CROSS-EXAMINATION

Q. Mr. Mathews, what is your position at V. P. I. now?

A. I am instructor in the Department of Geology.

* * * * *

2175 Q. Now you spoke of this river being an unusual river in that it cuts across the mountain, that is the stratum or strata of mountain; am I correct in that?

A. I believe I said it was an unusual river because it cuts across where you have a concentration of steep strata where the beds dip in an upstream direction.

Q. That is not so unusual, is it?

A. Well, I tried to think of another river that did the same, but I do not know of any.

Q. How long were you in the State of Utah?

A. For the period that I mentioned.

Q. 15 years?

A. Thereabouts.

Q. You taught at the State University?

A. I did.

Q. Did you ever hear of the Dolores River?

A. I did, but I have never visited the Dolores River, neither did I have occasion to study the Dolores River.

Q. And you do not know that the Dolores River is known as the paradox river and is in the Paradox Valley, and the reason for it is that it cuts right straight across the mountain range, you don't know that, do you?

A. What is the dip of the bed of the Dolores River?

Q. I am not answering the questions; it is one of the interesting characteristics, is it not, of the State of Utah, geologically?

A. There are many interesting characteristics of the State of Utah.

Q. I am asking if that is not one of them?

A. I presume it is.

Q. That any geologist in the State of Utah ought to know about?

A. No, I would not say that.

Q. It is a fact, isn't it, that it cuts right straight through Sandstone?

2176 A. As I said before, I do not know the geology of the Dolores River.

Q. Now let's go over to this question of formation in this river. I believe you said there were certain strata that stuck up in the river and you said that some of them were—well, tell us again what different kinds of it there were—you said one was sandstone, am I correct in that?

A. Yes, sir.

Q. Dolamite?

A. And Limestone.

Q. And you said that they were very impervious to water, is that right, they would not wear down?

A. No, I do not mean to convey that at all. There are resistant members in sandstone formations; there are resistant members in limestone formation, and in dolamite formations. The chert beds are always resistant.

Now, just because the formation of the limestone is of limestone, that is no sign that it is resistant, and just because the formation is a dolamite, that is not a sign that it is, but there are certain members in dolamitic formations that would be more resistant than other members in the dolamitic formation.

Q. You did not say that in your examination in chief, did you?

A. No, but I am saying it now.

Q. You gave it unqualifiedly that one of them was limestone and they were very resistant, isn't that correct?

A. Well, I don't believe that I was asked that question, to distinguish between them.

Q. Didn't you say that there were ledges of limestone that was very resistant—you said they were very resistant, and used an illustration of something that might not wear down, did you not?

A. They are ledges.

Q. Well, as a matter of fact, isn't limestone solvent in water over a period of time?

2177 A. It is.

Q. And isn't it a fact that you find that limestone is much different from feldspar granite and substances of that kind, they are the ones that stand up against water?

A. That is not entirely true. If you will go along the northern Wasatch Mountains, above Brigham, Utah, you will find a series of limestone that are at least two to four thousand feet in thickness, one of the common ledge of nature is the Central Wasatch, and I think it shows very clearly in the City Creek Canyon at Salt Lake City. The Madison limestone is several hundred feet thick.

Q. The limestone outcropping here that you speak of is not any several hundred feet thick, is it?

A. Some of them are.

Q. None of them in this river—you do not mean to tell the court that there is any—I am speaking about outcrops?

A. The major——

Q. What is the width of the limestone and where was that found, the limestone down there, the width of the outcropping, that is going to be worn off by the water, is it not?

A. The depth of the Copper Ridge formation at Narrows is approximately 2,000 feet thick.

Q. That is true, but the outcropping, the particular part that is shown in these pictures here is not more than a foot or two wide, is it, that outcrop?

A. You mean a single bed?

Q. Yes, sir.

A. Oh, no, the single beds will vary from two inches up to four or five feet or probably even more than that.

Q. And it is your experience that one of the easiest rocks to leach out is lime, is that correct?

A. There are certain formations of limestone that leach rather rapidly, the formation from the vicinity of Newport over to the vicinity of Narrows is the Murphreesboro limestone. 2178 Now that is a very thin-bedded limestone, some of the beds not being over half an inch in thickness. It is a type of limestone that the water can circulate through readily and easily and therefore it is soluble.

Q. Yes, that is what I thought. I don't know the Town of Murphreesboro; can you give me more details about that?

A. That is not a town, that is a formation.

Q. Where is that located on the river?

A. I gave you the location, it is distributed over that area.

Q. So that the limestone outcropping that you speak of are known as the Murphreesboro limestone?

A. It is the limestone outcropping that I referred to in my testimony at Ripplemead Bridge, that is the Murphreesboro limestone.

Q. I understood you to say that that is not where it outcrops thick at all, is that right, at this bridge, or wherever you say?

A. No.

Q. As I understand you, it is not thick, that is correct, is it?

A. It is not a very thick formation.

Q. How old would you estimate in geological years this New River channel is?

A. Well, sir, if you will give me the basis for making that estimate, I will give you an approximate estimate of time in years.

Q. I am asking you now, because I am a seeker after light on this question.

A. It is better to refer to the age of a river in that respect in geologic terms rather than years.

Q. Now you said the tertiary, didn't you?

A. I did.

Q. And how many million years back is the tertiary?

A. That depends on the author of the estimate. It is variable from a few million years to possibly up to, I judge, fifty million.

2179 Q. So that New River was really flowing, you would say, two million years ago?

A. That is our geologic concept of New River.

Q. And the changes that come about in the flow of New River are almost imperceptible, aren't they?

A. Well, in terms of geology, a river like New River in a region like it flows through, from a geologic sense changes are very rapid.

Q. What do you mean by rapid?

A. I mean that because of the grade of the stream that the downcutting is very much more rapid, than laterally, that is you do not have a widening of the stream or of the stream channel, but you have a downcutting.

Q. Would there be a perceptible change for instance in the outcroppings which you have shown us in these pictures say in 200 years?

A. The probability is that there would be a perceptible change but it would depend on what limitation of perceptibility is indicated.

Q. Well, let's try to keep this in laymen's terms now. Would one of those outcroppings that you speak of, wear 3 inches in 100 years?

A. I doubt whether there is any definite rate ever been compiled on that factor.

Q. Speaking in terms of the life of a man, the wearing down is a very slow process, isn't it?

A. But relatively speaking, from a geologic standpoint, in a situation like New River, it is very rapid, it is just the same as Niagara Falls. Niagara Falls has been measured, but it is relatively rapid. I think it was only a year or two ago when a considerable ledge broke off there.

Q. That had been working on it for hundreds of years?

A. Yes, sir.

Q. And there was, of course, a very much higher water pressure than you have for New River, from the pictures shown?

A. That is a question of relativity that I am not qualified to answer.

2180 Q. In the next fifty years will there be any perceptible change in this compressed outcropping that you speak of out there near Glen Lyn, will there be, let us say, an inch worn off?

A. Well, I have no basis for thinking there would or there would not be.

Q. So you really don't know?

A. I really don't know how much would be worn off.

Q. Now there has been a channel, a thing that we call a channel so far as that river is concerned, if I understand you correctly, for many, many hundreds of years.

A. You used the word channel—the use of the word channel in my testimony refers to the width, or the entire width of the river.

Q. And you have said that you are not a hydrographer; do you know anything about channels?

A. No, from the standpoint you are referring to.

Q. I am referring now to the question of channel down the river, so that none of your testimony goes to the question of any channel down the river, does it?

A. Well, I could not truthfully answer that question yes or no, because I don't know what you mean by channel.

Q. I mean by channel, a place where the greatest flow of the water of the riverbed that you speak of concentrates and goes down?

A. Will you state the question again?

Q. Read the question to him. (Question read.) Do I make that intelligent?

A. You do not make it clear to me, sir.

Q. Let me see if I can do it better. In every river bed there is one place where the stream flow is more concentrated than in another part of that bed, speaking as to the relationship across the bed; that is true, isn't it? In other words, you never saw a river of the same depth all the way across, did you?

A. I would not say it did not exist, but the probability of its existence is slight.

2181 Q. You are not testifying here today about any channel in the stream?

A. I am not testifying about that particular depth that you are referring to now, is that it?

Q. Yes, that is right.

A. Will you state the question again.

Q. That concentration of water that comes down the bed of the stream, as I understand it, you are not testifying as to that particular phase?

A. That is right.

Q. You are only testifying as to the stream with respect to its entire width?

A. I am testifying to the physical condition of the river in reference to the geology of the region through which it flows.

Q. You said that there were four predominant breaks or faults in the river; now what were they?

A. I referred to the general geology of the entire region through which the river traverses, is that what you mean?

Q. Yes. As I understood you, those breaks or faults cross the river bed and there are four of them; what were they?

A. The names beginning from the northwest to the southeast——

Q. All right.

A. The St. Clair fault, the Narrows fault, the Saltville fault and the Pulaski fault.

Q. And those faults as I understand, were caused by an upheaval, were they not, from the center of the earth, in some way or another?

A. I think I testified that they were caused because of earth forces.

Q. In other words, the earth folding together and pushing up?

A. Pushing them up, it would be in a fold something like that [indicating].

Q. Do each of those faults occur only once in the river?

A. Those faults occur only once on the river in that area.

2182 Q. In other words, you are now talking just about this area?

A. From Belspring to Glen Lyn.

Q. So they only occur once each time, is that correct?

A. That is correct.

Q. Did you speak of a fault that you call the Narrows Fault?

A. I did.

Q. You are familiar with this map, are you not [Exhibiting map to witness]—Geological Map of the Appalachian Valley in Virginia?

A. I am.

Q. See if that Narrows fault does not appear twice?

A. It appears once.

Q. All right, come down here [indicating].

A. Oh, that is not in the New River section, this is way up to the southwest, this should be up here [indicating], that gives you the whole valley, clear across the state of Virginia.

Q. What does that line there mean?

A. That line means, H. H., that is drawn on the map to show the location of the section that this author has interpreted.

Q. Down in the lower right hand corner of this map—you have got your finger right there—do you see the St. Clair fault?

A. The St. Clair fault is right there.

Q. And then on down here is the Narrows 1, and Narrows two; doesn't that show that fault twice?

A. It does on that map, that is due to the fact——

Q. So you would change your testimony in that respect and way that the map shows the Narrows fault twice?

A. May I answer that this way?

Q. Oh, yes, go ahead and answer it.

A. On the west side of the river—southwest side of the river, the Narrows fault divides into two segments, or two faults, what we call a split fault. On this side it is only traceable in one—some place between the west side of the river and the east side, these in two faults come together, don't you see, and that accounts for the statement. 2183

Q. Now will you identify this map for us, Geological Map of the Appalachian Valley in Virginia, by Charles Butts, and he is the State Commissioner of Conservation.

A. Dr. Butts is a geologist of the State Geological Survey and was employed to do this survey—this geological survey work for the State of Virginia and the map was published, as I remember, in conjunction with the State Geological Survey, and the work of the Federal Government.

Q. This is an authoritative map, isn't it?

A. In a general way, yes.

Q. And accurate, too, you would say, isn't it?

A. Not in detail.

Q. It is not?

A. It is not.

Q. Geologists consider it inaccurate in this State?

A. That is right.

Q. Your own conf'rers would say that, would they?

A. They would. If you will bring the map over here, I will show you——

Q. You concede, as I understand you now, that so far as t river is concerned, this Narrows fault does appear twice, is that correct?

A. On the west side of the river, I have never been able to trace it across the river channel itself, and so far as I know, no one else has ever been able to do that. On the east side of the bank at that particular place you have the rock strata in general covered by gravel terrace.

Q. Doesn't this map show up here about a mile from the river, where this fault separates and goes acorss the river?

A. No, it is right on the river. He has drawn this wrongly in here. As a matter of fact, Dr. Butts says himself that this is wrong in here.

2184 Q. He does?

A. He does.

Q. So that you would say that if he was here to testify he would say that there is a mistake in this map with respect to that fault, wouldn't he?

A. I never like to testify to what another man will say in Court.

Q. You have heard him say that it was wrong then?

A. I have heard him say that it was wrong, and I pointed it out to him and called his attention to it and he admitted it was wrong at that time.

Q. Where is Dr. Butts?

A. In Washington—his residence is in Washington.

Q. What is he doing in Washington, where is he in case we should want to locate him?

A. I think his office is in the U. S. National Museum.

Q. Now how many of these outcroppings of strata did you say there were that you counted there between the Gap Mountain and Walker Mountain?

A. I did not make a count—I repeat it, it is in the record stated, in one point across the stream from Dry Branch it seems there are two different interpretations about Dry Branch, the stream is on the Southwest side——

Q. Help me out and show me where that is on here, will you? [Referring to map posted on easel.]

A. That ought to be in here some place [indicating].

Q. It would be downstream from Pepper's ferry?

A. Downstream from Belspring.

Q. And you were standing on the left hand side?

A. No, I was on the right hand side.

Q. And you were up on a hill, weren't you.

A. I was.

Q. And you were looking downstream, were you not?

2185 A. I was looking across, up and downstream.

Q. How many of these outcroppings did you say that ou could see looking downstream?

A. I didn't count them looking downstream, I counted them as I could stand in one place looking upstream and downstream, nd I counted 86.

Q. In what area were you looking? Approximately now, that s what distance?

A. Oh, I couldn't say.

Q. Give us your best estimate?

A. Well, it would be over a mile.

Q. Approximately a mile?

A. Well, it would be over a mile.

Q. Would it be over a mile and a quarter?

A. It might be, I dislike to say.

Q. You testified that you stood there and made that count, and I am just trying to get as nearly accurate as I can what you aid; you counted 86; did you go down and inspect them down t close range?

A. No, I did not inspect all of them.

Q. How far apart were those outcroppings?

A. I mean to say, if I didn't say it, that I counted 86 riffles.

Q. Riffles?

A. Yes, sir.

Q. And you think that each riffle you see indicates one stratum, hat is right?

A. Well, it might indicate more than one stratum.

Q. It might indicate more, but I am asking you does it always ndicate any stratum?

A. It does not, because a row of boulders strung across the iver will give you a riffle.

Q. So that you did not mean to testify here that there were 86 different strata outcroppings in that river bed, did you?

2186 A. I did not so testify.

Q. Well, I am glad to have you clear that up. In other vords, a boulder may make a riffle, as you have said?

A. Well, a boulder would make a riffle locally, but not clear across the river channel—I mean clear across the width of the iver, it would be just local.

Q. Did you afterwards, when the water was so low that you could get down there, and see where the riffles had been, did you go down there and count to find out how many strata outcroppings were there?

A. No; I did not.

Q. How far were you from the river when you made that count?

A. Well, I couldn't tell you that, but the river bank, and then the Virginian Railroad, and I was sitting here [indicating], not very many rods away from the stream.

Q. Were you a quarter of a mile, would you say?

A. Oh, less than that, I would judge.

Q. You really could not tell looking from where you were, whether it was an outcropping that was making that riffle or whether it was a series of boulders that might be across there, you couldn't tell from where you were, could you?

A. Well, I could not probably, but I have seen enough of those riffles in New River, in the section under discussion, to know that when a riffle goes clear across the stream, that usually—I presume 90 percent of them or more, are due to outcroppings of ledges of rock.

Q. Now let me get one further question; As I understand you, when this concentration due to these four faults brought those rocks together, or those outcroppings together, they were more or less crushed, were they not?

A. Rock strata in all high structural areas are broken more or less.

Q. So that there might have been a breaking up here of the outcroppings that would not necessarily indicate that each one of those outcroppings was a fault, isn't that right?

2187 A. What is that again?

Q. That each one of those outcroppings was a stratum, I should say?

A. Would you ask that again?

Q. Read him the question. [Question read.] In other words, when you have a coming together with a situation of that kind in geology, as you say, they break and fracture, don't they, the strata that are forced together?

A. Yes; they become fractured and then cement themselves together.

Q. And if they were in the river bed and water was flowing over them you could not tell how many strata were outcroppings in that particular section?

A. I merely referred to the riffles.

Q. Well, that is all right. I understood that your testimony was going to the thought that each one of those riffles was produced by an outcropping or by these strata which had been forced up, and if I am mistaken on that——

A. I do not think I so testified.

Q. All right. You took the photographs which you have exhibited here and I believe that you said you took these photographs in September, 1931?

A. Well, it was in the summer of 1931, the general time, the month is given under each one of those photographs.

Q. As a matter of fact, some of these photographs were taken in the winter time, weren't they?

A. I said in general they were taken—I don't say that they were all taken in——

Q. Some of them were taken in the winter time?

A. One or two.

Q. When you took these photographs, who did you take them for?

A. I took them for the Virginia Geological Survey, for a report for the Virginia Geological Survey.

2188 Q. Were you working for the Virginia Geological Survey?

A. Part of the time I was and part of the time I was not.

Q. When you took these pictures were you working for the Virginia Geological Survey?

A. Part of the time I was.

Q. Were you taking them under the orders of some superior to be used for some kind of report?

A. I received permission from the Virginia Geological Survey to present for this Court any pictures that were taken under their direction.

Q. I am not asking you that. I am asking you were these pictures all taken under your direction?

A. They were taken all by myself.

Q. They were all taken by yourself?

A. Yes, sir.

Q. And you were not employed by the Virginia Geological Survey, when you took the pictures, is that correct, or not?

A. A part of the time I was; some of these pictures were taken when I was not employed by them.

Q. Who were you employed by when you took those when you were not employed by the Virginia Geological Survey?

A. Well, when a man is doing commercial work there is a part of the time he is not employed.

Q. Were you employed at the time that you took these other pictures?

Mr. **Jackson**. What do you mean by "other pictures"?

Mr. **Thompson**. He says that some of the pictures were taken when he was employed by the Virginia Geological Survey and he says that some of the pictures were taken when he was not employed by them.

A. I took at least one of the pictures in the group when I was not employed by them.

Q. Did you take more than one?

A. (Witness examines photograph album.)

2189 Q. Will you indicate those that were taken when you were not employed by the Virginia Geological Survey?

A. I am not certain whether 5, was taken—whether I was employed at that time or not, I don't remember.

Q. Well, how about three?

A. #3, yes.

Q. You were employed by the Virginia Geological Survey, weren't you, when you took that?

A. Yes, sir.

Q. Were you employed by the Virginia Geological Survey when you took #6?

A. Yes.

Q. And you will say the same about #8?

A. Yes.

Q. How about #10?

A. Yes.

Q. And #11?

A. Yes.

Q. All right. If you can tell us which ones that you were not employed by the Virginia Geological Survey, I wish you would do so.

A. #16, that seems to be the only one that I am positively sure of.

Q. That you did take when you were not employed by the Virginia Geological Survey?

A. Yes, sir.

Q. I say the ones you have named, only two of them, I believe, or was it one, only one that you did not take when you were employed by the Virginia Geological Survey?

A. I am not certain about #1.

Q. Now you say that you got authority from the Virginia Geological Survey to use any of these pictures in this case, is that right?

A. I did.

2190 Q. This album was prepared for the purposes of this law suit and these pictures gotten together for that purpose?

A. I had the pictures beforehand.

Q. You selected them for this case, didn't you?

A. I selected them to show conditions along New River.

Q. Are these all of the pictures you took in this particular area of New River?

A. No, sir. I don't know about the river. This in substance is a majority of the pictures I have taken along the river, but in that general area, I have taken a lot of pictures.

Q. You selected these particular ones for this case, did you?

~~A. I selected them.~~

Q. Out of all you had?

A. I intend to publish all or most of these pictures in my report to the Virginia Geological Survey.

Q. What kind of camera did you use?

A. An Eastman—I had two cameras.

Q. Did you just use a kodak?

A. I used what you call a Kodak.

Q. Did you have a lens in front of the Kodak?

A. Yes, sir part of the time.

Q. A lens that would magnify?

A. No, sir.

Q. Why did you have it there?

A. Because I used a tripod and put the camera equipped with a color filter on it in order to take the time exposures.

Q. You took these pictures strictly as a geologist.

A. I was——

Q. (Interrupting.) You wanted to show the outcropping of stratum and conditions on the river from a geological standpoint, as well as you could?

2191 A. Yes, sir.

Q. And you selected the driest part of the year for that purpose, didn't you?

A. When I was here in Virginia the first year, I did not know that I would be here very many months.

Q. When was that?

A. That was in 1931, when I was up here on the Geological Survey at their expense, and consequently, it was necessary for me to take the pictures at that time. It happened to be——

Q. Well, let me ask you——

A. It happened to be a time when the river was low.

Q. I am not saying that there was any coincidence about it, but you did take the pictures during one of the lowest flows known in this river, did you not?

A. I could not say about that, because I haven't looked up the flow of the river.

Q. You don't know anything about the flow of the river?

A. I have not looked up the details in time when the flow of the river was lowest, whether or not it was 1931 or 1932 or 1933, or 1929, or what it was. Now, undoubtedly, that data is published some place. I took the pictures because I was here—in 1931.

Q. Would these rocks have shown in high water?

A. Probably some of the ledges would not have shown—would not have even formed a riffle in high water.

Q. The same would be true if there was what we would call a medium flow of water in the river, wouldn't it?

A. Now, I dislike to answer that question, because I don't think that we have a meeting of minds.

Q. You are not sufficiently familiar with the river to state whether or not this was low water or a medium flow or not?

A. I considered this to be low water.

Q. But you were trying to take the pictures at a time when you could get these evidences of outcropping?

2192 A. That would be natural, yes, sir. As a geologist, a man would take the pictures when the situation he is looking for offers itself—he would naturally take the pictures then.

Q. Yes, sir, I want that for the record. You would not go there in high water, but at a time when you could see as many rocks as possible?

A. At this particular time I took the pictures because I happened to be in Virginia at that time doing work there at that time.

Q. And it was a coincidence that you happened to be there when it was low water?

A. I presume so.

Q. You said that you were brought into Virginia by somebody. Who brought you here?

A. I said the Geological Survey—Dr. Bevan.

Q. Did they send out to Utah and bring you here?

A. No, sir, I was at Oberlin, Ohio.

Q. He brought you here to do this work?

A. Yes, sir.

Q. And they sent you to take the pictures, did they?

A. He asked me to take as many pictures as I could of the area.

Q. Who asked you that?

A. Dr. Bevan, Geologist for the State of Virginia.

Q. You spoke about conditions in the river. Did you notice that on both sides of the river there were railroads?

A. Yes, sir, that is, through from Glen Lyn, I think, to Belspring.

Q. The Virginian comes on the right hand side, does it?

A. Yes, sir.

Q. And on the left the Norfolk and Western?

A. Yes, sir.

Q. And both of their right of ways are close to the river, aren't they?

A. Yes, sir—well, in a general way, they ~~are close to the~~ river, through a part of that area.

Q. In your geological studies, did you notice that they had
blasted off much of the roadway or the trackage place for
2193 tracks and that it had fallen into the river?

A. They had blasted some in some of the localities.

Q. So there are rocks in the river that came from the roadways?

A. Yes, sir, but in the Gap at the falls in one picture, there are big boulders in the river a distance from the shore.

Q. Yes, they have been there for years?

A. Yes, sir; they have been there a long time.

Q. Now, will you give us in miles the area that your pictures covered with respect to the outcroppings?

A. I don't understand your question.

Q. Well, you have shown us here a series of pictures, I believe, twenty seven, or something more—isn't it a fact that, from picture No. 27—from 17 to 27, you cover a distance of about two miles on the river.

A. What was the first picture [witness refers to album]?

Q. From 17 to 27; it starts with the rapids of New River at Berton, Virginia, and it says the stream flows, and so forth.

A. I could not tell you the distance there, but that is a matter that can be scaled from any map. I never scaled it.

Q. You don't know the distance?

A. No, sir.

Q. But you would not say that it was over three miles, would you?

A. I would not say it was three miles or less than three; I don't know the distance.

Q. Look at the album again and refer to pictures 22 to 25, inclusive, and tell us if it is not a fact that these pictures are all of one rapids?

A. No. 22 is the picture of the Big Falls; 23 is a picture of the Big Falls closer up; No. 24 picture is the Big Falls showing a part; No. 25 is the same thing. I think I testified to that in the beginning.

Q. Isn't it a fact that this is the worst rapids in the river—I mean in the thirty-five mile stretch?

2194 A. I have not measured either the falls at the Narrows or the big falls at the Gap, and when it comes to comparisons between the falls, I must say that I don't know which would be the most hazardous of the two, which has the greater drop; in other words, I don't know. That would be a matter of engineering detail, which I should think could be obtained elsewhere.

Q. Did you, in your observation of the rapids in this particular stretch, find any rapids over which water was flowing or falling in the perpendicular?

A. Clear across the river or any part of the stretch?

Q. No, clear across the river, I would say?

A. I do not recall such, where the rapids—that is, the fall is vertical over the ledge completely across the river.

Q. Yes. As you say, when you were taking the pictures, you were taking them purely from a geological standpoint?

A. Yes, sir.

Q. And not as to the question of navigability?

A. No, sir, I was not interested in navigability at all, no, sir.

Q. And will you turn to the album at picture No. 2? You don't know whether a boat could go up or down that stretch or not, do you?

A. I do not.

Q. You don't know whether there is a channel there, if there is one, do you?

A. I do not.

Q. Will you say the same thing in regard to No. 3?

A. Yes, sir.

Q. Will you say that in regard to all the pictures?

A. I would, yes, sir.

Q. I notice a number of pictures here where you did not take the entire width of the stream?

A. I did that, merely to bring out certain features of the stream I wanted to discuss in my report.

Q. In picture No. 10, what you were trying to do was to bring out the rocks in as large relief as possible?

2195 A. That is right.

Q. And show the stratification?

A. Yes, sir; put in the strata.

Q. And you did not take the stream all the way across?

A. In order to get that picture, I had to go out on a boulder away from the southwest bank on the left side of the stream.

Q. And in order to take a picture of that kind, you took it as near—as close to it as you could, did you?

A. Yes, sir.

Q. And the same thing holds true of picture 11. In other words, it does not show all of the river?

A. No, sir.

Q. That is a close-up?

A. Yes, sir.

Q. And the same thing is true of picture No. 19?

A. I was standing right at the edge of the ledge, which is on the bank of the river.

Q. And you were as close to the rock as you could get to take the picture?

A. I had to be at least 15 feet away to get a picture like that (indicating).

REDIRECT EXAMINATION

Q. How far downstream, at what point down-stream, is the location of the picture in the album, Exhibit 549, which is the furtherest downstream?

A. The view or the location at which I took the picture?

Q. I mean the view—what point on the river is furtherest down the stream—the view that you show in the album as your picture No. 1.

A. Picture No. 1 itself.

Q. And these photographs in general relate to views further upstream from that point?

2196 A. Yes, sir.

Q. And how far upstream was the location of the last photograph upstream—what is it in your album?

A. In photograph No. 27?

Q. Where is it?

A. The smoke in the right hand side of the picture is the smoke, as I remember, from Parrott, in Pulaski County, Virginia.

By Mr. Gatchell:

Q. What was that name?

A. Parrott.

By Mr. Jackson:

Q. Where is it?

A. On the left side of the river.

Q. How many miles is that up the river from the scene of picture No. 1?

A. It is between Glen Lyn and Belstring—it is below Belspring.

Q. That is the range of the pictures—the range of the river covered by the pictures?

A. Yes, sir, they show from just below Glen Lyn, because it shows below there.

Q. You don't know how many miles that is?

A. Yes, sir, I judge it is practically thirty-five miles, the trip.

Q. You were asked whether or not the railroad at certain points had blasted cuts and some rocks from the blasting had fallen in the river. Please state whether or not the rocks and the rock conditions about which you testified on direct examination, related at all or in any substantial degree to rocks which were thrown into the New River by railroad blasting or any other artificial cause?

A. I have not thought of that in just that sense; but as I recall them, most of the rock that was thrown over the bank of the river occurred at the place where the rock strata crossed the river and where the rock strata were very hard and resistant.

Q. What I want to know is this: when you testified
2197 about ledges and velocity of the riffles, you were testifying about rock—were you testifying about rock artificially thrown into the river or a natural formation or formations?

A. My intention was to testify to natural conditions in the river.

Q. Did your testimony relate to natural conditions?

A. It referred entirely to natural conditions, yes, sir.

RECROSS-EXAMINATION

Q. The 86 riffle that you spoke of, were they below McCoy's Ferry?

A. No, sir; a part of them were above McCoy's Ferry and part below.

Q. Was the place you described between that known as Sifford's Falls, where the riffles were?

A. I never heard of it.

Q. Do you know where Sifford's Falls are?

A. No, sir.

2198

HAROLD W. BUCK

DIRECT EXAMINATION

Q. Mr. Buck, what is your profession?

A. I am a consulting engineer.

Q. Tell us briefly something of the schooling you have had and what you have done.

A. I was graduated from the Yale Scientific School in 1894 with a Ph. B. degree; from the Columbia School of Mines in New York in 1895; with a degree of electrical engineer. In 1895 I became one of the engineers of the General Electric Company in Schenectady where I remained until 1900. In 1900 I became a member of the engineering staff, as electrical engineer, with the Niagara Falls Power Company at New York and allied companies. I remained with them until 1908.

In 1908 I assisted in the formation of an engineering corporation called Veilie, Blackwell and Buck, which corporation has been engaged since its organization in the design and construction of various power plants in the United States, among which were the two hydro electric plants on New River of the Appalachian Electric Power Company and a steam plant at Glen Lyn, belonging to the Appalachian Electric Power Company.

In 1917 I was engaged by the War Department to make a report and recommendation as to the design and capacity of the power house to be constructed in connection with the Wilson Dam at Muscle Shoals; and on or about 1927 I was engaged by the War Department as a member of the Commission which made up the reports for President Hoover in connection with the navigation and power developments on the St. Lawrence River in New York and Canada.

Q. Mr. Buck, when did you first see New River?

A. Our attention was called, I think in 1909, to certain possible water power developments on the New River, lying between Ivanhoe and Fries.

Q. And that was the first section of the river you saw, was it?

2199 A. Yes, sir.

Q. Will you state what portions of the river you have observed?

A. We inspected the proposed water power possibilities between Ivanhoe and Fries and we saw that there were possibilities for development, but before engaging actively in construction, we examined all and every possible alternative locations for dams lying all the way from Fries down as far as Glen Lyn.

Q. Well, how did you make these observations and inspection trips?

A. The examination from Ivanhoe to Hiwassee was made partly on foot and partly by driving along the road and also from the railroad; from Hiwassee to Radford, the examination was made from a small flat bottomed boat; from Radford to Glen Lyn, the examination was made by driving down the wagon roads near the river and frequently walking to the river bank on foot.

Q. For how long a period of time did the inspection of that portion between Radford and Glen Lyn take place?

A. This part of the examination required about two months.

By Mr. **Thompson**:

Q. From Radford to Glen Lyn?

A. Yes, sir.

By Mr. **Forbes**:

Q. As I understand you, the only portion of the inspection trips and examination made by you by boat was in that stretch of the river between Hiwassee and Radford?

A. Between Hiwassee and Radford, and that was made after the construction had actually been initiated in the developments known as Byllesby and Buck, lying between Fries and Ivanhoe.

Q. Would you describe the boat that you used to make that trip?

A. This boat was one of the prevailing types of blunt-ended flat bottomed skiffs, about 12 feet long, and possibly three feet in width.

Q. What would its draught be?

A. The draught unloaded was about three inches and the draught, with three men in it, was possibly six inches.

Q. What was the stage of the river when you made this trip?

A. I had with me during the trip in 1910 the hydraulic
2200 engineer of the H. N. Byllesby Company, Mr. Link, and
Mr. Wysor of Dublin, Virginia. We made some estimates and observations of the flow of the river and the cross-section from the surface, which we had at that time, and we estimated the flow to be in the neighborhood of 2,000 cubic feet per second, at the time we made the trip in the small boat.

Q. That was in what year you made the trip in the small boat?

A. Sometime in the summer of 1910.

Q. Will you describe the physical characteristics, so to speak, as you observed them, in making this boat trip?

A. We found what seemed to me very unusual characteristics, in that the river was—the floor of the river was made up of a succession of wide ridges of rock, extending down-stream, in some cases, for nearly a mile, over which the water flowed at rather high velocity, with a shallow depth, with intervening pools between these successive ridges or ledges of rock, and this condition existed all the way down the river from Hiwassee to Radford, ledges and ridges occupying a very considerable portion of the total distance traversed.

Q. Would you describe how you moved your boat along over that distance?

A. We rode part of the way where the depth of the water permitted. Over the shallow ridges and ledges, in many instances, we were unable to row, because the depth of the water was not sufficient, and we used poles, and on frequent occasions, the skiff grounded on the underlying rock and we got out and waded and, lifted the boat bodily down-stream, until the water was again deep enough for it to float with three men in it.

Q. Did you observe in most instances a concentration of water in what might be called a channel through these rock ledges or not?

A. The outstanding characteristic of New River is the fact that there is absolutely no channel in any part of the river that I have seen, the floor of the river being absolutely flat, almost as flat as a polo field, from one shore to another, without any evidence of the natural flow of the river having selected any particular spot for its concentration. It, therefore, made navigation and traversing it in a boat extremely difficult.

2201 Q. I assume you have outlined the difficulties that you had. Were there any other difficulties that you have not mentioned?

A. I might elaborate by saying that, as we passed into the intervening pools and approached one of these areas of shallow ledges, we would look downstream and try to pick out some section of the ledge which showed some advantage over another section in the depth of water, and it was impossible to make a selection of any particularly desirable route to follow.

Q. You said that you made observations on the river between Radford and Glen Lyn when you went down the river inspecting it. What were your observations of the physical characteristics of the river between those points—Radford and Glen Lyn?

A. We eliminated that portion of the river from consideration for power development, because we were unable to find a location where the construction of a dam would not seriously interfere with the Virginian and the Norfolk and Western Railroads, on each side of the river throughout that section. But we did observe that the physical characteristics of the floor of the river, all the way from Radford to Glen Lyn, were very similar to that which we had experienced between Hiwassee and Radford, except that they might be described as being even more so.

Q. First, what would you say as to the physical characteristics of the river above Hiwassee, in the part that you observed?

A. From Hiwassee to Fries, the same characteristics of outcropping ridges and ledges existed, the only difference being that the gradient of the river was somewhat steeper and the flow of water swifter, as I remember it.

Q. As you observed the river, what appeared to be the most important obstacle to the use of the river for transportation?

(Objection by Mr. Thompson.)

By Mr. Forbes:

Q. I will ask this: as you observed the river Mr. Buck, in proceeding over it in this row boat, what appeared to be the most important obstacle to the use of the river for transporting that boat?

A. The most serious obstacle to passage going down the river in that section were the frequently occurring out-crops of rock and the ledges across the river extending down-stream for distances, in some cases, up to nearly one thousand feet, and occurring every mile or two.

Q. You mean 1,000 feet measured up and down the stream?

A. Yes, sir.

2202 Q. And running across the stream?

A. Yes, sir.

Q. For how long a period would you say you have been familiar with New River?

A. From the time we made our first observation below Fries, in 1909, to the year 1927, when I terminated my connection with the Appalachian Electric Power Company. I believe I devoted throughout that period approximately one-third of my time to matters involving in some way the New River.

Q. Do you mean that that kept you within the vicinity of the river?

A. About one-third of my time was actually down along the river or on the river or near the river.

Q. Mr. Buck, will you state whether or not you have ever seen any farm or other products transported up and down that river in boats?

A. I have never seen, in all this contact with the river, any material transported up and down the river. I have seen wagons carried across the river on ferries, and I have seen small punts used by residents along the river for fishing local pools, but that is the only use of boats that I have seen on the river.

Q. You have described one trip you made from Hiwassee to Radford in this row boat. Did you make other trips from Hiwassee to Radford?

A. Our first trip from Hiwassee to Radford down the river was in 1910 and was for the purpose of making general observations of dam sites. In 1912 we made another trip throughout this district in a boat, largely for the purpose of locating sand deposits along the river for use in making concrete. In 1915 I made—I traversed down this section in a boat with a man who had done all our clearing in connection with transmission line construction, with the idea of estimating the amount of timber which would have to be cleared from the reservoir in connection with the so-called Number 6 development.

Q. Mr. Buck, will you state whether or not, in the construction f any dam on New River, you hauled anything by bateau?

A. When we were constructing the dams Byllesby and 2203 Buck, we wanted very much to transport sand from an island down below the dams to the construction works by oat, and we looked into it very thoroughly and found the scheme was utterly impracticable, on account of the shallow water and he high velocity of flow.

Q. How far down was these points?

A. About four miles.

By Mr. THOMPSON:

Q. Below Hiwassee?

A. No; below the dam at Buck, which is the lower of the two lams constructed.

By Mr. FORBES:

Q. State what the stage of the river was, if you know, on the rip you said you made in 1912, from Hiwassee to Radford, and lso what the stage was on the trip you made in 1915 from Hiwassee to Radford?

A. On the second and the third expeditions down the river in he boat, we made no specific measurements of the flow, but the eneral observations of the passage of the boat seemed to be, on oth occasions, about the same as it was in 1910.

CROSS EXAMINATION

Q. Mr. Buck, I believe you said you became a member of the taff of the Niagara Power Company in 1908?

A. In 1900.

Q. Is there any relationship between the American Gas & lectric Company and the Niagara?

A. There is not, and never has been.

Q. Have you any stock in the American Gas & Electric Company?

A. I have not.

Q. Or bonds?

A. I have not.

Q. Have you any in the Appalachian Electric Power Company?

A. I have not.

Q. I believe you testified that you went up the river, or down he river, locating various power sites?

A. Yes.

204 Q. How many power sites did you locate?

A. I don't know in numbers, but New River is characteristic such that you can build a dam almost anywhere because of these out-cropping rocks. Almost every place where there is a riffle, as they have been called, you can locate a dam, so there were a great many possible dam sites.

Q. As a matter of fact, I believe you did, from time to time, suggest or discuss the question of approximately six from Radford on up to Fries?

A. Six altogether, and later No. 5 was eliminated and consolidated with No. 6.

Q. To make the Radford project itself?

A. Yes.

Q. Then did you locate a dam site below Radford?

A. We investigated the possibilities of locating dams below Glen Lyn, but nothing between Radford and Glen Lyn, for the reasons I stated this morning, that the railroad prohibited such development.

Q. I thought at one time you did advocate the location of a dam between Hinton and Radford?

A. Hinton is below Glen Lyn. We did consider seriously one at Sandstone Falls, which is about 30 or 40 miles below Glen Lyn.

Q. That is 30 or 40 miles down-stream?

A. 30 or 40 miles below Glen Lyn.

Q. Did you consider a dam site at Hinton?

A. We considered in a very preliminary way the so-called Blue Stone location, and made a few rough surveys as a possibility.

Q. When you made these trips down the river, your chief purpose was, was it not, to locate sites?

A. We were looking to the future of the Appalachian Electric Power Company, and wanted to find practicable sites for future expansion.

Q. Did you, at that time, have any steam plant?

A. The Glen Lyn plant was in process of construction.

Q. Was that the only plant?

2205 A. That, plus the two water power developments which had been constructed up the river.

Q. Do you mean Buck and Byllesby?

A. Yes, and the switchback steam plant. Those were the principal sources.

Q. You are the one who really initiated what we will say the Appalachian Electric Power Company?

A. I think I had a good deal to do with it.

Q. And it was your plan, was it not, to have a series of steam plants, and the peak load carried by the Buck and Byllesby and other hydraulic electric companies?

Mr. FORBES. That is objected to as improper cross-examination.

The COURT. Objection overruled.

Mr. FORBES. Exception.

A. We had no specific program for operation of the various plants. We knew that, on account of the fluctuating flow in New River, steam reserve was necessary, and we knew that any water power plant constructed would have to have steam auxiliary.

Q. Your plan was, was it not, to carry the base load on the steam plant and the hydro plant for the peak?

A. No.

Mr. FORBES. May we have it understood that we object to all this line of testimony in regard to the operation of the plant. In the first place, as I understand, Mr. Buck is talking about the Appalachian Power Company.

WITNESS. That is correct.

Mr. FORBES. And talking about a different company, and, furthermore, this is entirely outside of the scope of the direct examination.

The COURT. Your exception may be noted.

By the WITNESS. Our plan in general was to use the steam plant to supplement the flow in low water.

Q. But they were to be used for carrying the peak loads, were they not?

A. Not necessarily. That is still a debatable point.

Q. I didn't ask you whether it was a debatable point, or not, but your ideas.

A. Our ideas were not formulated at the time.

Q. When did you formulate your plans?

A. We have not formulated them yet.

Q. Do you recall writing a letter on October 19, 1925, signed by you for Viele, Blackwell & Buck, dated October 19, 1925, and on your letter paper, addressed to Mr. O. C. Merrill, Executive Secretary of the Federal Power Commission, in which you said, "At the present time, the Appalachian Electric Power Company

> has in operation near Ivanhoe a hydroelectric plant. The
> 2206 operation of this plant at times results in a variation in
> flow in the river from practically zero to 3,600 cubic feet

per second." Do you recall writing that?

A. It is possible I did. I do not recall it.

Mr. FORBES. Your Honor, we object to it. It seems to me it is so outside of the scope of direct examination, it is not proper cross-examination, and has no bearing on the examination in chief, and we object to this line of testimony.

The COURT. Objection overruled.

Mr. FORBES. Note our exception.

By the WITNESS. I do not recollect the letter. It is quite possible I wrote it, and it is probable I did, if you have a copy of it.

Q. If you did write such a letter and set forth that the plant was run from zero to 3,600 cubic feet per second, would that indicate running on peak load?

A. Not necessarily peak load. It would indicate the flow was at peak at certain periods and was used to maximum capacity of the generators at other periods. That is all it indicates.

Q. Wouldn't that indicate you were, at certain times, using all the storage capacity?

A. It would indicate at that time that we were; yes. It is not an indication of policy, however.

Q. You used the word "we" when you were speaking a moment ago. You belong to this firm of Viele, Blackwell & Buck, do you not?

A. I did and do.

Q. Did you have authority to speak for the company?

A. I was, at that time, I think a director of the Appalachian Electric Power Company.

Q. So that when you——

Mr. FORBES (interposing). May we make it clear that this witness is speaking of the Appalachian Power Company, a distinct company from the Appalachian Electric Power Company, which is one of the parties to this suit, and that if Mr. Buck is to be the witness of the Government, and if this line of questions continues, plaintiff is bound by the answers.

The COURT. I don't know what distinction he is going to draw between the Appalachian Power Company and the Appalachian Electric Power Company.

Mr. FORBES. If your Honor please, one company bought out the other. The Appalachian Electric Power Company, as I understand, bought out the Appalachian Power Company—a distinct company. [The testimony was read.]

2207 Q. That is correct, is it?

A. Yes, "we" expresses the collective interest I had at that time.

Q. As the engineer, you were authorized to speak as the representative of the company, were you not?

A. No, I was not authorized to speak for the company. I was authorized to make investigations for the company and to obtain information.

Q. And when you wrote to the Power Commission, did you write as an individual, or were you writing on behalf of the company?

A. I was writing as the engineer of the company.

Q. Now, in this letter of October 19, 1925, you say, "In connection with the plan of New River Development Company to construct a dam and hydroelectric plant on New River, there are a few points I want to submit for your consideration." Were not you speaking for your company when you wrote that?

A. An engineer has no executive authority, but has authority to obtain information, and the authority implied in that letter is that of an engineer and not that of an executive.

Q. You were carrying out the instruction of your company, were you not?

A. General instructions to get information, yes.

Q. When you drafted the plans—you were the designer of Buck and Byllesby plants on New River, were you not?

A. Yes.

Q. When you designed those projects, you knew, before you started to operate, that is, you were the one who was relied on to set up a plant that was satisfactory, were you not?

A. The conditions when those two plants were started were entirely different. The load was very small and well within the minimum flow of the river, so the questions of carrying peak loads were not involved.

Q. Isn't it a fact, in that time, demand was increasing constantly for the use of electricity?

A. That is true.

Q. Wasn't it your purpose, in going up and down the river, to locate?

2208 A. It was, yes.

Q. These trips that you took down the river—did you enumerate all the trips that you took?

A. I do not believe it. There were so many, I couldn't possibly enumerate them.

Q. When you went down the river in this boat you spoke about, what was the length of that boat?

A. I think about 12 feet. It was the usual length of those boats along the river.

Q. How wide was it?

A. About three feet.

Q. And you say it drew about six inches?

A. I think so.

Q. You said from time to time you had to get out and push he boat, or pull it?

A. We did, and lifted it.

Q. You got down, though, didn't you, to your destination?

A. We did.

Q. And you did not do any portaging, did you?

A. We did, when we got to a ledge on which it was foundered.

Q. You are a sportsman, are you not?

A. Yes.

Q. You do not call that a portage?

A. No.

Q. Every time you went down the river you got to your destination, didn't you?

A. We did.

Q. You were the one that located the dam site at what is known as the Radford dam site, were you not?

A. Not the location now selected; no.

Q. You selected it down below, didn't you?

A. We selected it ten miles up above, and gradually moved it down until it is now near the location of others approximately ten miles below where the original site which we selected was. 2209

Q. Did you ever make any selection at the site of the ferry down below.

A. No.

Q. You did not?

A. We may have made some estimates on a possible dam. We considered every possible location there was.

Q. Why didn't they take your plan?

A. Because it was the desire that, as the company grew, to enlarge, and the site we selected above had a smaller capacity and smaller drainage area, and the dam has been moved down.

Q. Isn't it a fact you did not make any drilling at the site of the dam, so subsequent engineers came in and found it was not a proper site?

A. I do not concede that what we selected was an improper site, and I still maintain it was a perfectly good site.

Q. The company did not agree with you, did it?

A. No.

Q. That is the reason you resigned, isn't it?

A. One of the reasons, yes.

Q. Now, I believe you spoke about the river having a floor as level as a polo field?

A. A polo field is not a unit of measure, but I mentioned it as an expression of flatness.

Q. That is about as flat as anything you could get?

A. Yes.

Q. Would it be a difficult base or channel to run over in a boat?

A. Yes, with only a few inches of water over it.

Q. Suppose you had a few inches above the draw of your boat, wouldn't you get over all right?

A. Yes, if it were not roughened by these projecting pieces of rock which come up.

Q. As a matter of fact, these trips you took, you took in the summer time?

2210 A. Yes.

Q. Because you were not going to get out in cold water?

A. Yes.

Q. So you took it at a time when the water was at its lowest?

A. No; it was approximately 2,000 C. F. S.

Q. You would call that low water?

A. No.

Q. If there had been 4,000 second-feet flowing in that channel, the boat could have gotten over without having to get out and push it?

A. That is probable, although the increased swiftness of the water might have made some dangerous rapids for a small boat.

Q. When you got to investigating this situation way back there, did you read any records of engineers as to navigation on that river?

A. I knew in a general way that certain slots had been cut out of the rock.

Q. You knew, in coming down from Hiawassa to Radford, there was a channel?

A. I heard it, but I looked for it and couldn't find it. It was so distorted by debris I couldn't find it.

Q. You could see there was a channel there?

A. No; it was so full of that debris, it could not be utilized.

Q. That still would not distort the idea of a channel, would it?

A. No.

Q. So there could have been a channel there without your knowing about it?

A. A plugged up channel of very small proportions.

Q. Do you know what the Government proportions were?

A. No. I understood from hearsay it was designed to float logs through those slots.

Q. Do you know where Little River runs into New River?

A. I do.

Q. Did you ever know of any lumber being carried down the river on bateaux?

2211 A. I did not, and I testified this morning I had never seen any material transported on New River in the twenty odd years I have been connected with it.

Q. How many times would you say you had gone down New River and up from Hiawassa to Radford?

A. Three times.

Q. I thought you said a number of trips?

A. No; on foot on other trips.

Q. When you went down on foot, you did not go where you could observe the river, did you?

A. Yes. We drove down in an automobile, and then would go to the bank, and then go back and go to the river again.

Q. Was it pretty level along the bank?

A. No.

Q. You did not do much of that, did you?

A. Yes, I did a whole lot of it.

Q. Did you ever see any of the farmers out in boats doing anything other than fishing?

A. No.

Q. You never saw a boat go up the river or down the river?

A. I never did.

Q. Do you know that they have boats out in front of the cofferdam right now?

A. I don't doubt it.

Q. Motor boats?

A. That is quite possible. We had flat bottom boats in the construction at Buck and Byllesby, for the construction of cribs.

Q. You moved them about?

A. Yes, about fifty feet.

Q. Have you any reason to doubt that there were four or five thousand second-feet of water flowing from Hiawassa and that a boat might not come down there?

A. It might come down, but certainly not up.

2212 Q. Would you be surprised to know that men have gone up there in the last month in a motor boat?

A. I would be very much surprised.

Q. And it has been testified to in this room?

A. I don't know anything about it?

By the COURT. Has there been any testimony by anybody of going up there with three or four thousand feet? He said that he could not get up against that.

By Mr. THOMPSON. That is correct. I am incorrect in my statement. It was less than that amount of water.

By Mr. THOMPSON:

Q. You say you spent about one-third of your time on New River from the time your firm was employed, I believe, to 1927?

A. I believe I said one-third of my time in connection with Appalachian Electric Power Company work. We built transmission lines and sub stations and steam plants and made investigations of all kinds.

Q. So you were really not on the river all the time, but going to the steam plants?

A. Yes, but the steam plant happened to be on the river.

Q. The transmission lines were not on the river, were they?

A. No, but they crossed the river at various points.

Q. Do you recall a hearing held before Major H. M. Trippe, on he diversion of New River to North Carolina, January 13, 1925, vhich you attended?

A. I don't remember the date. I remember protesting against he diversion of waters of the New River away from the dam of he Appalachian Power Company.

Q. Do you remember saying your company customarily used 8% of the entire flow of the river?

By Mr. Forbes. I would like to object to this question as not roper cross examination; in so far as the Government makng this witness their own witness, they have already put on their ase, and it seems to me under any theory it is inappropriate.

By the Court. I think he is the Government's witness, but I lon't see why he should not be examined because they have conluded their evidence.

By Mr. Forbes. Exception.

A. I think what I said in my letter is what I said.

Q. It wasn't a letter, it was a statement made at the hearing.

A. I think it was possible certain years we did use up to 98%, ut that would not apply to particularly high years, when large loods would pass. I think there might have been years we did se 98%.

Q. I call your attention to a photostatic copy of that hearing, narked for identification Government Exhibit #247, and ask you f you made the following statement at that hearing:

"Judge Robert E. Scott. Mr. Buck, will you come around?

"Mr. H. W. Buck. Mr. Chairman, I think some distinc-
213 tion should be made between the two divisions of the application of the Central Power Company insofar as those lams are involved which merely store the waters of New River vithout diverting it, as to which the Appalachian Power Comany has no objection whatever. The more dams that can be uilt in New River above its present and future developments, he better it will be for the flow-maintenance and flow through he plants of the Appalachian Power Company. In regard to he diversion of waters from the proposed dam on the South ork, however, there seems to be from certain statements which I ave heard, some misconception as to the use of the waters made y the Appalachian Power Company.

"I have heard the statement made that the minimum flow vould be maintained, and that the surplus flow would be that vhich would be appropriated for diversion. As a matter of act, the Appalachian Power Company does not use the minimum flow—it uses ten times the minimum flow, and its whole proposition is predicated upon such use of the water. The Appalachian system is a combination of steam and water power, and the hydroelectric plants so designed as to use ten times the minimum flow of the river, thereby generating an annual output in kilowatt hours which justifies their present development. The deficiencies between those excess flows is made up by the company's very large steam plant at Glen Lyn, so that the annual output is maintained as constant, with very large contribution of hydro-electric energy from its water power plants."

A. I did.

By Mr. Forbes: We object to that as an improper form of examination of your own witness, that really amounts to cros examination of one's own witness, and to read a statement like that to your own witness and ask if he made that statement is obviously leading and most objectionable.

By the Court. Objection overruled.

By Mr. Forbes. Exception.

It was true then and it is true today, that statement.

Q. In your work as an engineer, Mr. Buck, and on the New River, did you give any value or credence to the Water Supply records of the Geological Survey?

A. We used them very largely, but we discounted them at times, because we checked them and found in many cases the readings had been made only once a month instead of every day.

Q. You depended on them when making your plans for the Buck and Byllesby dams?

2214 A. We used them in conjunction with observations we made.

Q. What observations?

A. We established gaging stations at various points along the river.

Q. Weren't they operated in connection with the Government's gaging stations?

A. They were not, but by men employed by ourselves for a period of sometimes a month at a time.

Q. Did you find any great divergence between yours and the Government's?

A. We did at times, and other times considerable agreement.

Q. As an expert engineer, do you think there is a better source than the Geological Survey gaging reports?

A. They are very helpful to all engineers.

Q. And the usual source of information?

A. They are, but as I said, they must be very carefully checked for the reason those local men employed to make the readings every day often don't make readings more than once a month, they go off on a trip somewhere and come back and fill in.

Q That does not apply to automatic gages?

A. [illegible], sir; the more recent years automatic gages have been used, but at times they relied on the daily readings by the local residents.

Q. You do rely on the automatic gages?

A. Yes, sir.

Q. Are you familiar with what is known as the Hutton report, Government Exhibit #31, and which is a report attached to Major Craighill's report?

A. I don't recollect the Hutton report.

Q. The Hutton report was in 1872. Do you recall having ever gone over the outline he has given, description of the mile by mile conditions of navigation on the river?

A. I may have read it, but I don't recollect it.

Q. If that report indicates and shows that 85% of the stretch which you have been discussing was the channel, was in 2215 pools rather than in shallow places, would you agree to that?

A. No, I would not.

By Mr. Forbes. We object to that question. In the first place he is asking the witness to testify to a state of facts not shown to exist by that report, and further being his own witness he is attempting to cross examine him.

By the Court. Go ahead. I think the question might be asked in a different form.

By Mr. Forbes. Exception.

I think 15% is too small. The percentage of shallow water is much greater than 15%.

Q. Mr. Buck, it is a fact, is it not, that the Buck and Byllesby plant is operated so it goes from zero to 3600 second feet in lischarge?

A. I have never had anything to do with the operation of ither Byllesby or Buck. I have not been there for twelve years, nd I cannot answer as to the present time.

Q. These trips you made down the river were they all before 1912?

A. 1910, 1912 and 1915, were the three times.

Q. If the Buck and Byllesby had been operating from zero to ,600 second-feet in 1915, might that not have had some effect on he stream so far as navigation is concerned?

By Mr. Forbes. We object to that question, because predicated n facts not shown to exist and because cross examination of his wn witness.

By the COURT. Overruled.

By Mr. FORBES. Exception.

A. I am very sure back in 1915 there was no such use of water at Byllesby as you mentioned. The load was not sufficiently high to make it necessary.

2216 **R. J. HOLDEN**

DIRECT EXAMINATION

Q. Mr. Holden, will you please state your name in full and your residence?

A. My name is R. J. Holden. I live at Blacksburg.

Q. What is your present occupation?

A. I teach Geology at the Virginia Polytechnic Institute.

Q. And where were you educated?

A. After preliminary schooling in High School and Academy I attended the University of Wisconsin, and received the degree of Bachelor of Science in 1900.

Q. Then what did you do?

A. Thereafter I taught Science in High School for two years. I returned to the University of Wisconsin and engaged in graduate study for a period of three years preparatory to the degree of Doctor of Philosophy. During the three years I completed all the requirements except thesis. In 1905 I was called to the Virginia Polytechnic Institute for two purposes; the main one of which was to study the iron ores of the State of Virginia for the Virginia Geological Survey. The other purpose was to teach Geology in the Virginia Polytechnic Institute. At odd times, when occasion permitted, I continued the work on my thesis. As an undergraduate I took all of the work in history which was offered for undergraduates in that institution.

Q. Mr. Holden, you referred to your thesis, in connection with your Doctor's degree, what was the subject of your thesis?

A. A history of the iron ore industry in the United States.

Q. Did you complete that thesis and receive your Doctor's degree?

A. I completed that and received my Doctor's degree in 1915.

Q. Are you a member of any scientific or professional society?

A. Yes, both. In the matter of scientific societies, I am a fellow of the Geological Society of America, and American Association for the Advancement of Science. In the matter of professional societies, I am a member of the Society of
2217 Economic Geologists; the American Association of Petroleum Geologists; the Society of Economic Paleontologists, and the American Institute of Mining Engineers.

Q. Have you written and published any papers on scientific or echnical subjects?

A. I have published various articles along scientific and proessional lines, among these articles there are items in the pubcations of the U. S. Geological Survey, of the Virginia Geogical Survey, of the Bulletin of the Geological Society of merica, and the magazine known as Economic Geology, in the ransactions of the American Institute of Mining Engineers, in ne magazine known as Science, in the publications of the Interational Geological Congress, and the magazine Journal of eology.

Q. Do you own any stock in the Appalachian Electric Power ompany?

A. I own ten shares of preferred stock.

Q. Have you ever been employed by the Appalachian Electric ower Company?

A. I was employed by the firm of Viele, Blackwell and Buck, connection with some geological work, in connection with the roposed Radford dam development.

Q. Since you received your Doctor's degree in 1915, what has een your occupation?

A. I have been teaching in the Virginia Polytechnic Institute, orking for the Virginia Geological Survey, and doing work r various private concerns.

Q. Do you specialize within the broad field of geology?

A. Yes, my specialty is economic geology.

Q. You referred to the fact your thesis, for your Doctor's deree, had dealt with the history of the iron ore industry of the nited States; state whether you studied the history of the iron dustry of Southwestern Virginia, after, or before you came to irginia Polytechnic Institute?

A. I tried to study it from a distance, in Wisconsin, but there ere many things I could not understand, and it was with conderable eagerness I embraced the opportunity to study first hand the industry in Southwest Virginia.

218 Q. You spoke a moment ago of your specialty being within the broad field of geology, economic geology; will u tell the Court in a word what that is?

A. Economic Geology is a rather broad term, and it includes e study of ore deposits, non-metallic deposits, the water reurces, and almost everything in geology that has commercial plication.

Q. You referred to making a study of the iron industry of uthwestern Virginia. State if that study had any connection ith the Geological Survey of Virginia?

A. It was done under the direction of the Geological Survey of Virginia.

Q. Have you made any study of the lead and zinc industries of Southwestern Virginia?

A. Yes. The lead and zinc occurrence is very closely associated with the occurrence of iron, and it is impossible to study the iron ores of that region without having intimate contact with the zinc occurrences, the mining utilization of the zinc materials. As a matter of fact, the iron ore, lead ore and zinc ore have been mined from the same mine.

Q. Have you done any work in your profession for private clients?

A. Yes, for a great many, and in rather diverse lines, in iron ore, lead and zinc, and limestone work, for a variety of interests.

Q. You refer to your private work or work for private clients having to do with iron, lead and zinc ores, did it have anything to do with those industries in Southwestern Virginia?

A. Yes.

Q. Did your study of the iron, lead and zinc industries include or have anything to do with the history of those industries in the upper New River valley?

A. Yes, quite decidedly. I was thinking perhaps I didn't answer the previous question fully. I have done considerable work in zinc in Tennessee, and the usefulness of my work in Tennessee was based to no small extent on my knowledge that has been gained through many years of the study of similar ores in Virginia. As a matter of fact, I did considerable work for one client in the Ivanhoe region.

2219 Q. Dr. Holden, what, in general, were the mineral resources of the valley of New River?

A. Iron ore in various forms, lead and zinc, some sulphide iron ores that have been used in the manufacture of sulphuric acid at Pulaski, some coal resources, and various other things.

Q. How did the iron ore deposits of Southwestern Virginia compare with other known deposits of such ore in Virginia, say prior to 1888—what was the relative magnitude so far as they were known prior to 1888, compared to known iron ore elsewhere in Virginia?

A. They were conspicuous. They were deposits of a character that were readily seen and they had attracted attention from the earliest time.

Q. Were they larger or smaller than other known deposits at that time in Virginia?

A. I think they were considered larger.

Q. You have stated you have made a study of the iron, lead and zinc industries of Southwestern Virginia. Will you please state something of the sources which you examined and studied in the course of your study of these industries in that area?

A. You mean from a historical standpoint?

Q. Yes.

A. I studied everything I could find.

Q. Will you just give the Court some idea what those historical sources were?

A. The one that interested me most was perhaps Iron Manufacturers' Guide, written by J. P. Leslie, and published in 1858; another one was Iron in all Ages, by J. M. Swank, and published about 1892; another one was the Bishop history of American Manufacturers; another was various items in the Transactions of the American Institute of Mining Engineers; the records of production of the U. S. Geological Survey, as published in Mineral Resources; a private report on the history of the zinc mines at Austinville; Bulletin #43 of the Virginia Geological Survey; publication known as the Mineral Resources of Virginia; C. R. Boyd's Mineral Resources of Southwest Virginia; reprint 2220 of the annual reports of the State Geologist, W. B. Rogers; publication prepared for the Norfolk & Western Railway by McCreath and D-Invilliers.

By Mr. Thompson:

Q. Is that a publication in the libraries so one can get it?

A. Generally. [Continuing.] On account of my interest in the historical side of this matter I interviewed all of the men who are engaged in the industry, at an early date, particularly the older men. I have talked with Mr. D'Invilliers, perhaps the most interesting was John W. Robinson and C. S. Lucas of the Pulaski Iron Company, Mine Superintendent, and Mr. A. J. Dull, President of the Pulaski Iron Company.

Q. Mr. Holden, when did you commence your research into these histories in Southwest Virginia?

A. Do you mean before or after I came here?

Q. Or at whatever time it was.

A. I began several years before I came here.

Q. Did you continue after you came here?

A. On every occasion and from every source.

Q. You have referred to a number of written documents and reports as among sources you have examined in the course of your studies. Will you please state whether those documents are generally accepted by students of the history of those industries in this area as reliable or trustworthy?

A. These reports are considered authoritative. In history we must draw from all available sources and as historians we must judge as to the relative value of the things. I consider all of these things I have cited as important and reliable.

Q. Doctor, prior to the time in 1886 when the Cripple Creek Division of the Norfolk & Western Railway Company was put in operation from Pulaski up as far as Foster Falls, what, if any, iron, lead or zinc industries were located on or near New River above Radford?

A. I am not familiar with all the zinc operations. The chief zinc operation was the mine now operated at Austinsville. There were a couple of other operations, one of which I think is called the Bertha Mine and was operated as a zinc mine for some
2221 years before I came to this country. At that time when I first visited the region it was being operated as an iron mine and some zinc recovered as a side issue. There were a considerable number of charcoal furnaces—did you say before 1888?

Q. Before 18—in and prior to 1886, when the Cripple Creek Division of the Norfolk & Western was built from Pulaski to Foster Falls?

A. I must answer that from the records, because I was not there at that time, but there are abundant records to show that there were many charcoal furnaces operated in that region.

By Mr. **Jackson**. I produce a map which bears the legend in the upper left-hand corner "Geological Map of the New River, Cripple Creek Region, showing the approximate location of ore openings and properties tributary to the Cripple Creek Extension of the Norfolk & Western Railroad, by E. V. D'Invilliers, Geologist, 1887," and ask to have it marked as Defendant's Exhibit 550, for identification.

(Same is here marked for identification as requested.)

By Mr. **Jackson**:

Q. Dr. Holden, I show you defendant's Exhibit 550 for identification, and ask you what it is?

A. This is a map which accompanied the report of McCreath and D'Invilliers, a report being made to the Norfolk & Western Railway Company.

Q. Does that map purport to show the location of iron, lead and zinc mines and of iron furnaces and lead and zinc industries in that area?

A. It does.

Q. Doctor, please state what reputation this map bears among tudents of the iron, lead, and zinc industries of southwestern Virginia as to accuracy of the locations of the various mines and urnaces shown thereon?

A. The map is generally accepted by students of iron, lead, and inc industries of southwestern Virginia as correctly showing he locations of the iron and zinc industries in that region. My wn study confirms the general acceptance—the general correctess of this map.

Q. That is in that respect?

A. In that respect. As a matter of fact, it was the chief guide hat I had when I started to study this region and I was quite ritical in regard to it, but I was unable to find anything essenially incorrect on it.

(Exhibit 550 introduced in evidence and subsequently phototatic copy thereof was substituted for said exhibit.)

Q. Dr. Holden, when were the charcoal and iron furnaces esablished which are shown on Defendant's Exhibit 550 as having een situated on or within easy access to New River?

All the furnaces mentioned in the category are not shown on that map.

222 Q. Will you state the date of the establishment of the early charcoal-iron furnaces with which you have become amiliar during your study of this subject?

A. I have here a list of such furnaces, together with the date f building, the date of rebuilding, and as a matter of conveniece, I will hand this to the reporter.

Q. Will you read it so it can be heard and then you can give t to the reporter for copying, so it will be easier for the reorter.

By Mr. **Thompson**:

Q. Are there many of them?

A. A dozen or so. I have not an extra copy here, but I can urnish one.

By Mr. **Jackson**:

Q. Will you read that, doctor?

A. The first column is name of the furnace, the second olumn is the name and building date and the third column is the late of rebuilding:

TABLE A

(List of certain Charcoal Blast Furnaces of the New River Region of Southwest Virginia with dates of Construction)

	Original building date	Rebuilt
Poplar Camp	1788	
Cedar Run (Parry Mount No. 1)	1800	
Raven Cliff	1810	1876
Brown Hill (Wilkenson's)	1810	1870–4, 1882
Little Wythe	1819	1876
Cedar Run (Parry Mount No. 2 or Graham's)	1832	
Barren Springs (Graham's New)	1853	1873
Eagle (Gray Eagle)	1864	1881
Radford (Macks Creek)	1868	
Walton	1872	1882
Speedwell	1873–4	
White Rock (Panic)	1875	
Beverly	1880	
Irondale (Norma or Noble)	1881	
2223 New River (Foster Falls or Pierce)	1881	
Reed Island (Boom)	1881	
Cave Hill	1881	
Ivanhoe	1881–2	
Sinking Creek	1873	

Q. Dr. Holden, will you state the capacity of these charcoal pig-iron furnaces for which reliable data are available?

A. I have that written out on a sheet, and I will read it: "Raven Cliff furnace had a daily capacity of ten tons. Brown Hill and Walton Furnaces an annual capacity of 8,500 tons——"

Q. That is for both of them?

A. I understand that that is the combined production capacity of both furnaces, and so given because they were owned by one concern.

By Mr. THOMPSON:

Q. May I ask where you got those figures from? You say you understand that the combined capacity there—where did you get these figures from?

A. Mostly from various sources, partly from an Iron Manufacturers Guide, partly from the Virginias.

Q. Virginias what?

A. Virginias is the name of a magazine which was published from 1880 to 1885, by Jed Hotchkiss, at Staunton, Virginia. Also these capacities were taken from the bulletins of the American Iron and Steel Association. In case of discrepancies I have used the information which seemed to be the most correct. In addition to this, I can say that I have seen most of these furnaces personally and am able to judge something from my own observation.

By Mr. JACKSON:

Q. Will you proceed with your reading?

A. "Wythe Furnace an annual capacity of 1,500 tons. Cedar Run (No. 2) an estimated annual capacity of 2,000 tons. Eagle, an annual capacity of 600 tons. Radford furnace an estimated annual capacity of 4,000 tons. White Rock, a daily capacity of 8 tons. Beverly, Eagle, Raven Cliff and Speedwell, an 2224 annual capacity of 7,500 tons. Irondale, an estimated annual capacity of 3,000 tons (daily capacity 15 tons). New River, an annual capacity of 2,000 tons. Reed Island, an annual capacity of 2,000 tons. Cave Hill, an estimated annual capacity of 2,500 tons. Ivanhoe, an annual capacity of 8,000 tons. The foregoing tonnages are based upon the short ton figure of 2,000 lbs. to the ton."

Q. Dr. Holden, what was the annual production in 1880 of these charcoal iron furnaces for which production figures are available?

A. I have here a table which I have prepared, giving such production.

Q. Production for 1880?

A. For 1880.

Q. Will you read it, please?

A. This is also in tons of 2,000 lbs. "Radford, 930 tons." Boom was then in process of building——

By Mr. THOMPSON:

Q. Where did you get your items for the Radford furnace of 930 tons?

A. From the Virginias, Volume 2, page 29, for the year 1881, Volume 2, page 29.

Q. May I ask what the Virginias is?

A. The Virginias is a magazine which was published monthly throughout the years 1880 to 1885. It is a standard source of information along lines of natural resources for those dates.

Q. Well, who is the authority for the publication?

A. I gave that previously—Jed Hotchkiss.

Q. Who is he?

A. I was not personally acquainted with Mr. Hotchkiss, but he was a man of considerable geological training and deeply interested in mineral resources.

Q. Was he a man of outstanding figure in the geological world?

A. He was an outstanding figure in Virginia at that time, he was preeminent.

By Mr. JACKSON:

2225 Q. Was Mr. Hotchkiss an engineer for a division, or part of the army commanded by Stonewall Jackson, do you know?

A. I am not quite sure, but I think he held some such position.

Q. Was he a man of any reputation for veracity or probity?

By Mr. THOMPSON. If Your Honor please he might have a reputation for veracity——

By the COURT. If you will permit an interjection by the Court here, he was a very notable figure following the Civil War and some years thereafter. He was an engineer and geologist and very much interested in mineral resources in the State of Virginia and in a general engineering and mining development—not only a geologist of considerable note but also an engineer, and he published this magazine to which reference has been made, for the purpose of furnishing information and giving data and arousing interest in the mineral resources of Virginia and to keep people informed about them. He was a very prominent figure in the State for many years. I know that was his history and status in the history of Virginia.

By Mr. JACKSON:

Q. This magazine, the Virginias, what was its reputation among students in this field, as to reliability and trustworthiness?

A. I have considered it a chief source of historical information for these things that I am particularly interested in and I have never heard any question of essential facts raised.

Q. Will you proceed?

A. What was the question?

Q. The question is, I ask you to read into the record the table which you had prepared showing the production for 1880, of such of these charcoal-iron furnaces as there is reliable data for?

A. I had started on that—I will begin at the beginning: "Radford, 930 tons; Boom, Building; Barren Springs, 1,500 (about); Cedar Run, 1,000; Pierce, Building; Walton, 350–400; Brown Hill, 1,000; Raven Cliff, 1,500; Beverly, 650; Wythe, 1,650; Speedwell, 750."

Q. Doctor Holden, have you prepared a table of the annual production in 1881 of these charcoal-iron furnaces for which production figures are available?

A. I have.

Q. And were those figures obtained from the same sources as production figures for 1880?

A. They were obtained from the Virginias, Volume 3, page 52, for the year 1882.

2226 By Mr. THOMPSON. You are referring now to this Table B-1 that we have?

By Mr. JACKSON. No, it is the table the doctor has marked "C."

A. I have previously given you the reference to B-1.

Q. Now if you will please read——

A. Again in tons of 2,000 lbs.: "Beverly Furnace, 950 tons; Cedar Run, 1,250; Eagle, 600; Irondale, 700; New River, 980; Raven Cliff, 1,500; Reed Island (Boom), 1,125; Speedwell, 600; Walton, 800; White Rock, 725; Wythe, 850."

Q. Dr. Holden, have you prepared a table showing the annual production in 1882 of the Charcoal Iron furnaces for which production figures are available?

A. I have.

Q. And did you obtain that information from substantially the same sources as the information for 1881?

A. From Virginias, Volume 4, page 5, for 1883.

Q. Will you read that?

A. Again in tons of 2,000 lbs.: "Barren Springs, 500 tons; Beverly, 1,600; Brown Hill, 1,000; Cave Hill, 450; Cedar
2227 Run, 900; Eagle, 350; Irondale, 1,200; Ivanhoe, 2,100; New River, 2,100; Macks Creek (Radford), 950; Raven Cliff, 1,500; Reed Island (Boom), 2,100; Speedwell, 1,200; Walton, 1,300; White Rock, 1,200; Wythe, 750."

Q. Dr. Holden, what was the total production of these charcoal iron furnaces for 1882?

A. About 20,000 tons.

Q. Are there production records showing separately the production of such charcoal iron furnaces for the period 1883 to 1886?

A. I have not been able to find any records stating separately the production of charcoal iron furnaces after these years.

Q. State if you know whether there was production from charcoal iron furnaces on or near New River, above Radford, prior to and subsequent to the years for which you have given production figures, that is, 1880, 1881 and 1882?

A. Will you repeat that please.

Q. Read him the question. [Question read.]

A. Yes, there was production both before and after those years.

Q. During the period prior to 1887, what proportion of the production of charcoal pig iron in Virginia was produced by the furnaces on and along upper New River?

A. During the period prior to 1887 most of the charcoal pig iron produced in Virginia came from the upper New River. For 1882 the charcoal iron produced in upper New River furnaces was approximately 19,200 tons. The total production of charcoal iron in Virginia for 1882 is reported as 26,133 tons. The furnaces along New River contributed about three-fourths of Virginia's production of charcoal iron in that year.

Q. Doctor, have you prepared a table showing the annual production of charcoal pig iron in Virginia for the period from 1872 to 1884 inclusive?

2228 A. I have.

Q. Will you read that into the record please.

A. "1872, 21,445 tons; 1873, 22,475; 1874, 23,451; 1875, 15,391; 1876, 7,350; 1877, 6,193; 1878, 6,333; 1879, 7,703; 1880, 14,043; 1881, 19,038; 1882, 26,133; 1883, 16,879; 1884, 14,829."

Q. Have you also prepared a table showing the annual production of pig iron in Virginia, both charcoal and coke for the period of 1872 to 1880, inclusive?

A. I have.

Q. Will you read that into the record please.

A. "1872, 21,445 tons; 1873, 26,475; 1874, 29,451, 1875, 29,985;
1876, 13,046; 1877, 12,434; 1878, 16,928; 1879, 18,873; 1880,
29,934; 1881, 83,711; 1882, 87,731; 1883, 152,907; 1884,
2229 157,843; 1885, 163,782; 1886, 156,250; 1887, 175,715; 1888,
197,598."

Q. Dr. Holden, your table on the charcoal pig iron production in Virginia 1872 to 1884, inclusive, were there any records later than 1884 showing the charcoal pig iron production separately?

A. I was able to find none.

Q. I think you have already testified as to the lead and zinc industries on or near New River, above Radford, in and prior to 1886, have you not?

A. As to the history?

Q. No; as to whether there were any or not?

A. Iron and zinc?

Q. No; lead and zinc.

A. I don't remember.

Q. Well, were there any before 1886 on New River above Radford?

A. Yes, sir.

Q. Give very briefly what they were?

A. The mining and smelting of lead and zinc had been carried on on the upper New River beginning about 1750, and is more or less continuous since that time. The zinc industry in the upper New River commenced operation near Austinville in 1864, and has operated quite continuously since that time.

Q. Dr. Holden, will you state what historical sources you have examined or considered in connection with the question of what route and means of transportation were employed by these charcoal iron furnaces and lead and zinc industries on or near New River at and prior to 1886 when the Cripple Creek Railroad was built up to Foster Falls?

A. Well, a gentleman of some reputation, and once President of the United States, Thomas Jefferson's Notes on Virginia, and another source is the U. S. Engineers Reports. I think also there is considerable information in various volumes of the Virginias.

By Mr. Thompson:

Q. What did you consult?

A. I consulted Thomas Jefferson's Notes on Virginia, I
2230 consulted the U. S. Engineers Reports, I consulted the Virginias, and furthermore I have talked with the old residents in this region.

By Mr. Jackson:

Q. Have you consulted any other works upon the mineral resources of that region or of Virginia?

A. I have consulted everything that I could find.

Q. Did you examine the works of C. R. Boyd, entitled "Resources of Southwestern Virginia, showing the mineral deposits etc., and methods of transportation etc."

By the Court. Did you consult that particular book?

A. I did.

By Mr. Jackson:

Q. Is that book regarded as authoritative or not by historians or investigators in your field?

A. It is. I consulted also a reprint of the Geology of the State of Virginia by the State Geologist, W. B. Rogers.

Q. And how is that works regarded among students in this field?

A. As an official publication.

Q. Doctor, prior to the opening of the Cripple Creek Division of the Norfolk & Western Railroad between Pulaski and Foster Falls in 1886, what does your historical investigation disclose to have been the route and means of transportation to and from these charcoal iron furnaces and the lead and zinc industries on or within convenient access to upper New River?

By Mr. Thompson. Your Honor, we object to that on the same grounds that we have been objecting right along. He has been referring to this magazine called the Virginias, and we have got these four volumes of it and I note that these articles in here are not written by this Jed Hotchkiss—he is the editor of the magazine, and here, for example, it says "We are indebted to our well-informed friend and correspondent, John W. Robinson, Esq., of Graham's Ford, Wythe County, Virginia, for the

information under date of December 28, 1882, from which we have prepared the following full and accurate account of the operations during the year 1882, of the group of 16 charcoal iron blast furnaces located in the Valley on New River and its branches in Smith, Wythe and Pulaski Counties, Virginia, and known as the Southwest Virginia blast furnaces." And
2231 then he goes on to say: "In transmitting this data, Mr. Robinson writes: 'I am sorry to say that the outlook for 1883 is not very encouraging for the iron producers. The low price of iron and the high price of labor, supplies, etc., together with our remoteness from railroads, will deter the most of us from operating our furnaces until things are better. There are no new enterprises on hand and there will be none until we can get cheap fuel.'"

Now here is a newspaper reporting on the situation in the iron industry up there. We are not impeaching this man who is the editor of this magazine, but he was getting his information from some correspondent.

By the COURT. In any magazine there is matter written by correspondents. Take any ordinary trade magazine, it will undertake to give you the extent or the status or business conditions throughout the United States, and that is gathered from their correspondents.

By Mr. JACKSON:

Q. Just in brief, who was John W. Robinson?

A. John W. Robinson, I was acquainted with personally. At the time I knew him he was a Field Superintendent of Iron Mines for the Virginia Iron, Coal & Coke Company. At the time the Virginia Iron, Coal & Coke Company was formed, it was formed to no small extent around a neucleus of furnaces in which John W. Robinson was interested. John W. Robinson, if I remember correctly, married into the Graham family. The Graham family had been interested in using charcoal pig iron from 1800 to the time of the formation of the Virginia Iron, Coal & Coke Company.

Q. In this southwest Virginia field?

A. Yes, sir.

Q. And do you know whether he was connected with some of these furnaces you have named—charcoal iron furnaces?

A. He was the leading spirit in the iron industry in southwest Virginia and at times he was financially interested in several of them, and I think at times four or five.

Q. Can you name them?

2232 A. He was interested in the Barren Springs furnace. I think he owned the Barren Springs furnace, but off-hand, could not state definitely the furnaces in which he was interted, but they were in that list that I read, if I may go back to e list, I think I can indicate the furnaces which I think he was terested in.

By the Court. I don't think that is necessary.

Q. Doctor, now I will ask my questions: Prior to the opening the Cripple Creek Division of the Norfolk & Western Railad between Pulaski and Foster Falls in 1886, what does your storical research disclose to have been the route and means of ansportation to and from these charcoal iron furnaces and the ad and zinc industries on or within convenient access to New iver?

A. The history of these industries shows that the method of ansportation to and from the charcoal iron furnaces was by agon over wagon road to rail heads. In the very early days ansportation was overland to points further east in Virginia d elsewhere. It is true that some of the reports of the Chief Engineers of the United States Army show that some iron om Radford and Boom furnaces was boated down to New iver bridge about 1881 or 1882, the iron boated down New River New River Bridge, from Radford and Boom Furnaces during ose years did not include all the production of those furnaces, d represented only a small fraction of the iron production of e furnaces located on and within convenient access to New iver.

By Mr. **Thompson**:

Q. Are you reading from a book or is this your own view?

A. It is my own view.

I have not finished.

By Mr. **Jackson**:

Q. All right, continue.

A. (Continuing.) There is no evidence in historical records of ating from Radford and Boom Furnace—that it continued ter 1882 or 1883.

Q. Will you state, if you know, Doctor, whether or not any rt of the products of these charcoal pig iron furnaces of upper ew River, was marketed in Cincinnati?

A. In the year 1881, some of the production of eight of these charcoal furnaces was marketed in Cincinnati; some in
33 Saint Louis and some in Louisville.

Q. Prior to 1886, what did your investigation or study sclose to have been the routes or means of transportation to d from the industries engaged in the production or utilization lead and zinc located on or in convenient access to New River?

A. I know of no attempts to use New River to transport the products of these lead and zinc industries, and a study of their production—a study of their history discloses that their products were transported by wagon to the railhead, after the constructions of railroads. In the earliest days, prior to the construction of railroads, lead was transported by road to points eastwardly.

Q. In your study of the history of these industries—that is, the lead, iron, and zinc industries that were within easy access to New River, did you find reference to any available water transportation to and from them?

By Mr. THOMPSON. We object to the question.

By the COURT. I believe I will sustain that objection.

AVOWAL

By Mr. JACKSON. We except to the ruling of the Court, and state that through this witness, we offer to prove that he has made a study of the history of these industries, and that he has found, in the historical records, dealing with the beginnings and development of these industries, on and along and over New River, no records of available water transportation, except such transportation from Radford and Boom Furnaces as was referred to in the reports of the Chief of Engineers of the United States Army dealing with the years 1881 and 1882.

By Mr. JACKSON:

Q. Doctor, is there any work of an historical character, dealing with the history of these enterprises, to which you would like to particularly refer?

A. I should like to draw attention to a work entitled "Resources of Southwestern Virginia," showing mineral deposits, etc., of the various counties and methods of transportation, etc., by C. B. Boyd, published in New York in 1881, by John Wiley and Sons.

Q. Will you state whether or not, if you have not already done so, if that work is generally accepted as reliable among students in that field?

A. I have already stated so.

Q. Read such excerpts from that work as you deem pertinent to this point.

A. In treating of Pulaski county along lines of transportation——

By Mr. THOMPSON:

Q. What page are you reading from?

A. I haven't the page, but under Pulaski county——

Q. The title of the book is "Resources of Southwestern Virginia."

A. Yes, the Resources of Southwestern Virginia, published by John Wiley and Sons, 1881.

Q. Have you the book?

A. Yes, sir.

Q. Let's see it.

A. (Continuing.) (Reading:). "This county is directly
2234 in the great line—the great through line of railroads from
the Atlantic seaboard, through Tennessee to the west and south. The Atlantic, Mississippi and Ohio Railroad passes through the heart of the county from East to west. New River, besides being in line of navigation improvement under the auspices of the general Government, is also the line of the New River Railroad, now being constructed.

"This is also one of the proposed lines of the Petersburg–Pittsburg Southern Railway.

"The county is well supplied with good county roads, and one of them is a fine macademized turnpike."

In treating the lines of transportation in Wythe county, no mention is made of New River.

In treating of Giles county, at page 157, this is said:

"The New River is contemplated to be made navigable at some date by the United States Government, surveys having been made to ascertain the practicability, costs, etc. Some appropriations have been made and work done on the river, but none in this county."

In dealing with the lines of transportation in Carroll county, at page 294, I find:

"The United States Government had the river examined with a view to its improvement and the officer in charge made a favorable report on the scheme."

In dealing with manufacturies in Grayson county, at page 307, it is said:

"There are very few manufacturies"—

I think that word is spelled wrong. I think the original says "manufactories"—

"in the county, except a carding machine or two and Little River forge now in operation."

Q. About what time are you reading?

A. This was published in 1881. Here is a further paragraph:

"There are the usual grist and sawmills in every neighborhood, but being without the facilities of transportation, there
has been no inducement to build expensive factories of
2235 any kind, though the people are sufficiently enterprising."

By Mr. **Jackson**:

Q. You referred awhile ago to a work entitled "Reprint of Annual Reports and Other Papers on the Virginias, by Mr. Rogers, I think the State Geologist. Is there any excerpt from that work to which you wish to direct attention as pertinent to your testimony?

A. Yes, sir.

By Mr. **Thompson**:

Q. Have you a copy of that?

A. Yes, sir. [Continuing.] I find on page 111 in that work, this quotation:

"The lead ores of Wythe county, under judicious managing as now working, could, with favorable means of conveying the resulting metal to the proper markets, could not fail to become a large source of profit to the State."

By Mr. **Gatchell**:

Q. What page is that?

A. Page 111.

By Mr. **Jackson**:

Q. Anything further?

A. Then on page 140, quoting from a report in the year 1836, in speaking of the lead ores, etc., we find:

"The fact that by far the largest portion of the lead which these mines furnish is carried in wagons to Baltimore, is direct proof of the lucrative nature of the manufacture and strongly indicates the benefit which exists in this product and which the public may be expected to reap from the extensive works of improvement which have been so wisely projected in this portion of the State."

By Mr. **Thompson**:

Q. What is the date of that?

A. That was the report for 1836.

By Mr. **Jackson**:

Q. Are iron, lead and zinc industries included in what is known as the "heavy" industries?

A. Yes, sir.

Q. State, if you know, whether or not water transportation, where practical, is of any value to such heavy industries?

A. Water transportation, where practical, is of greater benefit to heavy industries, than any other type of industries; yes, sir.

2236 Cross examination by Mr. THOMPSON:

Q. There were no railroads in that country in 1836, were there?

A. Not to the best of my knowledge.

Q. After you put your ore on down New River, where would it go—to the Ohio?

A. If it didn't go to the bottom, it would.

Q. Thank you for that remark. Do you know anything about the New River Navigation Company, chartered by the State of Virginia?

A. No, sir.

Q. You never heard of it?

A. No, sir.

Q. You are an expert on navigation history in this part of the country, are you?

A. I am familiar with the things I have talked about here.

Q. And nothing else?

A. Oh, yes; lots of things.

Q. What was the nearest place for the reduction of lead ore in the United States at that time from New River?

A. I understand that lead ore was so reduced in the vicinity of the mine. It was carried across New River from the mine and handled on the opposite bank of the river.

Q. That is, the shot tower?

A. No, sir; the shot tower is on the same side of the river.

Q. The consumption in this country would be soon satisfied with what they could manufacture in the shot tower there?

A. Yes, sir.

Q. So your excess would have to go to Baltimore, which was the place where they had the great shot tower and they did reduce lead ores?

A. I don't know much about that, but I do know that this was the chief source of lead in the Eastern United States.

Q. Baltimore was?

A. No, sir.

Q. This place was?

2237 A. No, sir; Austinville was.

Q. Baltimore was the place of distribution?

A. No, sir.

Q. Where they made ammunition of one kind or another?

A. I expect so; I have no special knowledge of that.

Q. There would be no point in sending excess lead ore on down the river, after they had reduced it into its particular constituents for the market within that area; isn't that so?

A. It seems to me that the New River furnished the route for a considerable number of miles from the Lead Mines Eastward and Northward.

Q. Where were there any Towns on New River in the year 1836, from the Lead Mines North?

A. I don't know.

Q. There weren't any, as a matter of fact, were there?

A. I doubt if there were.

Q. So your only market was East, wasn't it?

A. It seems that way.

Q. There was no purpose in sending lead ores down New River——

By Mr. **Jackson**. When?

By Mr. **Thompson**. In 1836. That is the date that he gave in the book.

Q. That is the date you quoted there, isn't it?

A. If I had been doing it, I would have sought the easiest and cheapest way of doing it.

Q. How do you know going down the river was the cheapest way?

A. I don't know; apparently it was not, or they would have done it.

Q. Even though there was no market there?

A. It was some miles from the Lead Mines to Radford, and Radford would be the natural point for trans-shipment to Baltimore, by team.

Q. Isn't it a fact that there was a road running from up there in that district, and in a Northeasterly direction, to Lynchburg, out that way to Baltimore?

A. There was a road Northeast of the mines, known as the Lead Mine Road.

2238 Q. Yes, sir. And wasn't the means of transportation in 1836, that which would get them to the—that of getting the ores or whatever they shipped, to the James River and on down the canal?

A. I don't get that.

Q. Read the question. (Question is read.) The canal along the James River.

A. Where?

Q. At any point—Covington——

By Mr. **Jackson**. When was this?

By Mr. **Thompson**. In 1836.

A. I doubt if there was much navigation on the James River from Covington in 1836.

Q. Isn't it a fact that from Covington down, was the greatest course of carrying commerce in the State of Virginia—that is north or west, in 1836?

By Mr. Jackson. We object to that. There is no evidence to show that Covington even existed then.

A. I have a reference somewhere that zinc ores were hauled to Lynchburg——

Q. Hauled to Lynchburg——

A. Wait a minute—the suggestion was made that they might profitably be hauled to James River at a point west of the blue ridge, which would be the present Buchanan. I cannot give the reference, but my remembrance is that it said they could carry that in canoes, a ton to two canoes and that meant that at that time, there was transportation for 500 pounds of cargo from Buchanan, but I have no evidence that such transportation was used. It is simply a suggestion.

Q. When was the canal built at Lynchburg on the James River?

A. I do not know.

Q. Isn't it a fact that it was a going business and the biggest corporation in the State of Virginia, so far as income was concerned, in 1836?

A. If I remember correctly, canalization was completed to Buchanan about 1855, but as to the details of the development of that transportation, I do not have the details of.

2239 Q. If there was no demand up the river or down the river, or in Virginia or in West Virginia, wouldn't it be natural to find a market—to find a place where there was a market going East?

A. Yes, sir; you could not find a market where there was no market.

Q. What would be the point in going down the river, then?

A. Commodities seek the lowest cost of transportation. It seems to me that the natural route would have been the water route from the Lead Mines, which were located on the New River, to Radford, and thence by wagon to market—the final destination.

Q. You refer to Radford. When was Radford established?

A. In the early maps of the United States Geological Survey, the locality known as Radford is referred to as Central Lovely Mount, and in these papers published in the 80's, Radford was not known as such at that time.

Q. As a matter of fact, there was no town of any size there in 1836, was there?

A. I have no knowledge of that.

Q. Why would you think that they would ship goods down or material or commerce to Radford. Why couldn't they take the road at the Lead Mines?

A. Of course, they could—as a matter of fact, they did.

Q. Wasn't that the reasonable thing to do.

A. It was, if there was no water transportation. If there was water transportation, the natural route would be to go on water as far as you could, and Radford—where Radford now is, would be the Eastern limit, in my guess, for water transportation.

Q. Why go North and East, when you could go East. You have to go North going on the river.

A. It is my understanding that Baltimore is Northeast of the mine.

Q. You had to go to Lynchburg to go to Baltimore, did you not?

A. Yes, sir; you had to go Eastward, but the natural route of transportation from the earliest times, from New York to Alabama, has been along the limestone valleys, and the
2240 natural route for lead would be the same valley, Northeast.

Q. Even though your river was running Northwest?

A. Are you stating that as a fact?

Q. I am asking you the question.

A. (Examines map.) This is approximately North [indicating on map]?

Q. Yes, sir.

A. This is East [indicating].

Q. Yes, sir.

A. This is Northwest and the Lead Mines are here [indicating on map], and from here to Radford is Northeast [indicating].

Q. How much Northeast is it?

A. About 20 miles by river.

Q. You, as a transportation expert, and an historical transportation expert, now say that they ought to take the lead from Austinville and take it down the river to Radford, and then start it in an Eastern direction, or any direction that it might be, to Baltimore?

A. Some years ago—your question involves an assumption that is not necessarily in accordance with the facts. I am familiar with the region—this lead and zinc region and this Virginia iron ore region that we have discussed. I have little knowledge of transportation outside of that, except as I have obtained from my studies of history—the history of the iron ore industry.

Q. That is your answer to my question: That is your answer, is it?

A. I said further, some years ago, it was my private business transport hundreds of thousands of tons of tan bark and lumr for 16 miles by wagon.

Q. You are now speaking about your own experience. I am lking about the year 1836. You gave us a reference to 1836. Vhat this man Boyd or somebody had to say in some book.

By Mr. Jackson. You are wrong about that.

By Mr. Thompson. The Annual Report of the Geology of the irginias by Mr. Rogers. I am asking you about 1836.

Q. The best answer that you, as an historical expert on transortation, can make, is that you would take the lead down to adford, and then start East with it, rather than start East or ortheast with it from the Lead Mines, when they had a road ere?

A. You keep jumping off the track.

241 Q. I will try to jump back on the track. Will you answer my question?

A. The route down New River is strictly Northeast and transortation from the Lead Mines down to the site of Radford, ould be directly in line towards Baltimore.

Q. How far would it be to Radford from Austinville, by river. ake into consideration all of the bends and curves on the river?

A. I made a slight allowance for that on the scale, when I said was 20 miles.

Q. It is 20 miles—you say that, do you?

A. I expect it is a little further than that down the river.

Q. As a matter of fact, it is 44 miles, is it not, by the river?

A. (Witness examines map.) The straight line on this map, cording to my guess, it is 15 miles, if that map is correct.

Q. I am not asking you that. I am asking you what is the istance by the river from Austinville to Radford?

A. I never measured it.

Q. You told the Court that you would take an ore shipment Radford by the river and go east then, did you not?

A. That is my judgment of the way it should be done.

Q. That is the best answer that you can give, is it?

A. Yes, sir.

* * * * *

Q. I would like to ask you something about this Defendant's xhibit #550. You say this is a very reliable map, do you not?

A. The man who made it said it was particularly good, beuse it was based on the Norfolk & Western survey as a base ne.

Q. That would necessarily make it good, would it?

A. Well I presume the Norfolk & Western employed competent engineers, if they were going to spend a few million dollars building a railway.

* * * * *

2242 Q. I would like to ask you with regard to the iron ore deposits up on New River. Do you understand the term in mining called "gophering"?

A. I have heard it used.

Q. You have been in the West?

A. Yes, but not extensively, that is not for a very long time.

Q. Is it or not true that up the head waters, the upper region, there is a large deposit of iron ore throughout that country?

A. Not throughout the country. The iron ores that were mined for these charcoal furnaces were mostly in the form of nodules, scattered through the residual clay, which overlies the limestone of the Great Valley region.

Q. Isn't it true up around Foster Falls and all through that stretch there is a great seam, or deposit, we will call it, of iron ore, that runs through that country for a stretch of about thirty miles?

A. No such thing as a seam.

Q. I will withdraw the word "seam." What is the word for it?

A. Those as I said were nodules or iron ore scattered through the clay, sometimes they constituted as much as one-third of the total materials and other times they constituted not more than one ton in twenty. The iron ore was obtained from the clay by a washing process; many times they recovered less than one-twentieth of the amount of material they put through the washer.

Q. Isn't it true that really what they have done up there to a very great degree, not entirely, but they have really been gophering where they got a deposit that was rich they took that out and left the low-grade ore there?

A. What would you consider a low-grade ore?

Q. I am not an expert on iron ore, I could not tell you—I could on gold or silver, but not on iron ore. I have been in the district and that is the impression I got, and ask you if that is correct!

A. Let's make a correction on gophering. You are familiar with gold and silver, and gold and silver can occur in great values
in a very small place, and you can properly call that go-
2243 phering. Now iron ores do not. They are a bulky mate-
rial, and when you are getting one ton of ore out of twenty
tons of material it would be a gopher that resembled the dinosaurs of old—you are trying to get at the amount of ore left there?

Q. Yes.

A. Those deposits have been practically exhausted.

Q. Would you say this iron ore in the Southwestern part of Virginia along the river is gone?

A. No; those residual ores in the limestone clays have been largely exhausted; there are several deposits which I understand have not been completely mined out, but there is a deposit of ore in Carroll County which is being mined primarily for its sulphide content on a considerable scale and hauled to Pulaski where it is used in the production of sulphuric acid and the iron which was in the original material is a by-product.

Q. That gets close to what I am trying to being out. In other words, you still have a deposit left, which if it came to a necessity, suppose you exhausted your Lake Superior and Michigan deposits, there would still be something left up New River, wouldn't there? That is low-grade?

A. It is not low-grade, but it is the sulphide, and I do not know of a single case where a sulphide ore has been mined as an iron ore; in many cases sulphides of iron have been mined for the sulphuric acid content, and the by-product of those operations used as an iron ore. At the present time there are quantities of this material, which is called "Blue Billy" stacked at the City of Pulaski, for which there is no market.

Q. Coming to the lead mine, what is the deposit there?

A. It is what we call a disseminated ore.

Q. Is there ore left there?

A. There was the last time I was in the mine.

Q. And there is zinc there?

A. Yes, sir.

Q. And still quite a lot of zinc up in that part of the country?

A. If you knew the New Jersey Zinc Company you would know they are not going to let anyone know how much reserve they have there.

2244 Q. I know the New Jersey Zinc Company, and I know they wouldn't let anyone know, but as a matter of fact they have got reserves there, isn't that true?

By the COURT. Ask the witness if it is in his knowledge there is considerable zinc reserve there.

A. The last time I was down in that mine they were mining zinc, and I saw zinc in the walls. I haven't the slightest idea whether there is any zinc a foot away from those walls or not; presumably there is, but I have no knowledge of the tonnage held in reserve.

Q. How about lead?

A. They are intermingled, the lead and the zinc.

Q. In your study of geology up that river, have you noticed the fact there are quarries up there that are valuable stone quarries?

A. What kind of stone quarries?

Q. For instance one right near the Radford project where they got out a lot of rock and shipped it, haven't they?

A. I understand that was opened for limestone deposit, and the people who opened it had not made adequate investigation and found the limestone there was of very limited value and since that time they have been mining the dolamite which has been used for crushed stone.

Q. That is being used and shipped?

A. The last time I noticed it was being used.

Q. There are sand deposits up that river?

A. What do you call sand?

Q. For cement works, etc.

A. Unfortunately some of that sand has been used for cement work.

Q. And it worked out?

A. Yes, it worked out dreadfully.

Q. You don't think there is sand up there for that industry?

A. Anyone that wants to can use it, but not in any of my concrete will there be any of that sand.

Q. There are also clays up there that are valuable?

A. There is a plant up there producing ochre.

2245 Q. Do you know any other geological deposit up there valuable for any commercial purpose?

A. I can conceive of a whole lot of things that could be used up there, but off-hand I don't think of anything that has much commercial prospects.

Q. Any coal up there?

A. No.

* * * * *

Q. You referred in your examination in chief to an engineer by the name of Boyd, who, I believe, has written quite a volume on geological matters in the State of Virginia?

A. I referred to Boyd, yes.

Q. Is he regarded as an authority?

A. Mr. Boyd was a Wytheville man, and it is my understanding that he traveled widely over this country and probably had better first hand knowledge of the country than anyone else I can imagine.

Q. Now, did you read his report that was attached to the report of Major Craighill in 1872?

A. I glanced through it. I did not read it critically.

Q. When did you do that?

A. Oh, a week ago.

Q. And not previous to that time?

A. No.

Q. Do you recall this paragraph in his report:

"Assuming that the mineral interests of the country tributary to New River are, or will be, of paramount importance, I have devoted the body of this report to that subject.

"That section of country contiguous to and likely to supply tonnage at once to a New River improvement, beginning at its southwestern limit, is the following: A part of the counties of Ashe, Alleghany, and Surry, in North Carolina; parts of the counties of Carroll, Grayson, Wythe, Pulaski, Montgomery, Bland, Tazewell and Giles, in Virginia; and the counties of Mercer, Monroe, and Summers, in West Virginia; comprising an area filled with apparently inexhaustible deposits of iron-ore of high grade, coal, lead, zinc, copper, baryta, salt, alumina, sandstone, (millstone and grindstone grit), limestone (both ordinary and magnesian), and sometimes strong indications of beds of gypsum, some of which leads of ore are exhibited nearly in their actual position upon the accompanying map." 2246

Do you recall having read that?

A. I don't remember the detail wording. I can well imagine that it is there.

Q. Do you agree with that statement?

Mr. **Jackson**. I suggest that he show it to the doctor.

Mr. **Thompson**. I was reading from Government Exhibit No. 31 (handing same to the witness).

A. The question is if I agree with that?

Q. Yes.

A. To a certain extent, in some respects, it was too optomistic and in other respects was not optomistic enough. In those days the knowledge of ore deposits was not what it is now. Someone has said that the only good description of a mine is an obituary and in many cases ore deposits turn out to be vastly greater than the report indicates. I could call your attention to a number of instances of that kind in Virginia.

Q. Are any of them up in the New River district?

A. No, I can't say that there are, but I feel quite sure that the early geologists did not visualize even approximately the form in which these ore bodies occurred. I doubt if they realized that there was as much zinc as there has proved to be in the Austinville mines.

Geologists in those days were inclined to think of things in leads; they were inclined to think of veins of indefinite extent; they would find a deposit in one point and another hundreds of miles away, and draw a line between, and assume that they had had solid ore all between. While it was not proper it was quite generally done.

Q. But, generally speaking, you would agree with his report, would you not?

2247 A. I would agree with that part of the report which deals with things which, as an ordinary individual, he could see from his own observation.

Q. And you did consider him a man, I think you said, about as familiar as anybody with that part of the country?

A. First, I was not back there at the time, but I understand he spent many years doing very little else than going back and forth over that country looking into mineral possibilities.

Q. Have you heard of the discovery of manganese up the river?

A. Where?

Q. On New River, or are there any manganese deposits?

A. How close to New River?

Q. Well, I couldn't tell you that, but the Press has carried that story from time to time within the last three years. In Montgomery County and Giles County?

A. There is a deposit that is being mined on the Bland-Giles County line at the present time, and it was a right promising deposit. Now, there are two appearances in Montgomery County that have been prospected in recent years, but I gather that they are more promotion than mining operations.

To be specific, representatives of the large interests came down here from New York, and got me to take them to see what was characterized as a million tons in Montgomery, and it was within quarter of a mile of New River. I said it was a waste of time to go down there. They said, "Well, we came all the way from New York to see it." Well, I said, "I will take you down there." I took them down there.

Q. Was this in Montgomery County?

A. Yes. It was on the corner of Montgomery, Giles and Pulaski. I said, "Here is your mine; now, show me the manganese," and they were unable to even show me a specimen; they were unable to show me anything that I was willing to admit was manganese. So there have been some very large stories about manganese in that section of the country, which have no basis whatever. There is a little manganese which has

2248 been mined not far from New River.

Q. In what form does manganese appear?

A. Mineralogically or geologically?

Q. Mineralogically?

A. Three forms—mineral——

Q. I mean, in what form is the deposit physically?

A. You mean geologically?

Q. Yes.

A. In this country it is a superficial deposit, the result of weathering activities, and in the Butte region it occurs in vein form and occurs at depth, but here manganese is limited to mere surface appearance. We have a number of these occurrences in Virginia. One of them, in the Allegheny Mountain region, in association with the Oriskany and sandstone. We have manganese again along the west base of the Blue Ridge.

Q. I want particularly down through that part of the country along the river. That, you say, is the surface form?

A. It occurs disseminated at shallow depths. I do not know of a single deposit that could be called manganese ore that is contiguous to New River. There are some deposits that have been mined there with iron ore rather high in manganese.

Q. Have you heard of deposits, exposed or prospective, at Dennison?

A. Where is Dennison?

Q. I think either Montgomery or Giles County.

A. I never heard of Dennison.

Q. Have you ever heard of Herron?

A. No.

Q. Eaton?

A. No.

Q. Linkous and Shumate?

Mr. Jackson. Are they towns?

Mr. Thompson. That is the way it is designated, as "Linkous and Shumate deposits."

2249 A. What is the name of that?

Q. A manganese deposit in western Virginia by G. W. Stose, 1922?

A. I do not know of any deposits by that name that have ever amounted to anything. The only deposit in the report in this region that amounted to anything was the one I mentioned on the Bland-Giles line, and that is known as the Stange mine.

Q. That covers 27,500 acres, doesn't it? The Stange?

A. The number of acres that it covers depends on the number of acres Mr. Stange owns. Mr. Stange owns a large boundary up in there, but, so far as I know, he has never opened that except in one place, and he has done all his mining in one particular locality.

Q. Where is that located with respect to New River—how close?

A. May I get a map?

Q. Yes.

A. I would answer 16 miles in a direct line.

Q. Now, have you heard of the others which are referred to in the Stose report of 1922—the Hare?

A. I am very much interested in manganese and consider that the Oriskany manganese and the Oriskany iron ore have had approximately the same origin. So it has been my business to visit the manganese deposits which seem to be of the Oriskany type.

Q. Have you ever been on Beamer?

A. No.

Q. On No Business Creek?

A. I know where it is, but I have not visited any manganese deposits on this.

Q. On Flat Top?

A. I am not sure where Flat Top is, but I do not recall having visited it.

Q. On Johnson?

A. I don't think so.

Q. On Thompson?

A. I don't remember it.

2250. Q. Isn't it a fact, Doctor, that you have made your transportation study within a very recent date?

A. In connection with my study of the history of the iron ore industry, transportation has been a part of the study. I gave particular attention to the early ore industry, particularly before the development of the coke furnace, and the charcoal furnaces were, for the most part, located close to their ore supplies, and the transportation there was mostly by cart or by wagon, and there was little occasion to give attention to that. I was concerned to a small extent with deposits of other products, pig iron products, but my business was mostly concerned with the ore itself, and I was supposed to rest when I got it to the furnace, and I might say my study of transportation has been contemporaneous with my study of iron ore deposits, and that runs over a period of 35 or 40 years.

Q. Did you ever talk to a man by the name of R. L. Howard whose father operated the Howard's Ferry and who has testified in this case?

A. I don't recall.

Q. Did you ever talk to a Mr. William Collins, who lives at Salem, Virginia, and who in the early days lived at Towe's Ferry on New River, and who has testified in this case for the Government?

By Mr. Jackson. I think you should specify the time.

By Mr. Thompson. Any time.

By Mr. Jackson. That is too vague and indefinite for cross examination.

A. My dear sir, some days there are a dozen people in my office and I don't know their names.

Q. So far as you know you have never talked to Mr. R. L. Howard, or Mr. William Collins about the boating of pig iron down New River, have you?

A. If I did I have forgotten it, or I did not know his name at the time.

Q. And you didn't make any notes about it?

A. I don't remember any.

Q. Did you ever talk to a man by the name of Lewis Harvey, whose farm is located near the Radford dam site, in fact just back of the dam site?

A. In as much as I spent about three years in that vicinity, I might have easily talked to Mr. Harvey, but I do not recall it.

Q. You did not make any notes of it?

A. I don't recall it.

Q. Did you ever talk to J. W. Flannagan who resides at Radford and who testified for the Government?

A. I have talked a good many times to a man named Flannagan, but I do not recall discussing iron ore or New River problems with him.

2251 Q. With none of these men did you ever discuss the question of boating iron ore down the river, or pig iron?

A. I don't recall I ever did.

Q. I believe you testified you found no historical reference to transportation of pig iron by boat later than the year 1882 or 1883?

A. I don't recall finding any.

Q. You say you don't recall?

A. I don't recall finding any such records.

Q. I will ask you if you do not know the cessation of transportation by boat of pig iron was occasioned only by the closing of the furnaces in 1884 or 1885?

A. No, I don't know that.

Q. You don't remember it or you have never known it?

A. The records indicate the furnaces continued to produce.

Q. And do you know the closing of the furnaces was occasioned by general business depression about that time?

By Mr. Jackson. I object to that question. He testified they didn't close.

A. It is a rather strange thing that these furnaces continued to operate after the poor prices of iron set in. They had had prices on iron which were double the prices which prevailed subsequently and it resulted in a large amount of furnace building and rebuilding. In the early eighties they had what was for the owners a very large investment, and at the beginning of 1883 the prospect in the iron manufacturing business was very gloomy indeed.

The records showed the Virginia production of iron 14,000 or 16,000 tons in '80, '83 and '84. Prior to that time 75% or 73% to be correct and exact was produced by the furnaces along New River. It is a reasonable expectation that a corresponding percentage of that 14,000 or 16,000 tons was due to the furnaces along New River; therefore I think I am justified in saying the furnaces did not shut down completely. As to why they shut down, how can I say that it was due to the depression?

Q. I believe you said you read the reports of the Chief of Engineers, did you not?

2252 A. I glanced through them.

Q. That was one of your sources of information you had, as you testified on Friday?

A. I looked through them, particularly with a view of seeing what transportation they recorded as having taken place on New River.

Q. I direct your attention to Government Exhibit #42, the same being the Annual Report of the Chief of Engineers, War Department for the year 1886, page 1602, being a part of the report of Col. William Proctor Smith, Assistant Engineer in charge of channel improvement on New River, to Lt. Col. William P. Craighill, under date of November 30, 1885, and read to you as follows: "It is not necessary to say anything about the other two divisions of New River, as there was no work done on them, nor were the channels examined; but from inquiries it is thought that the channel-way made in former years still keeps open, and bateaux are in constant use on them, iron having been shipped to New River Bridge up to the time of the suspension of the furnaces by the prevailing hard times."

8

Now do you agree with that statement?

A. My judgment is while this fellow might have been a good engineer he wasn't much of an economist, "but from inquiries it is thought the channel-way made in former years is still open." You will notice he is not sure the channel-way is open, and furthermore you will see he has not made a personal investigation. The sentence continues "and bateaux are in constant use on them." The balance of that clause beginning with "and" and ending with "them" is predicated on the inquiry which he had made, and not on personal observation, and he don't seem to be very sure about it.

Q. Don't you think Col. Smith was in a better position, he having been located on that river, than you are today, to tell what the conditions were there?

A. I don't see you have reliable evidence here there was any iron transported under the date of this report, or immediately preceding it.

2253 Q. I am asking, isn't his statement the suspension of the furnaces by prevailing hard times—that he would be in a position to know that better than you?

A. I would not be convinced to that statement that William Proctor Smith was correctly informed, particularly when we have statistical data to the contrary.

Q. Didn't you give this report as one of the sources of your information?

A. I had looked over this, and saw the item you referred to, but I didn't consider it reliable evidence in view of the other information I had that transportation was continued.

Q. On page 5017 of your testimony you said in reference to your sources of information, that you consulted Thomas Jefferson's notes on Virginia. Will you please tell us where there is anything in Thomas Jefferson's notes on Virginia discussing the question of the transportation of pig iron or iron ores?

By Mr. **Jackson**. I object to the form of the question, because the witness never testified he consulted Jefferson's notes about pig iron, but about lead and zinc.

Q. Let's go back to your testimony, page 5016 and 5017: "Dr. Holden, will you state what historical sources you have examined or considered in connection with the question of what route and means of transportation were employed by these charcoal iron furnaces and lead and zinc industries on or near New River and prior to 1886, when the Cripple Creek Railroad was built up to Foster Falls?" I am asking if there is any reference in the Jefferson document you speak about with respect to the roads upon which the ore was transported or the means by which the iron, the pig iron was transported?

A. He said iron or lead or zinc. I don't recall any reference in Jefferson in regard to iron but there is reference in regard to zinc.

By Mr. **Jackson**. And lead.

Q. I am asking about pig iron.

By Mr. **Jackson**. He has told you.

A. I answered that.

2254 Q. So you say there is no reference with reference to pig iron?

A. There is a reference in regard to iron in eastern Virginia.

Q. But not along New River?

A. I don't recall any such reference.

Q. You would recall it if there was such reference there?

A. If I had seen it I probably would.

Q. You have it in front of you?

A. Yes, sir.

Q. And there is no reference there?

A. I don't see any.

Q. You also in answer to Mr. Jackson's Question gave as one of your authorities the Virginias. Will you indicate in the Virginias Magazine in 1882, Vol. 3, page 52, and 1833, Vol. 4, page 5, where it makes any reference to the manner of shipment or transportation of pig iron?

A. In paragraph #1 it is said, "The iron made was sold in St. Louis, Cincinnati, Baltimore, and Wilmington," and paragraph #4 he makes the same statement.

Q. Does he say how the pig iron was transported?

A. It does not say how it was transported.

Q. So it doesn't show whether it was carried down New River by boat or any other way?

A. It doesn't say how it was transported.

Q. Have reference now to the 1883, Vol. 4, page 5, is there any reference there as to how the pig iron was transported?

A. In paragraph #7 he speaks that the furnaces had to blow-out on account of scarcity of transportation.

Q. But it doesn't indicate what kind of transportation?

A. Not in that paragraph.

Q. Or in any paragraph there?

A. I don't see any.

REDIRECT EXAMINATION

Q. During your cross examination on Friday, Dr. Holden, you
were asked what was the distance from the Lead Mines to
2255 the point on New River where Radford now is, and I
wondered if since that time you have checked that over?

A. I based my answer on this map, and I can see now I went from the extreme ends of the scale and not from the zero point.

Q. Will you state now what the distance would be approximately?

A. From where to where?

Q. From the Lead Mines northeast to the curve of the river, approximately to where Radford now is?

A. Well in a straight line I would estimate it was twenty inches which would make it forty miles, by river.

Q. About how far would it be about by the Lead Mines road to a point approximately opposite the curve of the river near Radford?

A. You said by the Lead Mines road?

Q. Yes, if that is the right road.

A. The Lead Mines road would not be the road which you would take today to go from the Lead Mines to Radford because there is a poor, indirect road from Childress to Radford.

Q. What I would like to get would be what would be the comparative distance by road from the Lead Mines down to the curve of the river near Radford?

A. I would make a guess there wasn't much difference.

Q. Between that and the distance you gave by river?

A. Yes, sir.

Q. And does that road which you now refer to pass along the river at Allisonia?

A. Yes, sir.

Q. And about how far from the river is it when it goes down to the vicinity of Radford or where Radford now is?

A. Well the road which existed at the time this map was made is directly at the river.

Q. Before the railroad do you know whether the through road crossed at Ingles' and Pepper's Ferry?

A. I think Jefferson speaks of the zinc being hauled to Lynchburg, and I think in that case they would have stayed on 2256 the south side of New River and gone through Christiansburg.

By Mr. Jackson. I produce what appears to be a letter in longhand addressed to Dr. J. E. Williams, Dean V. P. I., Blacksburg, Va., dated February 2, 1936, and signed by R. J. Noell, and ask to have it marked "Defendant's Exhibit #551" for identification. (Letter marked as requested.)

I also produce what appears to be a carbon copy of a letter dated March 2, 1936 addressed to Hon. R. J. Noell, East Radford, Virginia, and without signature, except "Dean of the College" and bearing the initials "JEW" and ask to have it marked "Defendant's Exhibit #552" for identification. (Letter marked as requested.)

I also ask to have marked as "Defendant's Exhibit #553," for identification, letter on the letterhead of Virginia Polytechnic Institute, Department of Geology, Blacksburg, Virginia, dated March 4, 1936, addressed to Hon. R. J. Noell, East Radford, and appearing to be signed by R. J. Holden, Professor of Geology. (Letter marked as requested.)

Q. Dr. Holden, you have already I think identified the letter I have had marked Defendant's Exhibit #553 for identification, as the letter which you wrote to R. J. Noell. Is that right?

A. I think this is the letter.

Q. I direct your attention to the first paragraph in which it says, "Your letter to Dean Williams and a copy of his letter to you have been referred to me," and show you Exhibit #551 and 552 for identification, and ask you whether #551 is the letter of Mr. Noell referred to you, and if #552 is a copy of the letter Dean Williams referred to you?

A. I believe them to be.

By Mr. **Jackson**. We offer in evidence Exhibits #551–552–553 in connection with the examination of Dr. Holden.

By Mr. **Thompson**. No objection to them going in.

By Mr. **Jackson**:

Q. I am not sure whether I asked you what is your position in the Department of Geology at Virginia Polytechnic Institute?

A. I am the head of the Department and have been for twenty-nine years.

By Mr. **Jackson**. I would like to read the letters just filed, if the Court doesn't think it will take too much time.

By the **Court**. All right.

Note.—Whereupon letters filed as Exhibits Nos. 551, 552 and 553 were read by Mr. Jackson, as follows:

"2-28-36
East Radford, Virginia.

Dr. J. E. Williams, Dean V. P. I.
Blacksburg, Va.

Dear Mr. Williams: I would be very glad to get as much information about the old iron furnaces that have been operated along New River as can be reasonably obtained. What furnaces, when they started, how operated and how long. The iron ore supply and how transported to the furnaces, especially as to being carried in boats on New River, also the disposition of the pig iron and how it was carried to railroad or the market; as to that located down the river and that hauled by teams from and to what places; especially that going down the river and any shipments out of the State. Also as to lumber, tan bark, 2257 staves, logs, wheat, corn and provisions or any products carried in boats up or down the New River and when, from and to what point, passengers, etc.; as well as rafting logs, staves, lumber, etc. I understand your library contains a copy of T. L. Watson's "Mineral Resources of Virginia" and which contains on pages 402–488 a chapter of Dr. Holden on iron, and this article contains on page 479 a list of furnaces in Virginia, also a book in your library "Virginia Iron Manufacturers in the Slave Era", by Kathleen Bruce. This book was published in 1931 and opposite page 452 it contains a map of Virginia showing the location of the iron furnaces in Virginia with names and considerable information as to some of the furnaces.

"I understand Dr. R. J. Holden is the best authority on these matters and I would be obliged if you could talk to Dr. Holden and apprise him of our appreciation of any information he will give us.

"My best wishes to you and Dr. Holden.

Very sincerely,

R. J. NOELL."

Then there is a footnote saying:

"Dr. WILLIAMS: If not asking too much will you kindly get your stenographer to type three copies of this letter and mail to me in your reply, as I am so pressed for time I could not look up a stenographer?

RJN"

Now #552:

"MARCH 2, 1936.

Hon. R. J. NOELL,
East Radford, Virginia.

DEAR SENATOR: Your letter of February 28 has been received and is being referred to Dr. R. J. Holden who, I am sure, will be glad to give you such information as he may have. Dr. Holden knows more about furnaces than all of us here put together. In fact, in my opinion, he knows more about them than anyone else in Virginia.

"Louise was glad to make three copies of your letter, and I am enclosing them herewith.

Very sincerely yours,

——— ———,
Dean of the College.

JEW:LA
Enc.

2258 #553 reads:

"VIRGINIA POLYTECHNIC INSTITUTE,
DEPARTMENT OF GEOLOGY,
Blacksburg, Virginia, March 4, 1936.

Hon. R. J. NOELL,
East Radford, Virginia.

DEAR SIR: Your letter to Dean Williams and a copy of his letter to you have been referred to me.

"To give you all the information in regard to the furnaces on New River and Cripple Creek in typewritten form will require a large amount of typewriting. A description of these furnaces was published in 1858 in the IRON MANUFACTURER'S GUIDE. This gives all the furnaces and forges that were known at that time. It contains some information on iron operations that had been abandoned scores of years before that time. A record of the operation of these furnaces from 1876 to recent time is contained in the printed records of the American Iron and Steel Association, copies of which are available in the Congressional Library in Washington. In the VIRGINIAS, a magazine published by Jed Hotchkiss, Staunton, 1880–1885, there is rather detailed information in regard to furnaces of this region, mostly from the pen of John W. Robinson.

"Last year J. A. Whitman of Wytheville, Virginia, published a twenty-page pamphlet entitled THE IRON INDUSTRY OF WYTHE COUNTY FROM 1792. I presume you might be able to obtain a copy of this from Mr. Whitman.

"While I have first-hand knowledge of all of the furnaces in this region which were standing thirty years ago, my memory is vague in regard to some of them, and I will have to consult my notes and read through a large number of notebooks and find scattered items which will be contained therein. If you cannot obtain this information in printed form and will tell me definitely just what information you require, I will see what I can do to get it for you.

Very truly yours,

R. J. HOLDEN,
Professor of Geology.

2259 Q. Dr. Holden, did you ever receive any reply to your letter, Exhibit #553?

A. I don't recall I ever did.

RECROSS EXAMINATION

Q. If I understood you correctly, I understood you to say that ore hauled from the Lead Mines would go by way of Snowville to Christiansburg, on that road. Am I correct in that understanding?

A. I do not know that I said that, but the easiest road from the standpoint of the topography of the country would be along the Great Valley, possibly as far as Roanoke, and such a route would take them through Christiansburg.

There is a shorter route by going across and through Floyd County, possibly across part of Carroll, but it is a very rugged country and I doubt if anyone would take that route with heavy haulage at that time.

Q. There has never been any road down the river from Austinsville to Radford that anybody ever attempted hauling any heavy loads, has there?

A. Part of the way it was close to the river, and part of the way it was not very close, but even at Christiansburg that road is only, in a direct line, about seven miles from the river.

Q. The most direct route was by Snowville, was it not, from the Lead Mines and to Christiansburg?

A. I think it would be.

2260 H. S. SLOCUM on Direct Examination testified as follows:

I am an engineer in charge of construction of the Winfield Development of the Kanawha Valley Power Company, an engineer in charge of construction, Appalachian Electric Power Company, Radford Development. I have been with the Appalachian Electric Power Company since May, 1929. I am also employed by and I have been with the Kanawha Valley Power Company since May, 1934. I spend most of my time with the Kanawha Valley Power Company at Winfield, and part of the time at Radford.

(Witness identified an album, Defendant's Exhibit 554, containing 60 photographs and the map in front of the album on which are the words "Appalachian Electric Power Company, location map for pictures, re—navigability of New River.")

I had those photographs taken in November, 1931. They were taken from a point about 2 miles below Austinsville to a point about one mile above Eggleston. I did not take the pictures myself. They were taken by a photographer named C. D. Fowler of Bluefield, West Virginia. He took them in my presence and in pursuance to my direction and request.

Q. Do the pictures appearing in this album represent a fair and accurate portrayal of the river and the riffles referred to in each photograph, at the time they were taken?

A. Yes, sir.

Q. Now please look at the map in front of the album on which are the words "Appalachian Electric Power Company, location map for pictures, re—navigability of New River," and state whether or not the photograph, or rather the location of the numbers from one to sixty appearing on that map indicate the reasonable proximation of the places where the pictures similarly numbered were taken along New River?

A. Yes, sir.

By Mr. ABBOT. We now desire to offer this album, containing 60 photographs, and the identification map in evidence. The identification map is not offered as any evidence of the

2261 State Line, or anything like that, it is simply offered with reference to showing the location where these pictures were taken for the use of the Court and counsel.

(Said album, together with the identification map and the 60 photographs is here filed in evidence, and is marked Defendant's Exhibit 554.)

The first series of photographs were taken on the 4th, 5th and 6th of November, and the second series were taken on the 24th, 25th and 26th, of November. The part of the river involved in the pictures taken on November 4, 5, and 6, is that stretch of the river from a point 2 miles below Austinsville down to a point one mile above Eggleston. The section of the river involved in the photographs taken on November 24, 25 and 26, was practically the same stretch of river, at least a great part of the same stretch was taken in the second series. We started on November 4, from a point 2 miles below Austinsville, about 9 o'clock in the morning. From the point where the first photographs were taken down the river to Foster Falls, the transportation was by means of an automobile. From Foster Falls we transported the photographer and camera in a boat. We started down the river from Foster Falls around 10 o'clock in the morning.

Q. Why did you take a boat at Foster Falls?

A. When I received instructions to take these photographs there seemed to be two alternatives to use to transport the photographer and the equipment, one was to walk the entire distance along the river and the other was to use a boat to transport the photographer and equipment. There are no roads paralleling the river at that point.

The boat was 19½ feet long, 3½ feet wide, and about 18 inches deep. When loaded with the 4 men and the equipment it would draw about 5 inches. In this country, this type of boat is called a canoe. In the Ohio River country it is called a John boat and in the north it is called a Punt. It is entirely different from what is usually termed a canoe. It is made out of plank, very roughly made and strongly made, and is utilized for rough work and rocky rivers. It stands a great deal of punishment. The boat came from the Radford Development. They had it
2262 around there and used it in transporting the men across the river, or ferrying them across the river.

When we left Foster Falls we expected to reach Whitt's Ferry on the first day. On the first day we reached Allisonia at 5:30 in the afternoon and the men were tired and wet, and we decided to stop there for the night, we had to. We had gone about 10 miles. It was a very rough trip, the boat was grounded a great many times, and it was necessary for the men who worked the boat to get out on the rocks and pull it over the ledges, and sometimes it was necessary for the passengers to get out and help to work the boat over, and at other times it was necessary for the passengers to walk along the shore to permit the men to lead the boat over the long stretches of shoals.

In one place the ledges ran parallel with the course of the river, and it was very difficult to find a place through these ledges to get the boat through. The ledges ran parallel with the river in one place, around a bend of the river. That was below Foster Falls, I don't know exactly but I would say 2 or 3 miles below.

We had 2 workmen on the boat, one for the bow and one for the stern. They got the boat down the river by using paddles whenever there was slack water, but most of the time it was necessary to pole it down and they used poles to fend the boat from the rocks, and also to pry it off the rocks when it was hung up. In several cases it was necessary for the photographer and myself to get out of the boat because the river was so shallow.

The first day, November 4, about an hour and a half was consumed taking photographs, I did not keep track of it.

On November 5 we covered that section of the river from Allisonia to Old No. 6 Dam Site. We left Allisonia at 7 o'clock in the morning. The men took the boat down the river to Clark's Mill, and the photographer and myself went along the shore in an automobile, over a stretch of about 4 miles. There was a road paralleling the river for that stretch of about 4 miles. We left Clark's Mill about 8:30 and went down the river and landed at Whitt's Ferry. We used the boat from Clark's Mill to Whitt's Ferry. We left Whitt's Ferry about 4 o'clock. The trip 2263 that day in the boat was more difficult and more arduous than on the preceding day, the rocks were more numerous, and while there were not so many shoals, the ledges were higher and more dangerous and the boat was in danger of capsizing several times.

The photographer and myself did not stay in the boat all that day, we got out on that day several times to permit the men to lead the boat down while we walked down the shore. I would not say the trip was made in good time, because it was very difficult to work the boat, it took a great deal of time, and also took time to find openings through the ledges which would be wide enough to permit the boat to go through. It is about 6½ miles roughly speaking from Clark's Mill to Whitt's Ferry. After we arrived at Whitt's Ferry, we transferred from the boat to an automobile and went down the river along the road which parallels the river.

On November 6, we started at the city of Radford. On the day before we had gone from Allisonia to Old No. 6 site which is about 4 miles above the present Radford site. On this first expedition of 3 days, we did not cover the river entirely between Development No. 6, and the town of Radford. On the morning of the 6th we went up as far as Ingle's Falls, or Ingle's Ferry and took pictures of that and then went down the river.

On the second trip, November 24, 25 and 26 we covered practically the same stretch of river as we did before, or a large part of it.

On the 24th of November, we covered a stretch between McCoy and the city of Radford. McCoy is just above the Big Falls on the Giles-Pulaski County line. On that day we used an automobile for transportation.

On the 25th we took a boat from Owen's Ferry to Whitt's Ferry—in other words, we went by automobile to Whitt's Ferry then drove across country around to Owen's Ferry and then took a boat from Owen's Ferry to Whitt's Ferry.

On the next day we went to Foster Falls, and had the same boat we used on the previous trip, and the same men, and went from Foster Falls to Allisonia. We had about the same experience as we had before, it was very difficult and arduous.

On the 26th we covered that section of the river between
2264 Foster Falls and Dalton, just below Allisonia. The boat was taken up to Foster Falls on a truck from the Radford Development. Allisonia is 3 or 4 miles from Delton. At Allisonia we sent the boat back to Radford on a truck.

Q. Do you know what the stage of the river was when these photographs were taken?

A. It was low, the river was low.

Q. Why did you take the pictures in this low-water season?

A. I was told to take the shoals, to take the rocks and anything that would show the real character of the river bed. It would seem that that time was the best time to take them, at least we thought the best time to take the pictures was when the water was low.

Q. Are there pictures here covering the entire river from below Austinsville to above Eggleston?

A. No, sir; they do not cover the entire river.

Q. What part of the river did you take then?

A. We took the most conspicuous and prominent ledges, shoals, rocks, and obstructions.

Photograph No. 1 is a view taken from the left bank looking up stream showing ledges and projecting rocks. It was taken 2 miles below Austinsville, or about 2 miles.

Photograph No. 2 shows a more close up view of the same ledges crossing the river, 2 miles below Austinsville. Both of these pictures were taken from a point approximately 2 miles below Austinsville. Photograph No. 2 is intended to show more details than No. 1. It shows the depth of the shoals, the height of the ledges, and things of that sort.

Photograph No. 3 is a view from the right hand bank at the lower drop of Foster Falls looking up stream. It shows the ledges crossing approximately at right angles to the stream, also numerous water worn boulders in the foreground. The man in the foreground is W. H. Smith, who was one of the men that helped to work the boat down the river.

Photograph No. 4 is a more detailed photograph showing the same ledge as is shown on the previous photograph, with W. H. Smith in the foreground, and it gives a comparison of the
2265 height of the ledge. That is the ledge further down stream at Foster Falls.

Photograph No. 5 is a view taken from the left bank looking up stream and across the stream to show in a general way the ledges crossing the river at Foster Falls. This picture was taken from an elevation looking down on the ledges.

Photograph No. 6 is a view just below Foster Falls Ferry and shows Foster Falls in the background, shows the ferry, also the ferry boat, and also shows the ledge from which the previous photograph was taken or the bluff on the river bank.

Photograph No. 7 is a view ¾ of a mile below Foster Falls showing a ledge extending approximately at right angles across the river ¾ of a mile below Foster Falls. This was taken from the right bank of the river. The man in the foreground is one of the workmen who took the boat down.

Photograph No. 8 shows a ledge ⅞ of a mile to a mile below Foster Falls, which ledge extends across the river and shows a gravel bank along the river and a gravel bar across the river. It boat was left for comparison with the ledge in the distance. The boat was left for comparison with the ledge in the middle of the picture. I believe that is the same ledge that is shown in Photograph No. 7. The ledge furthest up stream is the ledge shown on Photograph No. 7.

Photograph No. 9 is a view from the right bank, 3 miles, about 3 miles below Foster Falls, showing the ledges crossing the river and boulders in the foreground, and some projecting rocks.

Photograph No. 10 was taken from the right bank, taken from the Norfolk & Western grade, looking down on the ledges and shows several ledges crossing the river and also rocks projecting from the water. That picture was taken roughly 3¼ miles below Foster Falls.

Photograph No. 11 was taken slightly down stream from the point where Photograph No. 10 was taken. It shows the same ledges in the distance.

2266 Photograph No. 12 was taken from the left bank just above Carter's Ferry, and shows the ledges extending across the river at approximately right angles. It shows the gravel bar about the middle of the river and water worn boulders.

Photograph No. 13 was taken from the same point as Photograph No. 12, that is above Carter's Ferry, and shows in detail one of the main ledges crossing the stream.

Photograph No. 14 was taken from the left bank near Barren Springs. It shows ledges crossing the river and gravel bars in the river.

Photograph No. 15 was taken from the right bank of the river near Barren Springs station and shows the ledges crossing the river.

Photograph No. 16 was taken from the right bank of the river about 1 mile above Big Reed Island, and shows the shallowness of the water, and that is one of the points where it was necessary for the passengers to leave the boat and follow along the bank while the men worked the boat over. There is an indication of ledges on the right hand side of the picture and also gravel bars in the foreground. The boat in the picture is the same boat that we used that day and the same workmen. Big Reed Island is not very far above Allisonia.

Q. I show you photograph No. 17 and ask you where that was taken and what it shows.

A. This photograph was taken three-fourths of a mile above Big Reed Island bridge and shows the ledges and projecting rocks and water worn boulders and the shallow conditions at that time generally.

Photograph No. 18 was taken from the left bank near the gaging station at Allisonia and shows the ledges extending across the river and a few of the projecting rocks and also shows the gaging tower in the upper right hand corner.

Photograph No. 19 was taken from the right bank about ½ mile above Delton and shows the ledges extending across the river. My copy of that picture is not very clear; it looks a little hazy due to the fog. This picture was taken early in the morning and it shows the fog.

2267 Photograph No. 20 was taken from the right bank immediately above Delton and shows a series of ledges crossing the river. There is what appears to be a gap in that ledge, over across towards the right hand side of the picture. I could not say definitely whether that is a channel cut in there by the Government. It is impossible to say.

Photograph No. 21 was taken from the left bank above Delton and shows the ledges crossing the river and the ledge shown on the preceding photograph appears in this one. On this picture it appears on the far side of the upper ledge near the top of the picture.

Photograph No. 22 is a view from the right bank about 1 mile below Clark's Mill, and shows the shallow condition of the stream and our boat being carried across the shallow places—led across. Clark's Mill is just about 4 miles below Allisonia, about a mile and a half below Delton. This picture shows the river from shore to the other shore, all of the river is in the picture.

Photograph No. 23 was taken about 2 miles below Clark's Ferry and shows a large riffle and several other riffles crossing the river right angles and also shows a boat in the middle of the picture d 2 men working the boat over these ledges.

Delton is downstream from Allisonia on the opposite side of the ream and then Clark's Mill. Hiwassee is between Delton and llisonia, it is about 1 mile below Allisonia. It is difficult to give miles how far Delton is below the Hiwassee bridge. I have ot been up there for so long; probably a mile or a mile and a alf. Clark's Mill is about a mile and a half or a mile below elton.

Photograph No. 24 shows the ledges and the rocks projecting om the water and is at a point 3 miles below Clark's Ferry, ken from the right bank.

Photograph No. 25 is a view from the right bank about ¼ of a ile below Owens Ferry, showing the ledges crossing the river d some projecting rocks. I don't believe there is any channel rough that ledge observable in that picture. I don't see any.

68 Photograph No. 26 is a series of ledges crossing the river, ¾ of a mile approximately below Owens Ferry. There e several ledges extending all the way across the river.

Photograph No. 27 is a picture taken from the same point as hotograph No. 26. It shows the same ledges and also shows a p in 2 ledges. The gap is probably a part of the river improvements. It is not very deep but is sort of sunken.

Photograph No. 28 was taken from the left bank ¾ of a mile low Owens Ferry and also shows the same ledges shown in e preceding photograph No. 27.

Photograph No. 29 shows more in detail the picture of the dges taken in the last two or three photographs. In an atmpt to show, if possible, any river improvements. At this oint, we were trying to get in detail the low spot in the ledges.

Owens Ferry is shown on the map to be roughly 4 miles below lark's Ferry. Owens Ferry is the only name I know; Eanes erry possibly. I never heard it called Cox's Ferry. Max's reek comes into New River at Owens Ferry. Haw Branch is Wheeler Branch Ferry, and Owens Ferry as I recall is at the outh of Max's Creek.

In photograph No. 29 the sluice that may be the improvement mentioned is just about in the middle of the picture. That is rough the upper ledge and right about in the middle of the icture. The sluice is shown at right angles through the ledges.

Photograph No. 30 was taken from the left bank about ¼ of a ile below Wheeler Branch Ferry. Wheeler Branch Ferry is one side and Haw Branch on the other; sometimes they are lled one and sometimes the other. There is a highway bridge ere now; and the ferry has been discontinued.

Photograph No. 31 is a view across the river from the left bank showing 2 good sized ledges, ¾ of a mile below Wheeler Branch Ferry, and shows a gap through the ledge in the
2269 foreground, but I believe it is too narrow to indicate any improvement on the river; it is too narrow a gap through the ledge to be a river improvement.

Photograph No. 32 was taken from the same point as photograph No. 31 and shows the ledges of the river taken at a different angle. The gap in the ledge in the middle of the photograph is the same one shown a little to the left of the center in the preceding one.

Photograph No. 33 is a view taken from the left bank, ⅝ of a mile below Wheeler Branch Ferry and shows a series of ledges constituting the falls and the rough condition there. That is not the same part of the river shown in the two preceding photographs. I do not know what that particular falls is called.

Photograph No. 34 is a view upstream from the left bank of the river, about 1 mile above Whitt's Ferry, and shows a series of ledges in the distance and also a view of projecting rocks in the foreground.

Photograph No. 35 is a view up stream from the point in the river ½ a mile above Whitt's Ferry, showing the ledges extending across the river.

Photograph No. 36 is a series of ledges extending across the river; the picture was taken from the left bank and the point is just above Linkous' Ferry. Linkous' Ferry is, I should say 2 or 3 miles, below Whitt's Ferry. Photograph No. 36 shows a series of ledges extending across the river. It also shows the automobiles we used after we left the boat at Whitt's Ferry. That is in the left foreground.

Photograph No. 37 is a view across the river from the left bank and at a point immediately below Whitt's Ferry and shows ledges crossing the breadth of the stream. They are not the same ledges shown in photograph No. 36, these are below the ferry and the preceding photograph was above. They are probably ⅛ of a mile apart.

Photograph No. 38 is a view across the river from the left bank about ⅜ of a mile below Linkous' Ferry, and shows the ledges crossing the river and shows the gravel bars in the middle of the river. There is a low place in the ledge in the immediate foreground. It is impossible to say whether or not it was
2270 man made or nature made, from an observation of the place.

Photograph No. 39 is a view up stream from the left bank, a mile below Linkous' Ferry and shows the ledges across the stream and an island in the middle of the picture and the beginning of another island on the left-hand side of the photograph.

Photograph No. 40 is a view up stream from a high point about 1 mile below Peak Creek on the left bank, showing a series of ledges crossing the stream at approximately right angles, and also shows a series of islands extending up and down the river. That is about ¼ of a mile below Peaks Creek. The mouth of Peaks Creek is not shown in the picture.

Photograph No. 41 was taken on the left bank of Old No. 6 Site which was about four miles from the present one. It shows the rock ledges crossing the stream—not very much. There appears to be a channel in the middle of the picture, but whether or not it was man made, I don't know. We didn't go through that in a boat—we had no boat there.

Photograph No. 42 was taken from the left bank at Old No. 6 Dam Site and shows the ledges and the upper part of the island, and here too is shown something that appears to be a sluice (indicating). These two views, No. 41 and 42, are views from the left crossing from the left bank. The ledge in photograph No. 41 is not shown in photograph No. 42. The ledge in No. 42 is somewhat below No. 41. Looking at the top of the picture in 41 and No. 42 you will see a cornfield over at the edge of the stream which might identify the location better.

Photograph No. 43 is a view across the river at Ingle's Falls from the left bank, about ½ a mile above Ingle's Ferry. It shows the ledges extending across the stream and the projecting rocks and also shows the water tower of the city of Radford in the left-hand side of the picture, on top of the hill. What is shown there is generally called Ingle's Falls. All of Ingle's Falls is not in this photograph, it extends for quite a distance.

2271 Photograph No. 44 is a picture taken from about the same point but at a different angle and somewhat further away from the river than the preceding photograph. It shows the ledges and the projecting rocks. The ledges and rocks shown in picture No. 44 appear in No. 43, they do partially at least. These two pictures may be oriented by the large rock in the foreground of picture No. 43, which shows on the left side of picture No. 44, right by the trunk of the tree there, right near the water's edge.

Photograph No. 45 is a view from the left bank of Ingle's Ferry at the foot of Ingle's Falls and it shows a view of the projecting rocks and gravel bed or gravel bar, which is in the middle of the river.

Picture No. 46 was taken from the left bank at a point opposite the city of Radford, and shows a very regular ledge extending across the river and shows the Old Radford Furnace, or I think one of the furnaces at least, on the left side of the picture, and the pipe shop in the right side of the picture. That is above the highway bridge.

Photograph No. 47 is a view taken from the highway bridge crossing the bridge at the city of Radford looking downstream, showing the ledges crossing the stream at right angles.

Photograph No. 48 was taken from the left bank about ½ a mile below Walton and shows the ledges crossing the stream and also the gravel bars.

I would say Walton is about 3 miles by the river from Radford, guessing at it. I think that is pretty close—it is down-stream from the upper part of the horseshoe, that is, the arch. It is up-stream from the tunnel, the bridge and Pepper's Ferry.

Photograph No. 49 was taken from approximately the same point, and shows the ledges crossing the stream, at the same point as in the preceding photograph. It shows the ledges crossing the stream as well as the gravel bars. I believe they are the same ledges in both pictures.

Photograph No. 50 is a view across the river from the left bank, about 10 miles below and shows the shoals and the 2272 water worn boulders and the gravel. I don't know whether these are the Monkey Shoals or not. It is below Walton about 7 miles, I would say 6 or 7 miles below Walton, and 10 miles below Radford. Pictures No. 48 and 49 were taken from the same point; No. 50 was taken 10 miles down from Radford. I would say 7 miles or 6½ or 7 miles, below the point from which No. 48 and 49 were taken.

Photograph No. 51 was taken from about the same point that photograph No. 50 was taken, from the left bank about 10 miles below Radford. They are the same shoals and the same gravel bank in both pictures No. 50 and 51.

Photograph No. 52 was also taken from the same point that photograph No. 50 and photograph No. 51 were taken, and it shows the shoals and the gravel bars.

Photograph No. 53 is a view across the river from the left bank, taken from the Parrott Mining property, showing several series of ledges crossing the stream at right angles. Some of the ledges are submerged and it shows the Norfolk & Western Railroad in the foreground and the Virginian Railroad on the opposite bank. The village across the river is McCoy.

Photograph No. 54 is a view taken up stream from the left bank at the Parrott Mining property and shows the ledges extending across the river in the distance.

Photograph No. 55 is a view taken across the river from the right bank at McCoy railroad station and shows the ledges crossing the river and the projecting rocks and a few small islands and the Virginian Railroad in the foreground. The ledges on the left hand side of photograph No. 53 may be the ones shown in the photograph No. 55, it is a little indistinct.

Photograph No. 56 is a view from the left bank about ¼ of a mile above Big Falls. It shows a series of ledges crossing the stream and also shows the Norfolk & Western Railroad in the foreground and the Virginian Railroad on the opposite shore.

2273 Photograph No. 57 shows a view of Big Falls from the left bank; it shows the ledges crossing the stream at the Falls and the Norfolk & Western Railroad in the foreground and the Virginian on the opposite shore. The Falls are located on the Pulaski and Giles county line.

Photograph No. 58 is a view taken from the left bank slightly down stream from view shown in photograph No. 57. It shows the Big Falls, the same falls that were shown in No. 57.

Photograph No. 59 is a view from the right bank about ½ a mile above Goodwin's Ferry, and shows the regular ledges extending across the stream at right angles to the stream. There is the Norfolk & Western Railroad in the distance. Goodwin's Ferry is above Eggleston about 2 or 3 miles, I would say.

Photograph No. 60 is a view from the right bank, about a mile above Eggleston; it shows the ledges, the bars in the river, and some shallow places and the Norfolk & Western Railroad on the opposite bank of the river.

The witness on Cross Examination testified as follows:

I was instructed to take the photographs to show the rapids, rocks, and other obstructions in the river. I was given no particular explanation of why I was to take them. I was requested to take photographs of that portion of the river on which I did take them. No one asked me to go down the river as far as Hinton. Apparently there was some reason behind the taking of pictures which would prompt those who asked me to take them. I was their Engineer of construction. I do not recall that they gave me any reason for taking them. I was told to take the photographs.

Q. And what was the instruction that they gave you as to how you were to take them, if any?

A. All I recall is that I was told to take the photographs on a certain stretch of the river, and more particularly the exposed ledges and rapids and shoals and things of that sort.

2274 I just went out and got a photographer, and went up the river and started to photographing. I probably knew that the Appalachian Electric Power Company had filed a bill of complaint against George Otis Smith and other members of the Federal Power Commission prior to the request of me to take these pictures. I probably thought that these were being taken to be used in a law suit. I was not given the reason. I was told to take them.

The stretch over which I took pictures was much further than six or seven miles. Offhand I would say it was 50 or 60 miles, from Austinville to Eggleston, or maybe a little more.

It would be difficult to say what space down stream the faults or shoals occupied that were photographed. I took the prominent ones—the more outstanding. I did not attempt to get them all; I could not. I just took the most outstanding ones. The photographer used an 8 x 10 camera, I do not know the make, I don't believe he had a magnifying lens on the front of the camera. I have not studied the Craighill report of the number of pools and shoals in this river in the stretch that I took.

Q. You did not attempt to take pools in your pictures?

A. No, I did not.

Q. And, in taking these rocks and shoals, you took as close up as you could?

A. I showed as large detail as I could.

Q. You showed as large detail as you could?

A. Yes.

Q. I believe you stated that the flow was a low flow?

A. Yes, sir.

Q. You know that it was an exceptional low flow?

A. It was below normal flow—much below normal.

Q. Wasn't it at least one-third below low flow—below ordinary low flow?

A. Well, it probably was.

Q. Why did you select the days of the month of 1931 that you did select, namely: The 4th and 5th of November and the 24, 25th and 26th?

2275 A. It was not really left to my discretion. I was called over the telephone and asked to prepare for taking the photographs as soon as possible.

I did not watch for a time when I felt it would be the best time to get as much exposure of rocks in the river as I could. I was asked to take them the latter part of October, as I remember, and by the time I could get the photographer engaged and everything ready, it was the 4th of November. The fact that it was a real low flow at that time was a coincidence. I know that the operation of the Buck Dam was at peak loads and they carried them to get the most out of them. I did not look into the operation of the plant at all. If they were operating on a peak load, it would leave very little water in the river close by. If on the morning of November 4, 1931 the Buck Dam was closed down so that there was no flow, it would take some time for that to be felt that far down. At the time the first pictures were taken I was about 10 miles from the Buck Dam. I would not want to say what the normal flow is in that stretch of the river. When the Buck plant was closed down along that stretch of the river there would be practically no water in the stream except that which was coming in from the side streams. That would be true a part of the day but I do not know what part of the day it would be.

We had the right number of pictures we wanted in the first days, that is the 4th and 5th of November, but they were not very good as to quality. Some showed too much landscape and not enough detail of the ledges, and for that reason we took some of them over. We could have taken pictures there that would have shown the pools.

The boat I spoke of I called a punt. It is also described as a canoe. I would not say they are in the same class, I have traveled in both. They call them canoes in Virginia. It is not really a canoe. I have never seen a bateau, but I have seen photographs of them. This was a flat bottomed boat, and you could walk around in it. It was 19½ feet long, about 18 inches deep, and drew about 5 inches of water. A person could change seats and walk around from one place to the other in the
2276 boat. This is the common type of boat that is used on the river. I did not see many of these boats as I was going down the river. Different ferries usually have one or two to take foot passengers across instead of taking the big boat. Aside from that, there were very few. They use them at the Radford Dam, to carry men across—two or three of them. We have no boats down there with motors in them. Some of the fishermen run up and down the pool in boats with motors on them. It is quite a long pool, I would say possibly 3 miles. We have ferry boats the same type boat—that we used to build the Coffer Dam. We don't use them for ferry purposes. One of the boats we used there we built; the other was obtained at Radford.

I know that neither of these boats was brought down over Foster Falls nor was brought down from a distance of say eight or ten miles up the river above our project. I don't know how they got the boat up from Radford. I wasn't there. I don't know whether they hauled it up by truck. I don't know. I think that they did. I don't know whether they boated it up.

I have no idea why the company told me to go down as far as Eggleston and to start there taking pictures. I was puzzled myself, but I did not know why it was.

I would say that those pictures are representative of the river, at the time they were taken. We did not try to take the pools.

The pools could be taken. I think it would be representative of the river without the pools. It shows the nature of the river and the character of the river. Knowing there was a stretch between the photographs, there must be some pools between. I do not know whether that is an inference that probably many people would not know necessarily. A great many stretches between those ledges are not pools. They are shoals, projecting ledges and rocks. I think these pictures would be representative of the conditions of that river. It shows the rocks and a rocky and mountainous stream.

I saw indications of something that might have been Government improvement work, but I was unable to say definitely. I know that we tried to get through some with the boat, and especially the one that we took 3 or 4 pictures of at one place, and that seemed to be the most definite. The boat dragged
2277 on the rock, and it was difficult to get it through. It was
right in that area where I was told the Government had done work. We did not get out and push the boat through that one, but we had to take the poles and work it through and get the weight off the boat with the poles. The channel was too shallow for the boat to go through. There was not enough water for the boat to go through; the bottom would catch on the rocks. That was on November 5, 1931, along about noon I would say, just before noon I think. That particular spot was just below Owens Ferry about ¾ of a mile. As I could see it, and we were looking at it, it seemed the ledge was not cut deep enough through the rock. There were no channel indications at all. If there was one, it had filled up with debris. It was the rock, and the ledge itself that I was interested in.

On the trip I did not see at any time any rock that I thought had been thrown out on Government work, on that stretch of the river. I was looking for any indication for a channel, or rock cuts, or anything of that sort. I made my own observations. If I had seen any indications I would have taken pictures, but I did not see any. I would not say that there was no work done by the Government on this stretch. If there had been channels, they had probably been filled up with debris. High water probably filled them up. I have read some of the engineer's report in regard to the work done.

I was on the river there for 3 days at one time. During that time there was no noticeable variation in the flow of that stream due to the operation of the Buck and Byllesby dams. I did not see any variation. There may have been some, but it would not be noticeable. There could be a variation without it being perceptible to me as I went along. I was not measuring the stream flow.

I did not see a channel constructed there to the depth of two feet. I saw no channel. The only thing I saw which might have been an improvement was the tops of the ledges cut off in one or two places, and they were not 2½ feet deep.

Q. Do you think these channels which the engineers stated they dug were obliterated by reason of the fact they were filled up?

A. Might have been.

2278 Q. And being filled up with debris they have been obliterated?

A. Yes, sir.

On this trip down the river I had a photographer and 2 men to work the boat. They were familiar with the river, they lived on the river, that is, they had farms adjacent to the river. They did not boat up and down the river and they did not know anything about the channel of the river. None of them had been up and down the river through the channel. We had to find our way down through the ledges. Sometimes we would go back and forth from one side of the river to the other and find no channel, and in a case of that sort, the passengers would get out on the ledges and the 2 men forced the boat across. At that time there was no geological condition to upheave things so as to put a channel out of existence.

The Parrott Mines are coal mines. An anthracite deposit. It is located across the river from McCoy.

I remember that place shown in Government Exhibit No. 249, which purports to be an aerial photograph of a stretch of New River with Dublin in the distance.

Q. Do you notice certain lines drawn in the body of the river?

A. I do.

Q. Do you notice certain spots going with the flow of the river?

A. Yes, sir.

Q. Do you recognize those as channel work?

A. On our own photograph. I took our photograph from this point.

Q. Up where the trees are?

A. Yes, right up in there [indicating on picture], and while I was going over the river I could not see any indication even after I stood at that point, but after the photograph was developed and printed, one can see an indication down through there of what might have been a channel and rock thrown up along that side of the bank, but it wasn't noticeable looking down.

Q. Do you know where you went when you came down the river?

A. At this place we took the road. You can see the road parallel there.

2279 Q. You were using automobiles there?

A. Yes, sir.

Q. I call your attention to Exhibit #544 and ask you if it isn't a fact that of the sixty pictures you have there, 1 and 2 were taken from approximately the same point?

A. Yes, that is true.

Q. And 3, 4, 5 and 6 covering the same part of the river at Foster Falls?

A. That is true.

Q. And 7 and 8 at Baker's Ledge?

A. They are very close together.

Q. And 9, 10 and 11 at a point about three miles below Foster Falls?

A. Yes.

Q. And 12 and 13 at Carter's Ferry?

A. Yes.

Q. And 14 and 15 at Barren Springs?

A. That is true.

Q. All of those I have called your attention to at this time were above where the Radford pool is located on the river; is that right?

A. Yes, I believe so.

Q. And 16, 17 and 18 were all at Allisonia, were they not?

A. 16 was over a mile above Allisonia.

Q. And 17 and 18 were how close to Allisonia?

A. 17 three-quarters of a mile above Allisonia and 18 was practically at Allisonia.

Q. So they were all within an area of about a mile?

A. About a mile.

Q. 19, 20 and 21 were all at Delton, were they not?

A. Yes.

Q. And 22 and 23 were at Clark's Ferry?

A. 22 was a mile below Clark's Mill; 23 is about two miles below.

2280 Q. A mile apart?

A. Yes.

Q. And 26, 27, 28, and 29 were about together, and three-quarters of a mile below Owen's Ferry?

A. Yes, they are meant to show the same point.

Q. What is photograph 30?

A. View from left bank, one-fourth mile below Wheeler Branch Ferry.

Q. 30, 31, 32 and 33 are within an area of about a quarter of a mile or three-eights of a mile?

A. Yes, I would say so.

Q. 34 and 35 are close together too, are they not?

A. Yes, about a half mile apart.

Q. And they are close to which ferry?

A. About a mile from Whitt's Ferry.

Q. And 36 and 37?

A. Very close together.

Q. Near Linkous's Ferry?

A. Yes.

Q. 36, 37, 38 and 39 are all close together?

A. Well, yes, within probably a mile.

Q. Then 40, 41, and 42 are at the same point, are they not?

A. No, no, they are very widely separated.

Q. What is 41?

A. 41 is the view of the old #6 dam site about 4 miles above new #6.

Q. What is #42?

A. Very close to 41, practically the same location.

Q. 44 and 45 are very close together?

A. Yes, sir.

Q. And 46, 48, and 49 were taken at the same point, were they not?

A. They are taken at the same point.

Q. 50, 51 and 52 are also taken at the same point, are they not?

A. Yes.

Q. 53, 54, 55, and 56 are all taken at McCoy's Ferry, are they not, at Sifford's Falls? 1281

A. Well they are taken along a stretch of a mile or so. I would say maybe a mile and a half.

Q. How close are 57, 58 and 59 to each other?

A. 57 and 58 are taken practically at the same point, and 59 is a considerable distance downstream. I have forgotten just how far.

Q. It is a fact, is it not, that the shallows or shoals which you have taken photos of cover only seven miles out of the sixty-seven miles on the stretch which you covered by boat or cover in your photographs?

A. Yes.

Q. So the remaining sixty miles of the sixty-seven would be pools?

A. Not necessarily, no. It is impossible to take pools, the water might be only a few inches deep, and you could not show it in the picture, and many of the le'ges were so insignificant they would not show in a photograph, but there are not many what you would call pools.

Q. Wasn't it quietly flowing water in these stretches and not what you would call rapids?

A. Some places it was only a few inches deep and one stretch the ledges ran parallel to the river, and it was rough, you could not get around, you just could get through to get down the river, but could not show it in a photograph.

Q. How often have you been up to Allisonia and that part of the country?

A. A great many times.

Q. You have seen those rock, most of the rocks, covered by the water many times, have you not?

A. I have seen them covered, yes, sir.

Q. And if there was a flow down there say of three or four thousand feet, wouldn't they be covered most of the time?

A. Probably be covered, but still there would be obstructions and difficult to get anything over them.

2282 Q. The water under such conditions would be several feet deeper than when these pictures were made?

A. Deeper and more turbulent and more dangerous.

Q. Have you been informed that the U. S. Government sent a motor boat all the way up from Allisonia and back this year?

A. I have heard it rumored.

Q. You didn't know that to be a fact?

A. No.

Q. It has been testified to in court, but you didn't know about that?

A. No.

(Exhibit 249, being photograph No. 35 contained in album of aerial photographs of New River—Exhibit 273, was offered in evidence over Defendant's objection that said exhibit had not been properly proved.)

T. A. Patton on Direct Examination testified as follows:

I live at Roncefort, West Virginia. I am a photographer. I have been a photographer since 1884. I was a photographer in September, 1930. I recall taking some pictures on the New River during that month of September. I took the photographs No. 114 to 127 inclusive, contained in Defendant's Exhibit 555, which exhibit also contains a map showing the location of photographs 114 to 127 inclusive. I took these pictures on September 29, 1930.

Q. Do those photographs fairly portray what is shown in them as to the time and place at which they were taken, as indicated at the bottom of the photograph?

A. Yes, sir.

By Mr. Abbot. If Your Honor please, we offer Defendant's Exhibit 555 in evidence. This location map is offered simply with reference to the location of the different photographs and not as any evidence of State or County lines or anything of that kind.

(Said album containing 14 photographs of views on New River om Wiley's Falls to Mouth of Greenbrier River, Nos. 114 to 7, inclusive, and the location map, is here filed and is marked "Defendant's Exhibit 555.")

33 The witness on Cross Examination testified as follows:

I was not given any instruction when I took these pic- es. I went with an engineer employed by the Appalachian ectric Power Company to make these pictures. The engineer s Mr. Rader. He gave no instructions at all except just to take tures that he pointed out. He went along with me. The first ture shows the entire width of the river. It is an up-view of it, t it takes a full view.

(It was agreed by counsel for the plaintiff that photograph No. 1 in Defendant's Exhibit 555 was the same photograph which fendant offered and had marked for identification as "Exhibit .")

On the left-hand side of the picture there appears to be a body water that disappears behind some trees. There is no island re as I know of, I don't think so, I did not notice any. It is t back water. That is looking up stream. It is over on the ge of the stream and there might be an eddy there, I don't ow, I couldn't say just what that water is there. I don't remem- seeing any island there. I used an Eastmans 8 x 10 camera. lid not have any enlarging lens on the front, it was just a regu- Eastman kodak lens. I took this picture from the bank of the er. There is no island in picture 115, in the background. I ld not describe those pictures no more than to say I made them der orders. All I did was to do the camera work. I paid no ention to anything else except just the operation of the camera.

Q. Was the river very low at that time?

A. It wasn't very high.

Q. Would you say it was low?

A. Yes, sir, it was low.

Q. You don't know just exactly how low?

A. No, sir.

Q. Wouldn't this indicate on picture 115, that it was extremely v?

A. That was the first trip I took up the river, I am not familiar with the river, and I didn't pay any attention to that.

34 I did not know any places that I was going to up the river. I know nothing about this matter except that I took some pictures, I can vouch for the pictures, and that is all.

35 (Exhibit 556, being the Annual Report of the President and Directors of the Board of Public Words to the Gen- l Assembly of Virginia in pursuance of an Act entitled "An

Act creating a fund for internal improvements" was offered in evidence.)

(Exhibits 558A–G, inclusive, being a map—in 7 sheets—accompanying F. W. Alstaetter's report of November 21, 1912, bearing legend, "New River from Hinton, West Virginia, to Radford, Virginia, compiled under direction of Major F. W. Alstaetter, Corps of Engineers, U. S. A. from surveys by Engineering Department in 1872 and by United States Geological Survey in 1884–5–6 & 7" were offered in evidence—Exhibit 558G being the same as Exhibit 527 marked for identification.)

(Exhibit 559, being pp. 95, 133–139, inclusive, of Report of the Chief of Engineers, for 1875, was offered in evidence.)

(Exhibit 528, being the full and complete report from Major Craighill, U. S. Engineer's Office, Baltimore, Md., dated April 17, 1891, to Chief of Engineers, T. L. Casey—said report contains in particular the paragraph of Major Craighill's report which was omitted from Exhibit 43 as originally offered by plaintiff—together with Chief of Engineer's endorsement dated April 21 1891, was offered in evidence.)

(Exhibit 560, being pp. 251–253 and 1925–1929, inclusive, of the Report of the Chief of Engineers for the year 1887, relating to New River, was offered in evidence.).

(Exhibit 561, being pp. 225, 226, 1760, 1761 of the Report of the Chief of Engineers for the year 1888, was offered in evidence.)

(Exhibit 562, being pp. 261, 262, 1961, 1962 of the Report of the Chief of Engineers for the year 1889, was offered in evidence.)

(Exhibit 563, being pp. 235, 236, 2249–51, inclusive, of the Report of the Chief of Engineers for the year 1890, was offered in evidence.)

(Exhibit 564, being report of Brig. Gen. Casey, Chief of Engineers, U. S. Army, to the Secretary of War, dated November 16, 1894, to which is attached a third endorsement by Colonel Craighill, and also a second endorsement, was offered in evidence.)

(Exhibit 565, being a letter from the Secretary of War, dated December 16, 1903, transmitting with a report from the Chief of Engineers, dated December 1, 1903, a report on the Examination of New River, West Va., by Captain W. E. Craighill, dated February 4, 1903, was offered in evidence.)

(Exhibit 566, being a memorandum to the Secretary of War by General Black, Chief of Engineers, dated May 19, 1916, on "Pollution of the Waters of New River and its effluent, the Kanawha River, by the flowing of ore washings from the mines and furnaces located on the former river and its tributaries" was offered in evidence.)

(Exhibit 567, being page 1284 of the report of the Chief of Engineers, year 1917, was offered in evidence.)

2286 **RUFUS W. PUTNAM**

Direct Examination By Mr. JACKSON:

Q. Please state your full name and residence for the record?

A. Rufus W. Putnam; Riverside, Illinois.

Q. And that is a suburb of Chicago?

A. That is a suburb of Chicago.

Q. What is your present occupation?

A. I am a consulting engineer.

Q. And where is your office?

A. My office is located in Chicago, 20 North Wacker Drive.

Q. Where were you educated?

A. I was educated in high school, and later at United States Military Academy, West Point, graduating from there number nine in my class into the Corps of Engineers.

By Mr. THOMPSON:

Q. What year?

A. 1913.

Subsequently I attended the Army Engineers School at Washington Barracks, D. C., from the Fall of 1914 to late Spring or early Summer of 1916.

By Mr. JACKSON:

Q. You say you were commissioned in the Engineers Corps after graduation from West Point?

A. Yes; I was.

Q. What was the character of the studies you pursued at the Army Engineers School, Washington Barracks?

A. The course consisted of approximately 50 percent river and harbor engineering, and the balance of the course was devoted to mechanical and electrical and other phases of civil and military engineering.

Q. Did your work in the Army Engineers School, so far as related to river and harbor navigation, involve field inspection and work of that character?

2287 A. These courses did. I recall particularly two field inspection trips where river and harbor improvements were going on. One was over the Monongahela River and the other over the Ohio River.

Q. Major, will you please state generally what has been your experience in the practice of your profession since your graduation from West Point?

A. After graduating from the United States Military Academy, I served, except for the period previously described in the Army Engineers School, almost entirely with troops both in the United States and in France until June 1921. At that time I was assigned to duty in Chicago as Assistant to the United States District Engineer, which position I held for a year, and then was appointed U. S. District Engineer for the Chicago District.

Q. What waterways in general were under the jurisdiction of the United States Engineering Office for the Chicago District?

A. At that time the Chicago District included the harbors on Lack Michigan from Waukegan, Illinois, in the north, and, taking them in order, from there on around, the harbor of Chicago, South Chicago, Indiana harbor, supervision over the private harbors of Buffington and Gary and the public harbor at Michigan, Indiana; the Chicago and Calumet Rivers and their branches, the Indiana Harbor Ship Canal, what is known as Trail Creek at Michigan City, Indiana, the Chicago Drainage Canal, Calumet Sag Canal, the Illinois River from the head of the Federal Improvements near LaSalle, Illinois, about 100 miles out of Chicago, to the mouth of the Illinois River where it joins the Mississippi at Grafton.

Q. How long were you in charge of the Chicago District?

A. Four years.

Q. During that tour of duty, in charge of the United States Engineering Office of the Chicago District, did your duties involve studies of reports upon the condition of improvement of any of the rivers or streams in that district?

2288 A. These did include several streams and harbors in the district. The principal one had to do with the further improvement of the Illinois River to tie in with the improvement being undertaken by the State of Illinois between the head of the Federal improvement and the Chicago Drainage Canal.

Q. Did this study and report on the Illinois River involve any consideration of traffic possibilities?

A. It did. My office was asked to make recommendations with regard to the future improvement of this stream, and it appeared that the expenditure of a considerable sum of money would be involved, so that, in order to determine whether this improvement was justified, or not, it was necessary to make a very complete traffic survey.

We examined the methods of water transportation on the Illinois River and Mississippi and elsewhere in the United States, and determined what traffic might be available to the waterway, and from that we were able to consider the possible saving to the public by reason of any proposed method of improvement.

Q. Was your report on the Illinois River ever published?

A. It was subsequently published as a part of House Document No. 4, 69th Congress, First Session.

Q. Major, during your tour of duty in charge of the United States District Engineers' Office at Chicago, did you have occasion to study and consider the effect of large variations of flow and diversion of water from Lake Michigan through the Illinois waterway into Illinois River?

A. I did.

Q. Did that study involve substantial changes in the amount of flow or otherwise?

A. It involved substantial changes in the water of perhaps two to six thousand second-feet.

2289 Q. Now, will you please continue the statement of your professional experience after you finished your tour of duty in charge of the United States Engineering Office for the Chicago District?

A. When I finished that assignment, I had been assigned as United States District Engineer at Honolulu, and, at the same time, I had been requested by the Commercial Club of Chicago to make a study and report on the requirements of the Chicago Metropolitan District in the way of harbor and waterway improvements, and, as the result of this request on the part of the Commercial Club, I resigned from the service of the United States Army and undertook this work.

Q. That was when?

A. This was in 1926.

Q. Now, what did you do first after you entered upon that work?

A. I first went to Europe and spent some time there in the study of harbor and waterway improvements and traffic arrangements, including among the waterways the Seine and Rome Rivers in France; the Elbe and Rhone Rivers; and the Thames, I believe, in England.

After that I returned to the United States and spent some more time studying harbor and waterway improvements along the Atlantic Coast and the Gulf Coast, as well as along the Great Lakes, including inspection trips on the Mississippi River from Cairo to New Orleans, and one on the New York State Barge Canal between Oswego and Albany.

That particular work for the Commercial Club was completed in 1927, and, at that time, I had already begun to practice as a Consulting Engineer on river and harbor works.

Since then I have handled some 60 different projects in various parts of the country.

Q. Do you mean river and harbor projects?

A. River and harbor projects. Among these I might mention specifically the design and supervision of construction of the harbor and terminal for a stone company near Manistique, Michigan; harbor and waterway improvements near the
2290 mouth of the Rio Grande River in South Texas; some work

on the Houston Ship Canal, studies of the Ohio and upper Mississippi River with regard to the development of water transportation operations; a study for the same purpose, about the year 1930, of the Kanawha River, and, in addition to that, various projects which included the development of harbors and terminals at various locations.

Q. Have you, in recent years, had any connection with any company engaged in the navigation business?

A. I have. Since 1928 I have been an officer and stockholder in a navigation company which has been engaged in the transportation of bulk commodities on the Chicago Drainage Canal, Chicago River, Calumet River, and the harbors in the southern end of Lake Michigan.

During one season we operated a fleet of barges on the Illinois River, bringing coal into Chicago from a point about 200 miles south.

I have devoted about 25 percent of my time since 1928 to the affairs of that company.

Q. Have you had any other connection with the active management of navigation operations?

A. I have. In 1930 I was in active charge of an operation involving the transportation of coal by barges on the lower end of the Green River to Evansville, Indiana.

Q. Are you a member of any professional society?

A. A member of the American Society of Civil Engineers, the Society of American Military Engineers, and I am a past president of the Western Society of Engineers.

Q. Have you written any technical papers dealing with navigation problems?

A. I have written quite a few on this subject, one of which received the Wellington award of the American Society of Civil Engineers.

By Mr. **Thompson**:

Q. When you say "this subject," what subject?

2291 A. Water transportation.

By Mr. **Jackson**:

Q. Major, have you made any special study on the New and Kanawha Rivers?

A. I have made a special study on the New and Kanawha Rivers.

Q. In the course of that study, have you made any study of the reports, maps, and records of the United States Army Engineers dealing with the New River and the Kanawha River?

A. I have.

Q. Will you please state briefly what records, maps, and reports of the United States Army Engineers you have in general examined in the course of your study of the New River and the Kanawha River?

Mr. Thompson. May I ask the witness what he is reading from?

A. I am reading from notes I have prepared. For instance, right here I have a complete list of the various documents I have examined. There are so many, I couldn't possibly remember them all.

Mr. Thompson. All right.

A. I am not sure I understood that question, Mr. Jackson. Reports of Government Engineers?

Q. Any reports or maps of Government Engineers you have studied in your special study of the New and Kanawha Rivers—Government Engineers or early engineering surveys?

A. I studied the following in that connection: The Moore & Briggs Survey of 1819; Report of the Commission headed by Chief Justice Marshall in 1812: Map accompanying John Marshall Report, entitled A Survey of the Headwaters of the James River and the Greenbrier and Jackson Rivers and the great Kanawha or New River, and the high road between them; Annual Reports of the Chief of Engineers from 1873 to 1891, inclusive, which include the reports of the Chief of Engineers, the District Engineer and his local subordinates dealing with New River; photostats of originals of 35 maps, purporting
292 to be a part of the New River surveys made by Government Engineers between 1872 and 1878.

Q. Is that the map offered by the Government as Exhibit 190, do you know?

A. That is what I understand. Also various profiles of New River accompanying these reports. I have examined later reports of the Chief of Engineers and also the extracts from the River and Harbor Act of June 13, 1902, with reference to the discontinuance of the New River project.

The report of Major F. W. Alstaetter, District Engineer in 1912, with reference to the improvement from Radford to Hinton. That is known as House Document No. 1410, 62nd Congress, Third Session.

In regard to these foregoing reports, I have examined the reports of the Review Officers, including those of the Chief of Engineers and the Secretary of War.

I have examined Executive Document, House of Representatives, No. 110, 41st Congress, Third Session, containing reports of the Secretary of War, Chief of Engineers, and Major Craighill, covering a survey conducted in 1870 and 1871 on the James River and Kanawha Canal.

Also the Annual Report of the Chief of Engineers for the year 1873, containing a report of an additional survey of the James River and the Kanawha Canal.

A report of the Special Board of United States Engineers on the James River and Kanawha Canal, in 1874.

An extract from the Annual Report of Chief of Engineers, 1875, concerning additional surveys on the James River and Kanawha Canal.

Also what is known as the 308 Report on the Kanawha River and its tributaries, known as House Document 91, 74th Congress, First Session.

Also House Document No. 190, 70th Congress, First Session, being a report by Major Ardery and his reviewing officers on the improvement of the Kanawha River.

2293 Also House Document No. 31, 73rd Congress, First Session, being a report by Major Herman and his reviewing officers on improvement of Kanawha River.

Q. Major, do the reports of the District Engineer and his subordinates, or at least some of them, during the period 1873-1891, and the report of Major Alstaetter, 1912, refer to certain maps not published with the reports?

A. They do.

Q. Did you examine those unpublished maps?

A. I have, so far as they have been made available to me, and I understand all obtainable maps have been made available.

Q. In particular, have you examined the unpublished map and profiles which accompanied Major Alstaetter's Report of 1912?

A. I have examined those.

Q. Have you examined the maps of United States Geological Survey covering New and Kanawha Rivers?

A. I have.

Q. Will you state particularly whether you studied and examined the reports of the Mile-by-Mile Survey of the 128 mile stretch of New River extending from the Lead Mines to the mouth of Greenbrier, as set forth in the report of Major Craighill, and in the attached report accompanying it of N. H. Putnam, both appearing in the annual report of the Chief of Engineers 1873?

A. I have.

Q. Will you also please state in particular whether you examined the report of the mile-by-mile survey of New River from the mouth of Wilson Creek to the Lead Mines, as it appears in Report of Major Craighill, and the separate reports of his subordinates Capt. Cuyler and Mr. Scott, all appearing in the report of the Chief of Engineers 1879?

A. I have examined all.

2294 Q. Please state in particular whether you examined the Mile-by-Mile Survey contained in the Moore & Briggs Report of 1819?

A. I examined that also.

Q. Have you personally inspected or examined the New and Kanawha Rivers?

A. I have.

Q. Will you please state generally the nature and extent of your examination of the New and Kanawha Rivers?

A. About the year 1930, on behalf of the navigation company in which I was and still am interested, I made an examination of the Kanawha River with a view to the possibility of transporting coal from that district by water to St. Louis. That examination had to do with the navigation facilities existing on the stream at that time, including some of the coal loading facilities.

More recently I made an inspection of the New River between points on each of its forks in North Carolina to its mouth, and of the Kanawha River from the junction of the New and Gauley Rivers to its mouth, and included that section of the Ohio River between the mouth of the Kanawha and the lock and dam now under construction at Gallipolis.

This inspection was made by automobile, but at many points I found it desirable to get out and make closer inspections on foot.

Q. Major, will you please describe the physical characteristics of New River as you found them from your study of the early engineering reports, the Mile-by-Mile Survey, and your personal inspection of the river?

A. New River is a stream of comparatively steep slopes, flowing down between stable banks in general, which are fairly steep and high in most places.

There are not many places along New River where you will find bottom lands over which the river can spread out in times of flood.

There seems to be some difference in the characteristics as far as the banks and uplands are concerned, in the upper section as compared with the lower, having in mind that from, 2295 perhaps, in the neighborhood of McCoy or opposite Parrott's Mine these characteristics change.

Up-stream of that location we find the river flowing in general between uplands which do not extend to comparatively great heights, and the presence of more bottom lands in that section than further on down.

Below McCoy, the river begins to assume gorge characteristics, the banks are more steep and rise in many cases directly into mountains. There are fewer bottom lands, and while there are stretches where the characteristics described for the upper section seem to apply, in general more and more the river assumes the characteristics of a stream flowing through a gorge, and below Hinton, down to the mouth of the river, the gorge characteristics are almost continuous.

Q. What is the character of the bed of the stream?

A. The bed of the stream in general is rocky, composed of either ledge rock in place, or in some places shoals and gravel and boulders and fixed rocks.

Q. What is the relation of the flow of the stream to the Allegheny Mountains?

A. Below the point I mentioned a little while ago, below McCoy, where the characteristics begin to change a bit, at that location is where the river begins to cut through the Alleghany Mountains towards its mouth.

Q. At low water, what are the characteristics of the stream with reference to the condition of pools and the like?

A. The river at low water seems to be a succession of short pools, interrupted at irregular and frequent intervals by ledges and rocks, boulders and other similar obstructions.

Q. Major Putnam, please state whether or not, in your opinion, New River, in its natural and ordinary condition, was susceptible of practical use by boats carrying any substantial cargo, trade or commerce?

Objection. Sustained.

By Mr. **Jackson**:

Q. Please state whether, in your opinion, New River, in its natural and ordinary condition, was susceptible of use by boats?

Mr. **Thompson**. I object to that. That calls for the conclusion of the witness also.

The **Court**. There is a great deal of latitude as to the use of boats.

Mr. **Thompson**. Didn't we put that same question to Mr. McWhorter and it was refused?

Mr. **Jackson**. We will settle it by asking this question.

Q. (By Mr. Jackson.) Major Putnam, will you please state whether or not in your opinion, New River, in its natural condition, was susceptible of navigation?

Mr. **Thompson**. I object to that.

Mr. **Jackson**. That happened to be the form of question which Col. Watkins was permitted to answer over my objection at page 2616 of the record.

Mr. **Thompson**. Please read it.

Mr. JACKSON (reading): "Mr. Watkins, will you state whether or not, in your opinion, New River is susceptible of navigation in its natural state?" I said "We object to that question because it calls for a conclusion," and the Court overruled the objection and the defendant by counsel excepted for the reasons stated.

I would like to have an exception noted on the record to the sustaining of the objections to the questions which I have heretofore asked.

The COURT. If I admitted the question in that form before, he can answer it.

By Mr. JACKSON:

2296 Q. Will you state whether or not in your opinion New River was susceptible of navigation in its natural state?

A. In my opinion it was not.

Q. Will you please state the reasons for your opinion?

A. In my opinion, as shown by the Mile-by-Mile Surveys, New River was a succession of comparatively short pools, interrupted by rapids and shoals and falls. These rapids, shoals, and falls were composed of ledges, fixed rocks, loose boulders and gravel beds, and were of such a nature and so frequent that in my opinion the river could not have been navigable. The surveys show that in some locations chutes existed, through which the main flow of the river proceeded, but the——

The COURT (interposing). Let me interrupt you. Were those chutes artificially created?

A. No, sir. I am talking about the natural passage for the main flow of the stream before the artificial creation.

The COURT. I thought he meant the present condition.

Mr. JACKSON. I intended to ask about the present condition later.

WITNESS. Where these natural chutes existed, the course in general was tortuous and of such nature as to make navigation not only difficult but hazardous. The same conditions were possibly even more serious as to obstacles, and hazards, in my opinion, even when the river was at higher stages than might have prevailed during the time when these Mile-by-Mile Surveys were made.

This, in my opinion, is due to the fact that, with increased stages, the velocity of the stream increases to a certain extent; some of the exposed obstructions to navigation become wholly or partially concealed, and the combination of those circumstances (that is increased current velocity), with partially or completely submerged obstacles, would make the navigation of the sections where these conditions exist equally, if not more, difficult than at lower stages.

2297 Another point I have in mind in reaching this conclusion is that in some places, which is characteristic of streams of this character, the main flow of the water hugs the outside of the bend and in some situations we find along the outside of the bends rocky cliffs against which it would be rather serious for boats to strike.

Furthermore, as the result of the Mile-by-Mile Surveys, the War Department Engineers made reports to Congress stating that in order to attempt to make certain sections of the river susceptible to use by boats, it would be necessary to spend what was then a substantial sum of money with the idea of providing a channel of the least depth of two feet through a great many critical locations.

Q. In your opinion could small boats have moved about the pools in the river?

A. Oh yes, they could have in several places, and I would say that they could get, in occasional instances, from one pool to another, but based on the facts as drawn out by the mile by mile surveys, which I have referred to, such cases could not have been continuous, or regular, but quite to the contrary, and certainly in my estimation accompanied by a considerable degree of hazard.

Q. Now, Major Putnam, will you state whether or not, in your opinion, New River, in its present state, is susceptible of navigation?

By Mr. Thompson. I object to that question as calling for a conclusion. He has not been on the river, or at least hasn't so stated, to know whether there is navigation on there. It seems to me the question calls for a conclusion.

By the Court. I think it is the form of question I permitted before—it apparently is.

By Mr. Thompson. Exception.

A. In my opinion New River is not susceptible of navigation in its present state. This is based on the fact that my examination of the river itself, and the more recent reports of the officers having to do with reporting on the New River for the purpose of navigation——[interrupted].

2298 By Mr. Thompson. What reports—you said more recent reports? What dates?

By the Witness. I think up to the neighborhood of 1925, as I recall.

A. (Continuing) That the changes which have occurred since the early mile by mile surveys were made have been insufficient to have any material effect upon either improving the conditions as to navigability or upon the question of making conditions more adverse.

Q. Major Putnam, in your opinion, would it be economically practical to develop and improve New River artificially, so as to provide a useful channel for three foot navigation?

A. It would not be.

Q. Will you give the reason for your answer?

By Mr. **Thompson**. We except to all this line of testimony.

By Mr. **Jackson**. I think it is perhaps irrelevant, but it meets what you offered, and what was admitted over my objection as to its relevancy.

A. In the first place I do not believe that three foot navigation as such could in itself compete with other methods of transportation available to the territory at the present time; and over and above that, I do not see from my examination of the territory, and of the possible commerce that might be available to such an improvement, that there would be enough commerce likely to make use of such a route to justify any expenditures involved.

Q. As a matter of engineering, state whether the improvement of New River so as to provide three foot navigation would require the construction of locks and dams?

A. Assuming that three foot navigation meant three feet below extreme low water, such improvement would, in my judgment, require the use of locks and dams at certain critical locations.

Q. Would it be possible, in your judgment, to improve New River so as to provide nine foot navigation?

A. I think it would be possible.

Q. In your opinion, what would be the approximate cost of improving New River so as to provide nine foot navigation?

A. From the mouth of the New River to the mouth of Wilson Creek, a rough estimate of cost for a nine foot channel would be in excess of two hundred million dollars. 2299

Q. That would be a slack water system?

A. That would necessarily be a slack water system.

Q. In your opinion would the improvement of New River to provide nine foot navigation be economically feasible?

A. It would not.

Q. Will you state briefly the basis of your opinion?

A. As I see it, the mere annual carrying cost alone of the investment required, plus such maintenance cost as would be involved in keeping up the structures and plus operating costs at the locks and dams, would amount to a sum well in excess of what any anticipated savings through the use of the river by navigation could be.

2300 Q. In a Government project like the one for the improvement of the Kanawha River, or rather by dams and slack water pools, from what elevation is the project depth in the upper end of the pool measured and maintained?

A. It is measured and maintained below the elevation corresponding to a level pool.

Q. Major Putnam, referring to the conditions at or in the neighborhood of mile 90.5 on the Kanawha River, which the evidence shows to be the head of navigation of Government project in the London pool, at what discharge of the stream would the velocity of current become so great as to affect navigation adversely?

A. I would say it would be between 20,000 and 25,000 cubic feet per second, depending upon the elevation of that particular pool.

Q. In your opinion what, if any, difference would the rate at which the stage or discharge increased from some lesser amount up to this maximum discharge make?

A. It makes no difference to navigation what the rate is, as long as this maximum is not exceeded.

Q. Referring again to the portion of the London pool downstream from the official head of navigation project at mile 90.5 on the Kanawha River, would there be any adverse effect on navigation if there were a decrease in inflow at a rate not exceeding 2,000 second feet per hour, providing the inflow did not become less than that necessary to keep the London pool substantially at the minimum project elevation?

A. There would be no adverse effect on navigation.

Q. Major Putnam, in your opinion what, if any, adverse effect on navigation would result from an increase in stage at the head of the Marmet pool, at a rate not exceeding 1½ feet per hour?

2301 A. There would be no adverse effect upon navigation if the rate of increase in stage did not exceed 1½ feet per hour up to a point where a critical discharge of 22,000 second feet or more obtained, at which point it is possible current velocities would be such as to begin to interfere with navigation.

Q. Would that effect depend upon the rate of increase to that flow or upon the existence of the flow regardless of the rate?

A. It is the existence of the flow entirely.

Q. Please state, in your opinion, what if any adverse effect on navigation would result from an increase in stream flow at the head of the Marmet pool at a rate not exceeding 6,000 second feet per hour?

Q. Major, in your opinion, what if any effect upon navigation would result from an increase in stream flow at the head of the Marmet pool at a rate not exceeding 6,000 second feet per hour?

A. There would be two effects under these conditions; one would have to do with the possible reaching of a critical velocity which would be reached in the vicinity of 22,000 cubic feet per second, and the other would have to do with an increase in stage at the loading terminals where the relationship of the barge to the loading tipple would change as the stage increased.

Q. Would there be any adverse effect on navigation in your opinion?

A. There would be no adverse effect on navigation as long as this 6,000 second foot increase in stream flow did not produce a total in excess of the neighborhood of 22,000 second feet.

Q. And would any adverse effect at 22,000 feet depend——[interrupted].

Q. Would any adverse effect you have mentioned at 22,000
second feet depend upon the rate of increase in inflow or
2302 upon any other circumstances?

A. It would depend solely upon the current velocity as produced and not upon the rate of increase.

Q. Major Putnam, in your opinion what, if any, effect upon navigation in the Marmet pool would result from a decrease in stage at the head of the Marmet pool for not more than two hours at a rate not exceeding 1½ feet per hour.

A. The rate of change in stage would have no effect on navigation, adverse or otherwise, except the necessary adjustments to lines and spars where boats are tied up at the terminals, so long as this rate did not continue to a point where the pool was no longer maintained at its project elevation.

Q. Can you explain more fully what you mean by the last statement?

A. By that I mean this rate of decrease should not go on to a point where the flow remaining would be less than that necessary to take care of lockage, leakage and evaporation, and the draft through the power house.

There is another qualification I would like to make on that, and that is this is subject to the condition the roller gates are closed, and also subject to the qualification that I would assume under the conditions as I described them, that boats were not loaded beyond the drafts coming within the project depths, and furthermore, that barges were inside the limits of the channel, wherever it might be, of project depth.

Q. Now, Major Putnam, in your opinion what, if any, effect upon navigation in the Marmet pool would result from a decrease in stage at the head of the Marmet pool for not more than two hours at a rate not exceeding 6,000 second feet per hour?

A. The same limitation——[interrupted].

A. The same limitation would apply, and I believe I could very well clear up the point right here, and that is this, that as far as rate of increase or decrease is concerned, or as far

as the rate of increase is concerned, there is only one
2303 limitation, and that is when the current velocities of the
stream become obstructive. The rate of decrease and the total decrease is limited at the lower end by the maintenance of pool levels.

Q. Major, in the case of the Marmet pool, what if any effect upon navigation would result from variations in flow in the amount of 2,500 second feet upward and downward from the prevailing average flow?

A. You mean the average flow at the particular time?

Q. That is right.

A. There would be no material effect one way or the other as far as the variation in flow in the amount of 2,500 second feet is concerned, as long as the pool level is maintained. [Interrupted.]

A. (Continuing.) I will modify that to state that as long as pool levels are not below those required by the project. If, for instance, the discharge of the stream at any particular time is comparatively low a reduction or increase of 2,500 second feet will not be material. If the discharge gets high enough so we are approaching one of the critical discharges I described the percentage by which the velocity of flow is either increased or decreased is comparatively small, as for instance we have a total discharge in the stream of around 22,000 second feet, an increase or reduction of 2,500 second feet is in the order of change of 10% in the current velocity on the average. If you get still higher velocities the percentage of change is less and from the point of view of navigation is imperceptible.

By Mr. Jackson:

Q. Major, in your opinion, what, if any, effect upon navigation would result from increase in stage at the head of Winfield pool at a rate not exceeding two feet per hour?

2304 A. The rate would have no effect until the discharge had
reached 30,000 second feet. At that point, or in the vicinity of that discharge, the current velocities begin to become what I would term obstructive.

Q. In your opinion is that condition dependent upon rate of increase by which 30,000 second feet flow would be obtained?

A. No, sir, the rate has nothing to do with it. It is the total flow that produces current velocity.

Q. Major, assuming the maximum discharge, not exceeding 30,000 second feet, what, if any, effect upon navigation would result from an increase in stream flow at the head of Winfield pool at a rate not exceeding 6,000 second feet per hour?

A. As long as the maximum discharge did not exceed 30,000 second feet, the rate of increase is immaterial.

Q. In your opinion, what, if any effect upon navigation, would result from a decrease in stage at the head of Winfield pool for not more than two hours at a rate not exceeding two feet per hour?

A. There again we have the same condition as to the necessity of limiting reductions to a point where the pool is maintained at project elevation.

Q. What does that require?

A. That requires enough flow coming into the pool to take care of lockage, leakage and evaporation and draft at the proposed power plant, and as long as that is taken care of and as long, as I said in the other case, boats are not overloaded and keep within channel the rate of reduction has no material effect one way or the other on navigation.

Q. In the case of Winfield pool, what, if any, effect upon navigation would result from variations in flow to an amount of 2,500 second feet upward and downward from the prevailing average flow?

A. The effect on navigation of a variation of 2,500 second feet
between the upper and lower limits I have referred
2305 to previously, one the critical velocity and the other
maintenance of pool level, a variation of 2,500 second feet
will have no material effect on navigation. As I illustrated before, when the discharge is high the percentage of change in current velocity is relatively low, so it is not appreciable. If the discharge is low, the discharge itself does not produce current velocities having any substantial effect on navigation.

By the COURT:

Q. Are you stating that as a general proposition or does it apply to the Winfield pool?

A. That will apply to any pool ordinarily on the Kanawha River.

Q. Are you applying that statement only to the Kanawha River, and to the particular physical characteristics there?

A. Yes.

Q. It would not be true if you had a very narrow channel something in the form of a canal, which would increase the flow and might have a considerable difference.

A. Yes, if you produce destructive cross-currents and things of that character..

Q. It would increase the level, wouldn't it?

A. Yes, sir.

Q. You made a statement and I was wondering if you meant it to be a general statement or to apply to the physical characteristics there present on the Kanawha?

A. The latter is true because I have examined the cross-section of the stream and applied it accordingly.

By Mr. JACKSON:

Q. Am I right in understanding that you impose a lower limitation, as to how far the low flow may be reduced?

A. Yes, sir; I impose that same limitation, that is, maintenance of pool level, allowing for lockage, leakage, evaporation and same restrictions as to the loading of boats, and their location within the channel.

2306 Q. In your opinion, what effect, if any, upon navigation would result from increase in stage at the head of Gallipolis pool at a rate not exceeding 1½ feet per hour?

A. The rate itself has no material effect one way or other on navigation. It is only material when the increase continues to a point where the discharge exceeds 22,000 second feet, when we get resultant current velocities which might adversely affect navigation.

Q. Is that figure based upon your consideration of the physical characteristics of the Gallipolis pool?

A. It is.

Q. And was that true of the similar figures you gave for London, Marmet, and Winfield?

A. That is true for the other pools.

Q. In your opinion, what, if any, effect upon navigation would result from increase in stream flow at the head of Gallipolis pool at a rate not exceeding 7,000 second feet per hour?

A. The answer I gave to a previous question with reference to change in rate of flow would apply here, in other words, the rate is immaterial, it is a question entirely of reaching a critical stream flow velocity.

Q. Major, in your opinion, what, if any, effect upon navigation of the Gallipolis pool would result from a decrease in stage at the head of Gallipolis pool for not more than two hours at a rate not exceeding 1½ feet per hour?

A. Under those conditions, in my opinion, the same restrictions must be applied as in the case of the other pools. This rate of decrease in flow, in itself, is not particularly material, it is only when the flow gets below a certain total, which should be enough to take care of maintaining the pool at project level and allow for loss by lockage, leakage and evaporation, and the same 2307 restrictions I previously applied as to the loading of boats and their location in the channel would apply in this case.

Q. Instead of assuming the figures in stage, at the head of Gallipolis pool, for not more than two hours at a rate not to exceed 1½ feet an hour, assume figures in discharge at the head of Gallipolis pool for not more than two hours at a rate not exceeding 7,000 second feet per hour, what, if any, effect upon navigation would result?

By the COURT. What do you mean by 7,000 second feet per hour?

By Mr. JACKSON. If the flow at the Gallipolis pool was 20,000 second feet at noon, and later at one it was 13,000 second feet there would be a decrease of 7,000 second feet in the hour.

A. The answer I just gave with reference to change in stage at that particular location would apply in reference to figures in discharge at the rate given in view of the relationship existing between the decrease in stage and decrease in total discharge.

Q. Major, in the case of the Gallipolis pool, what, if any effect upon navigation would result from variation in flow into that pool in the amount of 2,500 second feet upward and downward from the prevailing average flow?

A. There again in view of the conditions of the channel and the critical cross section, a variation of 2,500 second feet, upward and downward, from any given stage, above that required to maintain project pool elevation; making allowances for the usual losses, any such variation would not have a material effect on navigation in that pool.

Q. What, if any, practical effect would an increase in stage, at a rate not to exceed two feet per hour, with a total rise in stage, not exceeding 5 feet, have upon the mooring, loading and unloading of barges or other vessels in harbors or at terminals along the Kanawha River?

A. I understand there is a total limitation or another limit placed on the total amount of change and that is placed at 5 feet. That being the case, the only effect on navigation under those conditions would be that the barge men would have to keep their eyes open more actively so that on a decreasing stage their 2308 lines would not part, and on a rising stage they could take in their lines, and whichever direction the stage was going they could properly adjust any spars they used for keeping their barges off the banks.

Q. You referred to rising and falling stages. I think I only asked about rising stages. Is your answer applicable to either rising or falling stages at the rate of 2 feet per hour with a maximum change of 5 feet.

A. Yes, it is.

Q. What is the present annual amount of commerce on the Kanawha River?

By Mr. **Jackson**:

Q. Have you investigated such records as are available as to the amount of commerce on the Kanawha River?

A. Yes, such as are included in the list I have.

A. The annual commerce on the Kanawha River, based on the reports I have examined, is in the neighborhood of 2,000,000 tons a year.

By Mr. **Jackson**:

Q. Assuming the Winfield and Gallipolis dams to have been placed in operation and assuming the present conditions of commerce on the Kanawha River, what would be the effect, if any, upon navigation, in the pools in the Kanawha River, if the flow into the London pool were to be reduced for a prolonged period to 200 second feet?

A. There would be no material effect.

Q. Why do you say that?

A. Because on the basis of the existing commerce in the neighborhood of 2,000,000 tons a year, in my opinion there is amply water available to take care of losses by leakage and evaporation and take care of locking that volume of commerce.

Q. Assuming the Winfield and Gallipolis dams to have been
placed in operation and assuming an annual amount of commerce
on the Kanawha River of 15,000,000 tons, what, if any, adverse
effect upon navigation on the pools of the Kanawha River, would
result if the flow into the London pool were reduced for
2309 a prolonged period to 500 second feet?

A. There would be no adverse effect under those conditions.

Q. Please state why?

A. Because it would still be possible to maintain project pool elevations and have enough water for losses due to leakage and evaporation, and to lock through commerce to the amount of 15,000,000 tons a year.

Q. Now assuming the Winfield and Gallipolis dams to have been completed and placed in operation, and assuming an annual commerce of 30,000,000 tons at Gallipolis, what, if any, effect upon navigation on the Gallipolis pool would result if the flow of Kanawha River at its mouth would be reduced for a prolonged period to 500 second feet?

A. There would be no adverse effect under those conditions.

Q. Please give your reasons for that.

A. If the flow into the Ohio River from the Kanawha were reduced 500 second feet there would still be enough water in the Ohio River at the Gallipolis lock and dam to take care of the requirements for lockage, leakage and evaporation, even with an annual commerce of 30,000,000 tons.

By the COURT:

Did you make your calculations in respect to that question with reference to the number of vessels that might be carrying or bearing the tonnage?

A. I did not quite make it that way, but with the same results, probably, because I took and assumed the loading of a particular barge. Take a thousand ton barge for instance, I assumed it would be loaded——

Q. What I meant was that you must have taken some basis in that regard.

A. Yes, there is a basis for that matter. I assumed 48 lockages per day, through the locks, and that the average tow would be 2,500 tons, composed of four to six barges. In other words, 2310 going downstream, the loading would be considerably more than 2,500 tons. Then the barges might come back light, so that would reduce the average tonnage and the average tonnage per lockage, and on that basis with 48 lockages per day and 2,500 tons per lockage, for a 300 day period, allowing 60 days for miscellaneous interruptions, which is more than ample on the Ohio River, it comes out 36,000,000 tons a year.

By the COURT:

The reason I asked this question was I wanted to find out how much weight to give your evidence, and I wanted to know the basis on which you made your statement.

A. Is that clear enough?

Q. Major, in arriving at this answer or figure that you have just given, did you compute the lockage requirements?

A. I did.

Q. Did you compute it in accordance with any practice recognized by army engineers in reporting on the subject?

A. I couldn't say I took their actual method of calculation, but it is entirely based upon figuring out what is the reasonable expectation in the way of number of lockages per day you can get through a lock in the first place. In other words, if you assume there is going to be some interruptions and traffic will not move without a hitch entirely, and you assume a lock of a certain lift, say in the neighborhood of 20 feet, one lockage, according to experience would take, on the average, about half an hour. That would mean 48 operations per day, if the locks were being used continuously. Then you compute the amount of water contained in a single lockage.

By the COURT:

Q. Do you have the dimensions and capacity of those locks?

A. Yes, I have.

By Mr. Jackson:

Just finish your answer.

A. Then running that into the number of days per year, you
get the total number of cubic feet of water required
2311 in the 48 lockages per day. Then you have to convert
the total number of cubic feet back to day second feet,
that is, cubic feet per second, used continuously throughout the day. For purposes of illustration, at the Gallipolis lock, at 48 lockages per day, and in the first place a single lockage requires 20 day second feet, and therefore 48 lockages per day would require 960 day second feet, in other words, 960 cubic feet per second would be required.

By Mr. Jackson:

Q. Am I right in assuming or understanding that on that hypothesis there would be continuous operations at the locks for 24 hours?

A. Practically so, and then convert that into tonnage, and you can make an assumption of how much would be the average cargo locked through at a certain time.

Q. Do engineers, in studying this subject, make estimates this way?

A. They do. As a check, I found the War Department had a lock on the Ohio River with over a 13 foot lift, they allowed 45 lockages per day and gave an annual capacity of 37,000,000 tons per year. That was approximately the figure I got, 36,000,000 tons.

Q. Please state whether as a practical matter it is possible to maintain a slack water navigation pool at constant elevation without any minor variations from the nominal pool level?

A. Based on experience, from the navigators end, I have learned that in practice the pools are not kept at the theoretical project elevation, but there is usually a minor variation, possibly 6 inches one way or the other.

By Mr. Jackson:

Q. Major, shortly before recess you testified that as a practical matter, minor variations up to 6 inches above or below nominal pool level do occur at slack water navigation. Will you please state what, if any, effect, such minor variations from nominal pool level have upon practical navigation?

2312 A. Navigators themselves take this into consideration
when it comes to the loading and maneuvering of their
vessels.

It has been found from experience that dredging operations themselves cannot be conducted to that particular degree of accuracy, namely 6 inches. It is also the experience of navigators that nature itself upsets conditions more rapidly and to a greater extent than the minor changes in pool levels under consideration would. It has also been found by experience that the operators of the pool cannot maintain that degree of accuracy. For that reason I made my first statement, that navigators, having these various elements of uncertainty to contend with, find that the possible fluctuations in pool levels are only one of several things with which they contend, so that in making allowances for these other difficulties, they, at the same time, make allowances for minor fluctuations in pool levels.

2313 Cross-examination by Mr. THOMPSON:

Q. Mr. Putnam, I think you said that you took a course at the Army Engineers School, did you not?

A. I did.

Q. That involved two inspection trips, one on the Ohio, and one on the Monongahela?

A. Yes, sir.

Q. The Monongahela is a tributary of the Ohio?

A. Yes, sir.

Q. How long were those inspection trips?

A. I don't recall.

Q. Were you there a week?

A. We took a trip which included both streams at the same time. We started on the Monongahela river and went downstream to Pittsburgh and down as far as Louisville. I thought it would take a week or ten days, and it was somewhere in that range, but I would not say exactly.

2314 Q. How long were you at the Army Engineering School?

A. From September 1914 to May 1916.

Q. That is located where?

A. At the present time it is located at Fort Belvoir, Virginia.

Q. Where was it when you took your course?

A. At the Washington Barracks.

Q. As a matter of fact, all of your work there was technical, that is, theoretical?

A. All the work I had at the Army Engineering School with respect to river and harbor improvements, outside of these two inspection trips, was confined to the study of text books, documents and lectures.

Q. And most of your work there was with regard to the movement of troops?

A. No, sir.

Q. Or engineering work in that line?

A. No, sir, it was not.

Q. I think you said you went to Europe on a trip?

A. Yes, sir.

Q. And that you went to Germany?

A. Yes.

Q. Did you inspect the canal that runs from the Danube to the Rhine River?

A. I did not.

Q. Do you know there is a canal that goes over two ranges of mountains and connects those two rivers?

A. I have heard of some such project.

Q. When you were in Europe I thought you made studies of these various conditions?

A. I made studies in Europe which I thought would apply to a local situation.

Q. The local situation was the Chicago situation, was it?

A. It had largely to do with the question of the relationship between barge transportation and ship transportation and 2315 whenever I found a combination of the two, I made investigations accordingly.

Q. You know that the canal that connects these two rivers is a barge canal?

A. I don't know much about that particular canal.

Q. Was your trip to Europe—over how long a period of time was it?

A. It was between two and three months.

Q. How many countries were you in?

A. I was in France, and I went through Switzerland to get to a certain point on the Rhine in Germany. I went through Amsterdam to get to Belgium and I was in Belgium and in England and in the southern part of Scotland.

Q. You did not, therefore, see many projects of power development or anything of that kind over there on navigable or non-navigable rivers?

A. I just recall one or two; not to any extent.

Q. Your trip was more or less a pleasure trip, wasn't it?

A. No, sir.

Q. What did you do in the way of hydrography, in the way of study?

A. Nothing in the way of hydrography.

Q. And you did not do anything in the way of construction, did you?

A. I inspected the construction of several projects.

Q. And none of these projects were power projects?

A. No, sir.

Q. When you returned, you returned to Chicago and you were the assistant district engineer, I believe?

A. That is not correct.

Q. That was afterwards, was it?

A. Yes, sir.

By Mr. **Jackson**. That was before.

By the **Witness**. Before the European trip, I was district engineer at Chicago.

By Mr. **Thompson**:

Q. You represented some company in Chicago. What was the organization that you represented when you came back from Europe.

A. I was connected with or engaged by the Commercial Club at Chicago.

2316 Q. Do you still represent them?

A. No, sir.

Q. You represent the other company—the shipping company, do you?

A. I am secretary and treasurer for that company.

Q. Did you give the name of the company?

A. No, sir.

Q. What is the name?

A. Leathem-Smith-Putnam Navigation Company.

Q. The Leathem-Smith-Putnam Navigation Company?

A. Yes, sir.

Q. Their office is in Chicago, is it?

A. Yes, sir.

Q. Do you spend most of your time there?

A. Most of my time, yes, sir; I will say about seventy-five per cent.

Q. How long were you district engineer?

A. About four years.

Q. So that approximately you were with the Government about five years?

A. Approximately—exactly five years, yes, sir.

Q. And since then you have been in Washington practically all of your professional life?

A. In Chicago.

Q. I mean Chicago. Please excuse me. The area around Chicago is very flat, isn't it?

A. Yes, sir.

Q. Do you know the course of the Des Plaines River?

A. Fairly well.

Q. Do you know of a divide from Chicago River that you had to go over in times past to get to the Des Plaines River?

A. I live within about two miles of it.

2317 Q. It is a fact that in Chicago that this river, the Des Plaines, runs through the town of Cicero part of the way on one edge of Cicero, isn't it?

A. It may for a fraction of a mile go near Cicero. I don't think it touches it.

Q. There are a great many bridges—cement bridges crossing that river, are there not?

A. Yes, sir, there are.

Q. And there are places where it is almost impossible to observe what was the channel of the river?

A. (No answer from witness.)

Q. Do you recall where the park is now?

A. There is a forest preserve section, I believe, around that particular point.

Q. And in the forest preserve, you cannot see anything but sand?

A. The old channel is obliterated by artificial filling and things of that character.

Q. And isn't it a fact that it is practically impossible for a child even to put a play-boat on there at that point?

A. At that particular location?

Q. Yes?

A. No, I don't think so, at that identical spot. I don't know the exact point—it is pretty hard for anybody to identify that, but in that vicinity there is a small amount of cano'ing.

Q. There is no possibility of navigation on that stretch of the river now, is there?

A. Not in its present stage, no, sir.

Q. And there hasn't been any navigation there for one hundred years, has there?

A. I don't know.

2318 Q. What do you mean when you speak of navigation?

A. By navigation I mean the practical use of a stream by boats carrying cargoes or trade or commerce of some form and variety.

Q. What size boats do you mean would do it?

A. I would not place any restrictions on the size except below a point where they will be so small as not to be of practical use.

Q. Would you say that a channel that was carrying canoes that carried two tons or less, for one-third of the year only, would be navigable?

A. For one-third of the year only?

Q. Yes.

A. I would not.

Q. You would not think that was navigable.

A. No, sir.

Q. Do you know that in the case of the Economy Light and Power Company the question arose over the navigability of the Des Plaines River and the records show that for only one third of the year in times past, in the early days, there was a possible navigation without having to portage one-third the distance of the Des Plaines River?

By Mr. **Jackson**. We object to that because it does not correctly state the record and it is immaterial and irrelevant and incompetent.

By the **Court**. He may answer.

By Mr. **Jackson**. We except to the ruling of the Court for reasons stated.

A. I don't know that the records show that.

Q. If the records show that, would you say that the Des Plaines River was navigable in its natural state?

By Mr. **Jackson**. We object to that, because it does not include the full statement of the record.

By Mr. **Thompson**. I am just testing his judgment as to what he means by navigation. He says it is not navigable.

The foregoing objection is overruled and the defendant, by counsel, excepts to the ruling of the Court for reasons stated.

By Mr. **Thompson**:

Q. I will ask that the question be read. [The question is read.]

A. That would all depend on whether or not that was the only means of transportation involved, and as to whether or not there were other means available that were more practicable, so that there would not be any choice between the two methods. As I previously stated, the question of navigability has some relationship to its practical use.

Q. Do you consider the Des Plaines River a navigable river?

A. I made no study of that with that in view.

Q. You can look at it. You don't have to study it.

A. It may have been susceptible of use in the early days by the boats that then prevailed.

2319 Q. How many railroad bridges are over it within the distance of ten miles of Chicago?

A. I don't know.

Q. How many various railroads run by it, do you know?

A. Yes, sir.

Q. The Santa Fe?

A. Yes, sir.

Q. And the Rock Island?

A. Not the Rock Island.

Q. That is about a mile over there?

A. It comes in fairly close to the Des Plaines in Joliet.

Q. The water is taken out by canal out of the river and subsequently, away below is brought back in the river?

A. No, sir; that is not true.

Q. What canal is that?

A. The Chicago Drainage Canal.

Q. The Chicago Drainage Canal?

A. It takes no water out of the Des Plaines except in time of floods, the Des Plaines flows into it.

Q. What is the canal between the lake and the river—the older canal?

A. The one to the southerly side of the drainage canal?

Q. I am not sure that it is south?

A. It is south and easterly, a diagonal line; that is the old Illinois and Michigan Canal.

Q. Doesn't it take water out of the river?

A. It may have years ago, but I don't think so. The main drainage canal is between this small canal and the Des Plaines River.

Q. You know something about the Des Plaines River and its location, do you?

A. Yes, sir.

Q. The question I want to ask you is, if in your opinion, you think it is a navigable river.

A. I cannot give such an opinion.

2320 Q. You have looked at it a great deal more than you did at the New River?

A. There is no question about that.

Q. And you have lived within two miles of it?

A. Yes, sir.

Q. And from your own observations, would you say it is a navigable river?

A. From my own observations, I would say it is not susceptible to use by boats carrying trade or commerce.

Q. Do you know whether or not there has ever been any navigation on New River?

A. I have noticed references to—in some of the earlier reports of the Chief of Engineers, of the use of the river by boats in certain sections.

Q. What kind of boats were those?

A. As I recollect the description, they were called bateaux.

Q. And those boats were about how long?

A. Roughly, I would say fifty feet.

Q. How many tons would they carry?

A. I don't recall that definitely; I will say in the neighborood of two or three tons, on a very slight draught, that is about ighteen inches or two feet.

Q. Didn't the Army report say that they carried six or eight r more tons?

A. I don't recall that.

Q. Do you remember from the Army Engineers' reports, how nany of those boats there were on the river—on New River?

A. According to those reports, as I remember them, they referred to some ten or twelve boats or thereabouts that were in xistence on the river at one time.

Q. Didn't they finally go to eighteen or twenty-five boats?

A. I don't remember that figure.

2321 Q. In reading these reports of the early days of the engineers you gave credence to those reports, didn't you?

A. Yes, sir.

By Mr. Thompson:

Q. You said that it was not navigable in its natural state?

A. I said it was not navigable in its natural state, yes, sir.

Q. Let me read to you from Plaintiff's Exhibit No. 47, on age 6: "In 1883 there were about seventeen keel boats in this raffic and there are still about ten or twelve of such boats now n the river. These keel boats, as they are called, in this traffic, ave an average length of about sixty feet and a width of six or ight feet; their draught is about two feet."

Do you remember that statement?

By the Witness. I do remember that substantial statement.

By Mr. Thompson:

Q. I will read another paragraph No. 9: "From Hinton to len Lyn, a distance of 30 miles, there was some commerce, onsisting of grains and miscellaneous merchandise." In view f that statement, would you say that New River, between these oints, was not a navigable river?

A. Yes, sir; I would say so.

Q. Upon what theory would you say so?

A. Upon the theory that this particular report that you refer o deals with the period shortly after the time some work was lone on the river between those points by the Government engieers, and my understanding of the question of what is and what s not a navigable river, refers to the river in its natural state.

Q. So you think that, New River having been improved, take t out of the class of a river that is navigable in its natural tate?

A. Not necessarily, but I don't want to be understood as saying hat it is navigable because they have made improvements.

Q. Is it your understanding that, if improvements are 2322 made on the river, it takes it out of the class of being navigable in its natural state?

A. Not necessarily.

Q. You don't know anything about the question of navigation on New River prior to the improvements made by the Government, do you?

A. The question of navigation—the fact of navigation—of navigation having existed?

Q. Yes?

A. No, sir, I do not.

Q. Let me refer you to Government's Exhibit No. 31, being report of Chief of Engineers of 1873—when were the improvements first made on New River by the Government?

2323 A. They began, as I remember it, either in 1872—I mean 1877 or 1878; I think it was 1877.

Q. I am reading from a report of the Chief of Engineers. I have just given you the Exhibit number; "The present system of transportation on this portion of the river is by keel boats, which carry from two to three tons and are rowed or floated down the river and poled up," and I am now referring to the point from the Lead Mines to the Greenbrier. Would you say that there was not any navigation on the river prior to the improvements made by the Government; after reading that statement?

A. I would not say that there was not any navigation.

Q. If there was navigation, wouldn't that part of the river in its natural state be a navigable river?

A. No, sir.

Q. Why not?

A. Because there is nothing in this report to say whether or not that was a regular or an intermittent system of transportation; what time of the year it occurred—whether or not they handled that in August or more or less through the year regularly. There is nothing in that statement to cover that.

Q. That statement doesn't mean a thing to you, then?

A. It only means what it says—that the present system is by keel boats.

Q. If they were keel boats, wouldn't that mean that the river was navigable?

A. No, sir; not necessarily.

Q. I call your attention to Government's Exhibit No. 33, at page 62, being the report of 1877. "A survey of this portion of New River—the improvement of New River from Wythe County to the mouth of the Greenbrier River. A survey of this portion of New River was made in 1872 and the report was printed in

the Annual Report of the Chief of Engineers for 1873.
2324 Two estimates were submitted, one looking to an improvement to facilitate the navigation by keel boats, now used, at a cost of $100,000; the other contemplated a three-foot steamboat navigation to cost $1,000,000." Do you recall reading that section?

A. Yes, sir.

Q. Would that have any effect upon your determination as to whether or not there was navigation prior to the improvement on the river by the Government?

A. No more than the previous extract that you read to me and for the same reason.

Q. You spoke about John Marshall's report. You read that report, didn't you?

A. I did.

Q. When did you read that report?

A. About two weeks ago.

Q. In the preparation of this case?

A. Yes, sir.

Q. You also spoke about Moore and Briggs' report?

A. Yes, sir.

Q. You read it, did you?

A. Yes, sir.

Q. About two weeks ago. Both of these reports tell about trips going down the river from Hinton to the mouth of the river, do they not?

A. I am not sure about both, but I am reasonably sure that one or the other did.

Q. Which one of them did?

A. The Moore and Briggs', as I recall.

Q. Did you forget about the trip of Chief Justice Marshall, when he said that he got all the way down, except that he had to get out at one place?

By Mr. Jackson. We object to that.

2325 By the Witness. He came down towards——

By Mr. Thompson. (Interrupting.) To the mouth.

By the Witness. Beeween Hinton and the mouth.

Q. And he went through what is known as the Narrows—the gorge, I mean.

A. I recall a reference to that.

Q. Would you call a trip like that navigation?

A. No, sir; I would not.

2326 By Mr. Thompson:

Q. The fact that Moore and Briggs went from Sinking Creek to Hinton and to the mouth of the river, would that have any influence upon you as to whether or not you could determine if this river, in its natural state, was susceptible of navigation?

A. It would not.

Q. If it is a fact that a man by the name of Laomi Baldwin made a trip down the river through the gorge, would that have any effect on your conception of navigation?

By Mr. **Jackson.** We object to that because it is highly improper. That report was introduced only to show that Baldwin went to Kanawha Falls and he failed to get by there and finally they had to meet him in a boat from Charleston.

By Mr. **Thompson.** I challenge that statement.

By the **Court.** There was a big dispute as to whether or not Baldwin travelled by land or sea.

By Mr. **Thompson.** He is interrupting me [indicating Mr. Jackson].

By the **Court.** Let's get the Baldwin statement.

By Mr. **Jackson.** If counsel will point out to me anything showing that he travelled by boat down there, I would like to see it.

By Mr. **Thompson.** That is about a survey that he made.

By Mr. **Jackson.** That is an official report.

By Mr. **Thompson.** That report is silent on that question.

By Mr. **Jackson.** If he can show me what I asked for, I will withdraw my objection and apologize.

By Mr. **Thompson.** We have here a history of Summers County [indicating].

By Mr. **Jackson.** That is not in evidence and is not proper.

By Mr. **Thompson.** Mr. Kegley said it was worthy of consideration; Mr. Kegley vouched for it. There is no mention of his going down the river in that report.

By Mr. **Jackson.** That is the reason you did not put it in.

By Mr. **Thompson.** Certainly not. It is entirely silent.

By the **Court.** What does it say there?

By Mr. **Thompson** (reading): "The New River country was visited by Chief Justice Marshall, and they went down the river as far as its mouth at Foss east of Summers Courthouse, and then they turned up New River and proceeded to the mouth of Indian Creek, then they ran on down the river to the present site of Hinton, and then down New River to its mouth."

By Mr. **Jackson.** That is impeached by Mr. Baldwin's own report.

By the **Court.** The historian says that they moved up and down New River on a boat and came to the mouth of the Greenbrier and proceeded up the river in a boat.

By Mr. **Thompson.** That report is perfectly accurate, but it does not refer to this trip.

By Mr. **Abbot**. Which shows that he did not take it.

By the **Court**. Does the historian say the date of that?

By Mr. **Thompson**. Yes, sir; in 1817.

By Mr. **Jackson**. He has got that confused with Moore and Briggs and the history of Summers County is a work that is strikingly notable for its absence of authorities.

By Mr. **Thompson**. He gives the length of the boat as 50 feet long.

By Mr. **Jackson**. That is pretty conclusive.

By the **Court**. What was the question?

By Mr. **Thompson**. I asked him if such a trip was made by Baldwin in 1817 down the river, through what is known as the gorge, whether or not that would have any effect on his opinion as to whether or not New River was navigable waters in its natural state.

By Mr. **Jackson**. We object to that, because the only evidence in the record shows that he never went down the river in a boat.

By Mr. **Thompson**. May I read to the Court a paragraph from Rogers on experts at page 79 and 80: "On cross examination of a witness, counsel may be permitted to ask hypothetical questions, whether or not the facts were testified to by the witness or not."

By the **Court**. I don't think that quotation is at all applicable. You asked him the question about Baldwin going down the river and you are asking him to assume that it is true. I don't know—this man has written a long report here and he said he had a great deal of difficulty. I don't know whether he said he went down New River or not.

By Mr. **Thompson**. There is not a word about it, no, sir.

By Mr. **Abbot**. No, sir. He says he went to Kanawha Falls and could not go down New River to do that, and that he met a boat below Kanawha Falls sent up from Charleston to meet him. Why would he do that if he had just gone down the river.

By the **Court**. He does not mention New River in his report.

By Mr. **Thompson**. No, sir. We objected to it.

By Mr. **Jackson**. We did that because you implied that he made a trip down the river in a boat, and we wanted to show what he did do.

By the **Court**. It comes to this—you have introduced a history of Summers County, in which some historian says that Baldwin made a trip on New River in a boat in 1817. In rebuttal of that, here is presented a copy of Baldwin's report himself, which is made to some official body—the Board of Public Works of the General Assembly of the State of Virginia—it is directed to them, relating about the trip that he took the same year, only it appears that his explorations were along the Jackson River and overland route connecting with the Kanawha River. He does not mention that he was on the New River, but his report shows that he was on the upper reaches of the James River and the Jackson River, and surveyed a road overland to Gauley River, possibly where the Gauley runs into the Kanawha, and from that point, he traveled, at least a portion of the way, by boat. Now, we have here two conflicting pieces of evidence. You want me to assume that the historian is correct and that as to Baldwin himself, his report is inaccurate.

By Mr. THOMPSON. I do not understand that they are in conflict in any way. I don't know how long that trip took, but my recollection is that it was a few months. There are nine months left in which he could make that trip. I don't understand that they are in conflict. That is the reason I objected.

By Mr. JACKSON. The History of Summers County has not been received in evidence and if anyone goes on the stand to vouch for it, we want to cross-examine the witness. I don't think you can find a reputable historian to vouch for it.

By Mr. THOMPSON. We can produce the record and show where Mr. Kegley said it was reliable.

By Mr. THOMPSON. We had it marked for identification.

By Mr. JACKSON. You offered it and we objected and were sustained.

By Mr. THOMPSON. We will offer the book in evidence.

By Mr. JACKSON. We will want to cross examine whoever presents it.

By the COURT. I think the statement in this history is not of value. The statement of Baldwin does not say anything about New River. He says he came over Kanawha Falls at the same time that the historian says he traveled up and down New River and the historian does not say anything about the difficulties of the travel or anything about the size of the boat——

By Mr. THOMPSON. Yes, sir; he says it was fifty feet long.

By the COURT. All right; but he says nothing about the difficulties; he says they traveled in a boat 50 feet long and went to the mouth of the Greenbrier——

By Mr. THOMPSON. He says the exploration was made in a boat 50 feet long and that they went to Foss, a mile East of Summers courthouse, and turned up New River and went down the river to the site of Hinton on New River at its mouth.

By the COURT. He says nothing at all about the difficulties or the lack of difficulties. Your question is based on the implication that the man went up and down New River on a boat, without any difficulties. In view of his report, I do not believe that the man was traveling on New River at all at that time. He says nothing at all about it in his own report. You can ask the question but I want to tell you what I think about the history of Summers County.

The defendant, by counsel, excepts to the ruling of the Court for reasons stated, and because it is immaterial and irrelevant and not based on the evidence in this case.

By Mr. **Thompson**:

Q. I will ask that the question be read.

(The question is read.)

A. Even if such a trip were in fact made, it would make no difference in my opinion.

Q. Major, I want to read you a reference from the report of the Chief of Engineers for the year 1879, Exhibit 35:

"The detail maps of the season's operations completed in the office, the property collected together and put in repair, and, finally, all boated down to Hinton, West Virginia, at the mouth of Greenbrier River, a distance of 84 miles, to which point, under your decision, operations were to be transferred in the future as a base. Everything was closed up by October 15."

Do you remember reading that?

A. What page, if you please?

Q. I have got the original here, but I haven't the exhibit.

By Mr. **Thompson**:

Q. Would that affect your judgment as to whether the river was navigable, or not, in its natural condition?

A. It would not affect my judgment.

Q. It would not affect your judgment?

A. No.

Q. Would the fact that the Army Engineers had sent a boat with a motor attached to it, an outboard motor, drawing about two and a half feet, from Hinton to Allisonia and back, within the last few weeks, influence your judgment as to whether
2327 New River is a navigable river?

Mr. **Jackson**. I object to the question unless he states the size of the boat and the difficulties encountered in pulling over ledges and bars.

By the **Court**. I think there should be some indication of the size of the boat.

By Mr. **Thompson**:

Q. A boat 16 feet long, and five feet wide, and drawing two and a half feet of water at the most?

Mr. **Jackson**. I think it should be shown that the witness stated——

Mr. **Thompson**. I do not care to have counsel address me.

The COURT. I think the question should contain all the conditions attending that movement—the number of persons in the boat and such as that.

By Mr. THOMPSON:

Q. Four persons in the boat, and a survey outfit, and the parties getting out only once on the trip from Allisonia down to Hinton, and then getting back into the boat—in other words, not portaging—and getting out on the trip five times over shallows, but not portaging, would that influence your judgment as to whether New River is navigable?

Mr. JACKSON. I object to the question unless he shows how many times he had to pole, and unless he shows what falls they had to get out and walk over.

The COURT. You may answer the question and save the point.

Mr. JACKSON. Exception.

A. That would not affect my judgment.

By Mr. THOMPSON:

Q. How far up the river did you say you went?

A. I touched the river at a point on each of the forks in North Carolina, and then jumped back to the mouth of Wilson.

2328 Q. And when you were noticing the flow of the river, did you know whether or not the Buck dam was closing down for any period of a day and then discharging water?

A. No, I did not.

Q. So that, when you looked at the river, you would not have known whether that was having any effect on the depth of the river, would you?

A. I would not know how much effect it would have on the depth of the river.

Q. You would know, though, it would have effect?

A. It would have some effect on the depth of the water in the pools and the amount of water that went across the falls.

Q. Would your judgment have been changed by the fact that, at the time you were looking at the pools, or shallows and water, the water had been shut off, or whether the wave had reached that point?

A. I do not think so, because I could see from the water line where the water had been some time during the day previous, and still showed exposed rocks and boulders and shoals that had no evidence of the water line.

Q. That would indicate that you did notice that there was fluctuation?

A. Yes, I did notice that there was a fluctuation.

Q. Now, let me get the date that you went over there? Where did you start from?

A. I started from here.

Q. From Roanoke?

A. Roanoke, yes, the morning of July 28th, this year; then eaded for North Carolina, crossing the river enroute at Jackn Ferry; then beyond Galax, coming back on the other side of e river; then at a point where I crossed New River some little stance this side of the line, and then down in North Carolina— rst crossed the South Fork and then the North Fork, and then back a road.

29 Q. Where did you stop that night?

A. I came all the way back to Roanoke, getting in about o'clock in the evening.

Q. How many miles did you travel that day?

A. I will say between 300 and 350. I don't know exactly.

Q. Did you attempt to look at the river that day at all?

A. I did.

Q. And is that all the time you spent on the river up-stream— at is, from Radford?

A. That is all the time I spent on the river between Jackson erry and the North Carolina points I mentioned.

Q. Is that the only time you were ever up there?

A. No. I was up there in the lower end again last Saturday, the location just below the Buck dam—a little above Ivanhoe urnace.

Q. But you did not go up above Buck dam at any other time, d you?

A. No, I did not.

Q. That was the only time. Well, now, how many places did u stop on your trip when you made the 350 miles in a day— at is on the river?

A. About ten different places.

Q. About ten.

A. Yes.

Q. The water in the river is very low, isn't it?

A. I have no information as to the amount of water in the ver. There was not much water at certain places I looked, if at is what you have in mind, but I would say that is below the wer dam. Above it would depend on the natural flow.

Q. You do not know the natural flow?

A. Only as reported in previous surveys, which I had studied eviously.

Q. On your ten stops, did you make any measurements of the depth of the river? Did you get out into the river yourself?

30 A. No.

Q. You just looked at it from the shore?

A. Yes.

Q. So, if there was a channel there, you would not know how deep the channel was?

A. I would not.

Q. Now, what time were you at the power dam?

A. I would say between 3 and 4 o'clock in the afternoon.

Q. And was the project discharging water at that time?

A. I don't know.

Q. What was the condition of the flow of the stream on that Saturday when you went up on the trip from here to the power dam, as to flow?

A. The stream was in a pretty low condition.

Q. In a pretty low condition?

A. Yes.

Q. What did you do when you got out on those visits? Did you just stand on the shore and look at the river?

A. I looked at the river, looking at the configurations of the bank, to see what effect would happen, roughly, with increased stages. I noted wherever I happened to drop in whether or not there was a section of pools there, whether or not there happened to be riffles, or boulders or shoals.

Q. There was not any way, on this trip, for you to make any check as to depths, as to whether the mile-to-mile depths, as shown by Craighill and others, were correct or incorrect?

A. No.

Q. As a matter of fact, if you made ten stops and covered 350 miles in a day, a part of which I understand was on pretty rough roads, they were short stops?

A. It was a long day.

Q. What time did you start?

2331 A. 7 o'clock in the morning.

Q. What time did you get back?

A. I think about 10:30 or 10 o'clock.

Q. What time did you get to New River? What time did you first see New River on that day?

A. That is when I crossed at Radford, which would be an hour to an hour and a half from here.

Q. Do you remember what your next stop was?

A. I didn't stop at that particular crossing, as I wanted to get up at the far end, and I went to Jackson Ferry, and then went to these other places, and stopped at the last point before I went into North Carolina.

Q. What time of day would it have been?

A. 11:30 in the morning.

Q. So the ten stops you made were made from 11:30 until what time in the day?

A. The last stop was at 5:30 in the evening.

Q. That is six hours. Now, can you remember where the stops were you made—at what points?

A. Not without reference to my notes. I can remember some, but not all.

Q. Can you give us those you remember?

A. I remember the stop at the highway crossing just before getting into North Carolina. I remember the stop at the two branches up in North Carolina. I remember the stop just below the mouth of Wilson and a stop at the foot of what is known as Osborne's Shoals.

Q. Where is that?

A. Roughly, six and a half miles below the mouth of Wilson. The next stop I can recall was just below Fries. The next was in the vicinity of Ivanhoe Furnace. The next was the Lead Mines. The next was just above Jackson Ferry, and the last was at Foster Falls.

2332 Q. That is nine, I believe.

A. I must have missed one. I just counted ten.

Q. Well, four of those stops were made at points not downstream further than Wilson Creek?

A. There were two of them made beyond the mouth of Wilson.

Q. I think you gave four made at Wilson or further upstream?

A. The point the highway crosses is just below the mouth of Wilson.

Q. Just below?

A. Several miles. I don't know how many, but four to six.

Q. If you had spent all your time at these various places, you would have spent about half an hour at each one of them, wouldn't you?

A. A little more than that.

Q. So that subtracting from that the time you took to make the automobile trip, you had very little time to stop and look at the river, did you not?

A. I don't imagine I averaged over ten or fifteen minutes at any one point.

Q. At what other time have you seen the river? The first trip was on the 28th, and then I believe on Saturday you went to the Buck dam?

A. That was last Saturday I went back. The first time was on the 28th of July.

Q. Now then, from Radford down, what did you do in the way of looking at the river?

A. My first visit there was on the 29th, starting in at the Radford dam site. From there I worked on down to Hinton, getting there late in the afternoon.

Q. And you ran from Radford to Hinton from the morning until the late afternoon?

A. Yes.

Q. What time did you start in the morning at Radford?

A. I think I started at Radford abut 8:30.

2333 Q. And you got down to Hinton about 4 or 5?

A. About 5 o'clock.

Q. It is 84 miles by road, isn't it?

A. I don't recall. It is not a very long way.

Q. How many times did you stop during that time from Radford to Hinton?

A. I stopped at the Radford dam site.

Q. That is about six miles above town, isn't it?

A. Yes. Then Ingles Ferry, crossed over at that point, and stopped there a few minutes. Then went down to the vicinity of Parrott Mines, and followed along the river to Walker's Mount Falls, I believe that they call it. Then I retraced my trip, and got back to the main highway, and went through to Pearisburg and over to the river at Klotz Quarry, I think is the name of the plant. Then back through Pearisburg to Narrows, Glen Lyn; then down on the back road along the river, passing Shumate Falls, stopping at Wylies, continuing on down that road to Crumps Bottom. I did not stop there. Then down to above Bull Falls, where I took the ferry across the river. Then down to Hinton.

Q. Do you make that eight stops altogether?

A. Seven would be the actual number of stops. I may have mentioned one for two stops.

Q. You were gone, as I figure it, from Radford eight hours and a half—that is, from 8:30 to 5—and you stopped off about an hour for lunch, did you?

A. Half or three-quarters of an hour. I did not take the full hour.

Q. We will call it a half an hour. You traveled approximately 100 miles. You doubled back?

A. No; I spent the night at Hinton. I doubled back a part of the way. It would make it, roughly, 100 miles from Radford.

2334 Q. And a good part of that time you were not in sight of the river, were you?

A. From the time I cut across from Radford and back to the river at Parrot Mines, I did not see the river in that stretch, and from Pearisburg there is a stretch of about 30 miles in there I didn't see it. The rest of the time the river was in sight most of the time.

Q. So your stops were about the same as the day before—about ten minutes?

A. I think that they would be longer, because I had more time.

Q. How long do you make them?

A. Not over an average of 20 or 25 minutes.

Q. Did you cover on your trip the stretch from Foster Falls to Radford?

A. No, I didn't get in that section at all.

Q. You didn't see that section at all?

A. No.

Q. That is a distance of how many miles?

A. Twenty-five to thirty.

Q. About thirty-eight by the Geological Survey. Did you go any farther down by Hinton by motor?

A. Yes, the next day I went down from there to the mouth of the Kanawha.

Q. That was on the 30th was it?

A. That was on the 30th.

Q. And that was from Hinton to the mouth of the Kanawha?

A. Yes, sir—No, I mean the mouth of the New River, pardon me.

Q. When did you start that day?

A. I left Hinton at 7:45 in the morning.

Q. And when did you get down to the mouth of the river?

A. A little before noon.

Q. That would be about four hours?

A. Yes, four hours.

2335 Q. You didn't follow the river, couldn't see the river part of the time, could you?

A. I could not see the river for quite a part of the time.

Q. How many stops did you make between Hinton and the mouth of the river?

A. Stopped at Stretcher Neck, in the vicinity of Stone Cliff, crossing the river at that point and back-tracking to get up on the road on top; thence to Fayette, and down toward Fayette station, and stopped again at that location; then I back-tracked again and the next place I got to the river was at the main highway crossing below Hawk's Nest development.

Q. Did you go up to the Hawk's Nest?

A. Yes, I went down to a place overlooking the valley where you could see the Hawk's Nest development.

Q. That would be four stops you made there and Stretcher's Neck, Fayette and Hawk's Nest.

A. Stopped at the crossing below Hawk's Nest.

Q. That would be five?

A. Yes, sir.

Q. So you didn't have much time to stop and view the river, did you, covering that distance in four hours?

A. No, I would say ten or fifteen minutes to a stop.

Q. Was it upon that basis of time you made your estimate of $200,000,000 for cost of improving navigation to a nine foot depth on New River?

A. No, sir.

Q. That was your sole inspection of the river, was it not?

A. Yes, sir.

By Mr. **Jackson**:

Q. You don't mean those three days was the only inspection?

A. No, I testified I had on August 10th made another trip in the vicinity of Buck, and it was on that trip I took in several other points that subsequent study had shown I ought to look at with more detail.

By Mr. **Thompson**:

2336 Q. What other places beside Buck?

A. From downstream working up, so I can remember the chronology, I began at Bulls Falls, Wylie's Falls, Shumate Falls, Walker's Mountain Falls.

Q. You mean you looked at those the second time?

A. Yes, sir; and the Sifford's Falls.

Q. Did you stop and look at Bulls Falls?

A. Yes, sir.

Q. Would you regard that as passable by a motorboat?

A. It might be passable.

Q. So that that spot you would say was navigable?

A. No.

Q. If it was passable by motorboat you wouldn't say it was navigable?

A. No, sir.

Q. You think navigation by motorboat is not navigation?

A. If it were continuous and substantial it might be navigation, but a mere passage by motorboat would not make navigation.

Q. What would lead you to believe it wasn't continuously passable?

A. No question was put to me as to that.

Q. Would you say it was not continuously passable or navigable by motorboat?

A. I would say most times you could go downstream in a motorboat, but that doesn't make it navigable.

Q. Could you go upstream?

A. I would say possibly at low water. Take a pretty good motorboat to do it.

Q. If you could go at low water, couldn't you go in a motorboat at average flow?

A. I wouldn't know because I wouldn't know what the current velocity would be.

2337 Q. So far as that particular spot is concerned, you don't know whether it is navigable or not?

A. Yes; I do; in my own estimation.

Q. Your own opinion?

A. Yes.

Q. Based on what you told us here?

A. Yes, sir.

Q. Would you say Bulls Falls was impossible for a motorboat to go up if a party could take one of these punts or flat-bottom boats and push it over the Falls at low water?

A. I am not sure I am clear as to what you mean by punt.

Q. What they call a punt is a canoe or some name for a flat bottom boat.

A. Such as you see on some of these pools around here?

Q. Yes.

A. What is the question?

Q. Isn't that Fall there practically navigable so far as getting up the river is concerned?

A. No; it is not. Probably at low water it constitutes a drop of two or two and a half feet.

Q. Have you ever heard there was navigation for many years by bateaux up and down that river at that point?

A. You read to me an extract from a report showing during certain years a certain number of bateaux had operated in there.

Q. That would not affect your judgment as to whether that particular part was navigable?

A. No, sir.

Q. How did you arrive at this expenditure of $200,000,000; in other words, how many reservoirs did you figure on constructing?

A. I figured an average lift of twenty feet at each dam, making roughly about 1,800 feet of fall, approximately 1,800 feet between the head of the London pool and the mouth of Wilson. I mean, to overcome that fall some 90 locks and dams would 2338 be required, with an average lift of twenty feet.

Q. Why did you only make it twenty feet?

A. Because, there were two reasons for that, in the first place I felt if I exceeded twenty feet in some locations we would get into difficulties with the railroads along the bank; in the second place there is from the point of view of improving a stream for navigation an economical limit, beyond which it is not wise to go on the question of lift, in other words, in attempting to save the number of dams, the cost of your structure per foot of lift increases somewhere above that point; and between those two I reached the conclusion a twenty feet average lift would be a reasonable assumption to make.

Q. The road-bed of the railroad, the C. & O. up through what is known as the Canyon is at least forty feet above the river, isn't it?

A. I am not sure it is.

Q. Any reason why you could not put in a dam higher than twenty feet, just as the Hawk's Nest people did?

A. If we don't get into trouble with the C. & O., the only reason would be an economical reason, and as I previously explained, it is generally cheaper to build two twenty foot dams than one forty foot dam for navigation alone.

Q. The dam at Hawk's Nest has a pool in it that is navigable, hasn't it?

A. Probably throughout the length of the pool; in other words, you can put boats there, if that is what you mean.

Q. And run them?

A. Yes, sir.

Q. Do you know any river where they have twenty foot dams?

A. Not exactly twenty feet, no, sir, some are twenty-four, some twenty-six, some eighteen and some down as low as ten, lots of them.

Q. Would you not, if you were building that project, or making that river navigable, for a nine foot depth, wouldn't
2339 you create power at the same time you stored your water?

A. It depends on the instructions I had. If I were told to put in a navigation project pure and simple I would put in something different than what I would if told to do something else.

Q. In this case were you told just to consider navigation?

A. This was purely a navigation project.

Q. You were not thinking in terms of what might be saved by the creation of power and amortizing that cost?

A. This was purely a navigation project.

Q. If you had created power on these projects you could have amortized your cost very considerably, couldn't you?

A. I do not know.

Q. Now the Radford project will have a pool twenty-one and a half miles, won't it?

A. I don't know.

Q. Don't you know the length of the pool?

A. No, sir.

Q. Do you know the defendant here has a project down at Bluestone, a double project, one at Bulls Falls and one to be at Bluestone also?

A. I have noticed reference to a possible project on the profile but that is about all I know of it.

Q. And the water from the after bay dam on the Bluestone will back the water right back up to Bulls Falls, won't it?

A. I do not know.

Q. And make it ten feet deep there?

A. I don't know.

Q. So you don't know anything about this question of proposed construction of dams up and down the river?

A. Only as I have seen from some profiles.

Q. You know the defendant is not intending to build any ten or twenty foot dam on the river?

2340 A. Any of those dams for which I have seen profiles on the river indicate some head greater than twenty feet.

Q. And everyone of those dams will improve navigation, or there will be navigation for boats?

A. There will be a navigation depth, a dependable navigation depth for the drawn down length of the pool, whatever that may be; there would remain a stretch between the high and low point you would have to do something to.

Q. You would have a pool for usable storage?

A. Possibly.

Q. And that would create navigation as the Hawk's Nest dam has created navigation?

A. It might.

Q. Now you have not given me very much information in regard to how you fixed this figure of $200,000,000. I am curious to know about that.

A. From my study of river and harbor projects elsewhere I have information as to the cost per foot of lift for locks the size used on the Kanawha at the present time 56 x 360 feet, and in this particular instance I would need 90 of those, on my assumption. Then I also have information available as to the cost of dam construction with rock foundation, roughly twenty feet of lift, or whatever unit you want to use, and combining these two I get a cost per foot of lift of the combination locks and dams, and making allowance in the dams for the relative width of this stream compared to others the cost is very close to $100,000 per foot of lift, so that comes out in the neighborhood of $180,000,000. Now the reason for rounding out that to $200,000,000 was in some places the river was pretty narrow and if you put a lock in there you restrict the stream, and might cause trouble with the flow, so there should be some margin of safety for such contingency, and still maintain the natural flow capacity of the stream. It is no more than a normal factor for safety.

2341 Q. You only made a very cursory examination didn't you, you wouldn't have anyone invest money on that basis?

A. No, I would not, sir, but I would guarantee it would not be more than 25% less than that under present conditions.

Q. As an engineer you wouldn't advise the Government to build a dam as low as the London and Marmet on as heavy a basis as those dams are built, would you, powerful, up on the New River?

A. Well I don't think those on New River would cost as much per foot of lift for the reason we are dealing with smaller quantities of flow.

Q. As I get it, you made your trip as you described it here, and then from your experience in Chicago and elsewhere, you estimated the value or cost of building these navigable dams only up the New River?

A. My answer applies to navigation dams only, but is based on a good deal more than you mentioned. It is based on not only this hurried trip over the river, but a study of all available maps and profiles and such reports as might apply to that class of construction and my experience in studying projects elsewhere.

Q. When you were along the river did you notice that the clearing away of the road-bed for the various railroads had caused rock and debris to be thrown down into the river?

A. I could see the railroads had a bank very close to the river, but whether it actually encroached on the original lines or not I had no way of telling.

Q. Do you know how far the headwaters of the New River are from the headwaters of the Tennessee River, the Holston?

A. No, I don't. Fairly close I would say, but I don't know.

Q. You stated that the river was frequently interrupted by obstructions, you were not making that statement from the stretch from Hinton up to the Buck dam, were you?

2342 A. Yes, sir; I was.

Q. That is the stretch I thought you had not been (interrupted)

A. From Hinton?

Q. I should have said Radford.

A. That statement was based on the mile by mile survey and not exclusively on observation.

Q. Can you show me in your mile by mile survey where there is low water, less than nine inches, going over the shallows from Radford up to Allisonia?

A. You can't tell from the mile by mile survey how many inches of water or what the depths are over the rapids and falls.

Q. Didn't Major Craighill in his report state it was about a foot in low water down over these shallows?

A. He may have. I don't recall that.

Q. If he did say that, then wouldn't you say that there would be navigability for boats over those shallows?

A. No; I would not.

Q. Why not?

A. Because as I said before I interpret navigability to include substantial use by boats carrying commerce and trade, and I can't conceive of boats carrying commerce and trade on a twelve-inch channel over rapids and falls.

Q. Do you consider logging and rafting navigation?

A. I would not. You have no control over that class of movement of goods.

Q. Did you know that there has been testimony here that millions of feet of lumber were floated from Hinton down to Charleston or down to what they call the gorge near Charleston?

A. No, sir.

By Mr. **Jackson**. I object to that. There is no such testimony in the record.

By Mr. **Thompson**. Do you say there was no such testimony?

By Mr. **Jackson**. Not that I heard of.

By Mr. **Thompson**. Mr. James testified to that effect.

2343 Q. Did you know when the C. & O. Railroad was being built in what is known as the gorge, that the materials, much of the materials being used on that road, were transported by boat from Hinton down the river?

A. No; I didn't.

Q. Would that affect your judgment as to whether New River was navigable?

A. I would have to inquire further into the conditions under which that stuff moved and as to whether it actually moved.

Q. If you actually found in your inquiry it did move down the river and was unloaded at Sandstone Falls and reloaded and carried further down the river, and then moved on the railroad, would that affect your judgment?

A. I can't very well make an estimate of navigability of that section of the stream on such slight information as I am getting now.

Q. What information did you have when you formed your judgment as to nonnavigability?

A. All the Government reports which I read into the record this morning, plus what I actually observed as a matter of my recent check on river conditions compared with those obtaining in the early days.

Q. Do you recall that Government reports do report that materials were floated down the river for the construction of the C. & O. Railroad?

A. I don't recall that.

2344 By Mr. THOMPSON:

Q. When you assumed, as I understood it, that decrease in the flow at the head of London pool would not cut navigable depths below 9 feet, at mile 90.5 you did not consider the possibility of a surge or oscillation below the normal pool level, did you?

A. I did not take any possible surges or oscillation into consideration in any of my replies that I made this morning.

Q. If there had been a discharge down from the London pool to the Marmet of, let us say, 6,000 second-feet, and it was suddenly cut off, would there be oscillation in the Marmet pool, in your opinion?

By Mr. JACKSON. We object to the question because it has no relation to the examination in chief and is not proper cross-examination.

By Mr. THOMPSON. I object to his guiding the witness.

By the COURT. I do not think that he is guiding the witness. Read the question. [Question read.]

By the COURT. Mr. Jackson, you examined this witness, did you not, about the decreasing and increasing depths in the pool?

By Mr. JACKSON. At certain rates per hour with a limitation, when the flow was never reduced below the amount which would maintain pool levels, or would be sufficient to meet lockage, leakage and evaporation, but this question refers to completely cutting off the water.

By Mr. THOMPSON. I understood that Mr. Jackson referred to a drop as much as 2 feet in the pool below, and he asked if they kept the pool level the same, whether there would be any effect on navigation.

By the COURT. I understood him to inquire about it, and to state if they kept the pool level at least up to its minimum depth.

By Mr. THOMPSON. I do not see how that could happen unless there was a change in the flow of the river.

By Mr. JACKSON. But not cutting off the flow entirely.

By the COURT. He may answer the question.

Defendant excepts.

By Mr. JACKSON. Read the question. [Question read.]

A. I do not know whether there would be oscillation or not.

By Mr. THOMPSON:

Q. If the flow from London to the Marmet dam was diminished, 2,500 second-feet in an hour, would that cause any oscillation in your opinion in the Marmet dam pool?

A. I made no study of the effect of oscillations or how they might be produced in those pools, so I cannot answer that question.

Q. So, as I get it, for the record, in all of this testimony which you gave this morning, you were not referring in any way to any effect that might produce oscillation.

A. No, sir; and if you will remember, I put in somewhere to this effect that they must keep up the level of the pool, if what I said were to apply. You could not have a level pool, as I see it, if you had oscillation, that is, if you had oscillation it might go below the level of the pool.

Q. As an expert engineer on the question of flow of streams, &c., will you not state, or will you state whether or not the cutting off of 2,500 second-feet from the London to the Marmet dam inside of an hour would create oscillation in the Marmet pool?

2345 A. I cannot say because, as I said before, I have not studied all the characteristics of the London and Marmet pools in sufficient detail to answer the question.

Q. Would you say the same thing in regard to the Winfield and Gallipolis dams?

A. Yes, sir.

Q. You said navigators accommodated themselves to the conditions of the river, I believe, this morning?

A. Probably words to that effect, yes, sir.

Q. Do you consider it the duty of a navigator to be on the watch for changes in the flow of the stream due to the discharges from a power plant?

A. If he has public notice that the power plant is there, then for his own protection he would be wise to carry on his operations in such a way that he will not be caught in difficulty.

Q. I did not ask you whether it was a wise thing for him to do if he knew about it, but is that his duty on a navigable river?

A. You are now getting into a question of law there that I would not be able to answer.

Q. Suppose you were a navigator and going up the river and a fog struck you and you had to spar in at some place as rapidly as possible, would you feel it was your duty, notwithstanding that the power plant, let us say, was going to cut off the discharge, and drop the stage, let us say, two feet in an hour?

A. I wouldn't say it was my duty, but it would certainly be a thing that I would look out for.

Q. Now your only answer to my question is that it is up to the navigator to look out for himself on the river, even though this discharge may come.

2346 A. As a matter of practical operation he should watch out for all these things.

By Mr. **Thompson**:

Q. Then as I understand it, you were not testifying as to the fluctuations caused by a power plant, on navigation?

A. There was no specification as to the agency which caused these fluctuations, that I discussed this morning.

Q. Can you give any instance of any river fluctuating two feet in an hour from natural causes?

A. The Kanawha River itself has done that on the rise.

Q. But that was during some very high floods, wasn't it?

A. The discharge was in the water, 65,000 second-feet, at those particular times, when the change in stage was 2.6 feet.

Q. That was during the flood, but do you know whether a storm would break over a watershed and it would rise, say the Kanawha, that there would be a rise of two feet?

A. I imagine that these discharges that I just referred to were the result of storms of sufficient intensity to produce such a rise. However, I am not quite sure that I understand you.

Q. I must have misunderstood your examination this morning, because I understood you were referring to discharges produced by artificial conditions, but as I understand you now 2347 these discharges you spoke of were produced by natural conditions?

A. No, sir; I said the agency that produced these fluctuations were not discussed this morning.

Q. Do you know in any normal times that any storm has produced on any river a fluctuation of two feet within an hour?

A. It depends on what is meant by normal. This illustration I gave is a flood condition. By normal do you mean somewhere about mean stage of the river?

Q. Yes, that is it.

A. No, I don't know of any.

Q. You said navigators easily adjusted themselves to a six inch fluctuation in the pool level. Fluctuations of 1½ to 2 feet are more serious, are they not, than six inches?

A. As long as the pool is not below project depth, they are no more critical, until you get up to the critical discharges I mentioned this morning.

Q. When they are repeated several times daily, they are more serious, are they not?

A. They are not serious until you get up to a point where the velocity of flow is such as I stated this morning, until the velocity of flow gets up to that.

Q. Are these fluctuations of more than 1½ to 2 feet not productive of oscillations in the pools below?

A. I don't know, I did not study oscillations.

Q. I believe you testified this morning, or what was it you testified to as the amount of water necessary for lockage at the London and Marmet dams?

A. With reference to navigation on the Kanawha the testimony was to the effect that if the flow were reduced to 200 second feet there would be no adverse effect on navigation, and I explained specifically, because the water available would be sufficient for lockage, leakage and evaporation for existing commerce; 2348 but there was an assumption that was put to me on that, assuming that the old dams had been replaced by new ones in the lower river.

Q. Do you know that there is an allowance of 250 second feet in the arrangement between the Government and the Kanawha Valley Power Co. for lockage and leakage on the Kanawha, on the London and Marmet dams?

A. No, I do not.

Q. Would you knowingly advise a client to expend millions of dollars on the London lock and dam and then permit the water supply to be reduced so that its full capacity could not be utilized?

A. I don't think I would.

Q. You spoke about a condition that will exist when the Gallipolis dam is completed?

A. Yes, sir.

Q. And that there was a certain amount of water there that would be used for lockage and leakage, I believe very little for leakage, mostly for lockage?

A. I stated that 960 feet per second would be necessary for lockage if we allowed 48 lockages a day of 2,500 tons a piece.

Q. Do you know that there have been quite a number of occasions when the flow in the Kanawha River during low water periods, into the Ohio, at Point Pleasant, had been greater than the flow from above Point Pleasant from the Ohio?

A. No, I do not.

Q. If you allowed simply 250 second feet during very low water periods for lockage on the Kanawha River, and you had a low water condition such as existed in October 1930, and the Ohio, and also existed in 1925, what would happen with regard to the dams below Gallipolis dam if they only had the flow that was coming through from the Gallipolis dam?

2349 A. I do not think I could answer that question because I don't know what the actual figures are as to the flow in the Ohio River at those particular times.

Q. You know the dams below the Gallipolis dam are wicket dams and they have to be caulked and needled, don't you?

A. Yes, sir.

Q. When the water gets low that becomes a very important matter with respect to navigation on the river, does it not?

A. That becomes important whenever the leakage will approximate the low water flow.

Q. And does that situation ever arise?

A. I have known in several seasons where they had to needle these dams and caulk them pretty well.

Q. Isn't it a fact they have to do that every year and at certain periods of the year?

A. We had not had so much trouble with low water then as they probably have had since.

Q. So your testimony here today goes as far as the Gallipolis dam and not beyond?

A. It does not go beyond the Gallipolis dam.

Q. You do not pretend to say what the effect on such conditions would be below the Gallipolis dam?

A. I do not.

By Mr. Thompson:

Q. I understood you to say before recess that the fluctuation on the Kanawha River of 2,500 second feet was not material to navigation on any of the pools. Am I correct in that understanding?

A. Not entirely correct. I qualified that by stating if the project pool level was maintained.

Q. Suppose that the project pool level were maintained and there was a fluctuation of 8 or 9 thousand second feet, what would you say?

A. Above or below a certain given elevation of pool,
2350 That might be there at that particular time?

Q. Yes, sir.

A. I would say that might be serious.

(Exhibit 88, being Declaration of Intention of New River Development Company dated June 25, 1925, having earlier been offered by plaintiff for a limited purpose, was offered in evidence by defendant for all purposes.)

(Exhibit 90-A, being maps accompanying Application for License dated August 30, 1936, having earlier been offered by plaintiff for a limited purpose, was offered in evidence by defendant for all purposes.)

(Exhibit 568, being letter dated July 1, 1925, from O. C. Merrill, Executive Secretary of Federal Power Commission, to Mr. C. Bascom Slemp, was offered in evidence as a part of the course of the proceedings between defendant and the Federal Power Commission.)

(Exhibit 569, being letter dated July 3, 1925, signed by C. B. Slemp and addressed to O. C. Merrill, Executive Secretary of Federal Power Commission, was offered in evidence as a part of the course of proceedings between the defendant's predecessor, and the Federal Power Commission.)

(Exhibit 570, being letter dated October 24, 1925, addressed to Federal Power Commission and signed by Curtis, Mallet-Prevost, Colt & Mosle, was offered in evidence to show part of course of conduct by defendant's predecessor.)

(Exhibit 571, being letter dated October 24, 1925, addressed to Major General Harry Taylor, Chief of Engineers, War Department, and signed by Curtis, Mallet-Prevost, Colt & Mosle, was offered in evidence as a part of the proceedings between defendant and plaintiff.)

(Exhibit 510, being letter dated February 5, 1927, from Major Trippe to F. W. Scheidenhelm, was offered in evidence.)

(Exhibit 511, being letter dated February 4, 1927, from F. W. Scheidenhelm to Major Trippe, was offered in evidence.)

2351 Mr. Abbot. On day before yesterday notice was given for the making of the motion with reference to the taking of the deposition of Colonel Ardery.

(The motion was duly filed.)

Mr. Abbot. I have an order which I desire to present on that motion, which is as follows:

ORDER

"The defendant, pursuant to Federal Equity Rule 47, having filed its verified motion for the purpose of taking the deposition of Lieutenant Colonel E. D. Ardery, Engineer, Fifth Corps Area United States Army, Fort Hayes, Columbus, Ohio, and good and exceptional cause having been shown by the defendant for the taking of said deposition at the time and place hereafter set forth.

"It is ordered that the defendant be and it hereby is authorized and permitted to take the deposition of said Lieutenant Colonel E. D. Ardery before Kenneth L. Sater, a Notary Public, in and for Franklin County, Ohio, at the office of Sater & Sater, 50 East Broad Street, Columbus, Ohio, on August 28th, 1936, beginning at 11 o'clock in the fore noon of said day with respect to the following matters:

"(*a*) Whether or not power waves from the Byllesby and Buck Hydro Stations during the years 1927–30 caused any interference with navigation on or the navigable capacity of the Kanawha River.

"(*b*) Whether or not during the power wave test conducted during March 1930 there was interference with navigation on or the navigable capacity of the Kanawha River and whether or not there was interference with the operation of the navigation works, and

"It is further ordered that the defendant be permitted to apply to the United States District Court for the Southern District of Ohio, Eastern Division or to such proper officer as the defendant may be advised for a subpoena to compel the attendance of said Lieutenant Colonel E. D. Ardery at the time and place aforesaid."

The **Court**. That is for Friday, is it?

Mr. **Abbot**. Yes, sir. Lieutenant Colonel Ardery has stated that he will give his deposition on that day.

(Above mentioned Order was signed by Hon. John Paul on August 26, 1936.)

Mr. **Thompson**. If the Court please: Yesterday your Honor entered an order permitting the taking of the deposition of Colonel Ardery, at Columbus, Ohio.

I have consulted with my associates since the adjournment last evening, and learn that the trip is about a thousand miles, going and returning, and I may say that so far, at this stage, we do not know how Colonel Ardery would answer the two questions that are to be propounded to him under the order—that is, the questions A and B—but in order to avoid taking this trip, and in view of the fact that our position has been that there was no evidence introduced to show that the wave from Buck and Byllesby dams did affect navigation down the river, but that they were introduced to show how the wave went down the river and how far it went, we are prepared to stipulate, although, as I say, we do not know how he would answer, we are prepared to stipulate that with regard to A as follows: That Col. Ardery would testify that the power waves from the Byllesby and Buck dams, from 1927 to September, 1930, inclusive, did not cause any interference with navigation on or the navigable capacity of the Kanawha River.

We are further willing to stipulate as to B that, during the test of the power waves in March 1930, that Col. Ardery will testify that there was no interference with navigation on or the navigable capacity of the Kanawha River. and there was no interference with the operation of the navigation works.

I have read the two questions which are to be propounded to him. We would, of course, want it understood that we are not by this
statement (the Government is not) admitting that those
2353 waves did not affect navigability or navigation down the
Kanawha River, and we are offering this stipulation on the condition that we will not have to take the deposition.

Mr. **Jackson**. Of course, I would want it stipulated further that Lieutenant Colonel Ardery was, at the time (that is 1927–30) and at the time of the power wave tests in March 1930, the District Engineer of the Corps of Engineers of the United States Army in charge of the Huntington District and in charge of the Kanawha River and navigation works on the Kanawha River and their operations, and also on certain parts of the Ohio River.

Mr. **Thompson**. This does not go to the Ohio River. It runs to the Ohio, but does get in it.

Mr. **Jackson**. The Huntington District includes to the mouth of the Kanawha and a certain distance down the Ohio River.

Mr. **Thompson**. We will agree to that, but we also want it understood and agreed to that Colonel Ardery was District Engineer and was there during all of this period that he speaks of.

My associates suggest that we are willing to stipulate that he was District Engineer during the time the official records show that he was such.

Mr. **Jackson**. We haven't official records, but we are stipulating that he was District Engineer during that time.

Mr. **Thompson**. What time?

Mr. **Jackson**. 1927–1930, inclusive, and particularly during the period of March, 1930, when the so-called tests were made with waves from the Buck and Byllesby plants.

Mr. **Thompson**. Will it be understood that his duty there expired in September, 1930?

Mr. **Jackson**. Sometime in September; yes.

2354 Mr. **Thompson**. We stipulate that, your Honor.

Mr. **Jackson**. And that these tests in March, 1930, were made in cooperation with his office as District Engineer?

Mr. **Thompson**. Do you mean cooperation with the defendant?

Mr. **Jackson**. Yes; and others, and, so far as that is concerned, that he cooperated in making the tests.

Mr. **Thompson**. All right, we will stipulate that.

Mr. **Abbot**. Shall that be put in the form of an order? I did not mean that there would be an order, but I think the record had better be read back.

Mr. **Jackson**. I think it can be read back, or checked so if there is any error we can correct it.

The **Court**. Will you please read it back?

Note.—The above was then read back.

Mr. Thompson. I would like to expunge from the record the motion that was made. The order is sufficient, it seems to me, to tie in the stipulation.

Mr. Jackson. It is all a part of the record, Mr. Thompson.

Mr. Thompson. I know, but we are not admitting any part of that.

The Court. I do not see any reason why it should be expunged from the record. It has been a part of the proceeding of the Court. If there is an appeal, or anything of that sort, you gentlemen might want it in the record, but we can omit any immaterial matters, but I think the record of this Court should show everything that happened.

Mr. Thompson. We are not conceding any of the statements set forth in the motion.

The Court. No.

(Exhibit 573, being defendant's Exhibit 505 identified by Col. Edgerton as part of the minutes subsequently printed as the minutes of the meeting of the Federal Power Commission of June 1, 1927, was offered in evidence.)

(Exhibit 574–a, being letter of July 1, 1927, from Federal Power Commission to Curtis, Mallet-Prevost, Colt & Mosle, was offered in evidence.)

(Exhibit 574–b, being certified copy of the minutes of the 38th Meeting of the Federal Power Commission held on June 1, 1927, was offered in evidence.)

(Exhibit 574–c, being form of major license tendered for project on navigable waters by Federal Power Commission to Appalachian Electric Power Company, was offered in evidence.)

(Exhibit 575, being a letter dated March 1, 1928, to Hon. Dwight F. Davis, Secretary of War, Hon. Hubert Work, Secretary of Interior, Hon. William N. Jardine, Secretary of Agriculture, constituting the Federal Power Commission and signed for Appalachian Electric Power Company by Curtis, Mallet-Prevost, Colt & Mosle was marked for identification. Inasmuch as said letter was set forth in the Eighth Annual Report of the Federal Power Commission, contained in Exhibit 91, the defendant did not offer the document marked Exhibit 575 for identification but instead was granted leave to refer to the text of Exhibit 575 in Exhibit 91 as though the document originally marked Exhibit 575 for identification had been offered in evidence.)

(Exhibit 529, being letter dated February 4, 1930, from Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle, to Federal Power Commission, re minor part license, was offered in evidence.)

(Exhibit 530, being memorandum dated February 4, 1930, re minor part license, prepared by Curtis, Mallet-Prevost, Colt &

Mosle, was offered in evidence, for the purpose of showing what the memorandum was which accompanied Exhibit 529, and to show what kind of an application Appalachian Electric Power Company was making.)

(Exhibit 576, being letter dated March 5, 1930, to Lt. Col. M. C. Tyler, Chief Engineer of Federal Power Commission, and signed "F. W. Scheidenhelm", was offered in evidence.)

(Exhibit 531, being letter dated July 21, 1930, from Patrick Hurley, Chairman, Federal Power Commission, to Attorney General of the United States, requesting opinion re power of Federal Power Commission to issue minor part license, was offered in evidence.)

(Exhibit 577, being pp. 6, 7, 8 and 9 of the 10th Annual Report of the Federal Power Commission for the year 1930, was offered in evidence.)

(Exhibit 532, being opinion of Attorney General William D. Mitchell, dated September 22, 1930, re minor part license, was offered in evidence.)

(Exhibit 578–a, being letter dated October 3, 1930, to General Brown, Chief of Engineers, and signed by F. E. Bonner, Executive Secretary of Federal Power Commission, was offered in evidence.)

(Exhibit 578–b, being letter dated October 10, 1930, to the Executive Secretary of the Federal Power Commission signed for the Chief of Engineers of the War Department by Hugh J. Casey, First Lieutenant, Corps of Engineers, was offered in evidence.)

(Exhibit 533, being letter dated October 6, 1930, from Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle, to Federal Power Commission, requesting action on part of Commission in light of Attorney General's opinion, was offered in evidence.)

(Exhibit 536, being letter dated October 31, 1930 from F. E. Bonner, Executive Secretary of Federal Power Commission, to Appalachian Electric Power Company, including draft of minor part license, was offered in evidence.)

(Exhibit 537, being letter dated November 6, 1930, from F. E. Bonner, Executive Secretary of Federal Power Commission, to Appalachian Electric Power Company, c/o F. W. Scheidenhelm, including revised draft of minor part license enclosed therein, was offered in evidence.)

(Exhibit 542, being letter dated November 8, 1930, addressed to Federal Power Commission from F. W. Scheidenhelm, notifying Federal Power Commission that Appalachian Electric Power Company will accept minor part license, was offered in evidence.)

(Exhibit 579–a, being letter dated November 5, 1930, addressed to Executive Secretary, Federal Power Commission, and signed by Lytle Brown, Major General, Chief of Engineers, was offered in evidence.)

(Exhibit 579-b, being copy of report entitled "Second Endorsement U. S. E. O. Huntington W. Va. October 18, 1930—to the Division Engineer Upper Miss. Valley Division, St. Louis, Mo." was offered in evidence.)

(Exhibit 579-c, being report on question of navigability of New River, Virginia (Huntington District, August 29, 1930) Third Endorsement Office Division Engineer Upper Miss. Valley Div. St. Louis, Mo. October 24, 1930 to Chief of Engineers United States Army, Washington, and signed by George R. Spalding, Lt. Col., Corps of Engineers, was offered in evidence.)

(Exhibit 535, being letter dated November 7, 1930, from Col. Kingman to Executive Secretary of Federal Power Commission regarding clause in license for discharge of water at Radford Dam, was offered in evidence.)

(Exhibit 538, being letter dated November 8, 1930, from F. E. Bonner, Executive Secretary of Federal Power Commission, to General Brown, Chief of Engineers, requesting opinion on navigability of New River, was offered in evidence.)

(Exhibit 580, being memorandum dated October 21, 1930, entitled "Memorandum for Executive Secretary" and signed by J. F. Lawson, Acting Chief Counsel, was offered in evidence as one of the documents transmitted to the Chief of Engineers with Exhibit 538.)

(Exhibit 541, being memorandum dated October 28, 1930 for the Executive Secretary of the Federal Power Commission prepared by Colonel Tyler, Chief Engineer of Federal Power Commission, re minor part license application, was offered in evidence as one of the documents transmitted to General Brown, Chief of Engineers, with Exhibit 538.)

(Exhibit 581, being memorandum for the Secretary of the Interior, Acting Chairman of Federal Power Commission, and signed by F. E. Bonner, Executive Secretary, dated October 30, 1930, was offered in evidence, as one of the documents transmitted to General Brown, Chief of Engineers, with Exhibit 538.)

(Exhibit 539-a, being letter dated December 15, 1930, from F. E. Bonner, Executive Secretary of Federal Power Commission, to Curtis, Mallet-Prevost, Colt & Mosle, enclosing report of General Brown, was offered in evidence.)

(Exhibit 539-b, being letter dated November 11, 1930 from General Brown, Chief of Engineers, to Federal Power Commission, re non-navigability of New River, was offered in evidence.)

(Exhibit 582, being letter dated November 8, 1930 to John G. Pollard, Governor of Virginia, and signed by F. E. Bonner, Execu-

ve Secretary, Federal Power Commission, was offered in evi-
ence.)

(Exhibit 583, being letter dated November 10, 1930, Governor
G. Pollard of Virginia to F. E. Bonner, Executive Secretary
f Federal Power Commission, was offered in evidence.)

(Exhibit 540–a, being letter dated November 28, 1930 from
. E. Bonner, Executive Secretary of Federal Power Commission,
Appalachian Electric Power Company, re meeting of Federal
ower Commission of November 25, 1930 was offered in evidence.)

(Exhibit 540–b, being certified copy of minutes of meeting of
ederal Power Commission of November 25, 1930, re action on
inor part license application of Appalachian Electric Power
ompany, was offered in evidence.)

(Exhibit 584, being letter dated January 27, 1931, from Curtis,
Iallet-Prevost, Colt & Mosle, to Federal Power Commission re
earing to be held on Radford Project, was offered in evidence.)

Exhibit 585, being telegram dated January 28, 1931, from Federal
ower Commission, signed by Geo. Otis Smith, Chairman, ad-
ressed to Appalachian Electric Power Company, was offered in
vidence.)

(Exhibit 525, being the report of Colonel Spalding, dated
ebruary 24, 1932, to Chief of Engineers, was offered in evidence.)

(Exhibit 509, being letter from Secretary of War dated
ebruary 25, 1928 transmitting report from the Chief of Engi-
eers on preliminary examination and survey of Kanawha River,
Vest Virginia, House Document No. 190, 70th Congress, 1st
ession, 1928, was offered in evidence.)

(Exhibit 586, being letter dated September 18, 1934, to Secre-
ary of War, and signed by Appalachian Electric Power Com-
any, was offered in evidence to show position and intent of and
ction taken by the defendant.)

(Exhibit 587, being letter dated October 9, 1934 to Appalachian
Electric Power Company, and signed by G. H. Dern, Secretary
f War, was offered in evidence.)

(Exhibit 588, being letter dated October 18, 1934, from Appa-
chian Electric Power Company to George H. Dern, Secretary
f War, was offered in evidence to show position and intent of
nd action taken by the defendant.)

(Exhibit 589, being letter dated September 18, 1934 to Frank R.
IcNinch, Chairman of Federal Power Commission, signed by
ppalachian Electric Power Company, was offered in evidence
show position and intent of and action taken by the defendant.)

(Exhibit 590, being letter dated October 19, 1934 to Frank R.
IcNinch, Chairman of Federal Power Commission, from Appa-
achian Electric Power Company, was offered in evidence to show
osition and intent of and action taken by the defendant.)

(Exhibit 591, being letter to M. F. Millikan, American Gas & Electric Company, signed by G. W. Lineweaver, dated October 23, 1934, was offered in evidence.)

(Exhibit 572, report of General Taylor, Chief of Engineers, dated December 29, 1925 to O. C. Merrill, Executive Secretary of Federal Power Commission, having previously been received in evidence for a limited purpose, was reoffered and received in evidence for all purposes.)

2355 S. M. Yarbro on Direct Examination testified as follows:

I live at Charleston, West Virginia. I am assistant construction engineer for the Kanawha Valley Power Company. I am at present occupied at Winfield, West Virginia.

I took some photographs on New River, on June 2nd, 1936. I didn't take them myself, but I accompanied the professional photographer. The photographer's name was Mr. R. Nunnally. Those photographs were taken on June 1st, 2nd, and 3rd, at Goodwin's Ferry, above Eggleston, Virginia; Round Bottom Creek, above Glen Lyn. The photographs on June 1st were taken from Glen Lyn to Round Bottom Creek. On June 2nd the majority of the photographs were taken from Narrows, Virginia, to Ripplemead, Virginia. On June 3 the photographs were taken from Eggleston, Virginia, to Pembroke.

Q. Mr. Yarbro, I hand you an album marked "Defendant's Exhibit No. 592," in which there appears a map showing the locations of certain photographs by number, and a series of photographs from 61 to 113, both inclusive, and I will ask you if those are the photographs which you have just mentioned?

A. Yes; they are.

Q. Does each one of those photographs fairly portray the situation that appears at the place and time mentioned under the bottom of these photographs?

A. Yes.

Mr. Abbott. If your Honor please, I now offer in evidence "Defendant's Exhibit No. 592," and with reference to the map in the beginning of it I will state that it is not being offered as evidence as to the State or County lines. That is all we wish to ask. (Exhibit 592 introduced in evidence.)

The witness on Cross-Examination testified as follows:

I was present when all of these photographs were taken. We took them on June 1st, 2nd, and 3rd and some on June 29th also.

I was instructed to take the pictures by my immediate 2356 superior. I believe he said that they were to be used in this suit. We went back on June 29th, because some of the pictures that we took on June 1st, 2nd, and 3rd were not very good, and we took the same pictures over again. I do not recall which ones were not good.

Q. What was the instruction that you had about taking the pictures?

A. Well, I was instructed to take pictures of the Rapids and falls between the points I have mentioned.

Q. The rapids and the falls?

A. Yes, sir.

Q. And they did not tell you to take any pictures of the pools?

A. No, sir.

Q. So what you did was to take pictures which would detail as much as possible the rapids and falls?

A. That is correct.

Photograph No. 111 is one we took on the 29th of June. I do not believe that we had taken that particular scene before. I was not sent back because I had missed scenes or views. They sent me back because some of the pictures did not show clearly; some were sun struck or light struck. They did not show the condition of the river. This picture (No. 111) was not taken before, because we missed this part of it. In driving down the road in an automobile we did not see it. I believe we removed all the pictures that were light struck. I selected the sites which I photographed. I had lived in the vicinity about ten years, and I know the river along in that section.

Q. What was the condition of the river when you took the photographs on June 1st, 2nd, and 3rd?

A. In the elevation of the river?

Q. Yes; the elevation of the river?

A. It was considered normal.

Q. Normal?

A. Normal elevation.

Q. Do you mean by "normal low water" the average flow?

2357 A. Average flow.

Q. Average flow?

A. Yes, sir.

Q. Did you learn that simply by observation, or did you happen to look up the gage station records?

A. Gage station records.

Q. And what was the flow say at Round Bottom Creek on June 29th?

A. I can tell you what it was at Glen Lyn steam plant of the Appalachian Electric Power Company. I can give the elevation of the river.

Q. What was it?

A. 1492.5. I believe that is the elevation, but I can't say positively.

Q. What was the stream flow?

A. I don't know what that was.

By the COURT:

Q. Where was that point?

A. That was at Glen Lyn Steam Station.

By Mr. THOMPSON:

Q. What is the number of your picture at Glen Lyn?

A. We don't have one right at Glen Lyn.

Q. What was your nearest to Glen Lyn? 97 or 8, they say; have you got those?

A. Yes, sir.

Q. You say you don't know what the second feet in flow was at that time?

A. No, sir; I do not.

Q. So really your statement about the amount of water in that river is simply your estimate by eye, isn't it?

A. My statement about the amount of water in the river meant that the elevation of the river on those days was what was considered normal by the Government gage. There is a gaging station at Glen Lyn.

Q. Did anybody say that that was the normal, or is that something you have learned?

A. Well, I understand that that elevation is fixed as normal flow by the Government.

2358 Q. And who in the Government told you that?

A. Well, I was informed that that was considered normal by the officials of the plant.

Q. That is hearsay. The officials of the plant?

A. Yes, sir.

Q. And the plant is the plant of the Appalachian Electric Power Company, isn't it?

A. Yes, sir.

Q. You did not attempt in all instances here to get the full river; what you were trying to get was shoals?

A. That is it.

Q. Were you taking just cross river views?

A. We took them from the best angle.

Q. From the best angle to show up the shoals?

A. Yes, sir.

I live at Charleston, West Virginia. I lived at Glen Lyn on New River from 1925 to 1931. From 1931 to 1934 I was at Narrows.

The condition of the river on June 2, 1936, when Photograph No. 61 was taken, was the same as the condition that prevailed when the other photographs were taken. I would say that this photograph was made about 3:00 in the afternoon. When Photograph No. 62 was taken we were standing on the bank of the river but the photographer had his camera elevated too high to get the bank. I think he had a Graflex camera.

The witness, recalled for further Cross Examination, testified as follows:

I covered a distance of about 36 miles in taking these pictures on the river. I never counted the number of shoals we took pictures of.

Q. Do you know what the distance was that the shoals covered of the 36 miles?

A. How is that, now?

Q. The distance up and down stream that those shoals covered of the 36 miles?

2359 A. No, sir; I do not.

Q. If I were to say it was five miles out of 36, would you agree with that?

A. I really have no information at all on that.

Mr. Abbot. I object to the question. The witness says that he doesn't know.

The Court. Objection overruled.

Mr. Abbot. Exception.

By Mr. Thompson:

Q. Would you not say that it was over five miles?

A. I merely had these pictures taken, but I have never measured the distance and have no idea at all what distance they cover.

Q. And you took the worst conditions of the river in the 36 miles, didn't you?

A. Well, I took the shoals and the rapids.

Q. And they are the worst conditions in the river, are they not?

A. What do you mean by "the worst conditions?"

Q. I mean the obstructions on the river—the greatest obstructions in the river or in that section?

A. Yes, sir.

I did not notice any channel in the river when I took photographs Nos. 61, 62, 63 and 64. Those pictures, Nos. 61, 62 and 63, were taken near Eggleston, Virginia.

Photographs Nos. 62, 63, 64, are all at about the same place in the river.

Photographs Nos. 65, 66, 67, 68, 69, 70 and 71, inclusive, were all taken within a distance of about a mile. They were not all taken of one shoal. There is a shoal for each picture except 69 and 70 are of the same shoal.

Q. What do you mean by a shoal?

A. Well, it is swift water, where water falls over an obstruction, such as projecting rocks.

Q. It is more than one particular ledge running across the river, isn't it?

A. It could be.

Q. Haven't you a series of ledges within a very short distance, that are practically all one shoal?

A. These pictures you have referred to are within a radius of about a mile, and that is all swift water in there.

2360 Q. They were taken about as closely as they could be taken, in order to get different views of the river?

A. Well, they were taken to show these shoals up to the best advantage.

Q. And by "the best advantage" you mean by showing them up as outstanding as possible, do you not?

A. Well, when we took these photographs we attempted to show the river as nearly the true condition as we could. I would not say that we tried to show the river as rough as possible, but tried to make a true picture.

Q. You were trying to make a true picture of the shoals?

A. Yes, sir.

Q. And that was the roughest part of the river at that particular place?

A. Yes, sir.

Q. And you said yesterday, I believe, you were not trying to take pictures of the pools above and below?

A. No; we paid no attention to those.

72, 73 and 74 are not of the same place exactly. They follow one after the other. 72, 73, 74 and 75 are from 4.1 miles below Eggleston to 4.7 miles.

Q. So you have a very close area there in which you took this series of pictures?

A. That is right.

Q. That is correct, is it?

A. Yes, sir.

Q. While you show these, are you familiar with the Hutton Survey?

A. No, sir.

Q. You don't know that the Hutton Survey shows that is only four-tenths of a mile instead of six-tenths, as you have it?

A. No, sir.

Q. Did you not know that the stretch where you were, or did you know that the stretch where you were taking pictures had been surveyed and that there was a channel there 16 feet 2361 wide, 2.3 feet deep? Let us take, for example, the reference back to Photograph No. 72: That looks like fairly rough water there, doesn't it?

A. Yes, sir.

Q. Did you know that there was a channel there 16 feet wide and 2.3 feet deep?

A. No, sir.

Mr. **Abbot.** We object to that question. There is no evidence in this record of any such channel.

The **Court.** I don't recall any testimony along that. He can answer it.

Mr. **Abbot.** Exception.

By Mr. **Thompson:**

Q. Did you know that there was a channel at No. 78 that is 30 feet wide and 3 feet deep?

Mr. **Abbot.** We make the same objection.

The **Court.** Overruled.

Mr. **Abbot.** Exception.

A. No, sir; I didn't know that.

By Mr. **Thompson:**

Q. And that the same condition existed at 79, 80, and 81?

Mr. **Abbot.** The same objection.

The **Court.** Where is the evidence of the present existence of a channel at that place?

Mr. **Thompson.** We have the testimony of Mr. Gerdes and those that went over it in a boat that there was a channel of this width and depth. They went there this summer and made the trip.

The **Court.** I remember that they made the trip, but I don't remember the other.

Mr. **Thompson.** Yes, sir. The answers to my questions were as to specific widths and depths, and that they actually measured the depths and got out in the water.

Mr. **Abbot.** If your Honor please, my recollection of Mr. Gerdes' testimony is not that he measured any channel lengthwise in the river, but when his experienced eye showed it was a critical point, then he measured across the river. There was no lengthwise measurement of any channel at any point.

Mr. **Thompson.** If there is any question about that we will have reference to his testimony.

The **Court.** Answer the question.

Mr. **Abbot.** Exception.

Note: The last two questions asked were read.

By Mr. **Thompson**:

Q. You didn't know that?

A. No, sir.

Photographs Nos. 78, 79, 80, and 81, inclusive, are located close to each other, they are not identical.

2362 Photographs Nos. 85 and 86 were taken of the same place on the river, but one is taken closer up than the other.

Q. I believe you testified yesterday that you were told by representatives of the Appalachian Electric Power Company, at Glen Lyn, that the stream flow on the days that you took these pictures was about normal?

A. That is correct.

Q. Do you know what they said the flow was, how much it was, on any one of those days?

A. Do you mean the elevation of the river, or second-feet?

Q. Second-feet?

A. I do not.

Q. Have you tried to find out since yesterday?

A. No, sir.

Q. Did you know that there was a variation in flow from 1700 to 2500 second feet during those days?

A. No, sir.

Q. There was not any storm on the river on those particular days, was there?

A. Not at the point where we took the pictures.

Q. You did not hear of any storm upstream?

A. No, sir.

Photographs Nos. 87, 88, 89, 90, 91, 92, and 93, inclusive, were all taken above Bluff City, and approximately within one-half mile of each other.

Photographs Nos. 103 and 104, were taken of the same spot in the river, 4.5 miles below Glen Lyn. 102 is not the same spot.

Photographs Nos. 109, 110, 111, and 113, inclusive, are all pictures of the river at Round Bottom Creek. There were indications that a Creek came into New River at Round Bottom, but there is no creek there now.

We took a great many photographs we didn't put in this Album.

Photographs Nos. 106, 107 and 108, inclusive, are views of 2363 Wylie's Falls, taken at practically the same place.

I have crossed the river several times in boats.

(Exhibit 250, being photograph No. 58 contained in album of aerial photographs of New River—exhibit 273 was marked for identification.)

(Exhibit 251, being photograph No. 56 contained in album of erial photographs of New River—exhibit 273 was marked for dentification.)

(Exhibit 252, being photograph No. 57 contained in album f aerial photographs of New River—exhibit 273 was marked or identification.)

I have heard the natives in the location of these pictures (107 nd 108) say that at certain points there were channels, but no ne has ever pointed out to me any channel there. If any chanel was there no one has ever pointed it out to me, and I could ot recognize it from looking at the river.

Defendant's exhibit 515 marked for identification is the same s No. 96 in Defendant's exhibit 592.

364 **HAROLD A. THOMAS**

Direct examination by Mr. JACKSON:

Q. Will you please state your full name and residence for the ecord?

A. Harold Allen Thomas. Pittsburg, Pa.

Q. What is your occupation?

A. I am a Professor of Civil Engineering at Carnegie Institute f Technology.

Q. Professor Thomas, will you please state what has been your ducation?

A. I spent six years at Columbia University, receiving the legree of A. B., in 1906, and Civil Engineer degree in 1908.

Q. State what has been your experience as a teacher since your raduation from Columbia University?

A. I spent a summer as instructor in Columbia University Surveying School. I taught a year and a half as instructor in Civil Engineering at the University of Washington, Seattle, Washngton.

From 1910 to 1923 I was Professor of Civil Engineering at Rose Polytechnic Institute, Terre Haute, Indiana.

Q. What were you in charge of at Rose Polytechnic Institute?

A. Civil Engineering courses, and among them courses in ydraulics and Hydraulic Engineering.

Q. Will you proceed?

A. Since 1923 I have been Professor of Civil Engineering at Carnegie Institute of Technology, Pittsburgh, Pa.

Q. Will you state what, if anything, your duties as Professor f Civil Engineering at Carnegie Institute of Technology had to lo with hydraulics or hydraulic engineering?

A. I have charge of all courses in Hydraulics and Hydraulic Engineering, which includes the graduate courses in Hydraulic Engineering and the courses in Advanced Hydraulics.

2365 Q. Does that include Water-Power Engineering?

A. Yes, sir; that includes Water-Power Engineering. I am also in charge of the Hydraulic laboratories.

Q. Outside of your work as a teacher of Hydraulic subjects, have you had any experience in engineering of a hydraulic character?

A. I have had a considerable amount of experience of such kind.

Q. Will you briefly indicate something of your experience in engineering work outside of your teaching activities?

A. During the fall and early winter of 1908 I was a member of the Engineering Corps of the New York State Water Supply Commission, engaged in surveys for water power and flood protection on the Genessee River, New York State.

During the summer of 1918 I was Assistant Engineer of the Corps of the Great Northern Railroad, at Monroe, Washington, where a part of my duties were to make investigations of flood heights along the Snoqualmie River, Washington.

Q. Will you proceed?

A. In the years 1914 and 1915 I was Consultant for the Pennsylvania Railroad, in connection with damage from floods arising in the Wabash River and White River Valleys in Indiana.

During the summer of 1918 I ws Assistant Engineer of the Miami Conservancy District, Dayton, Ohio, where my duties were to make computations on the hydraulic behavior of the flood retarding reservoirs, and to prepare a report on the hydraulic features of the flood protection system for Dayton, Ohio, and other cities in the Miami Valley.

In 1927 I was Consulting Engineer for the City of Pittsburg on studies having to do with the design of walls along the river front to protect the city from floods, and I made studies to determine how the construction of those walls would affect flood water heights in the Pittsburg District.

2366 During the summer of 1928 I served as senior engineer in the U. S. Engineer office of the War Department at Philadelphia, Pa., having charge of a survey and investigation of the water resources of the Delaware River, for future embodiment in the so-called 308 report.

Beginning 1928 I served as Consulting Engineer for the Flood Commission of Pittsburg. That engagement has continued to the present time. My principal duties have been to advise the Flood Commission on matters pertaining to flood protection of the Pittsburg District, and particularly to review and report on studies of flood protection made by the U. S. engineers.

Q. That covered what different rivers?

A. Alleghany, Monongahela and Upper Ohio River below Pittsburg.

About 1928 I established the Hydraulic Research Laboratory at Carnegie Institute of Technology, and since that time that Laboratory has carried on a great many investigations by means of models to study the action of various hydraulic structures, particularly dams, spillways and river navigation structures, such as locks and dams. During that time the structures we have investigated have included some of the largest structures built in the United States in recent years.

Q. Has your work outside of your teaching included any work for the Corps of Engineers of the U. S. Army along hydraulic lines?

A. We have done a great deal of work in the Laboratory for the Corps of U. S. Engineers. They maintain an office at Carnegie Institute of Technology where they have six men at present cooperating with my men on studies of various structures.

Q. Has that got to do with hydraulics?

A. Yes, sir.

2367 Q. Will you name some of the U. S. Engineering offices for which you have done work as Hydraulic Consultant?

A. The Philadelphia office, the Pittsburgh office, the Huntington, West Virginia, office, the Mobile, Alabama, office and the Panama Canal Zone.

Q. Have those studies anything to do with currents in connection with structures in the rivers?

A. We have made a number of studies to determine the best method of eliminating or controlling dangerous cross currents in the vicinities of the entrances to locks at navigation dams on rivers.

By Mr. Jackson:

Q. Please state a few of the navigation structures in regard to which you have made hydraulic studies of the character you have described.

A. We have made such studies on Lock and Dam No. 4, on the Monongahela River and Lock and Dam #9, on the Alleghany River; the Gallipolis Dam now under construction on the Ohio River; the New Emsworth Dam on the Ohio River, six miles below Pittsburgh, and we have made certain studies involving navigation at the Tuscaloosa Dam on the Warrier River in Alabama.

Q. In the course of those studies have you inspected or studied the actual operation of navigation locks and dams?

A. Yes, sir; I have had occasion to visit various locks and dams and in certain cases to make detailed surveys to show the direction and velocity of river current in the approaches to the navigation locks. I have also had occasion to observe the action of boats or tows moving in and out of locks, to determine how these were affected by river current.

Q. You stated you had studied, among other structures, the Gallipolis Dam. For what engineering office, if any, did you make that study?

2368 A. The Huntington office.

Q. Have you carried on any other studies of structures, involving hydraulic structures, for the Huntington office?

A. Yes, sir.

Q. Please state what they are.

A. During the past eight months we have been making very intensive studies of a number of models for the Bluestone Dam on the New River.

Q. Are you employed in any capacity with respect to the Bluestone Dam or the design of it?

A. Yes, sir; in addition to being in charge of the model studies at that dam, I am consulting engineer on the hydraulic design.

Q. Professor Thomas, are you the author of any technical or scientific articles on engineering subjects?

A. I have written a number of technical articles for engineering magazines.

Q. Can you name a few of them?

A. The Back Water Curve, published in Rose's Technic, back in 1915.

By Mr. **Thompson**:

Q. Is that a school or college?

A. Yes, sir; that was a school. I have also written short articles on methods of computing outflow from retarding reservoirs.

By Mr. **Jackson**:

Q. Did you have anything to do with any report on the Miami Conservancy District?

A. I prepared the original manuscript for the technical report of the Miami Conservancy District on the subject of "Hydraulics of the Miami Valley Flood Control System."

I prepared the report of the Pittsburgh Flood Commission reviewing the 1928 report of U. S. Army Engineers on Flood Protection for the Pittsburgh District.

2369 I am the author of a bulletin published by the Carnegie Institute of Technology on "Hydraulics of Flood Movements in Rivers."

Q. Are you a member of any professional or scientific society?

A. I am a member of the American Society of Civil Engineers; I am a Fellow of the American Association for the Advancement of Science; and I am a member of the Society for the Promotion of Engineering Education.

Q. Professor, have you any specialty in the field of hydraulics?

A. I have specialized in unsteady flows, irregular and fluctuating flow of water, particularly in rivers, and other open channels, studying such things as flood movements, flood waves or power waves or power tides, as we call them.

Q. What do you mean by river tides?

A. A condition in which the flow of the river increases and decreases alternately rather slowly. Though it is sometimes called river waves I think the term "tide" is more appropriate because the rise is gradual and the fall is gradual; because the thing resembles an ocean tide very much more than it resembles an ocean wave; for example, power tide in the river usually has a period of 24 hours, rising slowly and then receding slowly.

Q. Will you state a little more particularly what has been the nature of your specialization in connection with these river tides or fluctuating movements?

A. For many years I have been interested in the mathematical theory of unsteady flow in rivers and other open channels, and have done a great deal of work to develop mathematical methods of studying such action. I have also done a great deal of work studying the possibility of investigating such action by means of models, and I might say at the present time that the use of models is becoming a recognized method of solving all problems which are too intricate to be solved by strictly mathematical methods.

2370 Q. Have you employed these various methods, mathematical and model, in hydraulic work?

A. Yes, indeed; I employed both methods extensively.

Q. Are you familiar with the Kanawha River?

A. I have visited the Kanawha River, or the portion of it between Charleston and the mouth of Cauley River, particularly in the vicinity of the London and Marmet Dams.

Q. On those visits, have you observed any hydro-electric plants?

A. Yes, sir; I have visited the Marmet and London hydr'-electric plants, spent considerable time in each plant, observed the method of operating the plant, and observed the automatic gauges which record the water level in the forebay, and tailrace, of those plants.

Q. Are you familiar with the hydraulic conditions along the Kanawha River between Charleston and Kanawha Falls, and the methods for observing or measuring the hydraulic behavior of the river?

A. Yes; I have had an opportunity to inspect the various maps of the Kanawha River and to see the rating curves and rating tables at the various gauging stations, and those are the principal things that would affect the hydraulic characteristics of the river.

Q. What did you say about the rating tables, or what about them?

A. I have seen data on discharge of river, both in the form of rating curves and rating tables.

Q. Have you at any time made any examination or inspection of the original chart of the automatic gauges?

A. Yes; I have inspected those charts of the automatic gauges for various periods during the past few months.

Q. Have you inspected any original records of Lock Gauges at any navigation locks and dams?

A. Yes, sir; I visited the dams at Marmet and London and observed the operation there personally.

2371 Q. Have you any acquaintance with New River?

A. I visited the Radford dam site and then visited various other portions of New River, such as I could reach by automobile, from Radford dam site to the mouth of the river.

Q. Did those portions of the river which you visited include Glen Lyn region or not?

A. Yes; I traveled by automobile from Glen Lyn down the bank of the river as far as Hinton.

Q. What, if anything, did your inspection and study of the Kanawha River and New River have to do with the present suit?

A. As far as the Kanawha River is concerned, I visited it on account of the present suit. In connection with New River I visited it both in connection with the present suit and because of my interest in the hydraulic design of the Bluestone Dam.

Q. Have you ever had occasion to visit New River in connection with the Bluestone?

A. No, sir; this was my first visit in that connection.

Q. Was your visit to the Bluestone Dam in connection with this suit or in connection with some other employment?

A. The trip was made for both reasons, to inspect in connection with this suit and also at the authority of Col. Conklin, to inspect the site of the Bluestone Dam.

Q. Who is Col. Conklin?

A. He is the District Engineer in the Huntington District.

Q. You mean of the U. S. Army Engineering District?

A. Yes, sir.

Q. Will you describe briefly the methods which are accepted and employed in determining river flow conditions?

A. The best method of studying river flow conditions is by means of tests on the actual river, if it is possible to make 2372 such tests. If conditions are such that it is impossible to make actual tests, one can have resort to mathematical methods; but in general those methods are apt to be so cumbersome and intricate as not to be workable. That is particularly true in the case of steep rivers, and when studying waves of duration as short as a day under those conditions it is almost impossible to solve the problems in a satisfactory way by a purely mathematical method on account of the great amount of labor and the great length of time involved in getting results.

Another method of studying such problems is to construct natural scale models of the river, showing all the curves and ledges. That method is not very satisfactory in the case of a river such as New River, because the model has to be extremely long, or if the model is made shorter it has to be excessively shallow.

Another method of studying such action is to construct what we call an integrating model which does not show curves and all details of the river and yet shows the fundamental hydraulic action in such a way as to satisfy mathematically the requirements. It might be called a simplified model of the river which is used for solving mathematical equations of flow in the river.

Q. Does that method combine the mathematical method and the model method?

A. Yes, sir; I should say so.

2373 Q. Have you read the testimony of the plaintiff's witnesses in this case in regard to the so-called power waves, such as Mr. Kramer and Col. Watkins?

A. Yes; I have read that testimony.

Q. On the subject of so-called power waves or tides, do you use the same terminology as that employed by the plaintiff's witnesses, or perhaps you might briefly define the terminology that you use, so that your testimony will be clear.

A. I think I am in substantial agreement with their terminology, but I also use other terms which they did not include, and I would like to have an opportunity to explain those terms at the present time by making a sketch, if I may.

Q. Will you proceed and briefly explain the terms you use in these hydraulic matters in regard to the so-called power waves or tides?

A. This curve would represent what I call a hydrograph of the power tide curve, in which vertical distances represent flows in cubic feet per second, and horizontal distances represent time. The discharges are measured above the line of zero flow, which I can mark zero.

By Mr. Thompson:

Q. Will you finish stating the terms that you wish to use that these other witnesses did not?

A. One term I used is called hydrograph, as it describes that type of curve.

By Mr. Jackson:

Q. Go ahead.

A. The line connecting the lowest points of the two troughs of the tide I call the base flow line, B–B. I consider that a straight line, although my sketch shows it a curve.

By Mr. Thompson:

Q. Are you going to give the vertical there?

A. Yes sir. By amplitude of the tide I mean the length of the vertical line A—drawn from the crest of the curve to the base flow line. By volume of the tide, I mean the area of 2374 the curve above the base flow line, or the shaded area. By the average or mean flow line, I mean line drawn parallel to the base flow line, and I will letter the mean flow line M–M. It is drawn in such a way that the area between lines M–M and B–B, between the trough of the waves is equal to the volume of the tide above the base flow line. In other words, the mean flow line is drawn in such a way that the volume of the wave above the mean flow line would fill in the volumes of the troughs between the mean flow line and the base flow line.

Q. Is that on both sides or one side?

A. On both sides, the combined volume of both half troughs. I think that is all I need show on this sketch.

By Mr. Thompson:

Q. You have not given your vertical ordinate?

A. It is line A—which I call amplitude of the wave.

By Mr. Jackson:

Q. I will ask the reporter to mark the sheet of paper upon which Prof. Thomas has drawn the sketch referred to in his testimony as Defendant's Exhibit 593.

(Said sketch, exhibit 593 offered in evidence.)

By Mr. Thompson:

Q. That mean flow line, is that the average flow line?

A. Yes, sir.

Q. Instead of the mean flow line?

A. I can use either the average flow line or the mean flow line interchangeably.

By Mr. **Jackson**:

Q. You said there was some other term that you wanted to explain.

A. I also in my testimony would like to use the word "seiche" to describe fluctuations in reservoir or pools, or rather to describe the periodical fluctuations or oscillations in the surface of the reservoir or pool.

Q. What is the relation between the term "seiche," as you use it, and the term "oscillation" as was used by some of the Government Witnesses, if any?

A. I think it signifies the same thing, but the term "seiche," is a recognized technical term to describe oscillation in a large body of water.

2375 Q. Do you draw any distinction between variations in a power tide and an oscillation or seiche?

A. Yes, sir; in a seiche in a pool or reservoir, the ends of
the pool or reservoir are raised alternately, in a manner
2376 which is analogous to the oscillations which occur in a
plate of soup when it is tipped. That analogy is rather
helpful in describing what is meant by seiche. Another term
which I would like to use——

Q. (Interrupting.) May I ask you this: Will you state whether the variations in a power wave are above or below the average line or flow?

A. The variations of a power wave may be considered to be above or below the line of average flows. Those variations may be roughly one-half the amplitude of the waves.

By Mr. **Thompson**:

Q. Is that a universal rule?

A. I should say that is a simple definition of the use of the term.

Q. I mean does it have a general application?

A. Yes, sir. Another term which I should like to define is the volume of the crest of the wave.

By Mr. **Jackson**:

Q. Will you proceed to define it?

A. The volume of that portion of the wave which lies above the mean flow or average flow line, is the volume of the crest of the wave. It is that portion which would have to be removed by a reservoir which would regulate the wave so as to dampen off the irregular flow in the river. The volume of the crest is normally equal to the volume of the two half troughs, which would correspond to the volume of the reservoir required to dampen out the waves.

Q. Can you on the sketch that has been marked Defendant's Exhibit 593, put a cross-hatching in some fashion on the particular part of the wave which you have described as the volume of crest and indicate what would have to be removed from the wave in order to regulate it or iron out the irregularities, and show where that would be put?

A. What I have defined as the crest of the wave, is the part which I am double hatching.

Q. Will you double hatch the part of the trough into which that volume of the crest would be put in case of reregulation?

(Witness does so.)

2377 Q. Now for the record, will you state whether or not the portions of the trough which you have cross hatched lie between the line M–B, and below the line M–M, and the outline of the base of the wave?

A. Those two cross-hatched areas which you have just described, represent the volume of reservoir required to completely take the crest off the waves and produce uniform flow in the river.

Q. What I wanted to know is, for the record, whether my description of those cross-hatch areas on Exhibit 593 was correct?

A. Yes, sir; that is correct.

Q. Was your purpose in drawing that sketch to make the volume of crest equal to the two cross-hatch one-half troughs below the line M–M?

A. Yes, sir; that is the principle used in drawing the mean flow line M–M.

Q. Will you state generally what is the relationship between the height of a power tide or wave and its length, that is, some general description, of what is the length and height of a power tide generally?

A. A power tide usually lasts for 24 hours, and in the New River their velocities are in the vicinity of three or four miles an hour: if the velocity was three, the tide would be 72 miles long, and the height of it might be a few feet or a few inches. The tides passing Kanawha Falls are usually a few inches in height and about 70 miles long.

By Mr. Thompson:

Q. Are you referring now to the Buck and Byllesby waves?

A. Yes, sir.

By Mr. Jackson:

Q. Some time ago when I asked you about your observations on the Kanawha River, you stated you had observed the operations of the London and Marmet hydro station, of the Kanawha Valley Power Company. Will you please state in a little more detail what was involved in those observations?

2378 A. Those observations were made on August 14 and 15th of this year, and on those days the power plants at London and Marmet were operated under special conditions at my direction to produce a particular rate of increase and decrease of the flow of the river.

Q. At that time did you, in addition to observing the operation of the plant, make any study of the logs and charts?

A. Yes, sir; on those dates I visited the automatic gauges many times to study the fluctuations of the river level which were occurring at that time.

Q. Were these the tests that you were making?

A. Yes, sir.

Q. Describe the first tests that you made.

A. During the first test, the flow through the turbines of the London plant was regulated in loads so as to produce a power tide similar to tide No. 2 of the March 1930 series of tides, but with fifty percent greater amplitude. That test was of twenty-four hours duration.

Q. You say it was a fifty percent greater amplitude—is that amplitude in stage or in flow?

A. In flow.

Q. In second-feet?

A. The amplitude was approximately 4,100 second-feet.

Q. What was the relation between that and number two power tide in the 1930 series?

A. Number two tide in the 1930 series had an amplitude of just two-thirds of that.

Q. Proceed with the description of this test.

By Mr. GERDES. What was the volume of the 1930 wave?

2379 A. I don't have that computed except as to amplitude

By Mr. THOMPSON. You expressed the amplitude how?

A. In cubic feet per second.

Q. 4,100 cubic feet per second?

A. Yes, sir.

Q. That was in 1930?

A. No, sir; that was the actual test.

By the COURT:

Q. By that is it meant that that much water was released—4,100 second-feet, that the flow was increased that much?

A. Yes, sir; the water was partly released from the London pool or partly entered it at the upper end. They operated the plant so as to produce that flow in the pool according to that load throughout the twenty-four hours.

By Mr. **Jackson**:

Q. This relationship to wave No. 2 of 1930, was that the wave in your test was 150 percent of that wave as produced at Kanawha Falls, or in that vicinity?

A. Yes, sir.

By Mr. **Thompson**:

Q. That 4,100 second-feet, was that the difference between what entered the pool and what went out of the pool?

A. No, sir; that was the amplitude of the wave. That was a wave having an amplitude of 4,100 second-feet, approximately.

By Mr. **Jackson**:

Q. Tell us about the test, as to maintaining the pools.

A. It was operated in such a way as to maintain the pool between London and Marmet to satisfy Government regulations so as to allow for variations in the stage of that pool.

Q. What was the form of the outflow from Marmet?

A. The outflow from Marmet was very similar to outflow from London station. The pool between the two stations
2380 was maintained at as nearly a constant level as practicable.

Q. What was the relation between the outflow at Marmet station and No. 2 wave in the 1930 tests?

A. At the Marmet station, the water rose in the tail race during the test and then receded, giving a wave such as could be measured at Marmet.

Q. I am getting at this: What was the relation in volume between the wave or discharge at Marmet, and No. 2 wave of the 1930 tests, as it came down that part of the river?

A. It was fifty percent greater than the wave of the 1930 tests. The flow from Marmet was practically equal to the flow from London, because the pool was maintained at a practically constant elevation.

Q. What was the result of these tests at London and Marmet in respect to the navigation of the pools of the Kanawha?

A. I might say that our principal object in running the tests was to determine whether or not a wave could be employed to produce any seiches or periodic oscillations in the Marmet pool.

Q. And what did you find?

A. I found that there were no seiches in that pool which could be attributed to the waves that we ran. During the test there were minor seiches. The automatic gages—I might say
2381 that, during any period, the pencils of the automatic gages are continually moving indicating that minor fluctuations are constantly traveling up and down the surface of the navigation pools.

Q. What is the cause of these minor fluctuations?

A. The cause of these minor fluctuations are fourfold: they ay be due to lock operation—the discharge of the water from e navigation locks; they may be due to changes in the discharge rom the turbines of the power plant, as the turbines are started p or stopped, or as additional blocks of load are put on the urbines; they may be caused by the operation of the roller gates; nd they may be caused by gusts of wind.

Q. When you refer to taking off blocks of load on units of a ower plant, will you describe a little more fully what you mean y that?

A. These power plants are operated in such a way that it is ot feasible or convenient to increase the load of the unit slowly r gradually, but, if it is desired to change the load, it is changed y steps. In other words, they refer to that as taking off or utting on a block of load.

Q. Are these blocks large or small, in comparison to the total oad?

A. They are small as compared to the total load.

Q. When you refer to roller gates, are those the roller gates f the dam?

A. Yes, sir.

Q. Does the wind have any effect on minor oscillations?

A. Yes, sir; the wind has an effect on minor oscillations. I did ot complete my answer to your question. You asked me a uestion about the effect of the tests and I started to describe and nly completed part of the answer.

Q. Go forward, Professor Thomas, with your answer.

382 A. The tests showed numerous minor fluctuations, but showed no large fluctuations which could be attributed to the main wave. There were absolutely no seiches of such nature that corresponded to the periods of the main wave, or hat could be associated with the main wave, or main tide, in any ay. In regard to the minor fluctuations, I personally was in he gage house at a time when a boat passed through the lock nd I had a chance to see there that one of the oscillations of the age was caused by the boat coming through the lock—the eiche of water from the lock just after the—before the boat came ut of the lock. I also had a chance to witness the movement f the pencil after a load change was made in the turbine and aw that that particular oscillation was caused by the load change.

Q. Who operates the roller gates?

A. The Government.

Q. What was the total amplitude or vertical movement of these inor oscillations or fluctuations that you have mentioned?

A. Due to lockages, it was approximately 0.2 of a foot, in the test I witnessed, and in this test a seiche of 0.4 of a foot was caused by putting on a block of load at the London plant.

Q. Are any of these minor oscillations due to the power wave itself passing down the pool?

A. No, sir; they are absolutely not due to the power wave.

Q. What is the extent of the fluctuations that could be caused by roller gate operations?

A. It would be possible to cause a tremendous fluctuation by roller gates, if the roller gates were opened completely and simultaneously; they could cause a tremendous flood wave to travel down the pools.

Q. How would that compare with the potentialities of anything that could be produced by power stations?

A. Vastly greater than anything produced by power stations.

By the COURT:

You said that you noticed a minor fluctuation of 0.4 of a foot amplitude, resulting from putting on an extra load at the London plant? 2383

A. Yes, sir.

Q. That would create a fluctuation in the pool where?

A. Just below London; it was measured just below the plant at London.

Q. In the Marmet pool?

A. Yes, sir.

Q. Is that a power wave?

A. No, sir; that is not a power wave, in the sense of using the term power tide. It was a local fluctuation.

Q. Due to the discharge of an increased amount of water through the machinery at London, wasn't it?

A. Yes, sir. But that is not what I call a power tide. Power tides rise gradually over a period of several hours, and recede about in twenty-four hours. This was an almost instantaneous discharge of the local plant.

By Mr. JACKSON:

Q. Do minor fluctuations occur from the operation of any plant a considerable distance upstream from a given point?

A. No, sir; they could not occur from such a cause.

Q. Does it represent what could occur in the tail race of a power plant?

A. Yes, sir.

Q. Did you, during this test, observe the amplitude of the wave at the foot of Marmet Dam below the Marmet Power Station?

A. Yes, sir; I observed that on the record of the automatic gage.

Q. What was it?

A. It was about 1.3-foot rise.

Q. And you said that this amplitude in volume was 4,100 second-feet?

A. Yes, sir.

Q. And that compared how with wave No. 2 of the 1930 series?

A. That was fifty percent greater than wave No. 2.

2384 Q. When I said 4,100 second-feet volume, it should have been amplitude in second-feet. When the discharge out of Marmet Power Station was cut off, was there any resulting oscillation in Marmet pool approximateing this amplitude of 1.3 feet?

A. No; indeed.

Q. What did occur in—

Q. (Continuing.) I mean the discharge from London Station into Marmet was cut off.

A. During that test, the discharge of London Station was cut off, gradually, and no oscillations occurred in the pool from that.

Q. Have you completed the description of the first test?

A. Yes, sir.

Q. Did you make any other tests?

A. Yes, sir.

Q. Describe that test.

A. That was a test in which the operation of the London plant was suddenly stopped; in which the flow at London plant was cut off almost instantly.

Q. What was the volume of flow involved when it was cut off—the rate of flow?

A. It was about 3,800 second-feet—was dropped instantly.

Q. Are you sure that it was 3,800 feet?

A. I will have to refer to my notes on that (witness refers to papers). I looked at the records on the gage later on. It was 3,200 second-feet.

Q. Will you describe more fully what was the object of this test—what were you trying to determine?

A. I wanted to determine for my own satisfaction whether or not the sudden dropping of considerable load at that plant would produce a surge in the Marmet pool; in other words, to be certain whether or not some of these oscillations I witnessed in the pool were actually due to their sudden load changes in the plant.

2385 Q. You said "surge"—that is the same as seiches, is it?

A. Yes, sir.

Q. What were the results?

A. This sudden dropping of the load produced a definite surge, with an amplitude of .3 of a foot.

Q. Where was that?

A. Just below the London plant.

Q. Could such a seiche arise from a wave emitted from Radford?

A. No, sir.

Q. Why not?

A. The reason is that a wave emitted from Radford, by the time it reached the Marmet pool, would have its form changed, so that its rise would be very slow, occupying a period of several hours, probably from four to five hours, and that rise would be altogether too slow to produce any seiche in the Marmet pool.

Q. Does what you have said about Marmet pool apply to the London pool?

A. Yes, sir; both pools.

Q. Do these tests that you have described represent the reasonable typical conditions of the operations at the Marmet and London hydro stations?

A. I would say, with reference to the second test, that would not represent the typical conditions, in that the rate of the stopping of the plant was at a much more rapid rate than would have been done typically.

Q. Professor Thomas, does the concurrent operation of the London and Mamet stations, under any circumstances, produce a result different than would be produced by the operation of one plant alone, on the Kanawha?

A. Yes, sir; it is possible for the plants to be operated in such a way as to amplify the seiches.

Q. How would that happen?

2386 A. If the London plant were suddenly shut off, the water level below London would be lowered, and that would produce a negative wave which would travel down the river, and about an hour later would lower the water level at Marmet. If Marmet were suddenly started, with the load increased, it would lower the water level still more.

Q. The conditions have got to be concurrent?

A. Yes, sir; one superimposed on the other.

Q. Did you, in your test and study of the record, observe such a condition?

A. I observed conditions where I thought there was amplification of the waves, but I would not state that I could prove such amplification, because the time records of the automatic gages are not accurate enough to definitely prove that one surge amplifies another, but I consider that certain surges were caused by amplification.

Q. You took a time record, you say—do you refer to the clocks?

A. Yes, sir.

Q. I show you a copy of Government's Exhibit No. 229, which I would like for you to look at. (Hands paper to witness.) Now, you observe there a fluctuation on June 16th, 1936, according to that exhibit, do you?

A. Yes, sir.

Q. And have you any opinion as to the cause of that fluctuation?

A. My opinion is that that fluctuation was caused by the variations in the load at London and Marmet plants,—rather sudden variations.

Q. Have you any opinion as to whether or not this was caused by the simultaneous, or as the result of the concurrent operation of the two plants?

A. My opinion is very strongly that such is the case, but I have studied the records very carefully and I cannot prove it on account of the uncertainty of the time recordings of the automatic gages. 2387

Q. State from the exhibit the time when that seiche occurred and its extent.

A. It occurred at four o'clock P. M. on June 16th.

Q. May I substitute this so I can hand a copy to the Court, so that your testimony may be followed.

A. (Continuing.) It had a maximum amplitude of about .7 of a foot.

Q. Does that chart, Government's Exhibit 229, show any secondary oscillations?

A. Yes, sir, there is a secondary oscillation at the upper end of Marmet pool, in the latter part of the morning, about ten o'clock, showing a——

Q. (Interrupting.) What date was it?

A. (Continuing.) showing a surge resulting in a vertical line on top of the main wave.

Q. When was that?

A. June 16th.

Q. You refer to a perpendicular line at the top with this notation "591.0," 11,000 C. F. S."

A. Yes, sir.

Q. Have you any opinion as to the cause of that?

A. My opinion is that it was caused by the operation of the lock. That oscillation is exactly of the character and amplitude of the other oscillations that were observed from lockages.

Q. Did you examine the lock records?

A. I examined the lock records and there was a record of lockage at London at that time.

Q. Referring to the notation "591.0" and 11,000 second feet, state whether or not in your opinion the discharge at that time actually was 11,000 second feet? 2388

A. No, sir; I think it is very improbable that it was 11,000 second feet.

Q. And going back to the line you said you thought was caused by lockage, is that what you call a seiche or not—that short vertical line?

A. It is the beginning of a seiche. It runs into or is obscured by the main wave and is not evident on this chart.

Q. Does this phenomenon indicated by the legend 591.0—11,000 second feet, represent a seiche or not?

A. I should say there was a seiche in the pool at that time and, therefore, the ordinary relation between a stage of water and discharge in second feet does not hold at all. The ordinary relation would not hold. At the bottom of the seiche is marked zero cubic feet a second, but the flow was not zero cubic feet a second. Both power plants were in operation at the time, so these figures of 11,000 second feet and zero feet have no meaning. They were clearly not the true discharges at that time.

Q. Are you familiar with what has been referred to in this case as the 1930 wave tests?

A. Yes, sir.

Q. Will you state to what extent, if at all, you have taken this tests into consideration in your study?

A. I have studied these tests very carefully, making a close study of the decrease in amplitude of the various waves as they travelled down the river, passing various gaging stations.

Q. I show you a chart marked Government's Exhibit 227, and ask you whether or not you examined that chart in connection with your studies?

A. Yes, sir; I examined that chart.

2389 Q. What importance, if any, did this power wave test of 1930 have on your studies of the possible effect of the Radford power station.

A. These waves are of great importance in such a study, because they make it possible for one to check his results with his computations or decisions and determine the action of possible waves from future construction on the river. This series shows waves of different amplitude and different volumes, and waves occurring at different stages of the river, and the whole series is just a gold mine of information on the behavior of waves on this river.

Q. What, if any, conclusions did you draw from the wave tests of 1930?

A. One can draw the general conclusion that, as waves travelled down the river, they decreased in volume and amplitude.

Q. Substantially or otherwise?

A. Substantially.

Q. Do they in any instance disclose an increase at a particular point as they travel downstream?

A. In rare instances there is a slight increase in amplitude, occurring about where a wave of approximately rectangular form is changing from that form to triangle form; just after it is introduced in the channel, it may show an increase in amplitude or is likely to show it.

Q. What, if any, significance does that phenomenon have in the consideration of the effect of any such waves in the Kanawha River?

A. Little or no significance in that connection.

Q. Is there such a thing as the characteristic shape of a wave on New River?

A. I should say there is a characteristic shape of waves on all steep rivers, and these waves on New River have that characteristic shape.

2390 Q. How would you describe that shape?

A. The shape of the wave is plotted on the hydrograph and it is triangular with the downstream slope somewhat steeper than the upstream slope, the crest slightly rounded.

Q. Well, now, you say that the front of the wave is steeper than the back. Can you give some indication of the order of that slope in front of the wave?

A. Yes, sir; I could take, for example: No. 2 at Kanawha Falls which has an amplitude of stage in the neighborhood of six or seven inches, as near as I can read on the chart, say seven inches. For its total length we have a wave of twenty-four hours duration and moving three miles an hour, which would be seventy-two miles long. According to the chart, the period of rise is about, as near as I can read the scale, is four or five hours, say about four hours, and at three miles per hour, that would be twelve miles long for the wave front and a height of about seven inches.

By Mr. THOMPSON:

Q. That is No. 2.

A. Yes, sir.

By Mr. JACKSON:

Q. A slope of how much?

A. Seven inches in 12 miles, approximately. I am reading just without scaling it precisely. The rear of the wave would have a fall of about 7 inches in 20 hours and three times twenty would be 60 miles, giving a slope of seven inches in 60 miles, for the rear or descending part of the wave or tide.

Q. State whether or not it is the characteristic of the power tides on New River that they retain their amplitude and volume in passing down the river?

A. No; the characteristic is just the opposite. They lose their amplitude and volume in passing down.

Q. What is the relation between succeeding waves—do they tend to catch up with one another as they go down stream?

2391 A. The front of each wave tends to overlap the tail of the preceding wave. The individual wave being sent down the river would develop a tail in a duration of more than one day—perhaps two or three days—and each subsequent wave arrives on the tail of the preceding wave, so that the amplitude of the crest is not the same as the amplitude of the original wave—it is much less.

Q. Does that mean that the decrease is greater with a periodic power tide of twenty-four hours duration or not?

A. Periodic waves would have much less amplitude as they reached the Kanawha River than an individual wave would have.

Q. What do these 1930 power tests show with reference to the decrease or persistence of power tides in amplitude and volume?

A. They show in general that the tides decrease in both amplitude and volume as they travel down the river, with one minor exception that I mentioned.

Q. Have you made any study of the form or forms of power tides which might be released from the Radford power station?

A. Yes, sir, I made studies of such tides.

Q. What were the forms of those tides?

A. One tide I studied had a rectangular hydrograph having an amplitude of 9,000 second feet and a duration of eight hours.

Q. What does that mean with reference to the initiation of the flow and the cessations of the flow?

A. It assumes the flow to start instantly and continue eight hours for 9,000 feet a second and a cessation instantly.

Q. I show you Government exhibit No. 132, and direct your attention to the green square in the lower figures on the chart, and ask you whether or not, as to shape, that is the kind of wave about which you have just been testifying?

A. Yes, sir; that is the shape.

2392 Q. And this was peaking how many second feet.

A. Nine thousand for 8 hours. This [indicating Pl. Exhibit No. 132] is nine for 6⅓ hours. 2,000 second feet was an error; because that was not enough water to peak 6⅓ hours but only 5⅓ hours.

Q. Professor Thomas, in the light of your experience and knowledge of water power engineering, is it reasonably conceivable that waves—that a wave of that rectangular form, would ever be emitted from the Radford hydro station?

A. No, sir; I think it is highly improbable that a wave of that form would be emitted from the Radford station.

Q. What is the significance of the consideration of a wave of that form. Is it practical or theoretical?

A. It seems to me theoretical.

Q. I now produce a chart bearing the label Appalachian Electric Power Company—Estimated Discharge from Radford power station, and ask that it be marked Defendant's Exhibit No. 594 for Identification.

(Said paper was so marked as indicated.)

Q. I show you, Professor Thomas, Defendant's Exhibit marked for Identification No. 594, and ask you to examine it and state what it is?

A. This is a hydrograph given me by the Appalachian Electric Power Company, as representing a possible hydrograph of operation from the plant during rather severe peaking operation. It shows the discharge from the plant in cubic feet per second at various hours of the day.

Q. In your opinion, is the form of weekday operation shown on Exhibit 594, for identification a reasonable form of peak weekday operation for the Radford plant?

By Mr. Thompson. We object to that. It is not in evidence yet.

By the Court. Read the question. [The question is read.]

By Mr. Thompson. The document is not in evidence yet. It has simply been marked for identification.

By Mr. Jackson. I asked if it was a reasonable form before I offered it.

By the Court. He wants the witness to say whether it is a reasonable form, before putting it in evidence.

By Mr. Jackson. We are dealing with a plant not yet in existence, and I want the witness to consider certain hydraulic effects of certain operations, and I am asking him whether or not this possible method of operation would be a reasonable one.

By Mr. Thompson. Mr. Jackson consistently objected over and over again to any testimony going in with reference to our exhibits which were being offered in evidence, until they were offered in evidence. Here is a question being put to the witness as to whether or not this program is reasonable.

By the Court. He is familiar with the plans of the plant, I suppose, its capacity, etc.

By Mr. Thompson. I don't know whether he is or not. He has not testified to that.

By the Court. He may answer it.

The complainant excepts to the ruling of the Court, for reason stated.

By Mr. Jackson. Read the question. [The question is read.]

By Mr. THOMPSON. He has not qualified him on that subject. His qualifications have gone, as far as I can observe from the rapid fire of questions, to the fact that he advised the City of Pittsburgh, and other cities, in respect to walls they would build along the river banks to protect them from floods.

By the COURT. I think he is qualified. If for no other reason than that he was employed by the Government in consultation as to hydroelectric matters at Bluestone dam; that indicates that he is qualified.

By Mr. THOMPSON. No foundation has been laid for his knowledge of the Radford project or how they will operate it or anything of that sort.

By Mr. JACKSON. They can only assume the methods of operation. It is not in operation and not built.

By Mr. THOMPSON. Further, this Radford project is part of the system of the Appalachian Electric Power Company.

2393 By the COURT:

Q. Mr. Thomas, do you know, generally or specifically the plans for this Radford project?

A. Yes, sir.

Q. The height of the dam?

A. Yes, sir; generally.

Q. What is to be installed as to the hydro-electric capacity?

A. Yes, sir.

By Mr. JACKSON:

Q. In your opinion, is the form of weekday operation shown on Exhibit 594, for identification, a reasonable form of peak weekday operation for the Radford plant?

A. Yes, sir, in my opinion this is a reasonable form of operation for that plant.

Q. In your opinion, what other forms or methods of operation—or rather would other forms or methods of operation for that plant be reasonably possible?

A. Yes, sir.

(Exhibit 594 offered in evidence.)

By Mr. JACKSON:

Q. Professor Thomas, how many years have you taught water power engineering?

A. Since about 1912.

Q. And you have taught at the Rose Polytechnic Institute and the Carnegie Institute of Technology since that time?

A. Yes.

Q. And have you seen the system load curve of the Appalachian Electric Power Company, introduced by the Government as "Government Exhibit 142," to which I direct your attention?

A. Yes.

Q. Have you examined other load curves of the Appalachian Electric Power Company?

A. Yes.

2394 Q. In your opinion, would the operation of the Radford plant, in accordance with the method shown on defendant's Exhibit No. 594, be a reasonable or an unreasonable method of operation?

A. I consider it to be a reasonable method of operation.

The COURT. Let me get something straight: What is meant by the 3000 second foot days?

By Mr. JACKSON:

I will ask the witness to explain that.

A. It would be 3,000 cubic feet times 86,400 seconds in a day. 3000 second feet would be flowing for one day—that volume of water. It represents the total volume of water of the wave or tide, so to speak, measured in second foot days instead of in cubic feet. You will obtain the cubic feet by multiplying the number of second-feet-days by the number of seconds in a day.

By the COURT. Q. Does that mean, for example, that this wave represents the release of the same amount of water, although it is distributed, as would be released at a constant flow of 3000 feet a day?

Mr. JACKSON. It means a peaking of that draft of 3000 second feet a day, resulting in these various flows at various times.

By Mr. JACKSON:

Q. You stated that you had studied two forms of discharge of the Radford power station; am I right in understanding that the first one is a rectangular wave, such as is shown at the bottom of Government Exhibit No. 132, with an amplitude of 9000 second-feet in a duration of eight hours?

A. Yes, sir.

Q. The other wave is one with the characteristics shown on Exhibit 594?

A. Yes.

Q. And do those waves each deal with the same volume of water daily, or not?

A. Yes, for the same amount—3000 second-feet days.

2395 Q. Is the Ivanhoe Gaging Station near the Radford dam site?

A. Not very near.

Q. Is it above or below?

A. Above it.

Q. What were the volumes of the larger power tides of the 1930 series of wave tides in the form in which they pass the Ivanhoe Gaging Station?

A. The first is about 2,700 second-feet days and they vary from that down to 2,000.

Q. Those waves represent the peaking in the particular form of either 2,000 second-feet days or 2,700 second-feet days?

2396 A. Yes.

Q. Coming back to these two hypothetical waves which you have studied, the one the rectangular form and the other the form shown in Exhibit 594, did you reach any conclusion as to the amplitude of these hypothetical power tides if released from the proposed Radford power station, upon their reaching the Kanawha River?

A. Yes.

Q. Upon what do you base your judgment in that respect?

A. My judgment is based on studies of the 1930 series of power tides in the river, taking into consideration the rates of reduction of the amplitudes, and it is also based on the result of experiments I made on an integrating model, showing that portion of the New and Kanawha Rivers.

Q. Did you give any consideration to the mathematical relationship involved?

A. I made certain computations along those lines, although not a complete mathematical analysis of the progress of the wave.

Q. Have you stated the basis on which you reached your conclusion?

A. Yes.

By Mr. Thompson:

Q. Will you state it again?

A. Integrating model tests and a study of the 1930 series, and also certain computations.

By Mr. Jackson:

Q. Professor Thomas, in your opinion, what would be the amplitude of a power tide emitted from the Radford station in the form and volume shown on Exhibit 594, when it reached Kanawha Falls?

A. In my opinion, the amplitude of such a tide would be approximately 3,500 second-feet.

Q. And that would be a reduction from the maximum of what at the point of discharge?

2397 A. 9,000 second feet.

Q. And, in you ropinion, what would be the amplitude of the rectangular wave with 9,000 second feet amplitude in eight hours, as emitted from the Radford Station, when it reached Kanawha Falls?

A. About 4,000 second feet.

Q. And that would be a reduction from what maximum amplitude in second feet at the Radford station?

A. From 9,000.

Q. What would be the maximum of the amplitude of those two waves—the theoretical 9,000 second feet rectangular wave and the one corresponding to Exhibit 594, expressed in terms of variation upwards and downwards, from the equivalent natural flow at Kanawha Falls?

A. This variation would be approximately half the amplitude I gave before. In other words, approximately 1,750 cubic feet per second for the wave shown on this exhibit, and approximately 2,000 above and below the mean in the case of the rectangular wave.

Q. Is it my understanding that that means, in the case of the wave represented by Exhibit 594, there would be at Kanawha Falls a maximum variation of 1,750 second feet below what would otherwise be the natural flow?

A. Yes.

Q. And the same amount above?

A. Yes, sir.

Q. And the situation would be the same for the rectangular wave except the variation would be 2,000 second feet?

A. Yes.

Q. Are these results which you have just given applicable to isolated power tides, or to periodic power tides?

A. They are applicable to periodic power tides occurring for a succession of days.

2398 Q. How long would these figures apply if you had a power tide of the same kind you have described following each day?

A. They would be indefinite, each following the other as long as the series lasted.

Q. Assuming that the power stations were entirely out of operation on a Sunday, would the results be true of power tides at Kanawha Falls caused by power station discharges of the two given forms on the succeeding Monday?

A. Yes, the amplitude would be about the same on Monday as on other days.

Q. And assuming that the power station had been shut down for a period of a day and a half at the week end, would the figures that you have given be applicable to the emission of power waves at the two times you have described on the following Monday?

A. Yes, those figures would apply to them.

Q. Assume that the power plant were to be shut down for a period of two days, would the conclusions that you have stated be applicable to waves of the form and amplitude that you have described, if they were emitted from the plant on the following Monday?

A. Yes.

Q. Have you any opinion as to what would be the maximum rate of increase in flow of these two forms of power tide, the rectangular tide and the one corresponding to exhibit 594, at the time they were passing Kanawha Falls—the rate of increase in flow? I want to know what would be the maximum rate of increase in flow when power tides of the two kinds you have described having been emitted at the Radford dam site came down the stream and were passing the Kanawha Falls?

A. For the rectangular tide, the maximum rate of increase at Kanawha Falls would be about 1,200 second feet per hour, 2399 while for the tide corresponding to the exhibit 594, the maximum rate of increase at Kanawha Falls would be about 800 second feet per hour.

By the COURT. Q. What is the difference between this question and the answer and the question you asked a minute ago, where you said the answer would be the wave would increase 4000 feet?

Mr. JACKSON. 3500. The difference is this: The answer to the succeeding question shows a wave that had an amplitude at the time of discharge in the rectangular form of 9,000 would have decreased to 4,000 when it got to Kanawha Falls, and if it were in the form of 594, it would have decreased to 3,500. I am seeking to draw from the witness the question of rate of increase in flow. That is, if one of these waves comes down, it increases the flow, and I am now seeking to draw from the witness the rate in which that increase takes place. For instance, if it was a wall of water, it would have an instantaneous increase of, say 4,000 second feet, and, on the other hand, if it was a gradual flow, the increase would be only so much. In other words, it would be a gradual rise at Kanawha Falls.

The COURT. The crest of that wave would be—do I understand the crest of the wave would be carrying an increase at the rate of 4,000 feet?

Mr. JACKSON. Eventually a point would be reached on that wave, if it was a rectangular wave, when there would be an increase at Kanawha Falls of 4,000 second feet, but that point would not be something which happened as an immediate change. It would be a gradual change in condition, and the point of this question is to bring out from the witness how gradual it would be. That is, if it was a wall of water, it would have one effect, and if it was a gradual increase it would have no effect. I might ask the witness to illustrate it, as I should have done before, as he could do it much better.

By Mr. **Jackson**:

Q. Can you illustrate that a little more clearly than I can explain it to the Judge?

A. Yes. (Witness makes diagram.) If this diagram would represent the hydrograph of one of these waves at Kanawha Falls, say the wave caused by a wave at Radford similar to Exhibit 594, the figure of 3500 second feet which I gave as the maximum amplitude of that wave at Kanawha Falls, would be the height of the wave, and the figure which I gave for the rate of rise would be the increase of rise in one hour. If a vertical line is drawn from the curve intercepting a
2400 horizontal distance of one hour, the rate of rise per hour which I gave as 800 second feet would be represented by this line. One is the total amplitude of the wave, and the other the steepness of its front, as measured by the rate of rise per hour.

By Mr. **Thompson**:

Q. What is the distance across there?

A. 24 hours.

By Mr. **Jackson**:

Q. Will you mark that for the two figures?

A. Yes. (Witness marks on plat.)

By the **Court**:

Q. That is 800 feet?

A. That is the rise of one hour.

Q. Then it would be some time in the progress of that wave before the rate of flow would have been increased by as much as 3500 feet over what it was before the wave reached there?

A. Yes.

By Mr. **Jackson**:

Q. And would the rate of that increase depend upon the slope of the front of the wave and the rate of travel?

A. Yes, it would depend on those two things.

Q. And this kind of wave, roughly, what would be the length of the slope in the front of the wave.

A. Assuming that the velocity of travel of the wave is three miles an hour, and the duration of the rise from here to here [indicating] is about four hours, the length of the front of the wave would be three times four, or twelve miles.

Q. It would be about twelve miles?

A. Yes.

By Mr. THOMPSON:

Q. That is the crest of the wave?

A. The length of the front of the wave.

By Mr. JACKSON:

Q. That wave, if it is 3,500, it would be a little more than four hours?

2401 A. Yes. I used as an illustration four hours. The actual rise is more than four hours.

Q. You said the base of the front of the wave would be around twelve miles or better in length?

A. Yes.

Q. Do you know what is the vertical height of that front of the wave?

A. I do not have that figure exactly in my mind, but it is in the way of seven or eight inches at Kanawha Falls. That is just approximately.

Q. So the slope of the front of the wave, as it moved down the stream at Kanawha Falls, would be in the way of base of twelve miles and a vertical height of seven or eight inches?

A. Yes.

By the COURT:

Q. Do your figures and statements there—could they in any way be modified by the stage of the water in the stream below the point of release?

A. No, the waves seem to have about the same amplitude at different stages. There is not much variation in the amplitude with the stage.

By Mr. JACKSON:

Q. Mr. Thomas, will you mark on your diagram there, so as to indicate the length of that wave in miles, on an average, and in hours at the bottom of the wave?

A. (Witness marks on chart.) I might say I used the figure three miles an hour velocity as a representative figure. I did not happen to have the exact figure at this time, but it is between three and four.

Q. It would be somewhere around 72 miles or better?

2402 A. Yes. I do not like to mark this on this diagram, as this is a diagram of time. If I mark miles on it, it would not be correct. I can say corresponding to 72 miles on the profile. The correct time on the other would be comparative.

Mr. JACKSON. Mr. Reporter, will you mark the chart on which Mr. Thomas has drawn as "Defendant's Exhibit No. 595."

NOTE.—The chart is marked accordingly.

Q. Now, Professor Thomas, assuming a discharge at Radford of waves of the forms you have considered, that is the rectangular wave of 9,000 second feet amplitude, and eight hours duration, and the wave corresponding to Exhibit #594, please state what would be the maximum rate of decrease in the discharge or flow as these two power waves or tides, respectively, passed Kanawha Falls?

A. For a wave corresponding to Exhibit #594, the maximum rate of decrease would be about 250 second feet per hour. The figure here is not to scale [referring to drawing] and on this sketch this is not short enough compared to the 800 but the maximum rate of decrease would be 250 second feet per hour.

Q. What would be the maximum rate of decrease per hour at Kanawha Falls in the case of a rectangular wave of 9,000 second feet amplitude of eight hours duration, at the Radford dam site?

A. About 300 second feet per hour.

Q. Why does the rate of decrease per hour in the case of each of these two waves on passing Kanawha Falls differ from the rate of increase per hour at the same point for the same waves as they approach and pass Kanawha Falls?

A. Because the front or downstream face of the wave is steeper than the tail or up-stream face of the wave.

Q. Do you know how those rates of increase and decrease in flow at Kanawha Falls, resulting from the passage of the two forms of power waves from Radford which you have just described, compare with the actual rates of increase and decrease in flow out of the London and Marmet power stations?

A. These rates are very much smaller than the present
2403 rates of increase and decrease out of the London and Marmet
stations. At those stations the maximum rates which are ordinarily used are in the neighborhood of 3,000 second feet per hour, and several times greater than the rates I have mentioned.

Q. That is the rates in increase and decrease in flow at those points?

A. Yes, sir.

Q. From the standpoint of the possibility of producing seiches and oscillations in the pools, what is the more important, increase or decrease in flow?

A. Decrease. These seiches are ordinarily caused by decrease. In my test I made on that matter of decrease the decrease of 3,200 second-feet per hour produced a seiche of 3/10 of a foot. That was at London. The height of the seiche was 3/10 of a foot. The decrease which produced that seiche was more than twelve times this rate of decrease of 250 second-feet per hour.

By Mr. THOMPSON:

Was that the upper or lower London——

By the WITNESS:

Lower.

Q. Did you state the ratio between the rate of decrease of this experiment at London and the rate of decrease for your wave?

A. Yes; I stated that.

Q. That applied to Exhibit #594?

A. Yes, sir.

Q. Can you tell me what was the ratio between the rate of decrease in this test at the London dam and the rate of decrease which you found for a rectangular wave discharged at Radford by the time it had reached Kanawha Falls?

A. The rate of decrease for the rectangular wave by the time it had reached Kanawha Falls was 300, which was less than 1/10 of that observed during the test at London.

Q. In your opinion would it be possible for power tides from the Radford power station of the two forms and sizes which you have described to cause seiches or oscillations in the Kanawha navigation dam pools?

2404 A. No. In my opinion it would be impossible for waves released from a point as far upstream as Radford to cause any perceptible seiche in those navigation pools.

Q. Could the instantaneous shutting off of the flow of 9,000 second feet out of the Radford power station cause any seiche or oscillation of the London or other Kanawha River navigation pools, sufficient to cause any perceptible drop below the normal pool level?

A. No, it could not. Although the wave might be shut off instantly at Radford, this is, the tail of the wave would be vertical at Radford, by the time it had traveled downstream its tail would have flattened out, so the decrease would take many hours; therefore, the instantaneous shutting off at Radford would have no effect at all in producing a seiche.

Q. What is the period, natural period, of oscillation of the London pool at elevation 614 or 611?

A. It is approximately 1.2 hours.

Q. And what is the natural period of oscillation of the Marmet pool?

A. Approximately 1.8 hours.

Q. Will you explain what is meant by that?

A. If one of these seiches occurs which has been likened to the tilting of liquid in a plate of soup, the period of oscillation is the time from the rise at any one time to the subsequent rise at that same point. If a seiche occurs in the Marmet pool, the water at one end of the pool will gradually rise and fall, that is, from the high point and low point back again is the period of oscillation.

Q. If a seiche occurred at the upper end of the Marmet pool would the period of oscillation have any relation to the time it would take for that seiche to travel down to the dam and back to the upper end of the pool again?

A. Yes. The period of oscillation is equal to the time it would take a wave to travel the length of the normal pool and back.

Q. What, if any, relationship is there between the natural periods of oscillation on the London and Marmet pools, and the
possibility of a possible power wave, such as you have de-
2405 scribed, the two kinds you have been considering, being dis-
charged at Radford causing any oscillation in the London
or Marmet pools?

A. In order to cause oscillation in a body of liquid, you have to have an impulse of shorter duration than the period of oscillation. In tilting a plate of soup, to start this oscillation, you have to tilt it quickly. If slowly, you cause no oscillation in the surface. These tides from Radford will occupy several hours to rise and fall, those periods being much longer than the oscillation at those pools; therefore, they would cause no seiches in those navigation pools.

Q. Can you state what would be the period of time required for one of those Radford power tides to rise at the London and Marmet pools, and the period of time required for the fall of those waves at the London and Marmet pools?

A. The time of rise is approximately five hours, four and a half to five hours; and the time of fall is the difference between that and twenty-four, or in the neighborhood of nineteen hours.

Q. In your opinion, is there any possibility that power tides from the Radford station could cause the London pool or any other Kanawha navigation pool to have its water surface tilted in such way as to cause the upstream end to be lower in elevation than the downstream end?

A. No. In my opinion it would be impossible to tilt the water in those pools that way.

Q. Professor Thomas, assuming the discharge of a wave at the Radford power station with the same form as that shown on Exhibit #594, but with a smaller maximum amplitude, would the effects produced by the resulting power tides at Kanawha Falls be greater or less than those you have described in connection with the wave corresponding to Exhibit #594?

A. They would be no greater, and probably less.

Q. Professor Thomas, assuming a wave of the same form as that shown upon Exhibit #594, and particularly the same duration, but with a lesser maximum amplitude, and using a lesser total volume of water, would that wave, in your opinion cause seiches or oscillations in the navigation pools on the Kanawha?

A. No.

2406 Q. Now, Professor Thomas, assuming a form of operation which would result in a peak load output of 3,000 second foot days, or in other words, using 3,000 second feet days for peaking purposes, but with a greater duration of peak load than shown on Exhibit #594, what would be the effect of the resulting power tide having been emitted at Radford when it reached Kanawha Falls, as compared with the effects of the tides from the two forms of waves you have already testified about in detail?

A. Under conditions as set out in your question, the amplitude of a wave at Kanawha Falls would not be greater and would probably be less than of that which I previously described.

Q. And what would be the situation as to the possibility of seiche or oscillation in the navigation polls?

A. Such waves could cause absolutely no seiche or oscillation in the navigation pools.

Q. I want to invite your attention again a moment to a hypothetical rectangular form of wave which you considered, that is, the hypothesis of the discharge of a perfectly rectangular wave at Radford, with an amplitude of 9000 second feet, and a duration of eight hours, what is your opinion as to whether any conceivable operation of the Radford station could at Kanawha Falls produce tides with amplitudes greater than would be produced by a discharge from the Radford station in this particular rectangular or block form about which you have testified?

A. No conceivable method of operation could produce, with that same volume of water, a greater tide at Kanawha Falls.

Q. Would that be true of any other volume of water, assuming the same height?

A. The maximum amplitude is 9,000 second feet.

Q. What I wanted to find out is, a maximum amplitude of 9,000 second feet, and a perfectly rectangular form of wave, would the extension of the duration of the wave to more than eight hours, change the effect down at Kanawha Falls?

A. No, it would not make the amplitude of the wave at Kanawha Falls any greater.

2407 Q. And suppose you went far enough and kept extending the duration of that rectangular wave with an amplitude of 9000 second feet, what would happen?

A. If you extended it the full twenty-four hours it would be a uniform flow and no waves would occur at Kanawha Falls.

Q. Would the result of that be that the amplitude of fluctuations at Kanawha Falls would grow less from some point of duration, around eight hours—between that and twenty-four?

A. Yes, sir.

Q. You have testified you are consulting engineer on hydraulic design at the Bluestone Reservoir, I believe?

A. Yes, sir.

Q. Have you studied the effect of power tides from the Radford station upon the pool of the Bluestone reservoir project as it is described in Government Exhibit #145, the 308 report on the Bluestone?

A. Yes, I have made a study in connection with this case, and not in connection with my work on the Bluestone dam.

Q. Have you considered in particular the effect of power tides of the form and character about which you have been testifying this afternoon in that connection?

A. Yes, sir.

Q. Where is the head of the proposed power pool for the Bluestone project?

A. In the vicinity of Glen Lyn.

Q. In your opinion, would the Radford power tides of the two forms about which you have been testifying this afternoon be capable of causing seiches or oscillations with amplitudes of five feet upward and downward in the Bluestone reservoir at and downstream from Glen Lyn?

A. No. In my opinion neither of these waves which I studied would produce any perceptible oscillation at all in the surface of the Bluestone reservoir, not as much as one-half inch or one inch.

2408 Q. Will you state somewhat more fully the reason for your opinion in this respect?

A. I have studied that by analytical methods and also by constructing what I call an integrating model of the Bluestone reservoir, with different vertical and longitudinal scales, and it was sensitive enough to detect seiches of above five one hundredths of a foot, or ⅝ of an inch.

(A. (Continuing.) I could not detect any perceptible seiche in the reservoir on this model, which checked my computation, which showed the height of seiche in the Bluestone reservoir would be less than five one hundredths of a foot.

Q. You say ⅝ of an inch. Do you refer to the model or reservoir?

A. In the actual reservoir.

By the COURT:

Q. What pool elevation did you have in mind when you answered a question a little while ago, at the Bluestone?

A. That was spillway elevation, 1490.

2409 By Mr. JACKSON:

Q. What is the natural period of oscillation of the Bluestone reservoir when it as at pool elevation, 1,490?

A. It is about two hours.

Q. Now does that effect have anything to do with the possibility of the production of a seiche from the inflow of a power tide admitted at Radford?

A. Yes, sir.

Q. What has it go to do with it?

A. The period of rise of a power tide would have to be less than that if it produced a seiche.

Q. Would it be?

A. No; it would not be.

Q. Roughly, what would it be?

A. I would have to look up my notes to answer that question. (Witness does so.) About four hours.

Q. Prof. Thomas, assuming the Bluestone reservoir was in existence, what, if any, effect would the Bluestone reservoir have upon dampening out the Radford Power Tide?

A. If the Bluestone reservoir were in existence, I presume there would be a power station there and there would be an operator there and he would also operate the gates on the Bluestone dam. Under those conditions it would be absolutely in the power of the operator to control the Radford tide in any way desired. He could store up those tides and release them in whatever manner best suited to the generation of power at Bluestone. Of course, it would ordinarily be worth while to do that, and not let any of the Radford tide spill over the spillway, and to utilize every bit of power for power generation at Bluestone and under that condition the tide could not pass through the Bluestone reservoir at all. On very rare occasions it might be possible for the flow of the river to be slightly in excess of the capacity of the Bluestone Power plant, so that the water would be spilling over the spillway of the Bluestone reservoir, and at the same time there would be a remote possibility that the Radford station might be operating on peak load. It would be unlikely with so much water in the river as that, but it would be a possibility. Under those 2410 conditions it is conceivable that the Radford tide could pass the Bluestone Reservoir but in enormously dampened out form.

Q. In your opinion would it be probable there would be peaking at Radford when there was a flow over the spillway at the Bluestone Reservoir?

A. In my opinion there is a very improbable combination.

Q. Is there any other combination that you know of under which, with the Bluestone Reservoir in existence and in operation that the Radford power tide could pass the Bluestone Reservoir?

A. No; I cannot think of any other possible condition.

Q. Under the condition you have assumed, with a pool level at elevation 1,490 feet, and water spilling over the spillway, how large would the flow have to be at a minimum, that is, what is the hydraulic capacity of the Bluestone Power station?

A. I don't have that in mind now but I think it is 11,000 second-feet. I am not positive about that figure.

Q. Assuming the hydraulic capacity of the Bluestone to be 11,000 second-feet, would the flow have to be in excess of that to result in this coincidence you have described?

A. Yes; it would have to be in excess of that.

Q. By the COURT. I want to know why it would be improbable that the Radford dam would be peaking when the river was full?

By Mr. JACKSON:

Will you answer the Court's question. State why you deem it improbable that the Radford plant would be peaking when the flow at Bluestone would be 11,000 second-feet?

A. With so much water running, they could run the Radford plant day and night for the purpose of saving coal in their system, it would not be necessary to run it at peak, but under those circumstances they could run it continuously.

Q. Do you mean there would be enough water available to run that Radford plant at its maximum for 24 hours?

A. At a uniform high rate for 24 hours, and they need not attempt to save it up at night and release it during the day
2411 but they could just run it continuously so as to save coal on the whole system.

By the COURT:

Q. At what hydraulic capacity would they be running at Radford?

A. They could run their full capacity, 9,000 second-feet, day and night.

Q. That is the capacity they have been speaking here as being the peak?

A. There would be enough water so that they could keep on going day and night and they wouldn't have to shut down, they could simply run continuously. The purpose of peaking when there is not much water running in the river, is to save it up at night and utilize it in the daytime, but when there is plenty of water in the river they don't have to do that, they just run continuously, generating as much power as they want to, and shut down their steam plant.

Q. If, when the flow into the Bluestone reservoir exceeded 11,000 second-feet, the Radford reservoir was partly empty, would the Radford operation necessarily be uniform?

A. My opinion is that under those conditions with the reservoir partly empty there will be no peaking and the flow will be uniform.

Q. I meant to assume in that question that the Bluestone reservoir was full?

A. Yes.

Q. In your opinion what would be the likelihood of the Radford reservoir being partly empty when the Bluestone reservoir was full and the flow was in excess of 11,000 second-feet at Bluestone?

A. I think it would be improbable that the Radford reservoir would be partly empty under those conditions.

Q. Assuming these coincidences where you say it might be possible for Radford power tide to spill over the Bluestone spillway, what would be the effect by way of dampening out upon those Radford power tides in passing through the Bluestone reservoir?

2412 A. That would be enormously dampened out by the great surface area of the Bluestone reservoir.

Q. Please explain that.

A. The period of tide would necessarily be increased for 24 hours.

By Mr. **Thompson**:

Q. What is the area surface of the Bluestone reservoir?

A. Approximately 6,000 acres.

By Mr. **Jackson**:

Q. Will you please proceed with your explanation?

A. The surface of that reservoir would act somewhat as a flood retarding reservoir in dampening out those tides, and greatly increase the duration of them, and lower the crest of them.

Q. What is the storage capacity for an inch of depth in the Bluestone reservoir at that elevation, 1,490?

A. About 500 acre-feet per inch of height, and that would make 6,000 acre-feet per foot of height.

Q. How would the degree of dampening in the Bluestone reservoir of the Radford Power wave compare with the dampening which would occur to those same Radford power tides as they passed through the open river channel at the site of the Bluestone reservoir?

A. The dampening would be enormously greater with the Bluestone reservoir in place, than would have been the case in the original river channel.

Q. How does the power tide or wave depart from the equivalent natural flow?

A. I assume by that question you mean, how much does it vary above and below the natural flow?

Q. Yes.

A. By approximately half of its amplitude.

Q. How does that phenomenon affect the problem of reregulation of such waves?

2413 A. You mean reregulation by a reservoir?

Q. Yes. I think you had better explain what reregulation is first.

A. You speak of reregulation in the wave occurring when such wave enters the reservoir and it is dampened out by the reservoir so as to vanish altogether, so that the flow below the reservoir would be entirely uniform. I think I can explain that best by making a diagram.

(Court takes a recess.)

By Mr. Jackson:

Q. Please proceed to make your diagram.

A. I think I can explain the principle of reregulation most clearly by an hypothetical triangular wave. On this triangular wave I will draw in the mean flow line marking it M-M, and will cross hatch the volume of crest wave above the mean flow line. In order to reregulate that wave in a reservoir, it would be necessary to have a reservoir whose volume is equal to the volume of the trough wave. I will crosshatch this trough, marking the crest of the wave C, the required volume of reservoir R—. The crest of the wave must exactly fill the reservoir if the reservoir is of the correct size to completely regulate the wave. On this triangular diagram, I will draw the base flow line and call attention to the fact that the volume of crest of the wave is just one-fourth of the volume of wave, because we can split that portion of wave below the mean flow line into three triangles, whose volume is each equal to the volume of the crest. Therefore, in this hypothetical wave of triangular shaped size the reservoir required to regulate the wave would have a volume equal to one-fourth the volume of wave.

In actual reservoirs or actual waves where the crests are somewhat rounded it would require a volume slightly larger than one-fourth the wave volume to regulate waves so as to produce a uniform flow in the stream.

Q. Please state within what limits would that slightly increased volume be that would be required for reregulation of a wave with a somewhat rounded crest from the triangular wave you have used on your chart?

A. I made a computation for what is called a sine wave
2414 and in that case the volume of the crest is about one-third the volume of the wave. In waves such as we have on New River, the required volume would be between one-third and one-fourth of the wave volume.

Q. Could you draw on the bottom of that chart a series of small waves and draw the median line through them showing how much of the waves have to be taken care of in case of re-regulation, that is like the New River waves possibly that form a series of waves. Could you put it on the bottom of the chart?

A. I will draw the mean flow line on this diagram and the portion of waves that will have to be stored to regulate flow would be the portion above the mean flow line. Those crests above the mean flow line could be eliminated altogether by being stored in a reservoir having this volume.

Q. Now what would be the condition after that has been done, with reference to the flow?

A. The flow would be absolutely uniform, with the depth along the median line.

I will ask the Reporter to mark the chart Defendant's Exhibit 596.

(Said chart is marked Defendant's Exhibit 596.)

Q. Would you mind filling in the remaining valleys in the lower figures so that the chart will be complete?

(Witness does so.)

By Mr. Jackson:

Now I offer in evidence the chart just marked Exhibit 596 and I also want to offer in evidence chart marked Defendant's Exhibit 595, which I believe I had marked but forgot to offer it.

(Said charts are filed, marked Defendant's Exhibits 595 and 596.)

Q. Prof. Thomas, what is the capacity of the London Pool on the Kanawha River, between elevation 614 and 611?

A. It is approximately 2,700 acre-feet.

Q. Will you state whether this 2,700 acre-feet of pondage in the London pool would be sufficient to re-regulate the Radford power tide resulting from the two forms of waves, that is, the rectangular wave with 9,000 second-feet amplitude and 8-hour duration, and the wave corresponding to Exhibit 594, about which you have already testified?

A. In each case the London Pool would have a volume several times greater than that required to regulate the waves from Radford.

By WITNESS:

May I correct my last answer? I said the storage volume would be several times as great. The correct answer is that in case of a wave corresponding to Exhibit 594, the capacity will be two and half times as great as required and in case of rectangular wave it would be twice as great as required.

Q. When you speak of a rectangular wave, you refer to its form at Radford and not at Kanawha Falls?

2415 A. Yes, sir; at Radford.

Q. Now assuming that for some reason the three-foot draw down between elevations 611 and 614 in the case of the London Pondage would not be available for reregulating any Radford Power tides which might pass Kanawha Falls, and that no reregulation of these tides had been accomplished in any pond or reservoir upstream from the head of the London Pool, and assuming the Winfield and Gallipolis dams to have been completed and placed in operation. What, in your opinion, or rather what is your opinion as to whether any Radford power tide passing Kanawha Falls would be transmitted unchanged through the Kanawha navigation pools into the Ohio River, downstream from the Gallipolis dam?

A. I think it is improbable that these waves would be transmitted down those navigtaion dams. The surface area is very large, so large that variation in water level of about two inches in those pools would be sufficient to reregulate the power waves from the Radfort plant.

Q. A variation of water level of two inches in each pool?

A. In the Marmet and Winfield pools but if the Gallipolis pool were included, a variation of about three-fourths inch in water level would be sufficient to regulate the Radford waves, since the ordinary fluctuations in the level of those pools are much greater than two inches and more than three-fourths, I think it improbable that these waves would pass through.

Q. If they came in without reregulation, could these variations you have described, occur?

A. Yes, they would occur in those pools and thereby dampen out the waves o reregulate them.

Q. Could variations of three-quarters to two inches in pools of that character ever occur under other circumstances than the one assumed?

A. Yes, sir, in navigation pools a variation of the level of a few inches are very common, according to the regular course of operation.

Q. Assuming that no reregulation of power waves about which you have testified above the London Dam, would it be possible for any part of those power tides to pass the London Dam?

A. The question should specify whether London is to be used to regulate the waves, or not.

2416 Q. Assuming that London's storage reservoir is not to to used for reregulation at all, and assuming there has been no regulation upstream since the waves left Radford, under those conditions, in your opinion, could any part of these Radford power tides pass the London Dam?

A. Yes, I think if there was no regulation they could pass the London Dam.

Q. What would be the effect in your opinion?

A. If the London dam were not used for regulation, in other words, if its level were held exactly constant, the wave would pass right through the London Dam, or London plant.

Q. Assuming that the passage of these power tides through the London pool, without the use of the London pondage, without reregulation, upstream how would they compare with the fluctuations resulting from the operation of the London power station?

A. I do not follow the question clearly. Under these conditions, the London station would pass the wave through and the fluctuations of the wave would be the same as the fluctuations of the power station.

Q. What would be the relative magnitude of such power tides, if they passed through London pool, in comparison with the magnitude of the fluctuations produced below London dam, by the operations of the London hydro-electric plant?

A. (No answer.)

Q. That is, you said under all these assumptions, you thought some effect of these tides might pass London dam?

A. Yes, sir.

Q. I want to know how these power tides, as they pass London dam, below that dam, would compare with fluctuations produced below the dam by the operation of the London hydro plant?

A. The amplitude of the power tide, based on Exhibit No. 594, as I recall it, was stated by me to be 3,500 second feet. That would be the amplitude of that wave or that tide passing through the London station. At present, the variations of the flow through London are much larger than that—several times larger. I was in the
2417 London station when they were operating at 16,000 KW;
that would be at about 10,000 second feet.

Q. Well, as this power tide, under the assumed conditions, passed London dam and went through Marmet, what would be the effect on it—would it be dissipated in fact, or not?

A. If the Marmet pool were not used or regulated at all, it would not be dissipated in the Marmet pool.

Q. Are you sure 16,000 was there at London or Marmet?

A. I am not sure. I am not certain of that; I had better say approximately that.

By Mr. JACKSON:

Q. Now, Professer Thomas, assuming that these power tides, about which you have testified, from Radford were not subjected to any reregulation, as they came to the London pool, and passed through the London, Marmet, and Winfield power stations, in your opinion, would they be recognizable in the Ohio River down stream from the Gallipolis dam?

A. If the Marmet, London, and Winfield pools were held mathematically at a constant elevation?

Q. No, sir. If the power tide came into the London pool or passed through the hydro-electric plants of these three dams, London, Marmet, and Winfield——

By Mr. JACKSON:

Q. The plants normal in operation?

A. With the pools fluctuating—with small fluctuations in the pools, they would absorb the waves and regulate them so that they would not be perceptible at the Ohio.

Q. Would that be true in merely normal fluctuations in the pools?

A. Yes, sir.

Q. You testified, Professor Thomas, that there would be no effect of these power waves from Radford observable below Gallipolis. By that answer, state whether or not you mean that there would be no effects of any power waves observable below Gallipolis in the Ohio River from anywhere?

A. You mean from other stations farther up the Ohio?

Q. Or anywhere else?

2418 A. I don't know of any stations that would produce any such fluctuations below Gallipolis.

Q. What about Winfield, on the assumption that it were completed?

A. If I may answer the question in a slightly indirect way: Winfield, London and Marmet have power stations. As I say, the waves are entirely obliterated at those stations, unless the operators of these stations, so to speak, try to pass them through by taking unusual precautions.

2419 The pools normally show some storage in the ponds to absorb waves. I should say that it would be improbable that any of these waves would pass through London, Marmet or Winfield dams and appear in the Ohio River.

Q. Is that the same as saying that, if there is any power tide below Gallipolis dam, that they would be there because of the operations of the operator of the Winfield dam?

A. I think that is correct; except that I do not know whether or not there is any other power station anywhere on the watershed within reaching distance of Gallipolis. ~~I think there is not.~~

Q. Assuming there is none, would that be a correct statement?

A. Yes, sir.

Q. Professor Thomas, during periods of low or moderate flow through the Kanawha navigation pools, would physical conditions be such that silt would be deposited?

A. Very little silt would come down the river.

By Mr. Jackson:

Q. Under those conditions, if any silt were deposited, in what parts of the pool would it be deposited?

A. In my opinion, silt would come so finely divided, it would be carried into the deeper parts of the pool.

Q. Is that answer applicable to each of the navigation pools on the Kanawha River?

A. Yes, sir. I should say so.

Q. What, in your opinion, would be the effect of the Radford reservoir upon the matter of silt in the New River?

Q. (Continuing):—and the Kanawha navigation pools?

A. In my opinion, the Radford reservoir would act as a silt catcher, catching practically all silt above that site.

By Mr. Thompson:

I thought you said that it would go into the deeper pools on down the river.

A. Into the deeper parts of these pools.

By Mr. Jackson:

2420 Q. Referring to the Kanawha navigation pools, would the power tides from the Radford plant, or any other conceivable withholding of the flow at Radford dam, increase the amount of dredging needed to maintain the navigable depths at the heads of the Kanawha Navigation pools, when considered over a term of years?

A. No, sir.

Q. Would the amount of silt in the navigation pools be less or more than if the dam was not built?

A. Less.

Q. In the case of the Kanawha navigation pools, what would be the evaporation from the surface of the pools?

A. It would be very small, depending on the area of the pool. It would be small, in comparison with the leakage and lockage.

Q. Can you give an estimate, for instance, of the Winfield pool?

A. I made a computation of the evaporation from the Winfield pool, on the assumption of six inches of evaporation from the surface of that pool, during a very dry month, with no rainfall.

By Mr. **Jackson**:

Q. What was your figure?

A. My figure was about 30 cubic feet per second.

2421 Q. I show you a book, which is marked Defendant's Exhibit No. 544, for identification. Do you know what it is?

A. Yes, sir; it is a report on Power waves of New River and the Kanawha River, prepared in the office of the United States Engineers at Huntington, West Virginia, February 29th, 1932.

By Mr. **Jackson**:

Q. Are you familiar with that document?

A. Yes, sir.

Q. Or copies of it?

A. Yes, sir.

Q. Was one ever transmitted to you?

A. Yes, sir. A copy was sent to my laboratory.

Q. From where?

A. It came from the Secretary of the American Society of Civil Engineers', Special Committee on Hydraulic Research in Portland, Oregon.

By Mr. **Thompson**:

Q. When did it come to you?

By Mr. **Jackson**. Can I finish?

By Mr. **Thompson**. No, sir.

A. Sometime during the spring; I am not certain about the date; my feeling is that it was about the 1st of May.

Q. How did it come to you? Was it sent in the ordinary mail and without solicitation on your part?

A. May I explain about that. I received that report—I am a member of the American Society of Civil Engineers and on a committee on research in regard to the traveling of waves. The Secretary of the Committee got out circular letters and sent them to all Engineers' offices in the United States, where he thought he could get information on traveling waves, and that letter 2422 was received in the Huntington office and this report was mailed from that office to the Secretary of our Committee and the Secretary mailed it to me.

By the **Court**. It is not offered yet?

By Mr. **Jackson**:

No, sir.

Q. Did you later have any communication from the District Engineers' office about it?

A. Yes, sir. They sent me a telegram, asking me to send the report to the Division Engineers' office of the War Department at New York.

Q. Did you see a copy of that report elsewhere?

A. Yes, sir, I saw a copy of that report.

Q. Where?

A. In the office of Colonel F. W. Scheidenhelm in New York City.

Q. Is that a copy?

A. I think this was the same copy [indicating].

Q. Is that Exhibit No. 545, the same as the copy of the report you received and have described?

A. No. 544—it is the same in my opinion; it is essentially the same. I have not checked it page by page.

By Mr. **Jackson**:

Q. Were there any qualifications about this exhibit No. 544, or the copy of it, when it was transmitted to your committee, Professor Thomas?

A. No, sir.

Cross examination by Mr. **Thompson**:

Q. Professor Thomas, I believe you took your C. E. Degree in 1908, did you not?

A. Yes.

Q. Where did you take that degree?

A. At Columbia University.

Q. Then you started to teaching, didn't you, at Columbia?

A. Yes; that summer in the surveying camp.

2423 Q. You taught one summer?

A. Yes.

Q. You did not have anything to do with wave studies or anything while teaching, did you?

A. No.

Q. Then, you did a year and a half at Washington University?

A. Yes.

Q. You did not have anything to do with wave studies there, did you?

A. No.

Q. What did you teach?

A. I taught surveying and drawing.

Q. From 1910 to 1923 you were at the Rose Polytechnic Institute, were you not?

A. Yes, sir.

Q. That is where?

A. At Terre Haute, Indiana.

Q. You did not have any experience there or do any work in hydroelectric matters, did you?

A. I taught a course in water power engineering and had charge of student theses on design of water projects.

Q. That was wholly theoretical and technical, and had nothing to do with any practical work about hydroelectric projects or wave studies?

A. I don't know how you use the work "practical;" it was a student thesis work.

Q. You did not go out and make any studies of waves on the river, did you?

A. During the period at Terre Haute I studied flood waves on the Wabash.

Q. And what did you study on the Wabash River?

A. For the Pennsylvania Railroad.

2424 Q. What was the reason for that?

A. In connection with litigation arising from the 1913 flood.

Q. It had nothing to do with a hydro-electric plant?

A. No; flood waves.

Q. You were there with respect to what kind of walls they would build for the protection of the railroad right-of-way?

A. No; it was not that.

Q. What was it?

A. It was a damage case arising from damage caused by the 1913 flood.

Q. Then in 1923 you went to Carnegie Institute, was it?

A. Yes.

Q. And you taught there, didn't you?

A. Yes.

Q. In fact, most of your life—28 years of your life, at least, have been spent in teaching?

A. Yes, indeed.

Q. You have been in the class room?

A. Yes.

Q. I believe you said you did something on the Miami Conservancy District?

A. Yes.

Q. How long were you there?

A. I was there during the summer of 1918, and then I worked on the technical report in my spare time during the following winter.

Q. Now, isn't it a fact that you wrote a letter asking for a job by which you could make a little money during the summer and so fill out your professor's salary?

A. I do not recall writing a letter in those terms, and I am certain I did not write it in those terms. In fact, I did not write a letter there asking for a job. The request came from them to me, because of the article I wrote in the Engineering News.

2425 Q. Isn't it a fact you got about $200 a month for your work there?

A. No. I don't remember what I got, but it was not $200.

Q. It was $175, wasn't it?

A. I can't remember what it was, but the ordinary assistant's salary.

Q. You were assistant engineer with a great group of other assistant engineers who were there?

A. There were a number of others.

Q. And you held a very minor position?

A. I would not say it was a very minor position. The hydraulic engineers who had originally drawn up the program were in war service, and I had some extremely important work to do myself. I admit I was one of them.

Q. This paper you talk about you worked on, was written by Professor Woodward?

A. Professor Woodward was in charge, but I worked in his office.

Q. Were not there at least a dozen other engineers working on that?

A. Not on that technical report.

Q. On that data?

A. No.

Q. Do you know Mr. McWhorter here?

A. Yes, indeed.

Q. Do you remember him being there?

A. He mentioned to me today being there, and I have a vague recollection of it, but not clear.

Q. Do you mean to say you were not in any position other than a very minor assistant in the Miami Conservancy District?

A. I do not say very minor, but I was assistant engineer.

Q. And you did not have anything to do with the study of waves there with respect to a hydro-project?

2426 A. There was no hydroelectric work in the Miami Conservancy District. We studied waves in the river.

Q. The whole question was the building up of walls alongside where the river flows through the City of Dayton and further back, for the protection of another great flood of the character that they had?

A. That was only a part of the project.

Q. What was the other work?

A. The design of reservoirs.

Q. It was purely a flood control?

A. Yes.

Q. It was not in a mountainous country, either, was it?

A. No.

Q. It had nothing to do with power, did it?

A. No.

Q. Now then, I believe you went to the Great Northern Railroad, did you not?

A. Yes.

Q. What did you do there?

A. That was one of my first engagements when I was a young graduate just out of college.

Q. What kind of work were you doing?

A. I was appointed as a draftsman, sent out on the construction line in the office of the resident engineer. The resident engineer became sick, and I had to assume practically all the duties of that office.

Q. You did not have any wave studies there, did you?

A. No, except I will qualify that by saying we were very much interested in floods on the Snoqualmie River. It was my duty to locate the grade line of that river above the flood heights, and a part of my duty was to investigate that matter.

Q. I believe you went in 1914–15 with the Pennsylvania Railroad Company?

A. Yes.

2427 Q. And that was on the Wabash?

A. Yes.

Q. Your next was consulting engineer with the City of Pittsburgh, was it not?

A. Yes.

Q. What did you do on that job?

A. I made studies to determine the effect of certain proposed river walls at Pittsburgh on a flood height in the Pittsburgh district.

Q. And that did not have anything to do with hydroelectric problems, did it?

A. No, but it had to do with floods and rivers.

Q. Your whole duty was building up walls?

A. Yes, and to determine how those walls would be affected by the flood in the river.

Q. It did not have anything to do with the question of current other than the effect of current on a side wall?

A. We made studies up and down the river for many miles, an intricate study involving the behavior of floods, in the Pittsburgh district.

Q. I believe you said you had a position—that was 1927; how long were you in that job?

A. Do you mean by the City of Pittsburgh?

Q. Yes.

A. I worked on that—my impression is, in my spare time, about six months—all my spare time.

Q. You were teaching at the time, were you not?

A. Yes.

Q. How long were you occupied in your classes?

A. Fifty minutes—do you mean in the classes?

Q. No, I mean how many hours a week?

A. Oh, I think the hours of teaching run about 18—15 in the day and 3 at night.

2428 Q. Any professor who carries 18 hours a week has a pretty busy life, hasn't he?

A. Yes.

Q. You did not have much time to go on?

A. I worked day and night, Saturdays and Sundays, on that job.

Q. In 1928 you went to Philadelphia, didn't you?

A. Yes.

Q. What did you do there?

A. I had charge of the investigation and survey of the Delaware River.

Q. Did you give up your position of teaching?

A. No. I went to Philadelphia during the summer, and during the subsequent winter I worked on the report in my spare time.

Q. So the only time you were working in Philadelphia on a practical job was in the summer?

A. Yes.

Q. And that was how many months?

A. About four, or a little less.

Q. Four months?

A. Yes.

Q. Did you still have a job in Pittsburgh with regard to the flood problem there?

A. No, not during that summer.

Q. So that winter all you had was teaching 18 or 19 hours a week?

A. Yes.

Q. And writing this report?

A. Yes.

Q. You spoke about setting up this model testing plant in the Carnegie Tech, didn't you?

A. Yes, sir.

Q. What was that, what does it consist of?

A. You mean the laboratory?

2429 Q. Yes.

A. It is a Hydraulic Laboratory of the Carnegie Institute. We have pumps, flumes, tanks, etc., for testing hydraulic models, and measuring the amount of water.

Q. You can set up a model and make a test without ever looking at the proposition?

A. If we have proper maps supplied to us we can.

Q. As a matter of fact that is done there, and also done in Washington the same way, set up a model without the men ever having gone out on the project itself?

A. That is done, however we prefer to visit the project.

Q. It is a fact you set up an integrating model with respect to the Bluestone project before you ever saw it, didn't you?

A. With respect to New River, oh yes.

Q. And you made tests before you saw New River?

A. Yes, sir.

Q. And before you ever saw Bluestone reservoir site?

A. Yes, sir.

Q. So it is a purely theoretical proposition, isn't it, that kind of work?

A. I don't know what you mean by that.

Q. It isn't a practical operation, you never built a plant, a hydroelectric plant, did you?

A. No.

Q. Never operated one either?

A. Not until I operated this one the other day.

Q. You don't call that operating, do you?

A. No.

Q. How big is this model you speak of, how long is it?

By Mr. **Jackson**:

The Bluestone model?

2430 By Mr. **Thompson**:

Any kind of model.

Q. You said you made models, how big are they?

A. On the Emsworth project we have one 88 feet long and about 28 feet wide.

Q. How long was the one you made for the Bluestone project?

A. We have three different models for the Bluestone project. One is about 30 feet by 13 feet. Another is a model of the spillway section in a glass flume about 30 feet long and 6 or 7 feet deep and 2 feet wide.

Q. And you compress then the distance or extent of the country for about say thirty-five or thirty-six miles into something that is about thirty-five feet long?

A. Yes, we can do that.

Q. Then you make your test on that?

A. Yes, sir.

Q. And you have not got any of the conditions such as the physical conditions around Bluestone in front of you, such as the stream flow and run-off and things of that kind?

A. Yes. When we make a model we have complete information of that kind.

Q. Where do you get your information regarding stream flow?

A. From the U. S. District Engineer office of the War Department. They furnish the information. As I said we have six men or possibly more now from the War Department working in our Laboratory all the time, and they correspond with their Home Office and survey parties and obtain data on the whole project.

Q. Where do you get your information with regard to stream flow?

A. From whatever source it is available.

Q. Do you get it from the Geological Survey?

A. It depends on the particular job we are working on.

2431 Q. Supposing it is on New River. Did you get it from the Geological Survey?

A, We got it directly from the U. S. Engineer office. I don't know where they got it.

Q. You accepted that?

A. On the design of the Bluestone project, yes, sir, as the only information available.

Q. You are not employed by the United States Government?

A. No, I don't suppose so.

Q. Your arrangement is with Carnegie Tech?

A. No, with Hydraulic Laboratory of Carnegie Tech.

Q. That is a subdivision of Carnegie Tech?

A. Yes, sir. It happens I am however responsible head of that, and keep our finances separate from the Institute, and I made the contracts and sign them myself.

Q. But you don't draw any salary from the U. S. Government?

A. No, we make the models under contract, and my time is included among other things.

Q. But the Carnegie Institute, that division makes the model, and you happen to be the head of that division, is that it?

A. Yes, sir.

Q. Are you retained by the defendant in this case to testify here?

A. The defendant?

Q. That is the Appalachian Electric Power Company.

A. Yes, sir.

Q. What were you doing down at Emsworth?

A. When?

Q. You said you had some work at Emsworth.

A. We are making model studies in connection with the reconstruction of the dam.

2432 Q. How long have you known the Emsworth District?

A. Oh, I have lived in Pittsburg approximately thirteen years and probably went down to Emsworth the first year or so I was there. I have been there many times.

Q. They had the dam constructed long before thirteen years ago?

A. The Emsworth dam was constructed in 1921, the present dam.

Q. Do you know anything about the configuration of the channel of that river at Pittsburg?

A. Yes, sir.

Q. What is the base down at Emsworth of the channel?

A. Below Emsworth there is a deep hole in the channel below the dam.

Q. I mean right at Emsworth, what is the channel base made of?

A. It is a gravel channel.

Q. It is sandstone rock, isn't it, solid all the way across?

A. No, not right at the surface. They had to drive through a number of feet of gravel to reach the rock.

Q. You don't know what the condition of the river was before they had the dam there, do you?

A. Only in a general way.

Q. Do you mean to tell me that you were Consultant on the building of this dam at Emsworth, Pa., on the Ohio River, a few miles below Pittsburg, and that you had a gravel bed before you got to the sandstone rock?

A. I was not Consultant on the Emsworth dam. We are making model tests at the present time on that dam.

Q. These model tests—isn't it a fact what you do is to simply see that at the spillway the water that comes over there, whether it will cut into flows from the dam and cause a leak or a break-down?

A. That is part of what we do.

Q. What else do you do?

A. Many other things.

2433 Q. What else are you doing on the Bluestone?

A. Studying effect of cavitation, the forming of cavities.

Q. That is caused by dropping or falling water?

A. Yes, sir, and we are making another study to determine the best height of the coffer dams of the Bluestone, and another study to determine the proper curvature of the deflectors at the end of the outlet conduits.

Q. None of those problems have anything to do with wave studies made by power projects?

A. No.

Q. You don't know what the power capacity of the Bluestone is to be?

A. I paid no attention to that side of it. I don't think the design for that is prepared, at least not reported to me.

Q. They have preliminary plans?

A. We have nothing to do with the power end of it.

Q. You have not looked at the preliminary maps of it?

A. We have many maps of the site but have done nothing on the power end of it at our Laboratory.

Q. I think you said you made a study of #4 on the Monongahela River?

A. Yes, sir.

Q. That had to do with a power company, didn't it?

A. No, that is a navigation dam on the Monongahela River.

Q. So that had nothing to do with wave studies?

A. No.

Q. You also said you made a study on the Alleghany River?

A. Yes, sir.

Q. Where is the plant on the Alleghany located?

A. East Brady, Pa.

Q. That had nothing to do with wave studies?

A. No.

2434 Q. How about the Gallipolis plant, what were you doing down there?

A. We made studies on methods of controlling the direction of the velocity of currents at locks and (interrupted).

Q. That had to do with the water going through locks?

A. Yes, sir; and we also made studies of the roller gates, to determine a schedule of operation of roller gates, and a study to determine the pressure on the roller gates.

Q That had nothing to do with the effect of the waves downstream, below where the roller gates were?

A. No.

Q. Or the waves coming in from up above?

A. No.

Q. The fact is, you have had practically no experience with this question of wave study, have you?

A. I have had very extensive experience with wave studies.

Q. With respect to power plants?

A. No; the general waves in open channels.

Q. They are not like the waves from power plants, where you have peak loads?

A. They are the same hydraulic problem.

Q. They are in no sense uniform in their procedure downstream, are they?

A. No.

Q. And that is open channel work to a great extent too, isn't it?

A. Yes, sir.

Q. Is that the same condition as where you have a situation like you have on New River, where you have the Bluestone which may be operated, and the Radford project, where they are building one, and where you have the Buck and Byllesby up above working on peak loads; you don't have any such condition in these streams you speak of, where you have made studies, such as on the Monongahela and Alleghany Rivers?

A. Not exactly like that.

2435 Q. Professor, yesterday I asked you about your experience at the Miami Conservancy District. You knew that Col. Edward A. Deeds was Chairman of the Board of Directors there, didn't you?

A. Yes.

Q. I think you stated you went there and worked during the summer of 1918?

A. My recollection is 1918; it may have been 1917. I said that from memory, and did not look up the record. I can't say now whether it was 1917 or 1918. It was during the war, at a time shortly before the Armistice was signed.

Q. You stated, didn't you, the reason why you went there was because there was a shortage of engineers due to the war, and that there had been vacancies left there?

A. That was not the reason I went there. It was a condition that existed there when I arrived there.

Q. Isn't it a fact that Col. Deeds had all of these engineers on that project placed upon a priority, and not a single one of them, with one exception, withdrew or had withdrawn from that Miami Conservancy work?

A. I don't know that.

Q. And did you know a man by the name of Kenneth Grant, as one of the engineers?

A. I don't know him personally, but I know him by reputation.

Q. You would not be able to say that he was the only one who left there of that group of engineers?

A. I know Mr. Ross Riegal was absent.

Q. But he was not absent owing to the war?

A. I don't know. My impression is some reason connected with the war, but I am not certain of that.

Q. So you would still persist in saying there were a great many openings for engineers?

2436 A. I do not know about a great many openings, but I know that when I came there there was nobody I could consult on technical features of hydraulic design except Professor Woodward, who was not there when I first came there.

Q. In "Who's Who" I believe you claim to be the joint author of this article we were discussing yesterday, this technical report No. 7?

A. I didn't know that I was mentioned in "Who's Who."

Q. In engineering?

A. I don't know about that. I never knew I was mentioned in "Who's Who" in engineering.

Q. You never sent in your statement about articles of which you were the author?

A. No, I have no recollection of it.

Q. You do not claim then to be the coauthor?

A. No. I worked on that manuscript and wrote the original version of that manuscript. I was the author of the manuscript under the direction of Professor Woodward.

Q. Isn't it a fact that all the data on that whole report was collected under Professor Woodward, and all you did was to assemble it?

A. No. I actually wrote the report—the greater part of it. There was a certain amount of it written after I left there, but the greater part of it was written by me that summer.

×

P1/

CLERK'S COPY.

179

402909
Sup. Ct

TRANSCRIPT OF RECORD

(IN THREE VOLUMES)

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, ~~1939~~ 1940

No. ~~674~~ 12

THE UNITED STATES OF AMERICA, PETITIONER

vs.

APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

VOLUME 3

PETITION FOR CERTIORARI FILED JANUARY 26, 1940
CERTIORARI GRANTED MARCH 4, 1940

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1939

No. 674

THE UNITED STATES OF AMERICA, PETITIONER

vs.

APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

INDEX

	Original	Print
Record from D. C. U. S., Western District of Virginia	1	1
Praecipe for transcript of record	2	1
Writ of subpoena	4	2
Bill of complaint	5	4
Motion to amend bill of complaint, with amendments	23	19
Answer of defendant, as amended	44	39
Order granting leave to amend complaint, etc., September 19, 1935	81	67
Petition of the State of Virginia for leave to appear as *amicus curiae*	83	68
Petition of the State of West Virginia for leave to appear as *amicus curiae*	92	72
Motion for taking deposition filed on the 26th of August, 1936	98	75
Order of August 26, 1936, on motion for taking deposition	106	83
Stipulation re plaintiff's requests for findings and conclusions	106–A	84
Plaintiff's suggested findings of fact and conclusions of law and plaintiff's supplemental requested findings of fact and conclusions of law as renumbered and rearranged for purposes of appeal	107	84
Opinion of the court, Paul, J	133	101
Findings of fact and conclusions of law	194	154

Record from D. C. U. S., etc.—Continued. Original Print

Final decree and order granting exceptions 199 157
Assignment of errors, as amended 201 158
Order extending time for transcript of record 224 178
Order extending time for transcript of record 225 178
Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on Appeal 227 179
Order enlarging time for filing appellee's amendments to the statement of evidence and enlarging time to file record on appeal 228 180
Order extending time for transcript of record 229 180
Order extending time for transcript of record 230 181
Stipulation as to printing record on appeal under Rule 23 231 181
Stipulation as to sending up original exhibits 232 182
Order of February 2, 1939, directing the clerk to transmit all original exhibits which are not copied in full in the approved statement of evidence 233 183
Order approving statement of evidence 234 183
Statement of evidence under Equity Rule 75 236 184
    Testimony for plaintiff:
        Fred D. Bradford—Direct 237 185
        Lewis Harvey—
            Direct 237 185
            Cross 239 187
        J. W. Flannagan—
            Direct 241 189
            Cross 243 190
        T. W. Coleman—
            Direct 253 198
            Cross 255 199
            Redirect 259 202
            Recross 259 203
        Walter H. Towe—
            Direct 260 203
            Cross 261 204
            Redirect 261 205
            Recross 261 205
        E. H. Linkous—
            Direct 261 205
            Cross 263 206
        E. P. Hartsock—
            Direct 264 206
            Cross 264 207
            Redirect 265 208
        R. L. Howard—
            Direct 265 208
            Cross 271 213
            Redirect 276 217

Record from D. C. U. S., etc.—Continued.
Testimony for plaintiff—Continued.

	Original	Print
William Collins—		
Direct	277	218
Cross	279	220
George M. Webb—		
Direct	284	224
Cross	287	226
Charles E. Weiss—		
Direct	289	228
Cross	293	231
Redirect	296	234
J. G. Graham—		
Direct	297	235
Cross	298	236
Redirect	299	237
James Breeding—		
Direct	300	237
Cross	305	241
J. E. Owen—		
Direct	308	244
Cross	310	246
Redirect	315	250
Recross	316	251
J. W. Crowell—		
Direct	317	251
Cross	319	254
A. S. Breeding—		
Direct	320	255
Cross	322	256
Redirect	327	260
A. W. Snyder—		
Direct	327	260
Cross	330	263
Recross	334	266
L. T. Meredith—		
Direct	335	266
Cross	337	268
E. C. Meredith—		
Direct	337	269
Cross	338	270
Redirect	339	271
Ely Duncan—		
Direct	339	271
Cross	342	273
Redirect	343	274
T. C. Redpath—		
Direct	343	274
Cross	344	275
Redirect	345	276
Recross	346	276

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
H. L. Fagg—		
Direct	346	276
Cross	348	278
J. D. Haley—		
Direct	348	278
Cross	350	280
Thomas Monahan—		
Direct	350	280
Cross	353	282
Dan Hodge—		
Direct	359	287
Cross	360	289
Redirect	361	289
James Micou—		
Direct	362	290
Cross	363	291
Redirect	363	291
Zattoo Farmer—		
Direct	364	291
Cross	366	293
Redirect	367	294
Recross	368	295
Albert W. Snidow—		
Direct	368	295
Cross	372	299
Redirect	376	302
W. P. Snodgrass—		
Direct	377	302
Cross	379	304
Redirect	381	305
D. C. Allison—Direct	381	305
H. B. Allison—		
Direct	382	306
Cross	383	307
Paul L. James—		
Direct	386	309
Cross	395	317
John H. Peters—		
Direct	399	319
Cross	402	322
Redirect	414	332
Recross	415	333
James H. Howard—		
Direct	417	335
Cross	419	336
Redirect	420	337
Recross	420	337

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Henry S. Skeen—		
Direct	422	339
Cross	424	341
Redirect	425	342
William Price—		
Direct	425	342
Cross	427	343
Redirect	431	347
J. R. Smith—		
Direct	432	348
Cross	437	352
Redirect	451	364
B. T. Johnson—		
Direct	451	364
Cross	454	367
Redirect	459	371
Recross	460	372
J. A. Medley—		
Direct	461	372
Cross	465	375
Redirect	480	387
H. A. Starbuck—		
Direct	482	389
Cross	483	390
J. H. Dickinson—		
Direct	485	391
Cross	488	394
Redirect	490	395
D. L. Lane—		
Direct	490	395
Cross	492	397
Emmett M. Smith—		
Direct	493	398
Cross	494	399
E. N. Farley—Direct	495	399
Charles Edward Kenley—		
Direct	496	400
Cross	498	402
R. E. Lucas—		
Direct	500	404
Cross	501	404
J. W. Reed—		
Direct	502	405
Cross	504	407
Redirect	506	408
Lewis M. Smith—Direct	507	409

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Everett W. Lilly—		
Direct	510	412
Cross	512	413
Redirect	514	415
J. H. Hoover—		
Direct	514	415
Cross	515	416
Marshal Richmond—		
Direct	516	416
Cross	517	418
J. W. Graham—Direct	519	419
P. H. McGrath—Direct [omitted in printing]	519	419
D. H. Kauffelt—		
Direct [omitted in printing]	522	
Cross [omitted in printing]	522	
James John Green—Direct [omitted in printing]	523	
W. L. Burks—		
Direct	524	420
Cross	526	421
Z. V. Burks—		
Direct	527	422
Cross	531	426
Redirect	532	426
Recross	533	427
Gordan A. Farmer (deposition)—		
Direct	534	428
Cross	537	430
Redirect	538	431
Recross	539	432
Mrs. Hettie D. Helvey—		
Direct (deposition)	539	432
Cross	544	436
Redirect	544	436
Lucy Calfee Smith—		
Direct (deposition)	545	437
Cross	547	438
Redirect	551	442
Solomon C. Furrow—		
Direct (deposition)	551	442
Cross	553	443
Redirect	553	443
Recross	554	444
Redirect	555	445
D. R. Peterson—		
Direct (deposition)	555	445
Cross	556	446
Redirect	558	448
Re-redirect	558	448

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Robert Hill Moore—Direct (deposition)	559	449
William M. Martin—		
Direct (deposition)	561	450
Cross	563	452
Redirect	564	453
William M. Dalton (deposition)—		
Direct	564	453
Cross	566	455
Redirect	567	456
Recross	567	456
Redirect	567	456
Recross	567	456
Harvey C. Johnson (deposition)—Direct	568	456
W. C. Anderson (deposition)—		
Direct	570	458
Cross	572	459
C. H. Wauhop (deposition)—		
Direct	573	460
Cross	576	463
Redirect	578	464
Andrew G. Flanagan (deposition)—		
Direct	579	465
Cross	584	469
Redirect	585	470
T. G. Skaggs (deposition)—		
Direct	586	470
Cross	590	474
I. C. Stover (deposition)—		
Direct	594	477
Cross	596	478
Redirect	597	480
Robert Calloway (deposition)—		
Direct	598	480
Cross	599	481
Matthew V. Calloway (deposition)—		
Direct	599	482
Cross	602	484
Redirect	603	485
Recross	604	485
A. E. Miller (deposition)—		
Direct	604	486
Cross	609	489
Redirect	610	490

Record from D. C. U. S., etc.—Continued.		
Testimony for plaintiff—Continued.		
R. W. Martin (deposition)—	Original	Print
Direct	610	490
Cross	612	492
Redirect	612	492
Recross	612	492
Re-redirect	612	492
Re-recross	612	492
J. C. Martin (deposition)—Direct	612	492
Elbert E. Tomkies (deposition)—		
Direct	613	493
Cross	617	496
Redirect	621	499
Recross	621	499
Re-redirect	621	499
Re-recross	622	499
Dorsey B. Barton (deposition)—		
Direct	622	500
Cross	627	503
Redirect	628	505
W. C. Ratcliffe (deposition)—		
Direct	629	505
Cross	631	507
John Likens (deposition)—Direct	632	508
C. E. Roop (deposition)—		
Direct	634	509
Cross	636	511
Redirect	638	512
Recross	638	513
Redirect	639	513
William Kessler—		
Direct	640	515
Cross	651	524
Redirect	656	528
Recross	657	529
Witness recalled—		
Direct	657	529
Cross	659	531
J. J. Dirzulaitis—		
Direct	664	535
Cross	667	537
Redirect	673	541
Recross	674	542
Charles H. Pierce—		
Direct	676	543
Cross	703	565
Redirect	725	582

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
Glen E. Edgerton—		
Direct	732	587
Cross	752	606
Redirect	770	619
Recross	780	626
Mrs. Minnie Lee Ward—		
Direct	787	632
Cross	790	635
Redirect	792	636
Recross	793	637
W. S. Winn—		
Direct	794	637
Cross	808	649
Redirect	889	711
Recross	894	715
Harry M. Trippe—		
Direct	896	716
Cross	926	748
Redirect	955	768
Edwin W. Kramer—		
Direct	956	769
Cross	1000	805
Earl E. Teeter—		
Direct	1051	847
Cross	1084	871
Redirect	1127	900
Recross	1130	902
H. G. Gerdes—		
Direct	1131	903
Cross	1162	926
Redirect	1189	947
Recross	1194	950
Col. Lewis H. Watkins—		
Direct	1203	957
Cross	1256	1000
Redirect	1363	1004
Recross	1365	1006
John R. Douglass—		
Direct	1367	1082
Cross	1384	1095
Redirect	1415	1116
Recross	1421	1120
Capt. C. Stone—		
Direct	1423	1121
Cross	1435	1130
Redirect	1439	1132
Recross	1439	1132

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
E. A. Sherman—		
Direct [omitted in printing]	1441	
C. L. Forsling—		
Direct [omitted in printing]	1453	
Cross [omitted in printing]	1462	
Redirect [omitted in printing]	1472	
Recross [omitted in printing]	1474	
Dr. H. T. Cory—		
Direct [omitted in printing]	1477	
Cross [omitted in printing]	1493	
Redirect [omitted in printing]	1498	
Recross [omitted in printing]	1501	
Redirect [omitted in printing]	1503	
Recross [omitted in printing]	1506	
Redirect [omitted in printing]	1508	
H. G. Gerdes (recalled)—		
Direct	1510	1133
Cross	1526	1150
Redirect	1532	1155
Cross	1532	1155
Redirect	1546	1166
Recross	1548	1168
Capt. Phillip C. Elsey—		
Direct	1550	1169
Cross	1561	1178
Redirect	1577	1191
P. A. Gragnon—		
Direct	1579	1193
Cross	1603	1211
Redirect	1620	1224
John D. Fitch—		
Direct	1625	1228
Cross	1630	1231
Redirect	1632	1233
Recross	1632	1233
Roger B. McWhorter—		
Direct	1633	1233
Cross	1674	1266
Redirect	1740	1333
Recross	1743	1335
James W. Johnson—		
Direct	1745	1338
Cross	1792	1380
Redirect	1808	1400
Recross	1812	1410
Dr. F. F. Barnes—Direct [omitted in printing]	1821	
John A. Davenport—		
Direct	1835	1415
Cross	1861	1434

Record from D. C. U. S., etc.—Continued.

Testimony for plaintiff—Continued.

	Original	Print
H. G. Gerdes (recalled)—		
Direct	1871	1441
Cross	1896	1465
Redirect	1934	1493
Recross	1937	1495
Testimony for defendant.		
C. Rufus Spangler—		
Direct	1939	1498
Cross	1941	1500
Redirect	1944	1503
W. H. Spangler—		
Direct	1945	1503
Cross	1946	1505
Redirect	1951	1509
S. L. Buckland—		
Direct	1952	1509
Cross	1955	1511
Redirect	1960	1516
Recross	1962	1517
B. C. Lilly—		
Direct	1962	1517
Cross	1963	1518
Redirect	1970	1524
Recross	1971	1524
James Adair, Sr.—		
Direct	1971	1524
Cross	1973	1526
Redirect	1976	1528
Recross	1977	1529
N. A. Kersey—		
Direct	1979	1530
Cross	1982	1532
Redirect	1986	1536
H. Palmer Roberts—		
Direct	1986	1536
Cross	1988	1538
J. B. Talbot—		
Direct	1991	1540
Cross	1992	1541
Redirect	1996	1543
William Ingles—		
Direct	1996	1544
Cross	1996	1544
William R. Gerald—		
Direct	1999	1547
Cross	2002	1549
Redirect	2006	1552
Recross	2006	1552

Record from D. C. U. S., etc.—Continued.

Testimony for defendant—Continued.

	Original	Print
William R. Gerald (deposition)—		
Direct	2007	1552
Cross	2009	1554
A. Moore—		
Direct	2011	1555
Cross	2013	1557
Isaac Huff—		
Direct	2018	1561
Cross	2020	1562
Redirect	2023	1564
J. H. Knode—		
Direct	2024	1565
Cross	2031	1571
Redirect	2039	1577
F. B. Kegley—		
Direct	2041	1579
Cross	2070	1604
Redirect	2099	1629
Recross	2102	1631
E. C. Gannaway—		
Direct	2104	1632
Cross	2105	1633
Redirect	2108	1635
Recross	2108	1635
N. B. Harvey—		
Direct	2109	1636
Cross	2111	1638
Redirect	2118	1643
Recross	2118	1643
W. R. Hundley (deposition)—		
Direct	2119	1643
Cross	2123	1647
Redirect	2125	1648
Recross	2126	1649
Redirect	2126	1549
John G. Osborne—		
Direct	2127	1649
Cross	2130	1652
Redirect	2134	1655
Recross	2135	1656
Robert C. McWane—		
Direct	2135	1656
Cross	2143	1662
Redirect	2152	1669
Recross	2153	1670

Record from D. C. U. S., etc.—Continued.

Testimony for defendant—Continued.

	Original	Print
Frank P. Turner—		
Direct	2155	1671
Cross	2157	1672
J. B. Snethlage—		
Direct	2158	1673
Cross	2159	1674
A. A. L. Mathews—		
Direct	2160	1675
Cross	2174	1686
Redirect	2195	1702
Recross	2197	1704
Harold W. Buck—		
Direct	2198	1704
Cross	2203	1709
R. J. Holden—		
Direct	2216	1720
Cross	2236	1737
Redirect	2254	1751
Recross	2259	1756
H. S. Slocum—		
Direct	2260	1757
Cross	2273	1767
T. A. Patton—		
Direct	2282	1774
Cross	2283	1775
Rufus W. Putnam—		
Direct	2286	1777
Cross	2313	1797
S. M. Yarbro—		
Direct	2355	1834
Cross	2355	1834
Harold A. Thomas—		
Direct	2364	1841
Cross	2422	1883
Redirect	2488	1930
Recross	2504	1941
Daniel W. Mead—		
Direct	2506	1942
Cross	2530	1972
Redirect	2579	2011
F. W. Scheidenhelm—		
Direct	2581	2012
Cross	2664	2077
Redirect	2710	2118
Recross	2714	2123
Redirect	2717	2125
Recross	2721	2132

Record from D. C. U. S., etc.—Continued.

Rebuttal testimony for plaintiff:

	Original	Print
John E. Carpenter (recalled)—		
Direct	2725	2136
Cross	2747	2152
Re-direct	2772	2172
Re-cross	2774	2173
Re-direct	2775	2174
Rowland P. Castle—		
Direct	2777	2175
Cross	2788	2184
Re-direct	2800	2193
Harry R. Bright—		
Direct	2802	2194
Cross	2806	2199
W. H. Marshall—		
Direct	2810	2202
Cross	2815	2205
Thomas H. Graham—Direct	2828	2214
Roger B. McWhorter (recalled)—		
Direct	2832	2216
Cross	2840	2225
Lewis H. Watkins—		
Direct	2845	2228
Cross	2858	2240
H. G. Gerdes (recalled)—		
Direct	2881	2260
Cross	2891	2269
Plaintiff's exhibits:		
Exhibit No. 1—Map of New River (original exhibit)	2901	2277
Exhibits Nos. 2–13, inclusive—Photographs of bateaux and other types of boats on New River (original exhibits)	2903	2277
Exhibits Nos. 16–26, inclusive—Physician's certificates pertaining to certain witnesses for plaintiff (omitted)	2903	2277
Exhibits Nos. 27–29, inclusive—Day books and ledger of Lilly Lumber Company (omitted)	2903	2277
Exhibit No. 30—Photostat copy "Index to Reports, Chief of Engineers, U. S. Army, 1866–1912" (original exhibit)	2903	2277
Exhibit No. 31—Report of Chief of Engineers, 1873	2904	2277
Exhibit No. 32—Report of Moore and Briggs, 1819	2924	2298
Exhibit No. 33—Report of Chief of Engineers, 1877	2950	2324
Exhibit No. 34—Report of Chief of Engineers, 1878	2952	2326
Exhibit No. 35—Report of Chief of Engineers, 1879	2961	2333
Exhibit No. 36—Report of Chief of Engineers, 1880	2994	2360
Exhibit No. 37—Report of Chief of Engineers, 1881	3005	2370
Exhibit No. 38—Report of Chief of Engineers, 1882	3018	2382

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 39—Report of Chief of Engineers, 1883	3033	2394
Exhibit No. 40—Report of Chief of Engineers, 1884	3050	2404
Exhibit No. 41—Report of Chief of Engineers, 1885	3051	2405
Exhibit No. 42—Report of Chief of Engineers, 1886	3053	2406
Exhibit No. 43—Report of Chief of Engineers, 1891	3061	2413
Exhibit No. 44—Report of Chief of Engineers, 1897	3065	2416
Exhibit No. 45—Excerpt from The River and Harbor Appropriation Act of June 13, 1902	3067	2417
Exhibit No. 46—1912–1913—Alstaetter, Rossell, Bixby reports (House Document 1410, 62nd Congress, 3rd Session) on examination of New River from Radford, Virginia, to Hinton, West Virginia	3068	2418
Exhibit No. 47—Report of the Secretary of War, dated April 18, 1913	3078	2427
Exhibit No. 48—1930—January 24, 1930, to March 11, 1930—Kanawha River at Kanawha Falls, West Virginia—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 49—1930—March 11, 1930, to April 5, 1930—Kanawha River at Kanawha Falls, West Virginia—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 50—1930—January 25, 1930, to March 10, 1930—New River at Caperton, W. Va.—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 51—1930—March 12, 1930, to April 4, 1930—New River at Caperton, W. Va.—automatic gage recorder chart (original exhibit)	3112	2466
Exhibit No. 52—1929–1936—Rating curve for Kanawha River at Kanawha Falls, W. Va. (original exhibit)	3112	2466
Exhibit No. 53—1929–1931—Rating curve for New River at Caperton, W. Va. (original exhibit)	3112	2466
Exhibit No. 54—1929–1934—Rating curve for New River at Hinton, West Virginia (original exhibit)	3112	2466
Exhibit No. 55—October 27, 1928, to September 30, 1931—Rating table for Kanawha River at Kanawha Falls, W. Va. (original exhibit)	3112	2467
Exhibit No. 56—November 20, 1928, to September 30, 1930—"Rating table for New River at Caperton, West Virginia" (original exhibit)	3112	2467
Exhibit No. 57—4 sheets constituting "Rating tables for New River near Hinton, W. Va." for the following periods: October 1, 1929, to September 30, 1934; December 1, 1923, to September 30, 1929; December 1, 1923, to September 30, 1929; December 1, 1, 1923, to September 30, 1929 (original exhibits)	3113	2467

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 58—March 15, 1930—"Water Records at Glen Lyn for the week ending Saturday, March 15, 1930" (original exhibit)	3113	2467
Exhibit No. 59—1930—"Water Records at Glen Lyn for week ending Saturday, March 22, 1930" (original exhibit)	3113	2467
Exhibit No. 60—1930—"Water Records at Glen Lyn for week ending March 29, 1930." (original exhibit)	3113	2467
Exhibit No. 61—1930—"Water Records at Glen Lyn for week ending April 1, 1930" (original exhibit)	3113	2467
Exhibit No. 62—1930—Chart "New River at Eggleston, Va., March 11 to March 31, 1930" (original exhibit)	3113	2467
Exhibit No. 63—1930—Chart "New River at dam site "A" at Radford for the period from March 10, 1930, to April 1, 1930" (original exhibit)	3113	2467
Exhibit No. 64—1930—Chart "New River at Allisonia, March 11 to April 1, 1930" (original exhibit)	3113	2468
Exhibit No. 65—1930—Chart "New River at Ivanhoe from March 11 to April 1, 1930" (original exhibit)	3113	2468
Exhibit No. 66—5 pages, containing rating curves for— (a) Glen Lyn 1927–1928; (b) Eggleston 1911–24, 1925–28; (c) Dam site "A"; (d) Allisonia, 1930; (e) Ivanhoe, 1928–1930 (original exhibit)	3114	2468
Exhibit No. 67—5 sheets containing rating tables for New River at— Glen Lyn, 1927–1928; Eggleston, Oct. 1, 1920, to Sept. 30, 1931; Dam Site "A" 1927–1929; Allisonia, 1930; Ivanhoe, 1928–1930 (original exhibit)	3114	2468
Exhibit Nos. 68–83, inclusive—Water Supply Papers of United States Geological Survey (original exhibits)	3114	2468
Exhibit No. 84—Daily discharges for year ending September 30, 1935, at the gaging station on New River at Ivanhoe, Va. (original exhibit)	3114	2468
Exhibit No. 85—Daily discharges for the year ending September 30, 1935, at the gaging station on New River at Allisonia, Va. (original exhibit)	3114	2468
Exhibit No. 86—Daily discharges for the year ending September 30, 1935, at the gaging station on New River at Eggleston, Va. (original exhibit)	3114	2468
Exhibit No. 87—Daily discharges for the year ending September 30, 1935, at the gaging station on Little River at Graysonton, Va. (original exhibit)	3114	2468

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 88—Declaration of Intention to construct a dam and other project works	3115	2469
Exhibit No. 89—1926, August 30—Assignment of Declaration of Intention of New River Development Co. to Appalachian Electric Power Go, (original exhibit)	3121	2471
Exhibit No. 90—1926, August 30—Application for license by Appalachian Electric Power Co	3122	2471.
Exhibit No. 90-A—1926, August 30—Maps accompanying application for license (also revised maps accompanying application for minor part license) (original exhibit)	3175	2482A
Exhibit No. 91—1926-27-28-31-32—Excerpts from 6th, 7th, 8th, 11th, and 12th Annual Reports of Federal Power Commission dealing with Radford project	3176	2483
Exhibit No. 92—1925, August 20—Report of General Taylor, Chief of Engineers on Declaration of Intention for project No. 739	3207	2517
Exhibit No. 93—1925, July 23—Report of District Engineer, Major A. K. B. Lyman and Endorsement (7/25/29) Division Engineer, C. W. Kutz on declaration for project No. 739	3214	2522
Exhibit No. 94—1925, October 15—Letter and memorandum of Major Trippe, District Engineer to Lt. Col. Edgerton, on probable effects of proposed Radford project on Kanawha River	3218	2524
Exhibit No. 95—1926, April 7—Letter from Merrill, Executive Secretary, to General Taylor, C. of E., transmitting data with respect to Pitt River. Attached is memo initialed "R. W. D." and diagram of variations on Pitt and Sacramento Rivers (original exhibit)	3221	2526
Exhibit No. 96—1926, July 23—Report of Hubert Deakyne, C. of E., to Merrill Executive Secretary on declaration for project No. 739	3222	2526
Exhibit No. 97—1925, December 29—Report of General Taylor, C. of E., to Executive Secretary on declaration for project No. 739 (original exhibit)	3224	2527
Exhibit No. 98—1927, April 12—Report of General Deakyne, C. of E.; 1926, December 22—Report of Major Trippe, District Engineer; 1927, January 13—1st Endorsement Col. Kutz, Division Engineer. In dealing with application for license for project #739	3232	2533
Exhibit No. 99—1925, October 22—List of 22 affidavits submitted to Federal Power Commission for consideration upon Declaration of Intention of New River Development Company	3257	2556

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued. Original Print

Exhibit No. 100—1926, March 2—Transcript of hearing before Federal Power Commission on Declaration of Intention 3305 2584
Exhibit No. 101—1926, October 28; September 28; November 20—re Application for license. Notice of public hearing at Radford, September 28, 1926. Mailing list of notices September 28, 1926. Transcript of public hearing at Radford, October 28, 1926. Statement filed on behalf of Appalachian Electric Power Co. regarding protests, November 20, 1926 3329 2604
Exhibit No. 102—1926, September 2—Letter from Curtis, Mallet-Prevost, Colt & Mosle to Federal Power Commission enclosing assignment of declaration from Development Co. to A. E. P. Co. and application for license of A. E. P. Co. 3355 2624
Exhibit No. 103—1925, December 9—Telegram to Mr. Merrill, Executive Secretary, from Mr. Kramer re Pitt River 3356 2625
Exhibit No. 104—1925, December 15—Letter to Mr. Merrill from Mr. Kramer re Pitt River and enclosing hydrographs 3359 2626
Exhibit No. 105—1927, May 2—Letter from Mr. Bonner to Mr. Merrill enclosing copy of Kramer's report of Klamath River 3360 2628
Exhibit No. 106—1926, October 24—"Memorandum to Federal Power Commission re Declaration of Intention of New River Development Company" prepared by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit) 3383 2635
Exhibit No. 106-A—1925, October 23—Letter from L. J. Bevan to C. M. Micou, re drainage areas and run-off (original exhibit) 3383 2635
Exhibit No. 106-B—Memorandum of request of New River Development Company in regard to Report of Chief of Engineers dated Aug. 20, 1925, upon the proposed project of the Company for a water power development on New River, in Virginia, with respect to which declaration of intention has been filed by the Company with the Federal Power Commission, dated Oct. 26, 1925 3384 2635
Exhibit No. 106-C—1925, October 1, 1925—"Supplemented Memorandum re Declaration of Intention of New River Development Company (original exhibit) 3388 2638
Exhibit No. 107—1926, February 20—Letter from Mr. Merrill, Executive Secretary to, Bascom Slemp giving notification of public hearing of March 2, 1926 (original exhibit) 3388 2638

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 108—1930, October 16—Letter from C. M. P. C. M. to Federal Power Commission enclosing new drawings for minor part license to be substituted for certain drawings filed with original application for license (original exhibit)	3388	2638
Exhibit No. 109—1926, April 15—Charge sheet pertaining to removal of General Taylor's report dated December 29, 1925, from files by F. P. C. (original exhibit)	3388	2638
Exhibit No. 110—"Record of the daily gage readings at Lock No. 24, Ohio River" (original exhibit)	3388	2638
Exhibit No. 111—"Record of daily gage readings at Lock No. 25, Ohio River" (original exhibit)	3388	2638
Exhibit No. 112—4 sheets being "gage readings of Locks Nos. 2, 3, and 4, Kanawha River, and Locks Nos. 26, 27, and 28, Ohio River, during low water periods of 1921, 1925, 1930, and 1932 (original exhibit)	3388	2638
Exhibit No. 113—Diagram showing hydrographs at gaging stations (Kanawha and New Rivers) with published mean daily flows July and August, 1932. Prepared U. S. Engineers Office, Huntington, W. Va., September 1935 (original exhibit)	3388	2638
Exhibit No. 114—1930, July and August—Diagram showing hydrographs at gaging stations (Kanawha & New Rivers) for July and August 1930. Prepared U. S. Engineer Office, Huntington, W. Va., September 1935 (original exhibit)	3389	2639
Exhibit No. 115—1936, January—Diagram—Kanawha & New Rivers, Discharge at gaging stations—Data compiled from Automatic Water Stage Recorder—U. S. Engineer Office, Huntington, W. Va., January 1936 (original exhibit)	3389	2639
Exhibit No. 116—1936, July 7—Diagram "Kanawha River Profile—Backwater studies—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3389	2639
Exhibit No. 117-A—1936, July 9—Diagram "Rating Curves—Kanawha River Lock No. 2, Mile 84.8, London Dam, Mile 82.81, and Lock No. 3, Mile 79.7—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3389	2639
Exhibit No. 117-B—1935, December 10—Diagram "U. S. Engineer Office, Huntington, W. Va., Rating Curves—Kanawha River, Locks Nos. 4 & 5, and Marmet" (original exhibit)	3389	2639
Exhibit No. 117-C—1935, December 5—Diagram—"Rating Curves—Kanawha River—Locks Nos. 6, 7, 8" (original exhibit)	3389	2639

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 117-D—1936, July 8—Diagram "Kanawha River—Rating Curves Locks No. 9 and Winfield—U. S. Engineer Office, Huntington, W. Va." (original exhibit)	3389	2639
Exhibit No. 117-E—1935, December 5—Diagram "Rating Curves—Kanawha River Locks Nos. 10 and 11" (original exhibit)	3389	2639
Exhibit No. 117-F—1935, December 10—Diagram "Rating Curves—Ohio River below Point Pleasant at Lock No. 23—U. S. Engineer Office, Huntington, W. Va." (original exhibit)	3390	2640
Exhibit No. 118—1935, December—Diagram "Kanawha River Profile—Six & Nine feet projects"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 119—1935, December—Diagram "Kanawha River and Tributaries—proposed improvements"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 120—1935, December—Diagram "Kanawha River and Tributaries—proposed improvements—profiles"—U. S. Engineer Office, Huntington, W. Va. (original exhibit)	3390	2640
Exhibit No. 121—July 4-21, 1936—Gage recorder chart for New River at Eggleston, Va. (original exhibit)	3390	2640
Exhibit No. 122—July 6-21, 1936—Gage recorder chart for New River at Hinton (Packs Ferry), W. Va. (original exhibit)	3390	2640
Exhibit No. 123—1919, August 29. Request for permit for repairs and replacements by Electro Metallurgical Company with following enclosures: (1) 1919, Aug. 29; Letter from W. J. Knapp, V-P, Electro-Met. Co. to Secretary of War. (2) 1919, Sept. 15 and 17; 1st and 2nd Endorsements by Howell and Beach, C. of E. (3) 1919, Sept. 27; 3rd End. by Pillsbury, C. of E. (4) 1919, Oct. 4; 4th End. by Howell, C. of E. (5) Plan of proposed location of replacement dam. (6) 1899, Mar. 2; Letter from Chief of Engineers Office to Major Bixby, C. of E., enclosing permit. (7) 1899, Feb. 27—Permit to Wilson Aluminum Co. (original exhibit)	3390	2640
Exhibit No. 123-A—1934, October 24; Copies of correspondence and reports relating to the Kanawha Falls Plant of Elec-Met. Co. as follows: (1) 1934, Oct. 24; Letter from Capt. Clay, C. of E. to McNinch Chairman, F. P. C. enclosing the following: (2)		

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
1898, Nov. 12; letter from Wilson Aluminum Co. to Secretary of War. (3) Part of handwritten letter to Brig. Gen'l John M. Wilson, Chief of Eng. dated January 26, 1899. (4) War Department memorandum. (5) 1899, Feb. 13; Letter from Major Bixby to Brig. Gen. John M. Wilson, Chief of Eng. (6) War Department memo. (7) 3 endorsements by War Department. (8) Copy of telegram dated Feb. 17, 1899, from Mr. Wilson, Chief of Engineers to Wilson Aluminum Co. (9) Letter dated Feb. 18, 1894, from Wilson Aluminum Co. to Mr. Wilson, Chief of Engineers. (10) Letter from Sec. of War, Feb. 27, 1899, to Wilson Alum. Co. (original exhibit)	3391	2641
Exhibit No. 124—1926, November 30—Protest of Great Kanawha River Imp. Ass'n to H. M. Trippe	3393	2641
Exhibit No. 125—1926, November—Protest of Public Service Commission of W. Va	3396	2643
Exhibit No. 126—1925, May 28—Letter C. B. Slemp to General Taylor re letter from Mr. Buck	3400	2645
Exhibit No. 126-A—1925, May 27, Letter Mr. Buck of V. B. & B. to General Taylor, C. of E.	3402	2645
Exhibit No. 126-B—Map—New River Development Co.—preliminary layout, Dam site above mouth of Little River	3405	2647
Exhibit No. 127—1925—June 1—First endorsement General Jadnin (C. of E.) to District Engineer, re Buck letter 5/27/25	3408	2647
Exhibit No. 128—1925, June 15, 2nd end. Trippe to Chief of Engineers (project on New River)	3410	2648
Exhibit No. 129—1925, June 18—3rd end. Col. Kutz to Chief of Engineers (project on New River)	3413	2650
Exhibit No. 130—1927, July 1—Letter from O. C. Merrill, Executive Secretary to C. M. P. C. M. together with form of license tendered A. E. P. Co.	3414	2650
Exhibit No. 131—1931, May 5—Letter from George Otis Smith to A. E. P. Co., together with form of license tendered at that time	3414Q	2663
Exhibit No. 132—Plate 11. Diagram showing change in wave as it passes downstream (original exhibit)	3414GG	2675
Exhibit No. 133—March 1930. Discharge hydrograph wave study of New River at Allisonia, Va., from March 11, 1930–March 31, 1930 (original exhibit)	3414GG	2675
Exhibit No. 134—March, 1930—Discharge hydrograph wave study New River at Eggleston, Va. from March 11, 1930–March 31, 1930 (original exhibit)	3414GG	2675

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 135—March, 1930—"Discharge hydrograph wave study New River at Glen Lyn, Va., March 12, 1930–March 30, 1930 (original exhibit)	3414GG	2675
Exhibit No. 136—March, 1930—"Discharge hydrograph wave study New River at Hinton, W. Va., March 13, 1930–March 30, 1930 (original exhibit)	3414GG	2675
Exhibit No. 137—March, 1930—"Discharge hydrograph wave study New River at Caperton, W. Va.—March 12, 1930–April 3, 1930 (original exhibit)	3414GG	2675
Exhibit No. 138—March, 1930—"Discharge hydrograph wave study New River at Damsite 'A' near Radford, Va., March 11, 1930, to March 31, 1930" (original exhibit)	3414GG	2676
Exhibit No. 139—1930, March—"Discharge hydrograph wave study at Kanawha River at Kanawha Falls, W. Va., March 12, 1930, to April 1, 1930" (original exhibit)	3415	2676
Exhibit No. 140—1930, March—"Discharge hydrograph wave study of New River at Ivanhoe, March 12, 1930, to March 31, 1930" (original exhibit)	3415	2676
Exhibit No. 141—1930, March—"Discharge hydrograph wave study of Kanawha River at Montgomery, W. Va. (Lock #. 2), March 14 to March 31, 1930" (original exhibit)	3415	2676
Exhibit No. 142—1935, System Load Curve, A. E. P. Co. and Amer. Gas & Electric Co.—Weekday, Oct. 28, 1935, Sat. Nov. 2nd, 1935, and Sunday, Nov. 3rd, 1935	3416	2676
Exhibit No. 143—1930, June 1, chart "New Kanawha River Power Waves, 3/11/30 to 4/3/30" (original exhibit)	3418	2676
Exhibit No. 144—10 sheets: Plans of locks and dams, Nos. 2 to 11, inclusive, on Kanawha River, as follows: (a) Kanawha River—Lock and Dam No. 3; (b) Kanawha River—Lock and Dam No. 3; (c) Kanawha River—Lock and Dam No. 4; (d) Kanawha River—Lock and Dam No. 5; (e) Kanawha River—Lock and Dam No. 6; (f) Kanawha River—Lock and Dam No. 7; (g) Kanawha River—Lock and Dam No. 8; (h) Kanawha River—Lock and Dam No. 9; (i) Kanawha River—Lock and Dam No. 10; (j) Kanawha River—Lock and Dam No. 11 (original exhibit)	3418	2676
Exhibit No. 145—1935—74th Congress, 1st Session, House Doc. 91, 308 Report of Kanawha River, W. Va., Va., and N. C.	3419	2677

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 146—Views of shoals and rapids on unimproved section of New River between Wiley Falls, mile 88.6 and Radford, mile 146.1—July 13–15, 1936 (original exhibit)	3445	2714
Exhibit No. 147—Views of shoals and rapids on unimproved sections of New River between Wiley Falls, mile 88.6, and Radford, mile 146.1, and between Allisonia, mile 173.3, and Austinville Lead Mine, mile 190.0—June 22–29, 1936 (original exhibit)	3445	2714
Exhibit No. 148—Photograph of stern of boat showing type of propeller guard in July 1936 (original exhibit)	3445	2714
Exhibit Nos. 149–151, inclusive—Photographs of Gerdes' Party at Bull Falls in July 1936 (original exhibit)	3445	2714
Exhibit Nos. 152–154, inclusive—Photograph of Negro at Bull Falls in a rowboat in July 1936 (original exhibit)	3445	2714
Exhibit No. 155—1926—House Doc. #308, 69th Congress, 1st Session—Estimate of cost of examinations, etc., of streams where Power Development appears feasible (original exhibit)	3445	2714
Exhibit No. 156—Record of hearing before State Corporation Commission containing application and copy of State license (original exhibit)	3445	2714
Exhibit No. 157—Pilot license of John R. Douglass (read into the record) (omitted)	3445	2715
Exhibit No. 158—Map—"Parts of National Forests and Areas approved as National forests within the Kanawha River and New River watersheds" (original exhibit)	3445	2715
Exhibit No. 159—1922, June 12, letter from Geo. Otis Smith, Director U. S. G. S., including the Report #34 enclosed in said letter (excluded)	3445	2715
Exhibit No. 160—Map "Monongahela National Forest—West Virginia" 1936 (excluded)	3445	2715
Exhibit No. 161—"Graph of stream flow—storm of March 26, 1936—Bent Creek Experimental Forest" (original exhibit)	3446	2715
Exhibit Nos. 163–182, inclusive—"Photos of dams and reservoirs on upper New River showing silt deposits" (original exhibits)	3446	2715
Exhibit No. 183—Views of pools, shoals, rapids, and dams of Kanawha River and New River between London Lock, W. Va., and Hawks Nest, W. Va.—July 22, 1936 (original exhibit)	3446	2715

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 184—Photograph entitled "State line in vicinity of Round Bottom Branch" (original exhibit)	3447	2715
Exhibit No. 185—U. S. G. S. "Peterstown sheet" (original exhibit)	3449	2715
Exhibit Nos 186–187—Maps and deed descriptions, re Bluestone reservoir (original exhibits)	3451	2718
Exhibit No. 188—Key property map of A. E. P. Co. for Bluestone reservoir (original exhibit)	3452	2718
Exhibit No. 189—Report (pp. 3–4, 9–39) of Commissioners appointed to view certain rivers within Commonwealth of Virginia (original exhibit)	3454	2718
Exhibit No. 189–A—Map accompanying exhibit No. 189, John Marshall report (original exhibit)	3478	2735
Exhibit No. 190—Series of maps entitled "New River Survey, 1872 and 1878" (original exhibit)	3478	2735
Exhibit No. 191—Kanawha Valley Power Company license for project #1175 W. Va., including London and Marmet Dams (original exhibit)	3478	2735
Exhibit No. 192—Views of pools, shoals, and rapids on New River between Hinton, West Virginia, and Narrows, Virginia—July 19–20, 1936 (original exhibit)	3478	2735
Exhibit No. 193—Views of pools, shoals, and rapids on New River between Narrows, mile 101.0, and Allisonia, mile 172.0—July 9–13, 1936 (original exhibit)	3478	2735
Exhibit No. 194—Photostat of the chart from automatic gage, at Caperton, W. Va., for period August 8 to August 21, inclusive (original exhibit)	3478	2735
Exhibit No. 195—Blueprint of the recording gage chart at Kanawha Falls, for period July 30 to August 24, inclusive, 1930 (original exhibit)	3478	2736
Exhibit No. 196—Profile of New River, N. C., W. Va. and Va. (original exhibit)	3479	2736
Exhibit No. 197—Map styled "Railroads" (original exhibit)	3481	2736
Exhibit No. 198—Map entitled "New River, Va. and W. Va., Navigation improvements between Hinton and Wilson Creek, 1877 to 1889" (original exhibit)	3482	2736
Exhibit No. 199—Load curve of the Appalachian Electric Power Co. for week ending November 3, 1935 (original exhibit)	3484	2736
Exhibits Nos. 200–200–B—3 prints, U. S. Eng. Office, Huntington, W. Va., showing navigation features (barge lift, log chute, etc.) for Bluestone reservoir project (original exhibits)	3486	2736

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 201—Map showing existing ferries below the mouth of Wilson Creek on New and Kanawha Rivers (original exhibit)	3486	2736
Exhibit No. 202—Map showing ferries in operation prior to 1935 (original exhibit)	3486	2737
Exhibit No. 203—Photograph album of ferries on New River (original exhibit)	3486	2737
Exhibit No. 204—Illustration showing how Radford project could affect operating results of Bluestone development (original exhibit)	3486	2737
Exhibit No. 205—Photograph taken to show or to determine the direct measurement thickness of sediment in Byllesby reservoir (original exhibit)	3486	2737
Exhibit No. 207—Sedimentation map of Washington Mills reservoir showing original and present contours (original exhibit)	3486	2737
Exhibit Nos. 208–209—Topographic maps of sections of Washington Mills reservoir showing conditions—April 17 and April 23, 1936—after break-down (original exhibits)	3486	2737
Exhibit No. 210—Cross sections showing profiles on two ranges across the Washington Mills reservoir as of 4/17, and again on 4/23, 1936 (original exhibit)	3487	2737
Exhibit No. 211—Columnar sections of borings through sediment of Washington Mills reservoir (original exhibit)	3487	2737
Exhibit No. 212—Sedimentation map of Byllesby reservoir (original exhibit)	3487	2738
Exhibit No. 213—Chart showing longitudinal profiles of Byllesby reservoir (original exhibit)	3487	2738
Exhibit No. 214—Map of Buck reservoir showing present shore line (original exhibit)	3487	2738
Exhibit Nos. 215–217, inclusive—Cross section showing original and present profiles of the Buck reservoir (original exhibits)	3488	2738
Exhibit Nos. 218–220, inclusive—Cross sections showing the original and present profiles of Fields Mfg. Co.'s reservoir (original exhibits)	3488	2738
Exhibit Nos. 221–221–E, inclusive—Charts of the Ohio River, Pittsburgh, Pa. to mouth showing topography and soundings (original exhibits)	3488	2738
Exhibit No. 223—Federal Power Commission, National Power Survey, Principal Generating Plants and Electric transmission lines, United States, 1935 (original exhibit)	3488	2738
Exhibit No. 225—1 page—"Energy transactions between Appalachian Electric Power Co. and interconnected systems, 1934	3490	2738

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 226—Chart—"Study showing operation of Radford with stream flow conditions, as of the week ending Sunday, November 2, 1930, based on load curve, shape proportional to system load reported by Appalachian Electric Co., for week ending November 3, 1935" (original exhibit)	3491	2739
Exhibit No. 227—Map—"Appalachian Electric Power Co., wave study, New and Kanawha Rivers, March 1930" (original exhibit)	3493	2739
Exhibit No. 228—Map—"New River and Kanawha River Power Waves, March 11 to April 3, 1930" (original exhibit)	3493	2740
Exhibit No. 229—Chart—"Automatic Gauge Records, London and Marmet June 15–19, 1936" (original exhibit)	3495	2740
Exhibit No. 229-A—Corrected Exhibit No. 229 (original exhibit)	3495	2740
Exhibit No. 230—Profile of London, Marmet, and Dam No. 6 pools for June 16, 1936 (original exhibit)	3495	2740
Exhibit No. 230-A—Corrected Exhibit No. 230 (original exhibit)	3495	2740
Exhibit No. 231—Letter dated March 1, 1928, Curtis, Mallet-Prevost, Colt, & Mosle to Federal Power Commission, re Project No. 739, A. E. P. Co. (original exhibit)	3495	2740
Exhibit No. 232—Executive Order of the President authorizing the construction of the Bluestone reservoir project on New River (original exhibit)	3495	2740
Exhibit No. 233—Letter from Wm. W. Belknap, Secretary of War, in answer to the resolution of the House, on February 3, 1871, House Document No. 110, concerning James River and Kanawha Canal (original exhibit)	3495	2740
Exhibit No. 234—"The Congressional Globe"—1873, page 204 and page 206, adoption of resolution offered by Senator Windom (original exhibit)	3495	2740
Exhibit No. 235—"Journal of the House of Delegates of the State of West Virginia for the 11th Session, 1872–3" re James River and Kanawha Canal (original exhibit)	3495	2741
Exhibit No. 236—Report of the Committee of the House of Representatives, containing report No. 76 of the 3rd session of the 42nd Congress, re James River & Kanawha Canal (original exhibit)	3496	2741
Exhibit No. 237—"Congressional Record," Special Session of the Senate of the United States, March 4 to 26, 1873, Volume #1, re James River and Kanawha Canal (original exhibit)	3496	2741

D. C. U. S., etc.—Continued.

s exhibits—Continued.

	Original	Print
bit No. 238—Report of Major Craighill with port of Engineers Hutton and Harris, "James ver and Kanawha Canal, United States Engineer fice, Baltimore, Md., April 11, 1873" (original hibit)	3496	2741
bit No. 239—Letter from Senator Davis, of the ate of West Virginia, to Sec. of War, W. W. lknap, dated November 12, 1873, re James River d Kanawha Canal [omitted in printing]	3497	2741
bit No. 240—Report of the Board of Engineers March 18, 1874, on the James River and Kana- a Canal [omitted in printing]	3499	2741
bit No. 241—Report 307, Part 1, Senate, 43rd ongress, 1st Session, "Select committee on trans- rtation routes to the seaboard, April 24, 1874" iginal exhibit)	3565	2741
bit No. 242—Photostatic copy of four pages from ongressional Record," year 1874, re James River Kanawha Canal (original exhibit)	3565	2741
bit No. 243—Statutes at large, Volume 18, Part Page 237, etc., re Act passed June 23, 1874, apter 457, for estimates and surveys on trans- rtation routes to the seaboard (original exhibit)	3565	2742
bit No. 244—Report of Major Craighill, Corps of gineers, U. S. A., entitled "Third Subdivision of Central Transportation Route, January 13, 75" (original exhibit)	3565	2742
bit No. 245—Letter (pp. 54–57 printed herein) m the Sec. of War, etc., Senate Document No. 15, h Congress, 2nd Session, containing the reports Major Craighill and Brig. Gen. Humphreys, Nov. 1876 (original exhibit)	3567	2742
it No. 246—U. S. G. S. Report No. 20, the itetop Area, Virginia-Tennessee (original, ex- it)	3575	2748
it No. 247—Photostatic copy of hearing before jor H. M. Trippe, re Diversion of New River N. C. Jan. 13, 1925 (original exhibit)	3575	2749
it No. 248—Copy of letter addressed to the Hon. J. Noell, East Radford, Va., and signed by R. J. den, Professor of Geology; dated March 4, 1936 ginal exhibit)	3575	2749
it Nos. 249–252, inclusive—"Aerial photos of ain reaches of New River, being Nos. 35, 58, 56, in Government Exhibit No. 273" (original ex- ts)	3575	2749
t No. 254—Letter dated November 14, 1927, to or E. D. Ardery on "New River Development Radford, Geological Examination," signed by V. Scheidenhelm (original exhibit)	3575	2749

Record from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.

	Original	Print
Exhibit No. 255—Letter dated November 17, 1927, to Major E. D. Ardery from F. W. Scheidenhelm on "New River Development No. 6 (Radford), Geological Examination" (original exhibit)	3575	2749
Exhibit No. 256—Letter dated October 16, 1931, to Major Fred W. Herman from F. W. Scheidenhelm, pertaining to maintaining pool levels at dams 2, 3, and 4 on Kanawha River (original exhibit)	3575	2749
Exhibit No. 257—Letter dated September 18th, 1934, to Major John F. Conklin on subject of "Hydroelectric project of Appalachian Electric Power Company on New River near Radford, Va.," by F. W. Scheidenhelm (original exhibit)	3576	2749
Exhibit No. 258—Letter of April 2, 1936, to Major John F. Conklin on "Radford Hydro Project of Appalachian Electric Power Company, Capacity Curve of Reservoir," by F. W. Scheidenhelm (original exhibit)	3576	2749
Exhibit No. 259—Letter dated April 12, 1932, to Major Fred W. Herman, on New River Power Wave Study, by F. W. Scheidenhelm (original exhibit)	3576	2750
Exhibit No. 260—Letter dated April 20, 1932, to United States Engineer Department, signed by Daniel W. Mead and F. W. Scheidenhelm, re "New-Kanawha River Power Wave Study" (original exhibit)	3576	2750
Exhibit No. 261—Telegram dated December 10, 1930, addressed to F. E. Bonner, Executive Secretary, Federal Power Commission, sent by F. W. Scheidenhelm (original exhibit)	3576	2750
Exhibit No. 263—Letter signed by John F. Conklin, Lt. Col., Corps of Engineers, District Engineer, addressed to Kanawha Valley Power Company, "Kanawha River pool fluctuations resulting from operation of the Marmet and London hydro-plants"	3576A	2750
Exhibit Nos. 264–A, B, C—Aerial photographs of New River from Hinton, W. Va. to Narrows, Va. (original exhibits)	3577	2752
Exhibit No. 265—Document on Report on Application for License, Federal Power Project No. 1175, West Virginia, to Chief of Engineers, U. S. Army, Washington, D. C., dated Feb. 24, 1932, at St. Louis, Mo. (changed to defense exhibit No. 525 as it was already in evidence) (original exhibit)	3577	2752

ecord from D. C. U. S., etc.—Continued.

Plaintiff's exhibits—Continued.	Original	Print
Exhibit No. 266—Dated March 12, 1932, informal comment upon the report of the United States Division Engineer at St. Louis, Feb. 24, 1932, on application of Kanawha Valley Power project No. 1175, West Virginia, by F. W. Scheidenhelm, consulting engineer for applicant (original exhibit)	3577	2752
Exhibit No. 271—Copy of protest to A. E. P. Co. against application of town of Galax, Va., for grant and loan from Government for construction of municipal hydro and diesel engine power plant and distribution system (original exhibit)	3577	2753
Exhibit No. 272—Letter dated April 9, 1932, from George Otis Smith to Mr. Thompson (original exhibit)	3578	2753
Exhibit No. 273—Book of aerial photographs of New River, W. Va., Va., and N. C. (original exhibit)	3578	2753
Exhibit No. 274—An Act approved May 6, 1887, incorporating the New River Steam Boat Company, and authorizing them to operate a steam boat on New River (original exhibit)	3578	2753
Exhibit No. 275—Act of February 3, 1888, of the General Assembly of Virginia, to authorize the Radford Land and Improvement Company to erect a dam across New River (original exhibit)	3578	2753
Defendant's exhibits:		
Exhibit Nos. 500–504—Discharge hydrographs, a wave study of New River (original exhibits)	3579	2753
Exhibit No. 505—Document dated May 9, 1927, New River Development Company—Record for minutes (original exhibit)	3579	2753
Exhibit No. 506—Copy of 7th Annual Report of the Federal Power Commission 1927 (original exhibit)	3579	2753
Exhibit No. 507—Gage recorder chart of Kanawha River at Kanawha Falls, W. Va., for the period July 6 to 13, 1936, incl. (original exhibit)	3579	2753
Exhibit No. 509—House Doc. No. 190, 70th Congress, 1st Session (original exhibit)	3579	2754
Exhibit No. 510—Letter dated Feb. 5, 1927 from Major H. M. Trippe to F. W. Scheidenhelm (original exhibit)	3579	2754
Exhibit No. 511—Letter dated February 4, 1927 from F. W. Scheidenhelm to Major H. M. Trippe (original exhibit)	3579	2754
Exhibit No. 512—House Doc. No. 91, 74th Congress, 1st Session (original exhibit) (same as exhibit 145, a part of which is set forth at fol. 3419 herein)	3579	2754
Exhibit No. 513—Chart—Power Waves on New and Kanawha Rivers (original exhibit)	3579	2754

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued:

	Original	Print
Exhibit No. 514—Letter dated October 29, 1931, from F. B. Duis to F. W. Scheidenhelm re pool levels on Kanawha River (original exhibit)	3580	2754
Exhibits Nos. 515–517, inclusive—Photographs of certain sections of New River (original exhibits)	3580	2754
Exhibit No. 518—Dublin, Va., W. Va., U. S. G. S. Quadrangle sheet	3580A	2754
Exhibit No. 519—Scarborough's New Census Map of Virginia, West Virginia, Maryland, Delaware, and District of Columbia (original exhibit)	3580B	2754
Exhibit No. 520—Map entitled "The Middle Atlantic Group comprising Virginia, West Virginia, Maryland, Delaware, and District of Columbia," published by National Power Survey (original exhibit)	3580B	2755
Exhibit No. 521—Map of Virginia, Maryland, Delaware, and District of Columbia, published by National Map Co., Indianapolis, Indiana (original exhibit)	3580B	2755
Exhibit No. 522—Randall McNally Map of Virginia (original exhibit)	3580B	2755
Exhibit No. 523—Map entitled "Commonwealth of Virginia, State Highway System, State Highway Commission, July 1936" (original exhibit)	3580B	2755
Exhibit No. 524—Map of Giles County, Commonwealth of Virginia, Department of Highways, Richmond, Va. (original exhibit)	3580B	2755
Exhibit No. 525—Copy of a report on application for license, Federal Power Project No. 1175, W. Va., dated Feb. 24, 1932 (original exhibit)	3580B	2755
Exhibit No. 526—Photograph of Shumate Falls (original exhibit)	3581	2755
Exhibit No. 527—Map dated 11/21/1912. Reconnaissance Map of New River from Hinton, W. Va., to Radford, Va., compiled under direction of Major F. W. Alstaetter. (Same as original exhibit 558–G)	3581	2755
Exhibit No. 528—Report of Major Craighill, Corps of Engineers, U. S. A. dated April 17, 1891	3583	2755
Exhibit No. 529—Letter dated February 4, 1930, addressed to Federal Power Commission, signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle	3589	2760
Exhibit No. 530—Memorandum, re Federal Commission's authority to adopt a policy of issuing a minor part license for projects located on non-navigable streams and not involving the use of any land or other property of the United States, dated February 4, 1930	3589C	2762

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 531—Photostatic copy of letter dated July 21, 1930, addressed to Attorney General of United States and signed Patrick J. Hurley, Secretary of War	3589LL	2779
Exhibit No. 532—Document dated September 22, 1930, addressed to the President and signed by Wm. D. Mitchell, Attorney General. "The following opinion of the Attorney General was released by the Federal Power Commission, Sept. 26, 1930."	3589PP	2781
Exhibit No. 533—Letter of October 6, 1930, to Federal Power Commission signed Appalachian Electric Power Company, by Curtis, Mallet-Prevost, Colt & Mosle	3589YY	2787
Exhibit No. 534—Photostat copy of letter of October 16, 1930, to Federal Power Commission, signed—A. E. P. Co. by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3589ZZ	2788
Exhibit No. 535—Letter dated November 7, 1930, from War Department, Office of Chief of Engineers, to F. P. C. Exec. Secy. signed for Chief of Engineers by Major J. J. Kingman	3589AAA	2788
Exhibit No. 536—Letter dated October 31, 1930, from F. E. Bonner to A. E. P. Co. re Project No. 739 (original exhibit)	3589BBB	2789
Exhibit No. 537—Letter from F. P. C. to A. E. P. Co., dated November 6, 1930, signed by F. E. Bonner, Executive Secretary, and revised draft of minor-part license	3589CCC	2789
Exhibit No. 538—Photostatic copy of letter of November 8, 1930, to General Brown, Chief of Engineers, and signed by F. E. Bonner, Executive Secretary	3590	2790
Exhibit No. 539-A—Letter by Federal Power Commission of December 15, 1930, signed by F. E. Bonner, Executive Secretary to Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3590A	2795
Exhibit No. 539-B—"Inclosure 7992, from Federal Power Commission, U. S. Government Printing Office 1927." Marked copy. War Department office of Chief of Engineers, Washington, 11/11/1930, addressed to Federal Power Commission, signed "Lytle Brown, Major General, Chief of Engineers"	3592	2795
Exhibit No. 540-A—Letter dated 11/28/1930 from F. E. Bonner, Exec. Secy. of F. P. C. to A. E. P. Co. (original exhibit)	3593	2796
Exhibit No. 540-B—Certified copy of action of the Federal Power Commission upon application of the defendant for Minor Part license (original exhibit)	3593	2796

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 541—Memorandum dated October 28, 1930 for the Exec. Secy., signed M. C. Tyler, Lt. Col. Corps of Engineers, Chief of Engineers	3593A	2796
Exhibit No. 542—Copy of letter dated 11/8/1930 to F. E. Bonner from F. W. Scheidenhelm	3593L	2806
Exhibit No. 543—"Maneuvers of dams on Kanawha River during wave test, 1930" (original exhibit)	3593M	2806
Exhibit No. 544—"Report of Power Waves, New and Kanawha Rivers" (original exhibit)	3593M	2807
Exhibit No. 545—Location map	3593N	2806A
Exhibit No. 546—Certificate for W. R. Hundly, East Radford, Va. (omitted)	35930	2807
Exhibit No. 547—Four pages; namely, page 848 of the Congressional Record for January 10, 1901; page 1001 of the Congressional Record for January 14, 1901; page 1002 of the Congressional Record for January 14, 1901; and page 1096 of the Congressional Record for January 16, 1901	3595	2807
Exhibit No. 548—Map—"Railroads in relation to New River"	3603	2812A
Exhibit No. 549—Album of photographs (original exhibit)	3605	2813
Exhibit No. 550—Map "Geological Map of the New River, Cripple Creek region, showing the approximate location of ore openings and properties tributary to the Cripple Creek Extension of the Norfolk and Western Railroad, by E. N. D'In-Villiers, Geologist, 1887" (original exhibit)	3605	2813
Exhibit No. 551—Letter addressed to Dr. J. E. Williams, Dean at V. P. I., Blacksburg, Va., dated February 2, 1936, and signed by R. J. Noell (original exhibit)	3605	2813
Exhibit No. 552—Carbon copy of a letter dated March 2, 1926, addressed to Hon. R. J. Noell, East Radford, Virginia, and without signature except "Dean of the College" and bearing the initials "JEW" (original exhibit)	3605	2813
Exhibit No. 553—Letter dated March 4, 1936, from R. J. Holden, Professor, of Virginia Polytechnic Institute, Department of Geology, Blacksburg, Virginia, addressed to Hon. R. J. Noell, East Radford (original exhibit)	3605	2813
Exhibit No. 554—Album, together with the identification map and the 60 photographs of New River (original exhibit)	3605	2814
Exhibit No. 555—Map showing locations of photographs, and photographs Nos. 114 to 127, inclusive, of New River (original exhibit)	3605	2814

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 556—Annual report of the President and Directors of the Board of Public Works to the General Assembly of Virginia, in pursuance of an act, entitled "An act creating a fund for internal improvements" (original exhibit)	3605	2814
Exhibit No. 557—Pages 140 and 141 of the Journal of the Virginia House of Delegates for 1817–18 containing a portion of the report of the House Committee on roads and inland navigation brought in on January 21, 1818 (original exhibit)	3605	2814
Exhibit Nos. 558–A–558–G—Map dated November 21, 1912, survey made by Major F. W. Alstaetter, Corps of Engineers. Sheets 1 to 7, inclusive, of the Alstaetter map dated November 21, 1912, marked, respectively, 558–A to 558–G (original exhibits)	3606	2814
Exhibit No. 559—Pages from the Report of the Chief of Engineers for 1875	3606–A	2814
Exhibit No. 560—Report of Chief of Engineers, 1887	3607	2823
Exhibit No. 561—Report of the Chief of Engineers for the year 1888, pages 225, 226, 1760, 1761 (original exhibit)	3612	2832
Exhibit No. 562—Report of the Chief of Engineers for the year 1889, pages 261, 262, 1961, and 1962 (original exhibit)	3612	2832
Exhibit No. 563—Report of the Chief of Engineers for the year 1890, pages 235, 236, 2249, 2250, 2251 (original exhibit)	3612	2832
Exhibit No. 564—Report of Brigadier General Casey, Chief of Engineers, United States Army, to the Secretary of War, dated November 16, 1894, to which is attached a third endorsement by Col. Craigbill's underlying report, and also a second endorsement	3614	2832
Exhibit No. 565—Letter from the Secretary of War dated Dec. 16, 1903, transmitting letter from Chief of Engineers including report made by him on New River	3618	2835
Exhibit No. 566—Memorandum to the Secretary of War by Gen. Black, Chief of Engineers, dated May 19, 1916	3623	2840
Exhibit No. 567—Page 1284 of the Annual Reports of the Chief of Engineers of the War Department, year 1917 (original exhibit)	3634	2849
Exhibit No. 568—Copy of letter dated July 1, 1925, addressed to Mr. C. Bascom Slemp, and signed by O. C. Merrill, Executive Secretary of Federal Power Commission	3634–A	2849

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 569—Letter dated July 3, 1925, addressed to Honorable O. C. Merrill, Exec. Secy., F. P. C., Washington, D. C. and signed by C. B. Slemp (original exhibit)	3634–B	2850
Exhibit No. 570—Letter dated October 24, 1925, addressed to the Federal Power Commission, Washington, D. C., and signed by Curtis, Mallet-Prevost, Colt, and Mosle	3634–C	2850
Exhibit No. 571—Letter of October 24, 1925, addressed to Major General Harry Taylor, Chief of Engineers, War Department, Washington, D. C., signed by Curtis, Mallet-Prevost, Colt & Mosle, as counsel for the Appalachian Electric Power Co., or its predecessors	3634–D	2851
Exhibit No. 572—Report of Major General Taylor, Chief of Engineers, dated December 29th, 1925, addressed to the Executive Secretary of the Federal Power Commission, Washington, D. C. (text of this exhibit is same as Government Exhibit No. 97) (original exhibit)	3604–E	2851
Exhibit No. 573—"Defendant's Exhibit No. 505" identified by Col. Edgerton as a part of the minutes subsequently printed as the minutes of the meeting of June 1, 1927 (original exhibit)	3635	2851
Exhibit No. 574–A—Photostat of letter of July 1, 1927, from Federal Power Commission, addressed to Curtis, Mallet-Prevost, Colt & Mosle, signed by O. C. Merrill, Executive Secretary bearing reference "Ep–739–VA Appalachian Electric Power Company"	3635–A	2852
Exhibit No. 574–B—Certified copy of a part of the minutes of the 88th meeting of the Power Commission held on the first day of June 1927	3635–B	2852
Exhibit No. 574–C—"Federal Power Commission, Washington, D. C. License on Navigable Waters, Project No. 739, Virginia, Appalachian Electric Power Co." with it is a form of license consisting of 16 pages (original exhibit)	3635–C	2853
Exhibit No. 575—Letter dated March 1, 1928, to Hon. Dwight F. Davis, Secy. of War, Hon. Hubert Work, Secy. of Interior, Hon. Wm. N. Jardine, Secy. of Agriculture, constituting the Federal Power Commission, and signed A. E. P. Co., by Curtis, Mallet-Prevost, Colt & Mosle (original exhibit)	3635–D	2853
Exhibit No. 576—Letter dated March 5, 1930, to Lt. Col. M. C. Taylor, Chief Engineer, Federal Power Commission, Interior Building, Washington, D. C., and signed by F. W. Scheidenhelm (original exhibit)	3635–D	2854

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 577—Photostatic copies of pages 6, 7, 8, and 9, of the Tenth Annual Report of the Federal Power Commission for the year 1930	3635-E	2854
Exhibit No. 578-A—Letter dated October 3, 1930, to Gen. Brown, Chief of Engineers, and signed by F. E. Bonner, Exec. Secy. (original exhibit)	3636	2857
Exhibit No. 578-B—Letter dated October 10, 1930, to the Exec. Secy., F. P. C., Washington, D. C., signed for the Chief of Engineers, by Hugh J. Casey, First Lieut. Corps of Engineers (original exhibit)	3636	2857
Exhibit No. 579-A—Photostatic copy of letter dated November 5, 1930, to Exec. Secy., F. P. C. and signed by Lytle Brown, Major General, Chief of Engineers	3638	2857
Exhibit No. 579-B—Photostat of report entitled "Second endorsement U. S. E. O. Huntington, W. Va., Oct. 18, 1930, Div. Engineer, Upper Miss. Valley Division, St. Louis, Mo., signed by Major Herman, District Engineer."	3638	2857
Exhibit No. 579-C—Photostat copy of report on navigability of New River, Va. (Huntington District, August 29, 1930). Third endorsement office, Division, Engineer, Upper Miss. Valley Div., St. Louis, Mo., October 24, 1930, to Chief of Engineers, U. S. Army, Washington, and signed George R. Spalding, Lt. Col. Corps of Engineers	3638	2857
Exhibit No. 580—Memorandum dated October 21, 1930, entitled "Memorandum for Exec. Secy." and signed by J. F. Lawson, acting Chief Counsel (original exhibit)	3647	2865
Exhibit No. 581—Document dated October 30, 1930, entitled "Memorandum for the Sec. of Int., Acting Chairman," and signed by F. E. Bonner, Exec. Sec	3647-A	2865
Exhibit No. 582—Photostatic copy of letter dated November 8, 1930, to Hon. John G. Pollard, Gov. of Va., and signed by F. E. Bonner, Exec. Sec	3647-C	2866
Exhibit No. 583—Photostat of letter from Hon. John Pollard, Gov. of Va., to Mr. F. E. Bonner, Exec. Sec., F. P. C., dated Nov. 10, 1930	3647-D	2867
Exhibit No. 584—Letter Jan. 27, 1931, from Curtis, Mallet-Prevost, Colt & Mosle to F. P. C. re Project #739 (original exhibit)	3647-E	2867
Exhibit No. 585—Telegram dated January 28, 1931, from F. P. C., signed by George Otis Smith, Chairman, addressed to A. E. P. Co. (original exhibit)	3647-E	2867
Exhibit No. 586—Photostat of letter dated September 18, 1934, to Sec. of War, Washington, D. C., and signed by A. E. P. Co., by George N. Tidd, President	3647-F	2868

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 587—Photostatic copy of letter dated October 9, 1934, to A. E. P. Co. and signed by G. H. Dern, Secy. of War	3647–I	2871
Exhibit No. 588—Letter dated October 18, 1934, to Hon. George H. Dern, Sec. of War, and signed by George N. Tidd, President A. E. P. Co	3648	2871
Exhibit No. 589—Letter dated September 18, 1934, to Hon. Frank R. McNinch, Chairman, F. P. C., signed by Appalachian Electric Power Company, by George N. Tidd, President (original exhibit)	3648–B	2873
Exhibit No. 590—Letter dated October 19, 1934 to Frank R. McNinch, Chairman, F. P. C., without signature but counsel for both sides agreed that it was signed by I. F. Millikan, General Counsel of the Company (original exhibit)	3648–B	2873
Exhibit No. 591—Photostatic copy of letter to M. F. Millikan, American Gas and Electric Company, signed by G. W. Dineweaver, Secretary, Federal Power Commission, dated October 23, 1934 (original exhibit)	3648–B	2873
Exhibit No. 592—Map showing locations of certain photographs from 61 to 118, both inclusive, of New River (original exhibit)	3648–B	2873
Exhibit No. 593—Paper on which Prof. Thomas drew sketch of wave	3648–D	
Exhibit No. 594—Hydrograph representing a possible hydrograph of operation of the A. E. P. Co. plant during a rather severe peak load operation, showing the discharge from the plant in cubic feet per second at various hours of the day	3649	2874A
Exhibit No. 595—Chart showing a wave drawn during presentation of testimony of Prof. Thomas	3651	
Exhibit No. 596—Diagram of triangular wave prepared by Prof. Thomas	3651–A	2874B
Exhibit No. 597—Diagram by Prof. Thomas pertaining to principle of integrating model	3651–B	2874C
Exhibit No. 598—Diagram by Prof. Thomas showing reduction of Waves	3651–C	2874D
Exhibit No. 599—Chart upon which Dr. Mead made diagram in connection with his testimony, pertaining to stream flow (original exhibit)	3651–D	2874
Exhibit No. 600—Chart bearing legend, "Profile New and Kanawha Rivers to Forks of New River and North Carolina to Ohio River, showing existing and and proposed power developments"	3652	2874F

Record from D. C. U. S., etc.—Continued.

Defendant's exhibits—Continued.

	Original	Print
Exhibit No. 601—House Document No. 306, 74th Congress, First Session, entitled "Ohio River, letter from the Sec. of War transmitting, pursuant to Section 1 of the River and Harbor Act approved January 21, 1927, and Section 10 of the Flood Control Act, approved May 15, 1928, a letter from the Chief of Engineers, United States Army, dated August 14, 1935, submitting a report, together with accompanying papers and illustrations containing a general plan for the improvement of the Ohio River for the purposes of navigation and efficient development of its water power, the control of floods, and the needs of irrigation" (original exhibit)	3654	2874
Exhibit No. 602—This exhibit is the Table 45, Appendix A, referred to in the paragraph 263, page 146, of exhibit 601. The appendices to the reports otherwise embodied in House Document No. 306 (being exhibit 601) were not printed as part of that document (original exhibit)	3654–A	2874
Exhibit No. 603—Photostat of cover page of document entitled "The Ohio River Chart, drawings and description of features affecting navigation, navigable depths and tables of distances for [illegible] tributaries, compiled under the direction of [illegible] Chief of Engineers, United States Army," and also photostat of page 267 of that document (original exhibit)	3654–B	2874
Exhibit No. 604—Copy of letter dated June 13, 1936, from Mr. Baker to the late Sec. of War, Mr. Dern (original exhibit)	3654–C	2874
Exhibit No. 605—Reply of S. D. Embick, Acting Secretary of War, to Mr. Baker, dated June 22, 1936 (original exhibit)	3654–C	2874
Exhibit No. 606—Letter dated June 26, 1936, from Hon. John Paul to Secretary of War (original exhibit)	3654–C	2875
Exhibit No. 607—Letter dated July 17, 1936, to the Hon. John Paul, from Mr. Woodring, Acting Sec. of War (original exhibit)	3654–C	2875
Exhibit No. 608—Letter dated June 26, 1936, from Col. Conklin, addressed to the Kanawha Valley Power Company (original exhibit)	3655	2875
Exhibit No. 609—Letter dated July 10, 1936, to U. S. District Engineer Office, Huntington, W. Va., signed by Kanawha Valley Power Company, Graham Claytor, Vice President, subject "Kanawha River Pool Fluctuations resulting from operation of the Marmet and London Hydroplants"	3655–A	2875

Record from D. C. U. S., etc.—Continued.		
Defendant's exhibits—Continued.	Original	Print
Exhibit No. 610—Letter dated July 28, 1936, from the War Dept., United States Engineer Office, Huntington, W. Va., addressed to Col. F. W. Scheidenhelm, and signed by John F. Conklin, Lt. Col.. Corps of Engineers, District Engineer (original exhibit)	3655–C	2877
Exhibit No. 611—Executive Order No. 6251, dated Aug. 19, 1933 (set forth in full at fol. 2900 hereof)	3655–D	2877
Memorandum required by Rule 14, Section 7	3656	2877
Clerk's certificate [omitted in printing]	3657	
Proceedings in the United States Circuit Court of Appeals for the Fourth Circuit	3658	2878
Docket entries	3658	2878
Appearance for appellee	3658	2878
Appearance for appellant	3658	2878
Argument of cause	3660	2880
Opinion, Chesnut, J	3661	2880
Dissenting Opinion, Parker, J	3718	2922
Decree	3745	2943
Order staying mandate	3745	2943
Order as to use of original transcript of record	3747	2944
Clerk's certificate [omitted in printing]	3748	2944
Order allowing certiorari	3749	2944
Stipulation as to printing of record	3750	2945

2437 HAROLD A. THOMAS

CROSS EXAMINATION

Q. You spoke yesterday, I believe, about the wave from the Radford project being a 24-hour wave?

A. By that I meant in ordinary times such a tide or wave would be released once every 24 hours.

Q. Now, what would be the more forceful—a series of waves going down the river, one following the other, or an isolated wave, so far as the effect on conditions down the river are concerned?

A. I don't know what you mean by the word "Forceful" in that connection?

Q. Well, have power?

A. Do you refer to the amplitude?

Q. Yes—persistence, greater amplitude?

A. I would say an individual wave would have greater amplitude than individual waves of a series.

Q. And would it persist in volume more than a series of waves?

A. I think there would be a tendency for it to persist in volume more. I may qualify that by saying I think an individual wave would be detectable further down the river than the waves of a series. Its rate of reduction in volume, however, might be greater than the rate of reduction of any wave of a series.

Q. That being true, if the project were closed down on, let us say, Saturday afternoon, that last wave would be an isolated wave, would it not?

A. No, I would not call it an isolated wave, since it is adjacent to the Friday wave.

Q. How about the Monday. wave, would that be an isolated wave, the first wave going down? 2438

A. No; that would be adjacent to the Tuesday wave.

Q. How would you describe an isolated wave? Under what conditions would an isolated wave arise?

A. Under conditions such as if the plant at Radford had been shut down for a considerable number of days, and then opened up, and then shut down for a period of days.

Q. Monday's wave would not overlap on Friday's wave, would it?

A. You are referring to a one-day shut-down?

Q. A shut-down of a day and a half—from Saturday noon until Monday morning?

A. Under those conditions it would overlap slightly.

Q. But very slightly, wouldn't it?

A. Rather slightly.

Q. If you had a holiday on Monday, like Labor Day, and you had Sunday and Monday and half of Saturday, there would not be any overlapping?

A. The overlapping would be slight.

Q. But there would still be overlapping?

A. I think the effect of a large wave is perceptible for several days, though smaller.

Q. When did you set up this integrating model that you spoke of for the Bluestone?

A. Late in July.

Q. Of this year?

A. Yes.

Q. How late in July?

A. I can't remember clearly on that. During the latter part of July.

Q. And, up to that time, had you ever been up New River?

A. No.

2439 Q. Was it after you set up this model that you came to New River?

A. Yes.

Q. How much time after you set up the model?

A. Oh, my impression is two or three weeks.

Q. So that would have put you over into August, wouldn't it?

A. Yes.

Q. Is that since you came here to Roanoke and this stay here in Roanoke?

A. I made a trip to Roanoke, and from thence went to Charleston and spent a day or two along the Kanawha River; then returned to Pittsburgh, and then returned to Roanoke about a week ago.

Q. But you had made some of your tests before you came here the first time?

A. A part of the tests.

Q. Describe to the Court this integrating model? Is that it, an integrating model?

A. I call it an integrating model. The integrating model that I constructed of the Bluestone reservoir was made of sheet metal; it was about four feet long and eight inches deep, and three and a half inches at the widest part, which corresponded with the crest of the Bluestone dam. It was the general shape of the Bluestone reservoir with the distorted scales. The vertical scale was not the same as the horizontal scale——

Q. (Interposing.) What was the vertical scale?

A. I did not finish my answer.

Q. All right.

A. The vertical scale was not the same as the longitudinal scale, and the breadth scale was not the same as the other two scales. The model did not represent the Bluestone River reservoir exactly, but approximately. I constructed the model to guide my
2440 own judgment and to check my methods in studying the
1930 series of waves and to check my analysis of the seiches, which might be caused in Bluestone reservoir.

Q. Then you did not construct this model simply for the purpose of assisting the Government in the Bluestone reservoir?

A. No; it had no connection with that.

Q. You constructed it to make sure of your studies?

A. To make sure that my conclusions were correct in this case.

Q. I thought you said Carnegie had been employed (and you as its head) to make a study of the Bluestone entirely aside from the question of this law suit?

A. Yes; we are constructing several models pertaining to the Bluestone for the United States Government. This was something entirely different.

Q. What was the length of this model longitudinally?

A. About four feet.

Q. And that four feet represented 36 miles, didn't it?

A. Yes.

Q. And that 36 miles is the extent up the river that you expect the pools at its head to be?

A. I would like to correct my last answer, in that it represents 30 miles at elevation 1,490. The 36 miles is at an elevation of 1,520.

Q. That 1,490 is the height at which the pool would be filled when there is usable storage, isn't it?

A. Yes; as I understand it.

Q. What was the width of the river that you had for this model?

A. I do not have that figure in mind now, but I obtained
2441 it from United States Geological Survey maps.

Q. What did you reduce the width to?

A. I had a width scale, which I do not have in mind now. It gave the width of the river, of the water, of about one inch, but I would not say it was exactly one inch.

Q. What did you figure the width of the river to be where you had the dam site?

A. I don't have that figure in mind now, but I scaled it on the geological survey map.

Q. Can you give it in percentage as compared with the longitudinal measure?

A. I do not like to give those percentages offhand, but in general——

Q. (Interposing.) Have you any data here that could help you?

A. I think I could look up and probably find my scale figures, and I might say that the scale is such that longitudinally 30 miles is represented by something a little less than 48 inches. Transversely, a half mile will represent roughly the maximum width of the Bluestone reservoir near the dam, and is represented by three and a half inches.

Q. What is the vertical proportion?

A. The depth of the reservoir, which is 125 feet, approximately, was represented by about eight inches.

Q. Well, would not, or would, that make your proportion about 100 to 1 with respect to the vertical and the longitudinal?

A. No; all three scales were different—vertical, longitudinal and transverse.

Q. Wasn't the width distorted in the ratio of about 100 times the depth?

2442 A. I can figure that, if you want me to.

Q. All right.

A. (Witness makes calculation.) According to my figures, the width scale is about 45 times the depth scale. According to my figures, the breadth scale is in the vicinity of one in nine thousand.

Q. How about the length scale?

Mr. Jackson. Is that the relationship between the breadth and the depth scale, or is it a comparison of the distortion of the two scales?

Witness. I put it both ways.

Mr. Jackson. Let me have those again.

Witness. In round numbers the breadth scale is one in nine thousand and the height scale is one in two hundred.

By Mr. Thompson:

Q. Have you given the distortion of the lengths in relation to the depth?

A. In round numbers the length scale is about one in forty-five thousand.

Q. Now, then, what is the relationship of the lengths to the depth scale?

A. That is 200 to 45 thousand which would be 1 to 225.

Q. And that was a distortion, was it, of about 225?

A. Yes.

Q. So you relied on a model in which one dimension was exaggerated 225 times with respect to another?

A. Yes. That sort of exaggeration is peculiar——

Q. (Interposing.) Now, I didn't say——

A. By the term "integrating model" I mean a model in which such distortions are present and in which the model is not
2443 a scale model of the river.

By Mr. Thompson:

Q. So, any result you got there, you would have to follow it up with mathematical refinement to a very great degree, wouldn't you?

A. There has to be a mathematical analysis relating the action of the integrating model to the action of the prototype—that is the actual river or reservoir. The principles of such an analysis are recognized and definite and reliable.

Q. What was the volume of the reservoir in your model?

A. Oh, I don't have that figure in mind.

Q. Do you know what the width of the reservoir was in the model?

A. The maximum width was 3½ inches.

Q. 3½ inches?

A. Yes.

Q. Your model in appearance in no way represented the prototype, did it?

A. No, not at all.

Q. Your results are subject to individual interpretation and approximation, aren't they?

A. I should say so, yes.

Q. So that one person might read these results in one way and another person in an entirely different way?

A. Competent persons who would understand the principles involved would get reasonably equivalent results.

Q. That is your opinion?

A. Yes.

Q. It involves a matter of judgment, too, doesn't it?

A. Yes.

Q. This model of yours, did it extend down the river beyond the dam?

A. No.

2444 Q. Why didn't you extend it down the river?

A. It was made simply to study the effect of seiches on the Bluestone reservoir.

Q. And nothing beyond that?

A. No.

Q. Then it had no use, or, I believe you testified, that you used it in your comparison of a study of the 1930 wave itself?

A. Not that model. That was another model.

Q. You had another model then?

A. Yes. I had three models in connection with the studies in this case.

Q. How about the other model? Did that extend all the way down the river?

A. Yes, I had one model extending all the way down the river.

Q. From where to where?

A. From Byllesby to London. The model was built from Byllesby to Winfield, but I did not fully complete the part from London to Winfield.

Q. How long was that model?

A. Approximately 50 feet.

Q. And representing what length?

A. It represented the length from Byllesby to Winfield. According to my memory, in a rough way that distance is 200 miles.

Q. What were your other dimensions?

A. The scales on that model were: Vertical scale, 1 to 100; longitudinal scale, 1 to 30,000; and transverse scale, 1 to 5,000.

Q. And you did not have the Bluestone dam in that model, did you?

A. No.

2445 Q. Is that what you call an integrating model?

A. Yes, that is what I call an integrating model.

Q. The distortion in that model was 300 in length to depth, wasn't it?

A. Yes.

Q. And, in other words, the exaggeration of the length was 300 times that of the depth?

A. Yes.

By Mr. Jackson:

Q. "Exaggeration;" what does that mean increase or decrease?

A. By that I mean the ratio of the length scale to the depth scale is in the ratio of 300 to 1.

By Mr. Thompson:

Q. What was the bed of the stream composed of?

A. Wood.

Q. And it was perfectly smooth, was it?

A. No.

Q. How was it fixed?

A. It was roughened.

Q. Who advised you how to fix the bed of stream up in a rough way? Where did you get your information?

A. No one advised me.

Q. You had not been up here when you made the model?

A. No, but I had rating curves of the river at various gaging stations.

Q. Would those rating curves give sufficient accuracy to know the channel resistance?

A. Yes, they gave me the information to determine the channel resistance or roughness.

Q. Were they U. S. G. S. curves?

A. I don't know where they were obtained originally.

2446 Q. Where did you obtain them?

A. I obtained them in Mr. Schiedenhelm's office, in New York. I do not know the original source of those rating curves except from conversation that some of them were obtained from United States Engineers.

Q. Will you produce those?

A. I can produce them in two forms—either by copies of the notes furnished me or the originals furnished me.

Q. Well, let us have the originals.

A. (The witness procures papers.)

Q. May I see them, please?

(The papers are handed to Mr. Thompson.)

Q. You used how many stations?

Mr. **Jackson**. What are the curves that were handed over?

Mr. **Gatchell**. New River at Ivanhoe December 15, 1930;
New River at Ivanhoe August 11, 1927;
New River at Allisonia September 26, 1929;
New River at Dam Site A August 6, 1927;
New River at Eggleston October 1, 1920;
New River at Eggleston October 1, 1920;

Mr. **Jackson**. Are they duplicates?

Mr. **Gatchell**. Evidently.
New River at Eggleston October 20, 1914, to September 30, 1920;
New River at Glen Lyn August 10, 1927;
New River near Hinton December 1, 1923;
New River near Hinton without date;
Kanawha River at Kanawha Falls, West Virginia, October 27, 1928, to September 30, 1931.

All of the tables which I have just listed are tables prepared in the United States Geological Survey Water Resources Branch.

There was also handed over a rating curve for New River at Caperton, West Virginia, without date, prepared in the office of the United States Geological Survey, Water Resources Branch.

By Mr. **Thompson**:

Q. Did you have any more rating curves than these?

A. I don't think so.

Q. So what you had were rating curves at Ivanhoe, Radford, Eggleston, Hinton, Caperton, and Kanawha Falls; is that correct—and Allisonia?

A. And Allisonia.

Witness. How about Glen Lyn?

Mr. **Jackson.** Glen Lyn was listed.

Witness. Rating curve at Lock No. 2 was furnished me, but I made no use of it.

By Mr. **Thompson**:

Q. These were all U. S. G. S. data, were they not?

A. Yes.

Q. So you were depending upon—Mr. Schiedenhelm gave you the data from the U. S. G. S. to make all those figures?

A. Yes.

2447 Q. He apparently relied on those figures, didn't he, when he gave them to you?

A. So far as I know.

Q. And you did, too, didn't you?

A. Yes; I considered them reasonably accurate, or approximately accurate, with the ordinary accuracy of such studies.

Q. Now, I believe some of these are figures taken 15 years ago, aren't they, of these data?

A. I did not make a mental note of those dates as you just read them.

Q. The one at Eggleston is dated from October 20, 1914, to September 30, 1020. There may have been records much later than those?

A. Possibly. I don't know.

Q. Are they not frequently changing the records, gathering new data, and so forth?

A. At some stations they do, and at others not.

Q. Did you use this one at Eggleston from October 20, 1914, to September 30, 1920?

A. Yes.

Q. Then you have one here at Eggleston from October 1, 1920, to blank; do you what the blank was?

A. No.

Q. So you were not any more careful than that. You took what was given you?

A. As I explained, this model was built to guide my own judgment. I did not consider it a model to report results with a high degree of precision.

Q. You were coming here to testify on the basis of this
2448 model, and you made all your assertions on the basis of the model?

A. No; my study was made of various things, including the model.

Q. You had not seen the physical condition of the river prior to studying the model, had you?

A. No; but I had seen the rating curve and the results of the 1930 wave tests.

XQ. Do you know anything about boulders down in that river bed, or did you, when you made this model?

A. I had no detailed information about boulders. I realized it was a rough river by the nature of the data I had on it.

XQ. How did you indicate this in the channel of the river in the model?

A. By adjusting the roughness so as to make the rating curves of the model agree with the rating curves of the river.

XQ. Do you put anything of a physical characteristic of the bed on the model?

A. Yes, sir.

XQ. What do you put?

A. Little sheet metal baffles which are inserted in the bed and walls of the channel, and which can be adjusted in and out of the slots to reproduce the correct roughness of the prototype.

XQ. How do you know about this roughness?

A. From the rating curves of the river.

XQ. And that is the only way you do it?

A. Yes, sir.

XQ. Do you know where Sandstone Falls are?

2449 A. Yes, sir.

XQ. Did you represent Sandstone Falls?

A. I adjusted the roughness of the model at the nearest gaging station upstream, which was near Hinton, and at the nearest gaging station below, which was Caperton.

The baffles near Hinton and Caperton were moved in and out until the model gave the correct rating curve at those stations.

I then ran tides down the model corresponding to the 1930 tides and checked the change in the profiles at those tides, and then adjusted the baffles between gaging stations so the model would reproduce the profile or hydrographs of the 1930 tides.

XQ. What was the fall at Sandstone Falls that you adjusted this to?

A. I did not show Sandstone Falls in that model, but just the general friction between Hinton and Caperton.

XQ. Isn't that simply theoretical judgment on your part?

A. An integrating model satisfies the mathematical requirement, it does not have to represent the river exactly. It is not a true scale model.

X Q. Aren't you exercising your own personal judgment, when you sit in a room with the model, adjusting and readjusting it?

A. Two persons expert in that work would arrive at the same result.

X Q. They would if they used the same judgment, wouldn't they? But wouldn't a man who had been over the river, and familiar, like Col. Scheidenhelm is with the river down in the gorge, have had a judgment far better than yours and more accurate in attempting to regulate the bed of the river on this model?

A. No. If I was to build it again it would be the same way, I would do it just the same way.

2450 X Q. You don't think any number of trips on the river, or knowledge of the geology would help you?

A. No; because the fundamental data is the rating curve and wave test.

X Q. Then you throw yourself back absolutely on the rating curves?

A. And the wave tests and the profile and cross sections of the river.

X Q. On the rating curves you take the Geological Survey figures absolutely?

A. Yes, sir.

X Q. And depend on those entirely in that respect?

A. Yes, sir.

X Q. You don't question them at all?

A. I realize the Geological Survey figures are obtained by the use of current meters involving errors in the order of 5%, and occasionally more.

X Q. Now you adjusted the model until it gave the right answer, didn't you?

A. It showed—I reproduced certain waves of the 1930 series sent directly down the river.

X Q. At these various points you speak of?

A. Yes, sir.

X Q. Doesn't your result then only approximate the results on the river at the six stations selected by you?

A. I would hardly know what you mean by that.

X Q. You get only an approximate result?

A. I don't claim perfect precision on those results, but approximate.

2451 X Q. It doesn't give any indication of conditions between those six stations?

A. Yes, sir; something gives me indications of conditions between the stations, and that is the actual waves of the 1930 series.

X Q. So you have to come back each time to the 1930 series?

A. Yes, sir.

X Q. I want to get clear how many visits you have made to New River. When did you first see New River?

A. The first visit I made to New River?

X Q. When was that?

A. I guess about two weeks ago. I don't remember the date.

X Q. Where did you first see it, at what point?

A. At Radford.

X Q. And what time did you start from Radford?

A. Oh in the early morning.

X Q. And you were traveling by automobile?

A. Yes, sir.

X Q. Where did you go?

A. I crossed the New River at Radford—I started from Roanoke early in the morning, and crossed the New River at Radford, and went upstream to the Radford dam site and inspected that, and went from there to the Narrows, followed the river from the Narrows to Glen Lyn, and then along the bank of the river on a dirt road from Glen Lyn to Bull Falls, where I ferried across and followed the bank of the river to Hinton.

X Q. That describes somewhat the trip Mr. Putnam took. Were you with him?

A. No. I hadn't completed my answer. I then at Hinton took a road which crossed the river at Hinton and went through the mountains, behind the left bank of the river, and crossed the river again at a bridge a mile or so below the Hawks Nest
2452 hydroelectric plant. I then went up to the Hawks Nest
plant and visited that and came back to the river and visited the power-station of the Hawks Nest plant and followed the river down from Glen Ferris and visited that station.

X Q. Was this all in one day?

A. No, it was not. I spent a night at a little town called Mount Hope, between Hinton and Charleston.

X Q. How many miles did you cover that day?

A. The rest of the trip was from Glen Ferris to Charleston. I spent the night at Charleston and came up the river again and spent the next day at the London and Marmet plant.

X Q. How many miles did you travel the first day?

A. The first day, going from Roanoke to Mount Hope I don't have a record of the mileage.

X Q. Several hundred, was it not?

A. I don't think so. My feeling is I went about a couple hundred of miles that day.

X Q. A great part of the time you were not in sight of New River, were you?

A. No.

X Q. So you only saw a few spots on the river from the project site down to Hawks Nest?

A. I was practically in continuous view of the river between Glen Lyn and Hinton, about thirty-six miles.

X Q. But up above that, there was about thirty miles you didn't see the river?

A. Yes.

X Q. These are the only times you have seen the river?

A. Yes, sir.

X Q. And when you made this experiment down at the London and Marmet dam, how long were you on that?

2453 A. During two days.

X Q. You were there two days?

A. Yes, sir.

X Q. Did you make the experiment or did someone make it for you?

A. The actual operating of the plant was done by the operatives, however, I laid out the test and directed the volume of water to be run through the plant, through successive hours.

X Q. That is the only time you ever made a test of that kind in your life?

A. Yes.

X Q. The only time you ever saw a test of that kind made?

A. So far as I know it is the only time a test of exactly this kind has ever been made.

X Q. Let us refer for a moment to Defendant's Exhibit #594. Do you have a copy of that?

A. I have the original which I picked up off the floor last night, marked for identification.

X Q. That curve is constructed on the basis of a 9,000 second-foot wave, is it not?

A. Yes, sir; a wave with that peak.

X Q. And you understand that is the way this Radford project is to operate?

A. I understand this is a possible way for it to operate.

X Q. It is possible for the Radford project to operate on a peak load of 9,000 second-feet part of the day and close down for the rest of the day in low water time?

A. Yes, sir.

X Q. And you understand this is the way it will operate from time to time?

2454 A. In this approximate way.

X Q. Now I notice first of all it says "Week day operation," that would indicate, would it not, there would be a different operation on Sundays and on holidays?

A. I should say so.

X Q. Then "3. Carrying reasonably allocated portion of A. E. P. Co. system load." What is the A. E. P. Co. system load let us say in October or November of any year, or taking 1935 for an example?

A. I can't answer that. I do not know what their total system load is. I have seen curves of that but did not make a memorandum of the total.

X Q. When they handed you this paper, Col. Scheidenhelm handed you this, didn't he?

A. Yes.

X Q. Did he explain to you what the reasonable allocation was, or did you just read that and take it and go on with it?

A. If I may explain, the detail of how this paper was received, I was in Col. Scheidenhelm's office in New York City when he called up the operator of the plant or system at Charleston, asking him to furnish him a reasonable load curve for the future operation of the Radford plant, and that, according to my memory, was the only requirement, a future load curve which might be reasonable for that plant.

X Q. That was this paper handed to you subsequently?

A. Yes, sir.

X Q. Who handed this paper to you?

A. Mr. Scheidenhelm or some of his associates.

X Q. Now you went ahead blindly with regard to this carrying a reasonably allocated portion, you didn't go back to find out if it was reasonable or unreasonable?

2455 A. No, except my judgment on that sort of thing tells me it is a reasonable curve.

X Q. How can your judgment tell you if you don't know what the load of the company itself is for any period of time?

A. No answer.

X Q. Supposing that were handed to you and you knew nothing about the load of the Appalachian Electric Power Company, how would you know whether that was reasonable or not?

A. It resembles other load curves which I have seen of systems which are not Metropolitan systems such as New York.

X Q. Isn't it true most of those systems their load curves are practically alike?

A. No, I would not say that.

X Q. You said they resembled it?

A. In a broad way.

X Q. And that is the basis for your conclusion this was a reasonable allocated portion?

A. I used the term reasonable in a general way. This is a reasonable load curve for such system, not in detail, but in general.

X Q. Would the Metropolitan load curve in New York be anything like this out here?

A. It might be quite different.

X Q. What systems does it resemble?

A. I don't think I can answer that specifically, but in my opinion it is a reasonable load curve for a system of a general type such as this system.

2456 X Q. You must have some basis when they hand you a paper of this kind for saying whether it is reasonable. As I understood you, you said something that you do not know about the load curve of the Appalachian Electric Power Company. Am I correct on that?

A. I have seen load curves of the company.

X Q. You don't know, do you?

A. I have seen load curves which I consider or have reason to think are reasonable, which resemble this approximately. There was one introduced in evidence in this case which I have seen which resembles this.

X Q. When did you see that?

A. Oh, recently.

X Q. Are you referring to Exhibit #226?

A. I don't know the number. (Exhibit #226 handed to the witness.) Yes, this is the one.

X Q. You think #594 resembles #226?

A. In a broad way, yes.

X Q. Is this #594 a chart of a part of a system load curve?

A. Yes, sir.

X Q. This shows, doesn't it, a variation from zero to 9,000 second feet?

A. Yes, sir.

X Q. So that you would understand the Appalachian Electric Power Company was going to discharge waves at the Radford plant from zero to 9,000 second feet, from this chart?

A. Yes, sir.

X Q. You will recall this Exhibit #226, and you said that there was a sufficient similarity between the curve on #594 to #226 so that you could draw the conclusion #594 was a reasonable allocated portion of the AEP Co., curve, is that right?

2457 A. In so far as the shape of the curve is concerned.

X Q. Is it any more reasonable than the curve you have shown on Exhibit #226, or are they sufficiently similar to be approximately alike?

A. I should say the latter, they are sufficiently similar to be approximately alike.

X Q. Would you say the mode of operation on #226 as indicated by that chart was as reasonable as the mode of operation on Defendant's Exhibit #594?

A. I can't say one is more reasonable than the other. In my opinion they are both of the same general type.

X Q. Yesterday you testified about two waves, one was a rectangular wave and the other was a triangular wave—that was #594.

A. By triangular you refer to this sort of wave?

X Q. Yes, sir.

By Mr. Jackson. I don't think he called it triangular.

By Mr. Thompson. I called it triangular. I have a one track mind and it looks more like that to me.

By Mr. Jackson. Just as long as we understand the wave doesn't mean triangular, it doesn't make any difference what we call it.

X Q. I believe that wave calls for 9,000 second feet discharge during eight hours?

A. The rectangular one.

X Q. What was the base length of that wave at Radford, of the triangular wave?

By Mr. Jackson. That is #594.

A. 16½ hours if I am not mistaken.

X Q. Do you know what that length is in miles?

A. About fifty miles.

X Q. What was the base length of it at Glen Lyn, if you know?

A. I don't know exactly, but I would say it would be spread out so it would appear throughout the whole twenty-four hours to some extent.

X Q. Could you figure that out now?

A. No, not in any reasonable time.

X Q. Do you know what the base length would be at Hinton?

2458 A. The base length would be twenty-four hours.

X Q. At Hinton?

A. Yes; the wave would have a tail on it, so to speak, which would extend over the full twenty-four hours.

X Q. And that would include Kanawha Falls, too, wouldn't it?

A. Yes, sir.

X Q. What was the volume at Radford of this triangular wave, what would it be, the volume at Radford?

A. I can't answer that without computation.

XQ. Have you ever figured out what it would be?

A. I have made, or I can give you, a rough figure on that.

XQ. Suppose you figure that?

NOTE.—Last two questions read. [Witness figured.]

A. In my opinion it would be roughly 1,800 second-foot days.

XQ. That would be at Radford?

A. I figured that at Hinton. I had in mind you said Hinton. I have no quick way to figure that a Radford. It would be a long computation.

XQ. Didn't you assume [interrupted].

A. At Radford this wave is 3,000 second-foot days.

XQ. What would it be at Glen Lyn?

A. Oh, slightly, in my opinion, in a general way, about—slightly greater than at Hinton, say 2,000 second-foot days, or a little less.

XQ. Was this test being made through your model?

A. No; these figures I am giving you are figures I have in mind which are based on combination of the results I obtained from model tests, and studies of various waves of the 1930 2459 series. It is an opinion rather than a close highly precise computation, it is my general opinion, based on my general study of the problem.

XQ. Just give us an outline of how you arrived at that figure, I think you said 1,800 at Hinton?

A. Yes; roughly.

XQ. How did you get that figure?

A. By making a study of the rate of reduction of waves in the 1930 series tests, various waves, and also the rate of reduction of waves in my model test.

XQ. You can't give us any idea—I am very much of a novice on this and can't follow you—you can't give us any way you integrated these figures and had them separated and then embodied them together?

A. I obtained the result by studying the various waves of the 1930 series, whether they were adjacent to waves of similar size or separate, whether at high stage or low, and whether they were of large amplitude or small amplitude at the start, and by considering the results I got from my model.

~~XQ. Aren't the~~ waves in the 1930 series totally dissimilar?

A. I would not say that.

XQ. What was the volume of this wave at Kanawha Falls, of your #594?

A. I don't have that figure in mind.

XQ. Will you give us that? [Witness made calculation.]

A. According to my figures, in a general way the volume of the wave at Kanawaha Falls would be in the neighborhood of 1,400 second-feet days. I do not consider that a close mathematical computation, but a general figure of about the volume of the wave.

XQ. That is approximately the volume?

A. Approximately.

XQ. Now let's take this other wave, the rectangular wave, that was for 9,000 second-feet and eight hours per day, was it not?

2460 A. Yes, sir.

XQ. The length of that wave would be approximately the same as the other one, fifty miles?

A. Well, not at the start.

XQ. At the start it wouldn't?

A. No, it would be eight hours length, at three miles an hour would be twenty-four miles at the start.

XQ. That would gradually expand until it got to be the same as the other covering a distance of about fifty miles?

A. Yes, sir.

XQ. What was the volume of that at Radford?

A. That was 3,000 second foot days at Radford.

XQ. And what at Glen Lyn?

A. I can only answer that in an approximate way. My opinion is it would be about 2,300 second foot days at Glen Lyn and about 2,100—you didn't ask that.

XQ. What would it be at Kanawha Falls; excuse me, I should have said Hinton?

A. Hinton, in my opinion, approximately 2,100. I started to answer that.

XQ. Have you figured it for Kanawha Falls?

A. In a general way. I should say the volume at Kanawa Falls would be about 1,700 second foot days. Again I will say that is not a precise mathematical calculation, but result based on a study of various things.

XQ. And that includes a study of the 1930 waves as a background?

A. Yes, sir.

XQ. And your test you made in your Laboratory?

A. Yes, sir.

2461 XQ. Anything else now?

A. No. Those are the principal things.

XQ. Now will you turn to Plaintiff's Exhibit #227 please. Do you have it before you?

A. Yes, sir.

X Q. You have studied that also, have you not?

A. Yes, sir.

X Q. Have you looked at wave #4?

A. Yes.

X Q. Take it at Radford, what was the volume of that wave at Radford?

A. This chart doesn't give the volume of it.

X Q. Can't you figure it yourself?

A. Not easily, no, it is quite an undertaking to figure the volume.

X Q. You had to do that, didn't you, to make your calculations with respect to the wave moving down the river?

A. I didn't figure volume.

X Q. Didn't you figure volume at all?

A. I figured volume at various times in the study, but not for the purpose of adjusting the model.

X Q. Isn't volume the most important factor when it comes to the question of effect on the river down below?

A. Yes, sir.

X Q. Did you figure volume?

A. Yes, sir.

By Mr. **Thompson**:

Q. What did you figure the volume to be, if you did figure it, of wave 4, at Radford?

A. 1,620 second foot days.

2462 Q. What did you estimate the height of that wave to be at Radford?

A. By height I assume you mean amplitude?

Q. Yes, amplitude?

A. 4,940 second feet.

Q. And on that map it would be about two feet high, would it not, that is, on Exhibit 227?

A. Yes, about two feet.

Q. 1,620 was the figure you gave in second foot days?

A. Yes, sir.

Q. Don't you think that is a little strong and should that not be about 1,500?

A. No, according to my figures Wave four, at Radford, has a volume approximately of 1,620 second foot days.

Q. Do you recall which diagram or chart you figured that from?

A. I do not remember the number of the exhibit, but I can show it to you.

Q. If you can give us that, I would like for you to do so?

A. It is Exhibit 138.

Q. Now we will go to Hinton and take Wave #4 on Plaintiff's Exhibit 227, and will ask you to figure the volume or amplitude and height in second feet, at that point?

A. Wave #4 towards Hinton I get the amplitude, 3,620 second feet, and volume of 1,720 second foot days.

Q. And can you give us the height in second feet?

A. The height in second feet was 3,620.

By Mr. JACKSON:

Q. That is the amplitude?

A. When you said height, Mr. Thompson, you referred to amplitude, I believe?

2463 By Mr. THOMPSON:

Q. Yes. Now we will move on down to Lock #2, and what is the volume there?

A. According to my figure the volume there is 1,400 second foot days.

Q. Will you give us the amplitude?

A. According to my figures, the amplitude is 2,600 second feet.

Q. Now while we are on Plaintiff's Exhibit 227, will you look at Wave #10, and having reference to the wave at Radford, please give us the volume of the wave at Radford and the amplitude?

A. I will have to look at the diagram for No. 10.

Q. All right, please do so.

A. I get amplitude 6,760 second feet and volume of 2,020 second foot days.

Q. What do you make it at Hinton for volume and amplitude?

A. At Hinton I make volume 1,630 second foot days and amplitude 3,990 second feet.

Q. What did you make it at Lock 2, the volume?

A. At Lock 2 I make the volume 1,350 second foot days and the amplitude 2,880 cubic feet per second.

Q. Will you please recheck the volume of the wave at Radford?

A. You mean #10?

Q. Yes.

A. The volume of Wave #10 at Radford is 2,020 second foot days. That consists of two parts, a small projection on the front of wave of 365 second foot days, and a larger part, 1,665 second foot days.

Q. Still looking at plaintiff's exhibit 227, and at Radford, you see where the black line comes down through there on the wave.

2464 Are you referring in your figures to the preceding small wave just above the words "Radford, Virginia," or to the following wave just to the right?

A. No; the one which is just to the left.

Q. That would be on noon of the 21st?

A. Yes, sir.

Q. Do you, in your reading, of this, consider that that preceding part, that small wave just above Radford, is a part of the wave?

A. I consider that a part of Wave #10 because it is included in Wave #10 at Hinton and just below. Wave #10 overruns it and combines with it.

Q. Looking down below then at Hinton where the black line goes through the wave and up there at 22, would you say that little line as it rises or slopes up there, that that represents the effect or condition of the small wave referred to just above Radford, when it reaches Hinton. Do I make myself clear?

A. Yes; and I will answer the question "yes."

Q. That is the line from 10 a. m. to about 3 p. m.?

A. Yes, sir.

Q. And looking down there on the 23rd at Lock #2, the same effect is shown there where the line comes through from noon to 5 p. m.?

A. At Lock #2 there seems to be only a single wave, and there is no evidence of a smaller wave.

Q. It is the horizontal line from noon to 5 p. m. practically, isn't it?

A. I do not get that; it does not seem to me that way.

Q. Between 9 and 10, and between the line which separates 22 and 23, taking that point where the wave crosses that line and then looking back at the black line, wouldn't you call that practically a horizontal line?

2465 A. Yes; however, I do not think that horizontal part represents the small wave.

Q. Looking down at Lock #2 wouldn't you say that Wave #10 starts to rise at 5 a. m. on the 23rd.

A. About that; yes, sir.

Q. Would you not say that the small wave at Radford that we were referring to, just above the word "Radford" and at the Radford station, is indicated or shown when it gets down to Lock #2, in that short line, from midnight to 5 a. m. Do you get what I am referring to there?

A. I think I get it, but I don't know that I can answer that question definitely. The small wave seems to be obliterated at that point.

Q. The wave is blotted out but the effect of the wave is there, isn't it, in that horizontal line, isn't it indicated there?

A. I don't know that I can answer that question.

Q. If you were following the trend of the lines from Hinton to Lock #2 that would be indicative that that is this wave we have been referring to, this small wave at Radford, and then still smaller at Hinton?

A. Yes.

Q. What is the volume of the wave at Radford excluding the small wave we have been referring to?

A. According to my figures, it is 1,655 second foot days.

Q. What would it be at Hinton?

A. I have not separated the two at Hinton?

Q. What time did you start and finish your wave #10 at Hinton?

A. I started approximately 8 a. m. on the 22nd and terminated approximately 11 a. m. on the 23rd.

2466 Q. Now going to Lock #2, on No. 10, what is the beginning and ending period for that wave?

A. The beginning is approximately at midnight between the 22nd and 23rd and ends about 9 a. m. on the 24th.

Q. Now taking the figures which you have given us at Radford and this Lock #2, and the ratio of the amplitude of Wave #4, is not the persistence there of that wave 53 percent in amplitude and the volume 87 percent?

A. If you will read me the figures you used in that, it will save a good deal of time in checking.

Q. 87 percent in volume?

A. I mean the actual figures?

Q. 1,620 second foot days at Radford, and 1,400 second foot days at Lock #2.

A. That was Wave #4?

Q. Yes.

A. How about Wave #10?

Q. It was 1,655 second foot days and then 1,350 second foot days.

By Mr. Thompson:

Q. Taking Wave #10 proper at Radford, and excluding the small wave, I am asking you to make your computation on that basis, and I am asking you to exclude that small wave and make your calculation, excluding it I understand it is 1,655 second foot days?

A. Yes.

Q. Excluding the small supplementary wave between waves 9 and 10?

A. I have no way of excluding it all the way because I have not considered it at Lock #2.

Q. You have not answered my question, have you?

A. What was the question now.

Q. Could you give us the persistence in volume of waves #4 and #10 from Radford to Lock #2, expressed in percentage?

Q. All right, give it for #4 first?

2467 A. Approximately 86 percent.

Q. Now Wave #10?

A. About 65 percent.

By Mr. Jackson:

Q. Is that excluding the little wave at Radford?

A. No, that includes the little wave at both points.

By Mr. Thompson:

Q. Will you give it to us excluding it?

A. I have no way of excluding it at the lower station.

Q. If you follow the trend of lines of waves 9, 10 and 11, does not the small wave between 9 and 10 at Radford, fall into the horizontal line, midnight to five a. m., at Lock #2, separating waves 9 and 10 at Lock #2?

A. It does not seem to me that is the case. It seems to me that Wave #10 has overrun the small wave and that the small wave is included in Wave #10 at Lock #2.

Q. What is the explanation then for that horizontal line when the wave is at Lock #2 at midnight to five a. m.?

A. I don't know that there is any explanation of it.

Q. Would not your knowledge and experience of wave study tell you?

A. It seems to me when the crest was at the trough between Waves 9 and 10, it became somewhat rounded, but I would not say that the small wave is confined to the rounded part of the trough, or mainly in that trough.

A. Looking at the same wave on Exhibit 145, it is plain on that exhibit that the smaller wave has been combined with the larger wave at that point?

Q. Can you explain from this record, or this chart, or say that the small wave, call it 9½, has disappeared in Wave #10 below at Lock #2?

2468 A. It seems definitely at Lock #2, that the smaller wave forms a part of the main Wave #10. There is quite a dividing line between 9 and 10 at the left of the smaller wave.

Q. Referring to Government's Exhibit 141, look at five A. M. on the 23rd.

A. Is this the exhibit [indicating]?

Q. Professor, following wave No. 10 at Lock 2, will you agree that after five A. M. on March 23rd, this same waven No. 10 at Lock No. 2—is wave 10 at Radford the same wave 10 at Lock No. 2?

A. No, sir, that does not seem to me to be the case.

Q. Why not?

A. I don't know of any simple way of separating the small wave from the larger wave at Lock 2.

Q. How do you explain the horizontal line?

A. That is related in some way to the smaller wave, but I would not say that the volume under that line would represent the volume which could be attributed to the smaller wave at Lock 2.

Q. Professor Thomas, what was the persistence in amplitude of wave No. 4 between Radford and Lock No. 2.

A. You mean expressed—in what way do you mean?

Q. In percentage?

A. In percentage—assuming the figures you read to me are the ones that I testified to?

Q. Yes, sir.

A. It would be about eighty-six percent.

By Mr. Jackson:

Q. That is in volume?

A. Yes, sir.

By Mr. Jackson. I thought the question was changed. You have given that. You have not given him the figures, Mr. Thompson. You will have to give them to him.

By Mr. Thompson. They are 4,940 and 2,600.

By Mr. Jackson. For what?

By Mr. Thompson. Radford is 4,940 c. f. s.

By Mr. Jackson. I have 4,950; no, 4,940 is correct. What is the others?

By Mr. Thompson. Lock 2 is 2,600.

Q. What was it in percentage?

A. For a wave?

Q. The amplitude of No. 4?

A. The amplitude of No. 4 at Lock No. 2?

Q. Lock No. 2?

2469 A. Lock No. 2, the figure I testified to was 1,400.

Q. That was the volume figure?

A. Oh, you want the amplitude?

Q. Yes—4,940 and 2,600.

A. About fifty-two and a half percent, assuming the figures you gave me are correct.

Q. On your Exhibit 594, you gave figures showing an amplitude of 39 percent persistency, didn't you?

A. I do not have that data at hand, but what is that exhibit?

Q. That was Exhibit 594.

A. Yes, sir; that was Exhibit 594.

A. I cannot find my memorandum as to what I testified as the amplitude at Kanawha Falls.

Q. Can you get those figures?

A. I can get the volume.

By Mr. **Jackson**:

Q. Can you look at the two figures that Mr. Thompson wants to compare?

A. I think the one he wants is 9,000 second feet.

By Mr. **Thompson**:

Q. With respect to the rectangular wave that you described, you have 9,000 at Radford and 4,000——

A. (Interrupting.) Yes, sir.

Q. (Continuing.) At Kanawha Falls.

A. Yes, sir.

Q. Which would make a persistency of 45 percent?

A. Approximately 45 percent.

By Mr. **Jackson**:

Q. Forty-nine percent?

A. Forty-five percent.

By Mr. **Thompson**:

Q. So that your test waves or your waves that you have testified about rather, did not have the same persistency that wave 4 had on the test in 1930?

2470 A. No, sir.

Q. Professor Thomas, in order to create an oscillation, would you not discharge a large volume of water in the Marmet pool and suddenly cut it off, to make an oscillation in the Marmet pool?

A. Would such an oscillation be caused in that way?

Q. Yes, sir.

A. Yes, sir; that would be a way to cause such an oscillation.

Q. You testified yesterday that you created a wave fifty-percent greater and similar in shape to the 1930 tests of wave No. 2 at the London Dam; that you ran this wave through the Marmet pool, maintaining as nearly a constant level as possible in the Marmet pool. Is that correct?

A. Yes, sir.

Q. Did you observe any oscillation in the Marmet pool?

A. Yes, sir, there were oscillations.

Q. Isn't it a fact that the conditions you laid down here would prevent an oscillation—in other words, if you allowed practically the same amount of water to come into the pool that was going out, wouldn't you prevent an oscillation?

A. No, sir, you could have an oscillation with no flow at all through the pool.

Q. How would you create the oscillation?

A. Going back to the old illustration, just as you would create an oscillation in a plate of soup; you could have it without any flow through it.

Q. Yes, sir; but if you have a pool kept at a certain level and have the same amount of water coming in there and going out, how could you create an oscillation?

A. By suddenly increasing the inflow or decreasing it—a decrease in outflow or inflow.

Q. Would you call that an oscillation?

2471 A. I don't think the question clear—call what?

Q. An action of that kind in the Marmet pool.

A. I should say that such an oscillation was created—if it was created in that way, you would call it an oscillation.

By Mr. **Thompson**:

Q. Is that what you call an oscillation when you use the word seiche?

A. Yes, sir; by seiche, I mean a condition in which the water at one end of the reservoir, or both ends of the reservoir, oscillate up and down.

Q. Do you understand that water, under conditions of that kind, goes over the top of the—let us say the Marmet Dam.

A. It might or might not, depending on the height of the oscillation and the height of the water with respect to the top of the dam before the oscillation started.

Q. What is the normal pool level of Marmet with respect to the height of the dam?

A. I don't know—you mean with respect to the crest of the dam?

Q. Yes.

A. As I understand it, about 0.3 of a foot is allowed for variations; the pool level is supposed to be kept within 0.3 of a foot of the top of the dam.

Q. And it is supposed to be kept constant.

A. As nearly as practical.

Q. How is it possible to have any oscillation, if you have the same amount of water going in and the same amount going out?

A. Because an oscillation does not depend on the inflow or outflow; it simply depends on the travelling of the waves up and down the pool.

Q. Didn't you say yesterday that an oscillation is created by sudden inflow?

A. A sudden change of inflow or outflow.

Q. Would you change the level of your pool if you let the same amount of water go out that was coming in?

2472 A. I cannot answer that in a short way. Assuming that both stations are operated and the pool levels are constant and both shut down at the same instant, you then would produce a condition that would create an oscillation—the flow at both stations would be the same, but yet an oscillation would be produced.

Q. When you made the tests at Marmet, did you do that—close both pools at the same time?

A. No, sir.

Q. I mean stations?

A. No, sir.

Q. You testified on page 5701—strike that out. Assuming a three foot draw down at London pool eliminated, assume London and Marmet and Winfield maintained at fixed pool levels, assume a wave of 4,100 second feet entering London pool, will not this wave pass through London pool into Marmet pool and through Marmet into Winfield and beyond Winfield into the Ohio undiminished in volume and amplitude?

A. I remember such a question. I would like to look at my record [witness examines paper]. Is that the wording of a question asked, or a direct question that you are asking me now?

Q. No, I am asking you now. It is on page 5701 and 5702.

A. I misunderstood you.

By the COURT. Go ahead, if you can answer it.

By the WITNESS. I should say that, if the pool remained at a mathematically constant level, with absolutely no variations, the waves would pass through undiminished, but with ordinary routine variations, the waves would be completely absorbed and obliterated by the operation of the power plants. The Court called attention to that yesterday afternoon, and I called attention to the fact in my testimony that two inches of variation in the level of Winfield and Marmet would be sufficient to completely re-regulate those waves, and in the case of the Gallipolis pool, a variation of three-fourths of an inch would be enough to completely re-regulate it; and in the case of the Marmet pool, I know that variations of 0.3 of a foot are permitted to occur frequently and normally, and I feel justified in assuming that somewhat similiar variations will be permitted in other pools, and so my opinion is that it is utterly improbable that these waves would be transmitted through that series of navigation locks into the Ohio.

Q. If they are transmitted through the power plant, aren't they transmitted?

A. They are completely obliter'ed in transmission through the power plant.

Q. I cannot call that wave "A" or wave "B," but that volume of water goes through the power plant, doesn't it?

A. It will be re-regulated through the power plant; it will pass through there uniformly or intermittently.

Q. If it did not pass through the power plant, what would happen, in Marmet, for example, with this wave?

A. I don't think that is clear.

Q. It seems very simple. You have a wave into Marmet of 4,100 second feet?

2474 A. Yes, sir.

Q. And you say it is re-regulated?

A. Yes, sir.

Q. Suppose that the power plant was shut down, what would happen to that?

A. You would have to open the roller gates to keep them from overflowing.

Q. And it would go through, wouldn't it?

A. Not the original wave; some discharge from the roller gates.

Q. The wave itself would go through, 4,100 second-feet would have to go through there or it would spill over?

A. It would go over or through the gates.

Q. If it didn't go through the gates, it would spill over the top, then?

A. Yes, sir.

Q. If you get a constantly fixed level, you would have to let it go through the gates, wouldn't you?

A. If you kept a mathematical level; if you permit variations of a few inches, then it would not have to go through. Variations of pool level would be sufficient to re-regulate it.

Q. Getting back to my question: if this 4,100 second-feet were coming into the pool, you would have to open the gates to let it through or have it run through the power plant, wouldn't you?

A. As I said, the London pool would completely absorb that wave; it would absorb a wave two or two and a half times as large, and it would not have any effect below London.

Q. Coming back to the London pool and assuming that the London pool has a fixed point at the top, assume that we do not have the three-foot draw-down and water comes into the

2475 London pool, supposing the power plant closed down—what would happen?

A. Either the gates would have to be opened or the water would spill over the top.

Q. The waves would go through, wouldn't they?

A. Greatly reduced in amplitude.

Q. Why would they be greatly reduced in amplitude?

A. Because, to spill over the top of the dam, it would have to build up a head to the top of the dam several inches and that would store the water.

Q. It is considered good practice or practice that is countenanced to let water go over a dam of that kind?

A. No, sir.

Q. What you would do would be to open the gates and let it go through?

A. Yes, sir.

Q. Wouldn't this wave go on down through there that we are speaking about—this 4,100 second-feet?

A. It would cause a rise of a couple of inches in the pools below.

Q. Wouldn't that wave go on through down to the next pool?

A. Yes, sir.

Q. If you did not open the gates and wanted it to go through, they would have to let it go through the power plant, wouldn't they?

A. Yes, sir.

Q. Well, that is not re-regulation, is it?

A. If the water in the pool is permitted to rise as the wave comes into it, that is reregulation.

Q. Do you mean to tell the Court that letting that water go through by way of the dam or the gates, or by way of the power plant, is reregulation? 2476

A. I may say any operation which causes the levels to fluctuate will produce a condition where there will be reregulation and will obliterate the wave.

Q. You can call it any names that you wish, but you have to let the water go through—the 4,100 second-feet or it will go over the top, will it not?

A. It depends on how much of this is drawn down at the beginning.

Q. We are saying that there is a fixed level there and that the pool is filled.

A. Yes, sir, in that case——

Q. (Interrupting.) It has to go over the top?

A. It has to go over the top or through the gates.

Q. Or through the plant?

A. Yes, sir.

Q. And would go that way past each dam?

A. If the pool levels were maintained at a mathematical constant level, it would go through; if the pool levels were not maintained that way, the wave could be reregulated in any possible way—in many ways.

Q. You spoke of some minor fluctuations that you saw when you were making these experiments or studies at Marmet?

A. Yes, sir.

Q. I believe you named the operation of the locks?

A. Yes, sir.

Q. And then the operation of the roller gates?

A. Yes, sir.

Q. And gusts of wind?

A. Yes, sir.

2477 Q. I believe you said that there was one operation of the locks while you were there?

A. Yes, sir, at London.

Q. And there were no other operations of the locks.

A. No, sir; there were other operations that day, but not while I was there. As I recall it, the records showed there were lock operations that day, but not at the particular time while I was there.

Q. So that one operation could not account for an increase in the rise of water in the pools below, could it—that one operation of the locks?

A. Such a rise occurred immediately after the lock operation.

Q. Don't you know, as a matter of fact, that that boat that you speak of was going upstream, rather than down stream, that was being locked?

A. I think it went the other way, if my recollection is correct. I saw it coming out of the lock. However, I can check my records on that. [Witness examines paper.]

A. The lockage that I observed was on August 14th at two o'clock P. M.

By Mr. Thompson:

Q. On August 14th at two o'clock P. M.?

A. I have two records on this and this one [indicating] does not check with my records. I will have to look at the other one.

Q. Do you know what the one that you have there says?

A. The one I have—this record [indicating] does not show a lockage on the 14th. [Witness examines additional papers.] On August 14th, at 2.35 p.m., upstream.

Q. Then there would not be any flow of water down stream in locking upstream?

A. They may have prepared that lock for that boat just before it cam through. I assume that was the cause, but I did not verify that. There was a definite rise in the pencil at that time as I came in and a boat was at the lock. 2478

Q. You have your records there; there was not any other lockages?

A. On that day, one at five P. M. downstream at London and two upstream about eight o'clock P. M.

Q. After the tests were made?

A. That was during the period of the tests.

Q. Did you see that lockage?

A. No, sir; the only one I noticed was at 2.35 P. M.

Q. It was not a gusty or windy day when you were there, was it?

A. No, sir; but in the latter part of the afternoon, it became somewhat windy, and I noticed definitely an increase in the fluctuations in the pencils of the gages, as conditions became slightly windy. There was no strong wind, but a definite breeze came up during the latter part of the afternoon.

Q. There was not much indication of it?

A. No; as soon as the breeze came up, the pencil of the gage began to fluctuate from 0.05 to a 0.10 of a foot.

Q. Were the roller gates up when you were there?

A. The roller gates at Marmet were up three inches for a short period during the test.

Q. That was very small?

A. Yes, sir.

Q. Then it must have been a discharge of the turbines that caused the wave and was not these oscillations you speak of?

A. The minor oscillations you refer to?

Q. No. The minor oscillations were not caused by the
2479 the three conditions I referred to.

A. Yes, sir; these minor oscillations were caused by the three conditions you refer to: Lockages, taking a load off, blocks of load and by wind; and there was a small gate operation, but it did not produce any surge that I could detect.

Q. Can you give us the time when these gates were operated?

A. I don't know that I have a record of that. [Witness examines papers.] It was during the night. I think it is in the record, but I will have to take time to find it.

2480 Q. On what studies or observations do you base your Statement that power tides or waves rise and fall slowly?

A. In this case, I based it on the studies of the 1930 series of waves or tides.

Q. Have you ever studied any other power waves?

A. Not intensely, the way I have these.

Q. So you really do not know their characteristics?

A. Well, my opinion is that general hydraulic knowledge tells you a great deal about the characteristics of such waves in general. They are not greatly different from rain waves.

Q. Well, if your studies were general, your conclusions would be general also, wouldn't they?

A. Well, I don't think so. I think my studies in general give me the training to interpret these specific cases.

Q. What method did you employ in calculating the rate of flow obtaining during your tests at the London and Marmet dams?

A. Multiplied the kilowatts generated at the station by certain factors which were obtained by the test curves for the units.

Q. Do you mean——

A. The turbines and generators.

Q. Are you familiar ~~with what~~ happens to the discharge of a hydro plant when a breakdown occurs on the transmission lines connecting that plant with a system load?

A. Yes.

Q. What happens?

A. The turbine governor will close the gates.

Q. And the load drops very suddenly?

A. Yes. You speak of it as an open circuit?

Q. Yes.

A. Yes.

2481 Q. Supposing that the Radford plant were operating and discharging 9,000 second-feet, and the plant suddenly closed down (that is, the transmission line suddenly closed down), wouldn't there be an immediate cessation of discharge of water also?

A. A very quick cessation, yes.

Q. You were speaking about silt depositing in the pools: Do you know that recent observations at Boulder Dam show that silt in water entering the upper region of the reservoir followed a subsurface channel to the dam and passed through the openings at the dam with little decrease in silt content?

A. I had not heard that.

Q. You had not heard that?

A. No.

By Mr. THOMPSON:

Q. You stated that, in your opinion, the out-flow from the London dam, on June 10, 1936, at 2 A. M., was not 11,000 second-feet, as shown on Government Exhibit 229. In your opinion, how much was the outflow at that time?

A. I have no easy way to determine that exactly.

Q. How did you know that it was not 11,000 second-feet?

A. I think I said it was improbable it was 11,000 second-feet. According to my recollection, I said there was an oscillation in the pool at that time, and the ordinary relation between stage and discharge did not hold.

Q. But that was just simply a surmise of yours. It is not based on actual knowledge, is it?

A. No. The fact that the discharge stage relation did not hold during a period when seiches are occurring is based on actual knowledge, and because of this fact I could not say positively whether or not it was 11,000 feet at that particular instant, but I think it highly improbable that it was.

Q. Didn't you say that that little up-raise there of what looks like a finger standing at the top of the wave, Exhibit 591, was caused by lockage?

2482 A. I think I said in my opinion it was probably caused by lockage.

Q. You are not sure about that?

A. No. I cannot be positive of that, for one thing, because of the uncertainty of time in this record. I think that its relation to other storages caused by lockages are equal. I think that this probably was caused by a lockage.

Q. It might have been caused by some other reason, might it not?

A. Well, it seems to be improbable it was caused by any other reason.

Q. Do you know what the total power generation at the London dam was between 9 and 10 A. M. June 16, 1936?

A. I have the data by which that could be determined.

Q. Can you give us that? Have you got it handy?

A. I have a continuous record of the operation of that plant which, I think, shows that date. Would you like to have it?

Q. If it is not too much trouble, you can get it right now.

A. Between 9 and 10. Do you want the total between those two hours, or the individual hours?

By Mr. Thompson:

Q. The kilowatt hours between 9 and 10?

A. 15,000.

Q. What was the corresponding discharge for the same hour?

A. I can obtain it quite closely by multiplying by .62, if that will be close enough.

Q. All right.

A. About 9,300 second feet.

Q. Is that an average for an hour?

A. That is an average for an hour.

Q. Is it not reasonable that the maximum during that hour might be as much as 11,000 feet, as shown on Exhibit 229?

A. No, it is not.

Q. You do not think that is reasonable?

A. No.

2483 Q. You spoke about the fact that if the roller gates were open it might be a very serious disturbance created down in the London and Marmet dams?

A. Yes.

Q. You think there is any conceivable chance that the roller gates would be operated in that way by the United States Engineers?

A. No, I do not.

Q. Your 1930 test waves had relatively short crests, did they not?

A. Do you mean at the point of beginning, or further down the river?

Q. At Radford?

A. Yes, at Radford.

Q. Would you not expect waves from Radford having a broader crest, as shown in Government Exhibit 225, to be much more persistent?

A. The question is not complete enough to answer it.

By Mr. Thompson:

Q. That is having a broader crest?

A. Having the same volume?

Q. Yes, having a volume shown on Exhibit 225?

A. 226 the exhibit is.

Q. 226; pardon me.

A. I see no reason why they should be more persistent.

Q. A wave with a broader crest, wouldn't that be more persistent?

A. Not necessarily.

Q. Would the fact that the waves started probably 40 miles further-down-stream not make them more effective, or more persistent, when they reached Lock No. 2?

A. I don't think so, assuming the same discharge at the starting point?

Q. So distance does not make any difference; is that the idea?

A. I understood you asked me if they were traveling by the same distance and having the same volume at the start.

2484 Q. No. I did not mean starting the same distance, because I eliminated the 40 miles between Buck and Byllesby and Radford.

A. What is the question?

Q. Don't you think a wave of the same size, starting from Bluestone, for example, and traveling down the Kanawha Falls, would have a greater effectiveness or persistence, if you use that word, than a wave of the same size starting from Radford?

A. I don't see why it should have more persistence. Do you mean the rate of decrease?

Q. Yes. For example, it would not be flattened out as much as if it had traveled a shorter distance?

The COURT. Do you understand the question?

WITNESS. It is not entirely clear exactly what you mean. The rate of decrease, I think, might be the same in both cases.

By the COURT:

Q. Let me ask, supposing a wave of certain dimensions was released up at the Buck Dam, and a wave of the same volume, under the same conditions, was released down at the Radford dam on separate occasions, in order to make a comparison; when it finally got down to Kanawha Falls, wouldn't the wave from Buck dam have been distributed or flattened out more than the other?

A. Yes, indeed.

By Mr. JACKSON:

Q. There was confusion about the rate of decrease?

A. Yes, sir.

By Mr. THOMPSON:

Q. Would not a wave, such as is shown on Government Exhibit 226, starting from Radford, have more persistence on arrival at Lock No. 2, both in amplitude and volume, than a wave of a similar size (than the wave shown on Defendant's Exhibit 594) starting at Radford and going down as far as Lock No. 2?

2485 A. Do you refer to these waves as compared to that one?

Q. Yes.

A. In my opinion the two are essentially similar. There is no outstanding distinction between them. I could not say which would have the greater persistence.

Q. Doesn't the wave on Government Exhibit 226 approach the ideal of persistency more than the wave on Defendant's Exhibit 594—that is as to shape?

A. I do not see any essential difference between those two waves.

Q. Professor, do you know what the drainage area at Radford dam site is?

A. I do not have the exact figure in my mind, but approximately. I can look it up.

Q. Is it not 2,283 square miles?

A. Something on that order. The figure I have is 2,400 square miles.

Q. All right. What is the total drainage area of the Kanawha water shed?

A. At Kanawha Falls?

Q. Yes.

A. You asked the Kanawha water shed.

Q. What is the total drainage area of the Kanawha water shed? Strike out "at the falls."

A. Very nearly zero.

Q. The entire water shed?

A. At Kanawha Falls the water shed above Kanawha Falls, including the New and Gauley Rivers, is 8,375 square miles.

Q. What is the water shed of the entire Kanawha River?

A. The figure I have at Point Pleasant, West Virginia, is 12,245 square miles.

2486 Q. If the records of the United States Geological Survey show the mean flow of the Kanawha River, at Kanawha Falls Gage, to have been 1,130 second feet for the month of October, 1930, and if the testimony given in this case by Mr. C. H. Pierce, Senior Engineer of the Geological Survey, shows the mean flow at the Radford dam site to have been 759 second feet for the same month, would you question those figures as substantially correct?

Mr. JACKSON. I object to that question. There is no testimony of that.

The COURT. He may answer it.

Mr. JACKSON. Exception.

A. I see no reason in the figure itself why it could not be possible. Of course, I have no knowledge as to the actual flows at that time.

By Mr. THOMPSON:

Q. You see no reason to question them, though, do you?

A. I think I can't answer it any more clearly than I did.

Q. On the basis of these figures, is it not true that slightly more than two-thirds of the water that passed Kanawha Falls Gage, during that month, came from above Radford dam site?

A. I should say in the vicinity of two-thirds.

Q. You have read, I believe, Government Exhibit 145, being House Document No. 91, 74th Congress, First Session, have you not? That is known as the 308 report on the Kanawha River.

A. I have not read it thoroughly, but parts of it.

Q. If you were responsible for navigation on the Kanawha River during a period such as 1930 and the London and Marmet dams were in operation, would you be willing to cut off the flow of the watershed from above the Radford dam during a month such as October, 1930?

By Mr. JACKSON. I object to that question, because not proper cross examination; has no relation to the examination in chief; and this witness has not qualified as to navigation.

By the COURT. I don't see the objection from that standpoint, but I think the question has a very incomplete foundation.

By Mr. JACKSON. I should also like to object for the reason it doesn't specify the length of time of cut off.

By the COURT. As I said it has a very incomplete foundation.

By Mr. THOMPSON. I will make it for any length of time at the Radford dam.

By Mr. JACKSON. For a minute or more.

By Mr. THOMPSON. We will not consider a minute. I don't think that is sensible.

By Mr. JACKSON. I object unless something that is sensible is substituted then.

By Mr. THOMPSON. We will make it forty-eight hours then.

By Mr. JACKSON. I still object to the competency of the question.

By the COURT. He may answer.

By Mr. JACKSON. Exception.

2487 A. I think if I had the power to prevent the water from being shut off under those conditions I would exercise it.

Q. Have you hydrograph showing the fluctuations at the upper ends of the pools below the London and Marmet dams during the test of October 14 and 16, 1930?

A. Yes, sir.

Q. Could we have copies of those?

A. Yes, sir.

By Mr. JACKSON. We will supply them.

By Mr. THOMPSON:

Q. May we also have a report of the operation of the power plant when you made your test?

By Mr. JACKSON. You mean the record of the operation?

By Mr. THOMPSON. Yes.

A. I have only a single copy of that.

Q. How soon could we get a copy?

A. I have only one copy.

Q. Could we borrow it this evening?

By the WITNESS. So far as I am concerned.

By Mr. JACKSON. We will try to get you a copy.

2488 Redirect examination by Mr. JACKSON:

Q. Professor Thomas, I think you testified you began your integrating model tests in the latter part of July of this year. Have you since that time refreshed you recollection as to the accuracy of that time?

A. I think it was early in July, in the early part of July.

Q. Do you happen to know whether it was before the opening of this case on July 13th?

A. Yes; it was before July 13th.

Q. Will you explain to the Court the principle of the integrating model?

A. Such a model is a model of some hydraulic structure which does not resemble the structure closely physically, but satisfies the same mathematical equation. I think I can best explain the principle by using the chart. [Witness indicated on chart.]

Line "b" represents the bed of the river; line "s" represents the surface of the water, and we can give consideration to any cross section of the river. At that cross section there is a definite and well-known relation between the velocity of the water, which I will represent by "v"; the hydraulic depth which I will represent by "r" and the elevation above sea level, which I will represent by "z," and the distance measured from any arbitrary starting point to give horizontal distances, which I will designate by "x," and we will consider a slice at right angles to the river
of one-foot thickness. Now the well-recognized and
2489 adequate relation among those things can be expressed
by a formula applied to that slice one-foot thick. Although I realize there are non-technical persons here, I think if I write the formula down it will convey the idea I am talking about. The formula is that the velocity square divided by 2.21 times the hydraulic depth to the 4/3 power, times the roughness factor squared is equal to delta z, which is the rate of rise of the water surface divided by delta and v over g times delta v over delta x, which is the rate of change in the velocity times the velocity, and 1 over g times delta v over delta t. I wrote that formula just to show I am talking about something definite, and not something very general or vague.

Q. Was that a definite mathematical relationship?

A. That is a mathematical relation that takes into consideration the rate of rise of the river surface at that point, which is vital in understanding these waves.

Now in order to solve that for the whole river you have to satisfy that condition for every foot wide you have all the way down the river, which is a tremendous job.

Now if you have a model of that river you could predict the flow through that model by the same equation if you had the problem given you.

Those principles are explained in Durand's book on "Flow in Pipe Lines" and are also explained in Freeman's "Hydraulic Laboratory Practice" and also explained in various other places.

The fact there is this relation between the model and prototype makes it possible to distort the scale of the model and still obtain reliable results from the distorted model.

If the model although distorted had perfect representation of the prototype at every cross section the results of such model
would be perfect. If you cannot build your model abso-
2490 lutely perfect with respect to representation of the cross

section you nevertheless can get satisfactory approximate results depending on how closely and accurately the model is made.

Q. Now will you explain about the gages on the model, are they sensitive or otherwise?

A. In making a small model, the most satisfactory way to measure the variations in depth of the water in the model is to use an inclined gage, simply a glass tube inclined at an angle, and chemically cleaned up, so as to be absolutely clean, and that glass tube multiplies the fluctuations of the water surface, so with a model eight inches deep it is possible to represent the water in a reservoir 125 feet deep and still measure the depths closely enough in the model so as to represent one-half inch or three-fourths of an inch in the prototype.

Q. That is so the gages would reflect any change that would be as small as one-half or three-fourths of an inch in the full sized project?

A. Yes sir, in the full sized project.

Q. In the development of an integrating model, are gaging stations and records essential?

A. Absolutely.

Q. For what reasons?

A. In order to adjust the roughness of the model so as to satisfy the necessary conditions.

Q. Is that adjustment of roughness a matter of trying to reproduce a little Sandstone Falls or to adjust the friction so it will conform to the mathematical or hydraulic laws?

A. The latter is the case.

Q. State whether the principle of solving hydraulic problems by model testing is used in practical work?

2491 A. It is used very extensively in practical work; at the present time the U. S. Government maintains a great Laboratory at Vicksburg, Mississippi, where that work is done on a great scale.

Q. Can you state whether or not the use of model testing as a short cut for complicated mathematics increases with the size and complexity of the project?

A. Yes; on very large projects it is feasible to spend the necessary money to make large and accurate models.

Q. In your cross examination, with reference to the volume of Wave #10 at Kanawha Falls I was not quite clear when the reporter read your answer whether he gave the volume as 3,050 second foot day or 1,350 second foot day. Which is correct?

A. 1,350.

Q. You were asked to give a number of figures for the volume of certain of the waves mentioned or included rather in the 1930 wave tests. Will you state whether the volume of those waves were computed from the Government Exhibit #141, or Government Exhibit # 226 or #227; which one was it?

A. They were made from #141.

Q. The large hydrograph?

A. Yes, sir.

Q. Of individual gaging stations?

A. Yes; of individual gaging stations.

Q. You were also asked on your cross examination about a certain lockage you had observed at Marmet, in the course of these tests, and you spoke of preparing the lock as I understood it; what did you mean by that?

A. In case the boat approached from the downstream side of the lock it would be necessary to empty the lock before the boat could enter.

2492 Q. That would be true if the lock had been filled?

A. Yes; if previously filled.

By Mr. Thompson:

I understood him to say on his cross examination he didn't know if the lock was empty or not.

A. I might have looked in the record to see the previous lockage, whether upstream or downstream. I did not do that when you asked me the question.

By Mr. Thompson:

You don't know now, do you?

A. I can look it up now.

By Mr. Thompson:

Q. But you don't know at this time?

A. I have my notes of the lock master's record but I can't answer that without looking at the notes.

Q. When you said a minor oscillation might be caused by lockage, what is it about the lockage operation to which you refer?

A. It is the emptying of the lock through the conduits of the lock into the pool in which the fluctuation will occur.

Q. What effect, if any, would the filling of the lock at the lower end of the pool have as regards the possibilities of a minor oscillation?

A. The filling of the lock could have an effect also in producing an oscillation.

Q. Have you got at hand the exhibit about the 1930 wave tests?

By the Court. How could that happen? You are transferring a boat from the London pool into the Marmet pool. How could the filling of that lock which must be filled from the London

2493 pool where the water comes into it from the upper pool, how would the mere filling of that lock produce an oscillation in Marmet; it might if the lock were emptied?

By the WITNESS. What I had in mind was the filling of a lock at Marmet.

By the COURT. You are at London dam, passing a boat downstream——

By the WITNESS. That wouldn't have any effect, the filling of the Marmet lock would affect the Marmet pool.

Q. Professor Thomas, your attention was directed to Wave #4, I believe, on those wave tests?

A. Yes, sir.

Q. Will you state whether in your opinion that wave is typical of those wave tests?

A. In my opinion Wave #4 was not altogether typical.

Q. You were asked about the percentage of reduction in volume and amplitude of Wave #4 and Wave #10 of that test?

A. Yes.

Q. Will you state the reduction, percentage of reduction in volume and amplitude of some of the other waves on that chart, if there are any to which you would like to refer?

A. The reduction in volume from the Radford dam site to lock #2 Wave #5, has a reduction to 40%.

Q. Stated the other way is that a reduction of 60%?

A. Yes, a reduction of 60%.

By Mr. JACKSON:

A. In the case of Wave #8 the volume at Lock #2 was 51 percent of the volume at the Radford Dam Site.

2494 In the case of Wave 13A, the volume of the wave at Lock #2 was $16\frac{3}{10}$ percent of the volume at the Radford dam site.

In the case of Wave 13B the volume at Lock #2 was 15 percent of the volume at the Radford Dam site.

In the case of Wave 14A the volume at Lock #2 was 16½ percent of the volume at the Radford dam site.

In the case of Wave 15, the volume at Lock #2 was 47 percent of the volume at the Radford dam site.

In the case of Wave 16, the volume at Lock #2 was 38 percent of the volume at the Radford dam site.

Q. Now will you please give the percentage of reduction in amplitude?

A. In the case of Wave #5 the amplitude at Lock #2 was 45% of the amplitude at the Radford dam site.

The amplitude of Wave 7 was 39½ percent of the amplitude of that wave at the Radford dam site.

In the case of Wave #8 the amplitude at Lock #2 was 40% of the amplitude of that wave at the Radford dam site.

In the case of Wave 13A the amplitude of the wave at Lock #2 was 10½ percent of the amplitude at the Radford dam site.

In the case of wave 13B the amplitude at Lock #2 was 18½ percent of the amplitude at the Radford dam site.

In the case of wave 14A the amplitude at Lock #2 was 13 percent of the amplitude at the Radford dam site.

In the case of Wave 14B the amplitude at Lock #2 was 27 percent of the amplitude at the Radford dam site.

In the case of Wave 16, the amplitude at Lock #2, was 30 percent of its amplitude at the Radford dam site.

Q. In a comparison which you were asked to make between the 1930 waves upstream and those same waves at Kanawha Falls and other points downstream, were those comparisons based upon the wave as it was emitted from the Buck Power Plant or upon waves as they passed the Radford Dam site?

2495 A. They were based on the latter.

Q. You were also asked to make some comparison between the waves of 1930 wave test and the wave of the form and volume disclosed by exhibit 594. Do you recall that?

A. Yes.

Q. Was that comparison based upon the 1930 wave test as they passed the Radford dam site?

A. It was based on a study of those waves.

Q. What I am getting at is, in making the comparison, did you take those 1930 waves in the form they passed the Radford dam site or in the form when they were emitted from the Buck Plant upstream?

A. I took them in the form where they passed the dam site.

Q. What effect, if any, or what difference in the form of these waves, that is, the form of 1930 waves, as they passed the Radford dam site, and the form of the waves conforming to exhibit 594, as it was assumed to be discharged at the Radford power station, what difference in the form would there be in the discharge at the Radford Power Station or what difference would it have upon the percentage or reduction in amplitude or volume in second feet by the time these waves respectively reached Kanawha Falls?

A. The waves corresponding to the exhibit would have a greater reduction at the time they passed Kanawha Falls.

Q. Would the difference in the form of the two waves have something to do with that?

A. Yes, sir.

Q. Explain briefly why that is?

A. The greater length of the wave corresponding to Exhibit 594, that is, the fact that it occupies the greater portion of

2496 the day would tend to fill up the valley between successive waves.

Q. What is the comparison between the duration of the maximum peak of a wave conforming to exhibit 594, and the duration of the peak of the waves of the 1930 wave test as they passed the Radford dam site, that is, which has the greater duration, referring to maximum peak?

A. The maximum peak in Exhibit 594, has a duration of one hour.

Q. How does that compare with the maximum peak of the waves of the 1930 wave test as they passed the Radford dam site?

A. That is less.

Q. Which is less?

A. One hour is less than these other peaks.

Q. You were examined at some length about the percentage of relationship between amplitudes and volumes of waves as they proceeded downstream. Does the mere relation between amplitudes and volumes of waves at the successive points travelled downstream give a true picture of the nature or extent of change in those waves or wave conditions in passing downstream?

A. No, I am of the opinion we cannot solve problems pertaining to wave head reduction or wave amplitude reduction by applying simply percentages based on other waves.

Q. Does the percentage of volume and time enter into that picture?

A. I should say yes.

Q. Can you explain or illustrate your answer more fully with respect to your view that percentage relationship of this character does not give a true picture?

A. I think I can explain that more clearly by making a sketch.

By Mr. Jackson. I would like to have the sketch which the witness made with reference to his explanation of the principle of integrating model marked Defendant's Exhibit 597 before it is removed from the easel.

(Said sketch is here filed, marked Defendant's Exhibit 597.)

By Mr. Jackson:

Q. Now go a head, Prof. Thomas, with your explanation?

2497 A. Sketch "A" represents a series of waves of comparatively small amplitude released at an upstream point such as Radford. For simplicity, I will assume that they are released at a time when the stream bed is practically dry. That is a simplified explanation.

Sketch "C" might represent the conditions when those waves have reached a downstream point such as, for example, Kanawha

Falls. The condition there is caused by overlapping of the crest and tails of the waves, as shown by the dotted line.

A. If there was no flow in the river, the base flows or mean flows would be the same in both cases. I will represent the mean flows by "M."

Now then I will sketch a similar sketch for waves of greater amplitude. These waves again are caused by overlapping the original waves and if there was no flow in the river, the mean flow would be the same, because of overlapping and the filling up of the base. It is readily possible for both amplitudes to be exactly the same at the lower point, although caused by waves of greater amplitude at the upper point, in which case the mean flow would be the same.

In the case of the lower wave, if we assume the original amplitude was 1,000, and the final amplitude was say 500, the percent reduction in amplitude would be 50 percent. Now if we take a higher initial wave and we assume an amplitude of say 3,000, and I am taking that figure simply for illustration, and the same amplitude occurs at the lower station, the percent reduction would be 500 over 3,000 or it would be reduced to 16 percent.

I make this illustration, not to represent any particular case, but just simply to bring out the general proposition that you cannot depend on simple percent reduction as to the case
2498 of two series of waves of unequal amplitude. It is important in this situation to understand that you cannot go on a simple percentage reduction basis. The shape of the wave is more important than amplitude, and it is readily possible that waves of greater amplitude at the upper station will have equal or even less amplitudes at the lower station.

Q. What are those broken lines on that sketch?

A. They represent the tails of the waves as they would be if the waves were individual waves.

Q. That is, the merging of the lower part of the wave?

A. Yes, sir; into a general base flow, the only difference of the two is seen to be in this case that the base flow is higher.

Q. Have you finished your explanation?

A. Yes, sir.

By Mr. **Jackson**:

I will ask that the sketch which has just been prepared by the witness be filed as Defendant's Exhibit 598.

(Said sketch is here filed, marked Defendant's Exhibit 598.)

A. (Continuing.) There is another thing I would like to say——

By Mr. **Jackson**:

Go ahead.

A. In determining the percent of reductions of waves it is important to take into consideration a great many things, among them whether the wave occurs on a rising or falling stage of the stream, whether the wave is one of a series or group of
2499 similar waves or whether adjacent waves are larger or smaller, whether there are minor wave summits between the main wave summit. All of those things enter into the question of what the reduction in amplitude and volume will be, and in the case of the 1930 wave series, we noted that there is an enormous variation in the percent reduction and volume of individual waves, and those percentages depending on a variety of conditions which were present in that series.

Q. Now you were asked to make a percentage comparison in reduction in amplitude and volume between this hypothetical wave emitted at Radford to conform with the Defendant's Exhibit 594, and certain of the 1930 waves as they passed the Radford dam site. Please state whether in your opinion if any percentage comparison were to be made at all, the percentage of comparison between reduction in the wave corresponding to Exhibit 594, in the matter of amplitude and volume, and any of the waves of the 1930 wave test, after reaching some point downstream such as Kanawha Falls should be made with those 1930 waves as they pass the Radford dam site or as they were emitted from the Buck Power Station.

A. It would be more proper to make a comparison with those waves as they were emitted from the power station.

Q. Please explain why?

A. Because as emitted from the power station they would more closely resemble the shape of the actual wave which would be emitted from the power station, and would not have the sharp triangular peak that they had attained when they reached Radford.

Q. Can you select some downstream gauging station which would be appropriate for such comparisons?

2500 A. In making such comparison I would say that the travel of the 1930 waves from Ivanhoe to Hinton could be compared approximately with the travel of the future Radford wave, from Radford to Kanawha Falls.

Q. Which would have the longer travel?

A. The latter, or from Radford to Kanawha Falls is 156 miles, while the distance from Ivanhoe to Hinton is 130 miles.

Q. What effect, is any, would that form of comparison have upon the answers which you gave on cross-examination where you used the Radford dam site as the point from which to measure reduction in the 1930 waves?

2501 A. The reductions in the waves from Radford to Kanawha Falls would be somewhat greater than from Ivanhoe to Hinton, because the distance is slightly longer.

Q. Can you give percentages in reduction of amplitude and volume from Ivanhoe to Hinton?

A. Yes, on some of these waves the reduction in volume, or the volume at Hinton expressed as percentage to the volume at Ivanhoe for Wave #5 is 48 percent, for Wave 8, it is 49½ percent, for wave 13A, it is 34 percent. For wave 13B it is 38 percent. For Wave 14A it is 33 percent.

Q. Are those all in volume?

A. Those were volumes.

The amplitude for wave 5, is 41½ percent, for wave 7, it is 44½ percent; for wave 10, it is 37½ percent; for wave 12 it is 48 percent; for wave 13A it is 10 percent; for wave 13B it is 11 percent; for wave 14A it is 10 percent. For wave 14B it is 34½ percent. For wave 15 it is 23½ percent. For wave 16 it is 14 percent.

Q. Will you give the reduction in amplitude for Wave #8?

A. For wave #8, it is 45 percent.

Q. Are these reductions or percents that you have given, are they the percentage in the original volume that remained at that point?

A. No, sir, they are the ratio of the final to the original.

Q. Will you look at wave 4 about which you were cross-examined, and tell me what was the duration of that wave at Lock #2, how many hours?

A. At Lock #2, the duration was very close to 24 hours.

Q. Please look at Exhibit 141 where the scale is larger?

A. No, I am looking at Wave #2.

Q. Please look at Exhibit 141 and give me the duration for wave 4 at Lock #2?

A. About 28 hours.

2502 Q. Was that Wave #4 followed by an overlapping wave?

A. Wave No. 5 followed it.

Q. Was that Wave #5 overlapping Wave #4 in the same sense as waves in the series you considered would form, conforming with Defendant's Exhibit 594?

A. Possibly, I should say they do not overlap so much.

Q. What I am getting at is the matter of comparison.

Were you comparing there for instance a 28-hour wave with a 24-hour wave, or were you asked to do that?

A. Yes, wave #4 is a 28-hour wave, which would necessarily have more volume than a 24-hour wave.

Q. And would it have any effect on percentage reduction?

A. It would give some reduction in volume, of course.

Q. That is, for wave #4?

A. Wave #4, I do not consider it a typical wave, it occurs on a descending stage and it is spread out in width.

Q. You were asked this morning to express an opinion with reference to the persistency in volume of waves of the form shown on defendant's Exhibit 594, and of certain waves corresponding to the characteristics shown on Plaintiff's Exhibit 226, do you have that?

A. I do not have it here.

Q. In making your answer did you assume, or did you not, that the volume of the wave in each instance would be the same?

A. I had in mind that they would be the same.

Q. On your cross-examination you were asked with reference to the matter of any flow over the crest of dam on any of the navigation pools on the Kanawha. Please state whether flows over dams at navigation pools of that character do occur?

A. Yes, sir; they do occur, quite frequently.

Q. You were also asked questions with reference to the level of pools such as navigation pools on the Kanawha. Will you please state whether those pool levels are or are not subject to minor fluctuations?

2503 A. Yes, the pools are subject to minor fluctuation.

Q. Does that answer apply to present conditions of operation on the Kanawha?

A. Yes, sir.

Q. Under present conditions of operation, are these minor fluctuations both above and below normal pool level?

A. Yes, that means occasionally the water slops over or even frequently slops over the gates.

Q. Prof. Thomas, in your testimony with reference to the reduction of these waves passing down the river, did you give any consideration to such re-regulation, if any, as might occur in the Hawks Nest Pool?

A. No, I did not.

Q. In the course of your cross-examination with reference to the wave corresponding to defendant's Exhibit 594, treating that form as a daily series of waves, you were asked about the duration of one of those waves at Glen Lyn. Will you please state whether the duration of one of these waves at Glen Lyn would be equal to, greater or less than 24 hours?

A. I should say they probably would be equal to 24 hours, the tail of the wave would extend through a 24 hour period, by the time the wave reached Glen Lyn.

Q. Would there by any overlapping by the time it reached Glen Lyn?

A. There would probably be some.

Q. Would there be any overlapping at Hinton?

A. Yes, sir.

Q. Have you any opinion as to what the duration of overlapping would be at Hinton, and I mean just a single wave, the duration of one wave without giving any consideration to overlapping at Hinton, that is, would it be substantially more than 24 hours, or not?

A. You mean a single wave, not a series of waves, but one wave released by itself, with no wave preceding or following?

2504 Q. Yes.

A. Such a wave would have a duration of several days by the time it reached Hinton.

By Mr. Jackson. Now, I would like to offer in evidence the two charts, marked "Defendant's Exhibits 597 and 598."

(Said charts are here filed, marked "Defendant's Exhibits 597 and 598.")

Re-cross examination by Mr. Thompson:

Q. Prof. Thomas, I only have a question or two to ask you. So far as you know, these waves 4 and 10 have never been criticised as not typical of the waves of the test made in 1930. Is that correct?

A. Nobody has criticised them to me.

Q. You never heard any objection to them?

A. I do not think I have discussed these waves, certainly with no one except a representative of the Power Company.

Q. Is it not a fact that on redirect examination you selected a number of very small waves which are not typical because of the various obscure facts as shown by the chart, and which have not previously been considered seriously?

A. I selected waves showing considerable reduction in volume, and I consider those waves should have just as much weight in making the decision as to the probable reduction as some of the larger waves. Because a wave is small is no sign its behaviour should not be given weight in making a study of wave reduction. I think some of the larger waves have more serious distortion in them than some of these small ones. I selected those particularly to bring out the fact that simple percent relations cannot be applied in predicting lowering of waves. The problem is intricate and one requiring many things to be taken into consideration.

Q. Isn't it a fact that the smaller waves you have selected and testified to on your re-direct examination from Plaintiff's Exhibit 227, show less persistence and greater reduction than waves, 2, 4 and 10, from Radford to Lock #2?

A. Yes.

2505 Q. On this basis, would not the two Radford waves, coming from the Radford Project, and being larger, show a greater persistence than test waves, 2, 4, and 10?

A. No, I don't think that is probable.

Q. On the basis of ratio between these two groups, isn't that probable? I mean the Radford wave and the ratio between these smaller waves and larger waves, on your test waves of 1930?

A. As I explained in drawing this chart, I do not think you can discuss this question of reduction simply in terms of the size of waves; the shape is also important.

Q. It is a fact, is it not, that the larger waves on this 1930 test show a greater percent of persistency than the smaller waves?

A. I think in general that is so.

2506 **DANIEL W. MEAD**

Direct examination by Mr. JACKSON:

Q. State your full name and residence, for the record, Doctor?

A. Daniel W. Mead, Madison, Wisconsin.

Q. What is your occupation?

A. Engineer—Civil Engineer.

Q. What is your education?

A. A general common school education and a technical University education in civil engineering.

Q. Did you take a degree?

A. Yes, from Cornell University.

Q. When was that?

A. In June 1884.

Q. What was that degree?

A. Bachelor of Civil Engineering.

Q. Will you just state generally, Dr. Mead, what has been your experience, and then, after you have made the general statement, I will ask you to give some particular details.

A. Well, in general I might say that, after I left high school, I entered the machine shops and spent two years learning the machine trade and got some knowledge of machinery, and then I entered college and took the course in Civil Engineering at Cornell University and graduated in June, 1884; and I was for a very short time with the United States Geological Survey in Wisconsin; then City Engineer at Rockford, Illinois, and then went into contracting, and for the next twelve years, I was engaged most largely in contracting, though I did some work in engineering designing at that time.

Q. Where were your headquarters?

A. In Rockford, Illinois. I left contracting and established an office in Chicago, as Consulting Engineer.

By Mr. **Thompson**:

Q. When?

A. About the latter part, I should say of 1899. I was in
2507 Chicago until 1904, and was asked to take a chair which was to be established, if I accepted it, in Hydraulic and Sanitary Engineering at the University of Wisconsin, the arrangement being that I should continue my practice and spend about half of my time during the college year in educational work, and half as I saw fit, in professional work. I served in that capacity as head of the Department of Hydraulic and Sanitary Engineering for 28 years, and resigned in 1932, but have continued lecturing on Contracts, Specifications and Engineering Relations, in one semester each year since I resigned. I have the position, if it can be called a position, of Professor Emeritus of Hydraulic and Sanitary Engineering.

By Mr. **Jackson**:

Q. Doctor Mead, I have asked you to prepare a statement, not of all your professional activities, but of those along certain lines, and from that will you read into the record a partial list of the hydro-electrical projects that you have examined and reported on.

By Mr. **Thompson**. Can we have a copy?

By Mr. **Jackson**. I haven't a copy—an extra copy now. We will give you one later.

A. The first plants mentioned here are those that I examined and made reports on, but not including construction. The next list is composed of plants I designed and constructed.

Q. Read that?

A. Yes. I want to say that reports were also made on the plants constructed but that I have not mentioned them.

The reports covered the Ox-Bow project, between Idaho and Oregon on the Snake River.

The Ocmulgee project, below Atlanta, Georgia.

The Big Sandy and Cheat River projects, of which there was a number—I don't know how many—in West Virgiina.

The Bull River project in British Columbia.

The Cornell and Knowlton projects and the Bad River project in Wisconsin.

The Manistee River Project at Lansing, and the Pere Marquette project in Michigan.

The Columbia River and Priest Rapids project in Washington.

The Spokane River project in Washington. I might say that I have reported on three or four plants on the Spokane River in Washington.

The Missouri River project in the State of South Dakota.

And there are various others that I cannot recall in detail. The following were designed and built. Shall I give the capacities?

By Mr. JACKSON:

Q. Yes, sir.

A. The next, I think, was the Prairie du Sac—it was 30,000 Kilowatts, on the Wisconsin River. These are not given in the order in which they were built.

The Kilbourn project in Wisconsin, on the Wisconsin River, 6500 Kilowatts. That was one of the early hydro-electric plants, built probably nearly 30 years ago. I think it was just 30 years ago.

High Falls on the Peshtigo River, 7500 Kilowatts.

Twin Falls, between Wisconsin and Michigan. That was 5,000 Kilowatts.

Johnson Falls, Wisconsin, 4,000 Kilowatts.

Brule River, between Wisconsin and Michigan; that was 5,000 Kilowatts.

Pine River, in Wisconsin, 4,000 Kilowatts.

Caldron Falls, on the Peshtigo River, Wisconsin, 7500 Kilowatts.

Sandstone Rapids, on the Peshtigo River, Wisconsin, 4,000 Kilowatts.

Alpena, Michigan; a small plant of 1200 Kilowatts.

Sturgeon River, Michigan, which was a small plant on a small stream—an automatic plant—1,000 Kilowatts.

And I have listed here Rockford, Illinois. I was City Engineer—but this was not for the City, but the Water Power Company there, which built their own plant, an early plant, and the system is the Rockford General Electric or the Rockford Edison Company, I believe, it was called.

Sterling, Illinois, was another old fashioned vertical turbine plant.

By Mr. JACKSON:

Q. Were any of these hydro-electrical plants, reservoir plants?

A. They were all reservoir plants, to an extent. Four I mentioned were built, one above the other on the Peshtigo River. The highest up was Caldron Falls; the next was High Falls, and Johnson—Falls and the Sandstone Rapids, and then two were built—rebuilt lower down stream near Potato Rapids, and one near the mouth of the Peshtigo River.

I reconstructed various plants mentioned here—at Hatfield, on the Black River; Black River Falls and Peshtigo, Wisconsin; Ingalls, Michigan; and one on the Elwha River of the Olympic peninsula in Washington.

By Mr. JACKSON:

Q. State a little what subjects you lectured on, more in detail, in the University of Wisconsin?

A. My lectures were largely on what we call professional subjects; that is, the application of professional knowledge to the construction of various kinds of work. Among those were Water Power; Public Water Supply; Irrigation; Drainage; Hydraulic Machinery; Hydrology; Hydraulic Design; Contracts; Specifications and Engineering Relations.

Hydrology was a subject I introduced. I don't think it was ever taught before, but I insisted upon introducing it at the University of Wisconsin. It is now, I think, quite generally taught in all of the Universities.

By Mr. JACKSON:

Q. Have you had any experience in connection with the design and construction of dams?

A. Yes.

Q. Give a few instances of that?

A. Well, it is hard to remember back 52 years. I have noted them here [indicating papers]. As I recall them, I have noted them.

I mention here, among others, the Danville, Illinois, plant; the Batavia, Illinois, project; and Rockford, Illinois; High Falls; also Kilbourn—it is written here as Hilbourn, but that is a mistake—the "H" should be a "K." Prairie du Sac, Wisconsin. Iron Mountain and Alpena, Michigan; and on the Elwha River, in the State of Washington. There I put a foundation under a dam 100 feet high. The river ran under it and I had to seal the bottom and also reconstruct the plant.

Well, that was continued between 1904 to 1912. There are others mentioned later on. I think this is more or less of a——

By Mr. JACKSON:

Q. A chronological statement?

A. Yes, sir.

Q. Did you have any or have you had any experience in connection with flood control?

A. Yes, sir. I was Consulting Engineer throughout the construction of the Miami Conservancy District work and was acting

Chief Engineer for the first six months and organized the work and got it under way.

I made plans in Oklahoma City for flood protection of the City. Then on occasions, I was at Waterloo, Iowa, advising them as to the protection of their City from excessive floods.

By Mr. Jackson:

Q. Now, Doctor Mead, I want to ask you to select some limited instances of your experience having some relation to the testimony and you have prepared this sheet. [Indicating.] I suggest it would be perhaps simpler if you read into the record such of these experiences as you have noted, beginning at the bottom of page 2, with the 1914 reference?

A. In 1914, I was a member of the Engineering Board for Flood control on the Huai River, in China, for the American Red Cross and the Chinese Republic. This work involved an expenditure of $43,000,000, but the World War broke out in Europe and it was not done.

In 1915, I was Consulting Engineer for the Miami Conservancy District, and Acting Chief Engineer for six months, during the sickness of the Chief Engineer. The total expenditure was $30,000,000; slightly above that, I believe.

In 1917, I reported on the dam and power plant in Austin, Texas, for the City of Austin; the Calaveras Spillway, San Francisco, California. I also reported to the Chief of Engineers of the United States on the foundations of the Muscle Shoals dam, called the Wilson dam.

In 1918 and 1919, I was consulting Engineer for the Peninsular Power Company, for the design and construction of hydro-electric plant on the Brule River, near Florence, Wisconsin.

For the City of Black River Falls, Wisconsin, on re-construction and design of hydroelectric plant.

In 1920 and 1921, I was consulting engineer for the Wisconsin Public Utility Company, Milwaukee, Wisconsin; the Wisconsin Railway, Light and Power Company, of Milwaukee, Wisconsin; the Wisconsin Securities Company, Milwaukee, Wisconsin; the Peninsular Power Company, Madison, Wisconsin, in the building of a hydroelectric plant that year, started on the Pine River South of Florence, Wisconsin.

Also consulting Engineer for the Public Service Company of Northern, Illinois, water power work.

For the Oconto Service Company, Peshtigo, Wisconsin, water power.

The State of South Dakota—reported on the feasibility of the development of hydroelectric power from the Missouri River. Reports published in April, 1920.

Also consulting engineer for the Northern Peshtigo Pulp and Paper Company for a hydroelectric plant at Caldron Falls, Wisconsin—although this company did not build the plant which was finally built by another company.

In 1922, the design and construction of a hydro-electric plant on the Peshtigo River at Johnson Falls.

In 1922, continuing with water power, with the Oconto Service Company, Peshtigo, Wisconsin, began the design and supervision of power station for the Madison Gas and Electric Company of Madison, Wisconsin, and put in several units, I think 5, 10 or 15 thousand Kilowatts, as I remember, turbo generating plants for that company at Madison.

By Mr. JACKSON:

Q. I suggest that you turn to page 5 of the statement, and just simply state some of your more recent experiences, beginning with 1926 or 1927; whatever it is?

A. Do you want all of this stuff read [indicating paper]?

Q. Those that deal with your most recent experiences?

A. Well, in 1926 and 1927, I made investigation and report on the proposed hydroelectric developments on the Menominee River and the White Rapids and Chalk Rapids, for Halsey, Stuart and Company of Chicago and the First Wisconsin Trust Company.

I was consulting engineer for the Cheat Haven plant of the West Virginia Power and Transmission Company, with 75,000 horse power.

Consulting Engineer, Sacramento Municipal Utility District, California, as to new water supply and power development on the South fork of the American River.

Also consulting engineer for the Washington Water Power Company, Spokane, Washington, dam for Lake Chelan hydroelectric development.

Investigation and report on hydroelectric development at Wisconsin Rapids, for the First Wisconsin Company, Milwaukee.

That was a hydro development that was very large—I do not remember the capacity. That was a 400 foot head and a pretty heavy flow. I am referring now to the project of the Washington Water Power Company, Spokane, Washington, for a dam for Lake Chelan.

Then I made an investigation and report on the hydroelectric development at Wisconsin Rapids, to which I have alluded, for the First Wisconsin Company, which is a Bank.

In 1928 and to 1931, I was a member of the Colorado River Board for the United States Government. I was appointed—I do not know when it was; I guess the records will show that. I examined the Imperial Valley and various irrigation works on the Lower Colorado Canyon and Colorado River, and these included the Boulder Canyon and the Black Canyon project in 1928, and we increased the estimate at that time from $125,000,000 to $165,000,000; that increase was not that much—by $40,000,000 to $165,000,000..

Reports and plans for the flood protection of Oklahoma River—I mentioned that—about a $10,000,000 proposition.

By Mr. JACKSON:

Q. Turn to 1932?

A. In 1932, I was still a Member of the Colorado River Board, and we approved plans for the Hoover Dam in November, 1932, at which time the Board finished its work.

I think it was in 1933 that I reported to the Illinois Central Railway in connection with the Bonnet Carre Spillway operation before the Federal Commission at New Orleans.

I think the same year, I reported on the hydroelectric development for the City of Spokane, Washington.

By Mr. JACKSON:

Q. I will ask you to omit some of these things, and I want to ask you whether or not you had anything to do with any plants on New River, in Virginia or West Virginia, in 1931?

A. Yes; through the New York office of Daniel W. Mead and F. W. Scheidenhelm, various investigations were made for plants on New River, in Virginia and in West Virginia.

Q. Have you had any connection with the Special Board for the Tennessee Valley Authority?

A. I am on the Board now, as consulting engineer about maximum floods in the Tennessee Valley; also I am Chairman of the Board of Review of the Sanitary District of Chicago, planning the expenditure of $56,000,000 for sewerage disposal.

Q. Have you published any scientific and technical books or writings?

A. Yes.

Q. Will you read a list of such books—not the articles that you have written.

A. I have a list here somewhere. I might explain that when I went to the University of Wisconsin, there were no available text books, and I published, before I went to Madison, certain notes on hydrology, which I think is the first publication on that subject in the United States; and when I took up the matter of water power, I was writing a book on that subject. There was nothing that covered it adequately.

Q. What book was that?

A. Water Power Engineering, published, I think about 1908, first, and revamped in different forms later on.

Another book was Contracts, Specifications, and Engineering Relations, published in 1916.

A book entitled Dam and Water Power Development at Austin, Texas, in 1917.

A larger and more complete work on Hydrology, published in 1919.

And a book, including my report on the feasibility of the Development of hydroelectric power on the Missouri River in South Dakota, published in 1920.

Also two volumes on Hydraulic Design, Estimate of Water Supply and Water Power of a River and the Design of a Hydroelectric plant, published in 1930. In 1930–1933, there was published my book on Hydraulic Machinery.

By Mr. **Jackson**:

Q. I show you papers that you handed to me, which contains a list of the papers you have written, in addition to these books. Is that correct. [Papers are handed to the witness.]

A. So far as I can make out, yes, sir; that seems to be correct.

Q. I will ask you to hand that list to the shorthand reporter and have them listed in the record.

A. All right.

By Mr. **Jackson**. Is that agreeable to you gentlemen? [Addressing opposite counsel.]

By Mr. **Thompson**. Yes, sir.

By Mr. **Jackson**. I will ask that they be included in the record without having the witness read them.

SCIENTIFIC AND TECHNICAL WRITINGS OF DANIEL W. MEAD—1932

BOOKS PUBLISHED

Notes on Hydrology—Published privately—1904, pp. 202+XI.

Water Power Engineering—McGraw-Hill Book Company. 1908–1915, pp. 843+XVII.

Contracts, Specifications, and Engineering Relations—McGraw-Hill Book Company 1916. pp. 525+XI.

Dam and Water Power Development at Austin, Texas, City of Austin, 1917, pp. 205 VIII.

Hydrology—McGraw-Hill Book Co. 1919, pp. 647+XI.

Feasibility of the Development of Hydro Electric Power on the Missouri River in South Dakota, State of South Dakota, 1920, 4 vo. pp. 118+VIII.

Hydraulic Design, 2 vols. Madison 1930—Vol. 1. Estimate of Water Supply and Water Power of a River. Vol. 2. The design of a Hydroelectric Plant. Hydraulic Machinery. 1933.

PAPERS

Sources of Water Supply—Report of the 4th Annual Meeting of the Illinois Society of Engineers and Surveyors, 1889, pp. 38–39.

The Qualities of Water for Domestic Supply and Use—Report of the 7th Annual Meeting of the Illinois Society of Engineers and Surveyors, 1892, pp. 24–37.

The Geology of Wisconsin in Water Supplies—Report of the American Water Works Association—1893, pp. 63–74.

Notes on the Hydro Geology of Illinois in Relation to its Water Supplies. Report of the 8th Annual Meeting of the Illinois Society of Engineers and Surveyors, 1893, pp. 48–68.

The Hydro Geology of the Upper Mississippi Valley—Journal of the Association of Engineering Societies, Vol. 13, 1894, pp. 329–396.

Pure Water vs. Purified Water for the Public Water Supplies—Papers and Reports of the American Public Health Association, Vol. 20, 1895, pp. 49–52.

Locating a Public Water Supply—The Engineering Magazine, Vol. 10, 1895, pp. 876–882.

DeKalb Electrical Pumping Plant—Journal of the Association of Engineering Societies, Vol. 15, 1895, pp. 83–101.

The Hydraulic Ram—11th Annual Report of the Illinois Society of Engineers and Surveyors, pp. 50–60, 1896.

Mechanics of Suction and Suction Pipes—Journal Western Society of Engineers, Vol. 4, 1899, pp. 12–34.

Notes on the Commercial Transformation of Energy—14th Annual Report of the Illinois Society of Engineers and Surveyors, 1899, pp. 38–75.

Notes on Steam Engine Indicator—15th Annual Report of the Illinois Society of Engineers and Surveyors, 1900, pp. 44–59.

New Plant for Increasing the Water Supply at Rockford, Illinois. Proceedings of the 13th Annual Meeting of the Iowa Engineering Society, 1901.

Appraisal of the Value of Public Utilities—American Water Works Association 1902, pp. 9.

Some Small Water Works Installations—proc. 22d. Annual Meeting American Water Works Association, 1902, pp. 183–212.

A Gas Driven Direct Pressure Pumping Plant—Journal of the Western Society of Engineers, Vol. 7, 1902, pp. 20–35.

Recent Improvements in the Plant of the Danville Water Company, Journal Western Society of Engineers, Vol. 10, 1905, pp. 272–289.

Technical Instruction in Hydraulic Engineering—Proc. of the Society for the Promotion of Engineering Education, Vol. 16, 1908, pp. 174–199.

Hydraulic Engineering at the University of Wisconsin—Journal of the Western Society of Engineers. Vol. 13, 1908, pp. 1–34.

The Relations of Experimental Results to the Theory of the Tangential Wheel. Bulletin of the University of Wisconsin, No. 337, 1909, pp. 1–104.

The Flow of Streams and the Factors that Control it.[8] Bulletin of the University of Wisconsin, No. 425, 1911, pp. 1–192.

The Runaway Speed of Water Wheels—Proc. of the American Institute of Electrical Engineers, Vol. 31, 1912, pp. 1937–58.

The Cause of Floods and Factors that Influence Their Intensity [9]—Journal Western Society of Engineers, 1913, Vol. 18, pp. 239–282.

The Present Status of the Water Powers of Wisconsin—Read before the Engineering Society of Milwaukee, January 1914, Published privately, pp. 1–39.

Hydraulic Engineering Education—Bulletin of the Society for the Promotion of Engineering Education, Vol. 4, 1914, pp. 185–198.

Latent Water Powers of Wisconsin—7th Annual Convention of Wisconsin Electrical Association, Milwaukee, 1915, pp. 8.

Four Thousand Years of Practical Engineering in China—The Wisconsin Engineer, January, 1915, pp. 1–29.

The Influence of Surface and Subterranean Waters on the Flow of Streams—13th International Congress of Navigation, London, 1923.

The Economics of Hydro Electric Development—American Society of Civil Engineers, Atlanta, Georgia, 1924. Transactions, Vol. 88, p. 158, 1925.

An Analysis of the Proposed Plans for Flood Protection of the Lower Mississippi Valley. Journal Western Society of Engineers, Vol. 33, p. 297, 1925.

Floods and Flood Protection in the Lower Mississippi Valley. Bulletin of the Associated State Engineering Societies, July, 1928.

The Colorado River and Its Proposed Development. The Boulder Dam Project. Journal Western Society of Engineers, Vol. 34, July 1929.

The Boulder Canyon Project. Bulletin Association Engineers Societies, July 1929.

The Colorado River, The Imperial Valley, and the Boulder Canyon Project. Wisconsin Engineer, Vol. 34, October–November, 1929.

The Rockford Water Supply, Journal American Water Works Association, August, 1933.

---

[8] Awarded the Fuertes gold medal for original research by the Engineering Department of Cornell University.

[9] Awarded the Chanute medal for best paper on civil engineering presented before the Society for the year 1913.

Water Works Development of the St. Lawrence River, Proc. American Society of Civil Engineers, August, 1933, pp. 965–82.

By Mr. **Jackson**:

Q. Are you a member of any professional or technical Societies?

A. I have quite a list of it. I will read them.

Q. Can you hand the list to the shorthand reporter, if that is agreeable.

By Mr. **Thompson**. That is all right.

By the **Court**. What are some of them?

A. The American Institute of Consulting Engineers, The American Society of Civil Engineers, American Society of Mechanical Engineers, Western Society of Engineers, American Water Works Association, New England Water Works Association, Wisconsin Society of Engineers, Illinois Society of Engineers, International Association of Navigation Congress, Society for Promotion of Engineering Education, American Association for Advancement of Science, American Academy of Political Science, American Political Science Association, American Forestry Association, American Meteorological Society, American Institute of Electrical Engineers, American Public Health Association.

A. (Continuing.) And there are others that I cannot now recall.

By Mr. **Jackson**:

Q. Do you hold any office in the American Society of Civil Engineers?

A. Yes.

Q. What is it?

A. I am the 1936 President; the President for the year 1936.

Q. Doctor Mead, do you have any business relationship with the defendant here, the Appalachian Electric Power Company?

A. Yes; both directly and indirectly. I have been associated with Colonel Scheidenhelm, since, as near as I can remember, since 1912, in New York, under the firm name of Mead—Daniel W. Mead and F. W. Scheidenhelm, Consulating Engineers, and I think, for about 11 years, my office has done considerable work for the Appalachian Electric Power Company.

Q. Have you been connected with the work or not?

A. Yes, sir—Yes and no—not intimately acquainted with it, because Colonel Scheidenhelm gives his special attention to it, and I come in occasionally, when he asks me to. My work is done largely in the West.

Q. Can you state what part of the work done by your firm for the Appalachian Electric Power Company, you are most familiar with?

A. I know more about the Radford project, in a general way, than any of the others, although as I said above, I did examine two sites on the lower New River in West Virginia.

Q. What were they?

A. One was just above Hinton, about one mile, and the other about 9 miles above, called Bull Falls.

Q. When did you make that examination?

A. I could not tell you.

Q. Was it sometime ago?

A. Yes, sir; some years ago. I appeared at that time before the West Virginia Rate Commission—is—I don't know the name, but they had jurisdiction over the granting of the license.

Q. I believe it is the West Virginia Public Service Commission?

A. Possibly so; I don't know the names.

Q. At the time that you made the examination near Hinton, was the possibility of constructing some project there under consideration?

A. Yes, sir.

Q. Did it have a name, do you know?

A. It had a name, but I have so many things in my mind that I cannot remember it. It was a dam above Hinton and Bull Falls dam, the latter being a very high dam and the other a re-regulating dam, as I recall it.

Q. Well, you say there were two dams—a dam and a reregulating dam?

A. Yes, sir; they were both dams, and the reregulating was more particularly the function of the smaller dam.

Q. Would that mean one high dam and one——

A. (Interrupting.) Yes, and one lower down and about a mile above Hinton.

Q. It was about a mile above Hinton?

A. That was the smaller reregulating dam and the other was about nine miles, I think, at Bulls Falls. I may be off as to the miles.

Q. You said you were more familiar with the Radford project. Are you acquainted with the details of that project?

A. No, I am more acquainted with the dam site and the reservoir. I have been there several times and examined the question of the location and other questions connected with the fundamental elements of the design.

Q. What is the extent of your acquaintance with New River?

A. Well, I should say it was limited to that examination that was made above Hinton; I remember that when I went on the Bulls Falls site and went up five or six miles further, and back through Indian Creek and went across the river again at some place—I do not remember the name, but I remember the poor supper we had there, and finally got to Radford—or the dam site at Radford.

Q. Were you ever at the Narrows?

A. We passed the Narrows, I think, somewhere; I think it was near that that we had the memorable supper.

Q. How often, if ever, have you visited the Radford dam site?

A. I cannot remember that; I should say three or four times; possibly more; but I am quite sure three or four times and I think at least three and I think four or more.

Q. Do you have any acquaintance with Kanawha River?

A. I have known in a general way of the Kanawha River for many years. I had occasion to lecture once for a good many years on the question of rivers and canals for navigation, and at that time, I knew pretty thoroughly about the lock and dam system on the Great Kanawha and the Ohio, and I visited some of the dams on the Ohio and I visited the Kanawha River, the first time at Point Pleasant, and went on to Charleston and stopped and examined some of the dams and locks, and I remember taking various pictures there.

By Mr. Thompson:

Q. How many years ago was that?

A. I should say that my first actual contact with the river must have been 25 years ago—possibly more; and of course these locks have been replaced or are now being replaced, and I have not seen the river since I was there—yes, I was at Charleston when I made the investigation of the Hinton site, but I have not seen the river since the new dams and the power plants were put in at two places; I understand there are three locks or dams and power plants, that are replacing seven original dams on the river."

By Mr. Jackson:

Q. Dr. Mead, what is the proposed storage capacity of the Radford project?

A. 100,000 acre-feet."

Q. What would be the equalized flow out of the Radford project if during the year of the lowest stream flow of record the storage capacity were utilized to bring about the largest uniform flow throughout that period?

A. It is about 1,200 second-feet—a little bit less than that, I think. In round numbers that is close enough for all practical purposes.

Q. Are you familiar with the methods of operating storage for a power development, such as the Radford project?

A. I have had to become pretty familiar with hydraulic plants, including reservoirs, which are quite often an important matter in connection with them.

Q. Over how many years has your experience in that regard extended?

A. Oh, I should say 30 years, at least.

Q. How could the operator of such a storage reservoir operate the project if an equalized flow of a minimum amount of 2508 1,200 second-feet was to be maintained?

A. The equalized flow, perhaps, ought to be explained. It is an equalized flow in a sense, but it is not used in a wholly equalized manner. That, when I say 1,200 second-feet, would mean that that was about the average rate at which it would have to be used. It might have to be used four or five times that amount for a certain length of time and even less than that amount a part of the time, but the average flow for 24 hours would have to be not more than that. In the operation of a plant, any plant, for the best uses of a stream, taking other parts of the year leading up to the dry season we would see that we did not exceed, say, the average weekly flow of the stream, and try and leave the reservoir full on the approach of the extreme dry weather. Occasionally before that time we might get less than what we considered the minimum, perhaps for a day. That might take a little water from the reservoir, which would be replaced the next. When the dry weather really came on, we would augment the natural flow of the stream to bring it up on a 24-hour or a seven-day period, or whatever the unit might be used, keeping always preferably within, say 1,200 second-feet, because it is a wise provision to take care of something that might be worse than we have ever known. So that it would be very poor policy to draw on your reserve supply except when absolutely necessary, for two reasons: Power is necessarily made up of weight and head. The weight of the water we are using and the head of the water. Where you draw a reservoir down, you reduce not only the quantity of water held but the head. With the head, you reduce the capacity of your plant, and good judgment always means that a reservoir of the fullest capacity possible be reserved as long as possible.

Q. Would that effect result on the average to stretch the storage out over the low-water season?

A. That is what we determine when we say 1,200 feet could be carried by use of 100,000 acre-feet of storage through the maximum dry period which we experienced, which would include the 2509 years 1925 and 1930. Both were low years, and I do not know which was the less.

Q. When you said 1,200 feet a moment ago, you meant 1,200 cubic feet?

A. 1,200 cubic feet per second used irregularly through the time, as long as the average for the day, or week, or month, did not exceed that amount. That is the measure that we have established, and it must not be exceeded for long intervals, the object being, of course, to have, at the end of the first month and the beginning of the second month, enough to carry through the balance of the dry season. At the end of the third month, you would have enough to carry through the balance of the dry season.

Q. Would it be feasible for the operator of the Radford project to utilize the storage, or to draw the storage down, in advance of the low-water season?

A. I suppose he might do it if he was not interested in getting the best results. It would be a very foolish proposition.

Q. Dr. Mead, are you familiar with the United States Geological Survey Stream Flow Estimates on New River for 1930?

A. Yes. I examined them.

Q. Have you examined the records for the gaging stations above Radford?

A. Yes, I saw that. I think I saw one above and one below. The one above I gave particular attention to.

Q. Doctor, I hand you a water supply table, duplicate of which has been marked "Government Exhibit No. 81," and I direct your attention to pages 62 and 63 and ask you what table is shown there, and whether you have studied the table?

By Mr. Thompson:

Q. Will you kindly tell what water supply table that is?

A. 698. I have looked these over, and one of them shows the approximate flow per day, September 26, 1929, to September 30, 1930. That is at Allisonia. The other is the same time—no: It starts October 1, 1929, and goes to September 30, 1930, at Eggleston. Eggleston is below, as I recall, and Allisonia is above.

2510 By Mr. Jackson:

Q. Dr. Mead, from your examination of the table showing estimates of daily discharge for New River at Allisonia, Virginia, for the twelve months ending September 30, 1930, as shown in "Government Exhibit No. 81," when, in your opinion, would the utilization of the Radford storage have been begun if the Radford project had been in operation in 1930?

A. With a full reservoir, there would be some very slight draft in June. I am supposing if intelligently used, there would have been some slight draft in June, when the flow went down apparently below 1200 second feet. About June 22, it ran down to 1,070, which is a little below probable flow at the Radford dam, as this flow is only about twenty miles up-stream and about ten percent under the probable flow at Radford. Then it goes down for the next day, and up the next to 1,270, and then it remains below 1,000 for about two months, when the dry weather flow would be augmented by the reservoir capacity and probably above the plant, and bring it up to not exceeding 1,200 second-feet. That is on an average. It might exceed it a day and be less the next day, but the average should be kept under 1,200 second-feet.

By Mr. **Thompson**:

Q. I don't know whether I understand it right; That is for two months it was below a thousand second feet, and at that time you were figuring on drawing from the reservoir?

A. Yes.

Q. To bring it up to 1200?

A. Yes.

By Mr. **Jackson**. Not more than 1200.

Q. Under that method of operation, would the storage be exhausted at any time prior to the end of the low water season?

A. Not unless—I don't know that it ever gets so low so you can't find some time it might go lower, and, therefore, you should cut under 1200 feet. It may occur.

Q. You said in the first part of your answer, assuming, at the commencement of the low water season, the reservoir was full, please state whether, in your opinion, under proper
2511 operation the Radford reservoir would have been full at the commencement of the low water season early in June?

A. Under proper operation it certainly should have been filled and practically full at the time of the low water season. We have had quite a number of years of it and we know practically what we strike.

Q. Would you consider it a reasonable or an unreasonable method of operation if, under conditions disclosed in 1930, the utilizable storage of the reservoir had been depleted, or exhausted, prior to June 22nd, or 23rd, 1930?

A. I should consider it an inexcusable blunder.

Q. Are you familiar with the load requirements of the system of the Appalachian Electric Power Company?

A. No, I don't know anything about it except in the way, as I have stated, of loadcurves in pretty near all the country in the main plants. I do not recall that particular load curve. I may have seen it and presume I have.

Q. Does that fact in any way affect the opinion which you have expressed with regard to the method of operation which would have drawn down or exhausted the Radford reservoir prior to June 22, 1930?

A. None whatever.

By the COURT:

What was the date, during 1930, when the stream flow was returned to as much as 1,200 feet?

A. It did for four days in August, but it went down again. There was evidently rainfall somewhere. Well, there were four days in August, and then it kept under 1,200 feet up to the 17th of November, when it was up for a few days, then it was down and up, and a few days were below in December, and one day it was below in January, no two days below in January, but in general it was getting back up about 1,200, some days as high as 9,000. It varies as those rivers always do. By the 1st of December or 2nd of December it got up to 1,230 although there were two or three days when it was below 1,200 later on.

2512 Q. That is according to the gaging station upstream from the dam site?

A. Yes, sir; which really should be increased about 10% I think for the Radford dam site.

Q. You stated earlier in your testimony, Dr. Mead, that this uniform flow which could be produced by the 100,000 acre-feet of Radford storage, was expected to be approximately 1,200 second-feet?

A. Yes, sir.

Q. Did that estimate of 1,200 second-feet take into consideration the low water season or experience of 1930?

A. It was based on the two low water periods of 1925 and 1930.

Q. Is that sort of an estimate based on the worst years or the best years?

A. Those were the two worst years, that is what we always base reservoir studies on.

Q. Are you familiar with the Bluestone reservoir project as it is described in the report of the Army Engineers, which is in evidence here as Government Exhibit #145?

A. In a very general way, yes, sir.

Q. Do you know what height of dam is contemplated by that project?

A. My recollection is about 150 feet for the combined project I take it for flood protection and power.

Q. Do you know what the storage for flood control is, the amount reserved for flood control?

A. Of course all I know and all anyone knows is what is estimated in that report, because there is no such thing, 150 feet, and the upper 30 feet is supposed to be reserved for flood control, and has a capacity as I recall it of about 236,000 acre feet. I wouldn't be positive without looking up the figures. I think I noted them somewhere. (Referred to file.) Well I have it 235,000

acre-feet and the power storage I figured would have a maximum head of about 120 feet and about 286,000 acre-feet total
2513 capacity, including a certain amount that was to be reserved for freshets, but which I take it was also to be used for power.

Q. Did you mean 286,000 or 268,000?

A. I gave two figures.

Q. The last you gave was 286,000 reserved for power and I thought you had maybe misread your note?

A. It was 235,300 acre-feet, which allowed 5 feet above containing 32,700 acre-feet for freshets, and the two together—I take it freshet water was to be reserved and saved, as would be the intelligent thing to do—the two together would be 268,000. I think there is a slight indefiniteness in that report. I could not check one or two figures. One gave more than the other. This was stated directly 268,000 I recall in the report.

Q. Do you know whether part of this reservoir is devoted to power?

A. This 268,000 I understood was to be devoted to power purposes.

Q. Is that what we sometimes refer to as utilizable storage for power purposes?

A. Yes, sir.

Q. Please state whether in your opinion the operation of the Radford project would have any adverse effect upon the Bluestone project?

A. I don't see how it could have any adverse effect under any reasonable intelligent use.

Q. Do you think the Radford project would have any effect, adverse or favorable, upon the Bluestone project?

A. I think it would be entirely favorable in general. It really consists of 100,000 acre-feet additional capacity for Bluestone.

Q. Are you referring to storage now?

A. Yes, sir.

Q. Will you explain a little more fully the reason for your opinion as to the fact the effect would be beneficial?

A. Well it is just the ordinary principle we have on
2514 every reservoir where we are reserving water for storage purposes. We frequently have one dam above the other and it is the common attempt to utilize the storage so it will be of the greatest benefit to all concerned, but which cannot quite be accomplished in that way when the plants are in the hands of different interests, but universally there is a benefit from the upstream storage of water; it is simply holding back the floods that would pass off at a time they cannot be used, and putting them into the low spots where they can be used.

Q. How would that affect the possible power production at Bluestone?

A. It increases it, and as a rule that is what we are aiming at in these reservoir systems.

Q. What, if any, effect would the construction and operation of the Radford project have upon the Bluestone project from the standpoint of silting?

A. Without the Radford project the silt would be carried down into the Bluestone, and with it nothing but the finest material would ever reach the Bluestone or the river below. The up-river dams have a great advantage in that way, which sometimes are very serious, but I don't regard it as serious here as in the Boulder Canyon project. Unless we get some up-river projects we won't have any project there in 200 years. We will have thirty million acre feet of silt instead of thirty million acre feet of water.

Q. As I understand you—— [interrupted].

A. The Radford plant would keep the silt out of the Bluestone you call it.

Q. That is the silt would stop in the Radford reservoir?

A. Yes, everything except the very finest silt which in some cases, I don't know if in this river or not, but in most rivers certain silt will remain in suspension as long as any motion at all persists and sometimes after motion is stopped, but that is of no moment, because it will go right on down to sea eventually.

2515 Q. That is it would pass through the Bluestone?

A. This very fine stuff remains in suspension for days. Stuff like that would simply go down until it gets into the salt water. It doesn't amount to anything in volume.

Q. Going back a moment to your testimony that in your opinion the construction and operation of the Radford project would have a beneficial effect upon the production of power at Bluestone, will you explain how that additional 100,000 acre feet of storage at Radford would be used by the operator of Bluestone to benefit the Bluestone Reservoir?

A. Well it would replace an equal amount of water that might be used in power or it would increase the power output that could be obtained from the Bluestone project if more power was desired, without additional lowering of the Bluestone reservoir. That is, it would take the place of some used or it could add to the amount used.

Q. Am I right in understanding that would either mean more power would be produced at Bluestone or that the Bluestone reservoir would be maintained——[interrupted].

A. It would mean more power or more head.

Q. Are you familiar with the subject of fluctuating discharges from water power stations?

A. I have seen several.

2516 By Mr. JACKSON:

Q. Dr. Mead, at the adjournment Friday I had just asked whether you are familiar with the subject of fluctuating discharge from water power systems?

A. I am.

Q. For what period of time have you been familiar with that subject?

A. Well, I should say 50 years.

Q. What, in your opinion, would be the effect of the Bluestone reservoir, about which you testified Friday, upon varying discharge of power tides which might be produced in the operation of the Radford power station?

A. In general, the effect would be an equalizing effect.

By Mr. JACKSON:

Q. Will you state somewhat more in detail what, in your opinion, would happen to any power tides produced by the operation of the Radford station when those power tides reached the Bluestone reservoir?

A. In general, the tide would spread out over the reservoir and raise the water in the reservoir in proportion to the quantity of water in the tide.

Q. State whether or not, in your opinion, the power tide would pass through the Bluestone reservoir as a tide?

A. Not without change in form and quantity. If the reservoir was full, the water in the tide above the quantity necessary to fill the reservoir would naturally overflow and pass on down the river but have a different distribution in the quantity and in the distribution of the tide itself. If the reservoir were not full, it would simply spread out and add to the head of the reservoir.

Q. When you say if the reservoir was not full, which reservoir do you refer to?

A. I was speaking of the Bluestone reservoir.

Q. If the Bluestone reservoir were not full, what would control the nature of the discharge below Bluestone—the tides from Radford, or the method of operation of Bluestone?

2517 A. The operation of the gates or plants which, I understand, are installed in connection with the Bluestone dam.

Q. Under the circumstances last described, would the Radford power tide appear at all in the stream below Bluestone—that is when the Bluestone reservoir was not full?

A. Not as a wave—not as a tide. The water would, of course, continue to go down-stream unless it is conserved and held in the reservoir.

Q. Would any power tides from the Radford reservoir, under such circumstances, be recognizable in the stream below the Bluestone reservoir?

A. No, not as a tide, under the conditions that it left Radford. It would change in form entirely.

Q. Assuming that the Bluestone reservoir were partly empty, what would control the form of discharge in the stream below the Bluestone reservoir?

A. It would be entirely controlled by the operation of the power plant or gate at Bluestone.

Q. You first referred to the condition where the Bluestone reservoir might be full: Under those circumstances, what would be the effect, if any, of the Bluestone reservoir on any power tides from the Radford station?

A. The power tides from the Radford station would normally flow into the reservoir, spread out, and be reduced in height. If, as I understand the question, the reservoir were full, it would gradually spill over, increasing in volume as the depth increased, or it might pass through the power plant if the power plant were placed in operation and the demand for power be sufficient to utilize it.

Q. Assuming the Bluestone reservoir were full, and the Radford power tide spread out as you have described it on top of the reservoir, what would be the effect, if any, of that circumstance upon the form of the Radford power tide, if and to the extent it passed from the Bluestone reservoir?

2518 A. The form of the power tide would change entirely. It would simply begin to spill over as the level increased until a sufficient amount were spilled over to take care of the water.

Q. Would that involve the increasing or decreasing the amplitude of the tide?

A. It would decrease the amplitude of the tide. If the tide were very, very, small, and even then the spreading out would decrease any tide, as far as that is concerned.

Q. What, if any, use of the gates at the Bluestone dam could be made under such conditions to make the outflow uniform?

A. If the reservoir were full to the flood level, the gates could be used to control to the capacity of the gates and equalize the flow as might be desired, made large or small, but no smaller, of course, than the amount entering the reservoir.

Q. Well, would the gates be sufficient to fully equalize any power tide that could be produced by the Radford power plant, or not?

A. Yes, it is sufficient, I understand, to take care of action in flood, and the tide from the Radford plant, or any other plant, would be a comparatively small amount.

By Mr. **Jackson**:

Q. Do you know what the hydraulic capacity of the Bluestone reservoir is in second feet?

A. Only in a general way. I understand it is about 10,000 second-feet—possibly a little more than that. I think it is somewhat larger than the proposed plant up the river, which is 9000 second feet, with the reservoir full.

Q. Dr. Mead, referring to this special condition when the part of the Bluestone reservoir reserve for power purposes might be full and the flow into the Bluestone reservoir in excess of the hydraulic capacity of the Bluestone power installation, 2519 or, as appears from Exhibit 145 in excess of 11,000 second feet, and the Radford power station be simultaneously operating on a peak load basis, please state whether in your opinion this coincidence of circumstances would be likely to occur?

A. It is very unlikely, I should say.

By Mr. **Jackson**:

Q. Will you state the basis of your opinion?

A. There are so many provisions there, I think possibly in one or two of the preceding questions this morning, I misunderstood. I thought when you spoke of the Bluestone Reservoir being full, you referred to not only the power but to the flood storage. My answers were given in the first place with that in view. The general scheme of the Bluestone reservoir, of course, is to keep five feet for freshets, and I take it that that would be the usual course. It would be only under exceptional circumstances in which a freshet had just occurred and is then followed by a discharge of 11,000 feet plus the peak load from the plant above, a condition which is hardly conceivable.

Q. Well, Dr. Mead, assuming the Bluestone reservoir were full to the extent of the power capacity, and that there were an in-flow in excess of 11,000 second feet in the Bluestone reservoir, what, in your opinion would be the likelihood of the Radford plant being concurrently operated on a peak load basis?

A. The peak load capacity of the plant above at Radford would normally only be used for a very brief period, perhaps an hour or more in any one day. The coincidence of the peak in a flood, either from above or below, a peak load at the same hour would be very unexpected and unusual and would hardly be anticipated to occur.

By Mr. JACKSON:

Q. Dr. Mead, assuming that the Radford reservoir were full, and there were a flow in the Radford reservoir of approximately 9000 second feet, state whether or not in your opinion the Radford plant would be operating on a peak load?

2520 A. In the operation of plants such as the Radford plant, it is the purpose to get as much power out of it as possible, and it would probably be operating as far as possible at the maximum load that could be carried. It might be no peak at all, but a steady discharge at or near its maximum capacity.

Q. Assuming the Radford reservoir were full, and there were a flow into the Radford reservoir equal to the hydraulic capacity of the Radford power installation, state whether or not in your opinion the Radford power plant would be operated on a peak basis during the continuance of that condition.

A. I should say not.

By Mr. JACKSON:

Q. Why?

A. A peak basis necessarily means that during the day the plant would be operated from a low basis to a high basis, the higher basis being what we would call the peak. With the capacity of the plant coming into the reservoir, I should consider the proper operation would be to run the plant as nearly to its capacity as possible, and practically eliminate all questions of peak and run it essentially uniform and as near the capacity of the plant as possible.

Q. Would it involve waste of water under those circumstances?

A. No waste.

Q. Dr. Mead, are you familiar with the power development at the navigation dams of the United States on the Kanawha River?

A. I know something about the capacity and location, but I have never seen them, and have never examined in detail the plans.

Q. Do you know what power developments have been built or are in process of construction at navigation dams on the Kanawha River?

A. I am informed that there are two completed and one under construction.

Q. Will you state whether in your opinion the potential power out-put at the Government navigation dams on the Kanawha River would be injured or benefited by reason of the existence and operation of the Radford power project?

A. It would be benefited.

2521 Q. Will you explain a little more fully the reason for your opinion?

A. The storage of water from the high flows and its release at low water is in general beneficial to power plants further downstream below the storage, and the benefit would result in either the case of the Radford plant alone or the Radford plant in connection with the Bluestone.

2522 Q. What effect, if any, would the existence and operation of the Radford power station have upon the low water flow available for power at the Government navigation dams?

A. It would increase the flow at the Government navigation dams.

Q. What effect, if any, would the existence and operation of the Radford power station have upon the head available at the Government navigation dams, available for power at the Government navigation dams?

A. When ever the Radford reservoir reduced the high water flow it would to that extent relieve the over-flow and the loss of head at the dams. I understand they are drowned out during extreme floods and the period which they would be drowned out would be shortened.

Q. Under what circumstances would the Radford reservoir reduce high water flows?

A. Under flood conditions in which water was being stored at Radford.

Q. What would be done with the stored water?

A. It would be held for power purposes during the low water period.

Q. Dr. Mead, in the course of your engineering experience, have you been familiar with the stream flow records of the U. S. Geological Survey?

A. I have.

Q. Assuming stream flow records of the U. S. Geological Survey, which indicate that the flow at an upstream gaging station for a given period of a week or more was substantially greater than the flow at a downstream gaging station, taking into account the lag in the flow from the upstream to the downstream station, what, in your opinion, would be the reliability of those records in the case of New River?

A. I should think it would lead to the conclusion of inaccuracy in the measurement, perhaps in the rating curve or in the data on which the rating curve was established or in the reading itself.

Q. At which gage?

A. At the upper gage that showed more water than would be found downstream.

Q. Will you state whether it might indicate the downstream gage reading was inaccurate?

A. It might indicate either one was inaccurate.

2523 Q. In your opinion, Dr. Mead, where an estimate of stream flow in the records of the U. S. Geological Survey for an upstream gaging station on New River, shows a greater flow than the corresponding flow shown by the same records for a downstream gaging station on New River, allowing for the necessary lag, could that discrepancy be explained or accounted for by losses due to evaporation or seepage?

A. Only in the event the difference was very small and not greater than the evaporation.

Q. Can you give any indication of the order of that difference?

A. Well if it was 100 second feet I should say it could not be due to evaporation.

Q. State whether the amount of evaporation would or would not be likely to be within the limits of errors of estimates in stream flow?

A. Commonly I think they would.

Q. How long and to what extent has your hydraulic work involved the study and use of U. S. Geological Survey estimates of stream flows?

A. Ever since there were any such records.

Q. For about how many years have you worked with U. S. Geological Survey estimates of stream flow?

A. I don't remember the exact date which the U. S. Geological Survey began their work. I remember there was some work done about 1893. When I first began work on rivers there were no Geological Survey measurements being made. They have developed in later years, and I think began somewhere after 1890. The first records are published in the annual reports of the Director and later they appeared and were called "Water Supply and Irrigation Papers." I think they are now called "Water Supply Papers," some six or seven hundred of them have been published.

Q. Please state from your experience what is the range of accuracy of the U. S. Geological Survey estimates of stream flow?

A. A great many of the earlier reports were quite inaccurate. That is, the readings were quite inaccurate, or the relation between the readings and the actual flow. They have greatly 2524 increased in accuracy with the experience of the Survey, but only as a general indication. I would not want to count on them closer perhaps than 5%, and the earlier ones were sometimes off a great deal more than that. That is, they were off sometimes very far.

By Mr. **Thompson**:

Q. You said the earlier ones were quite inaccurate. Would you give a figure there?

A. It depends upon the location. Some of the earlier ones were pretty fair and some entirely misleading. I always try to look into them as thoroughly as possible before using them, and I use the older records with a great deal of reluctance unless I have some substantial way of checking up their probable accuracy. The methods have been developed within the last few years, in fact the last ten years have been a very great improvement in the methods used.

By Mr. **Jackson**:

Q. In engineering work do you accept the present estimates without checking them?

A. I always try to check any data we use as far as practicable.

Q. State whether stream flow estimates involve matters of judgment?

A. Yes, all measurements require judgment.

Q. Dr. Mead, have you any acquaintance with the Water Supply situation at Charleston, West Virginia?

A. I had at one time. I don't know just what it is at the present time.

Q. When did you last have any knowledge about it, as of what date?

A. I believe it was September 1930 when I was before the Commission at Charleston. The Commission asked me to go up and look at the works of the Water Company and to advise them as to whether or not they were doing all that could be expected in the way of furnishing pure water to the city. I did make such an examination and reported to the Commission informally, verbally, that I thought they were doing all that could be expected at that time.

Q. What was the source of the city water supply in 1930?

A. It was supposed to be from the Elk River.

2525 A. (Continuing.) The Elk River had almost stopped flowing and the flow was not at that time sufficient to furnish the needed water supply for the City of Charleston. The result was that the Kanawha River was flowing upstream and was flowing over some garbage, which the city had allowed to be dumped at the mouth of the river.

Q. Did you mean the Kanawha River?

A. No; the Kanawha River was flowing into the Elk, to supply water which the Elk could not furnish, which was polluted with garbage the city had permitted to go into the mouth of Elk River, which ordinarily would have flowed out, but at that time was flowing in, and the water supply was polluted. They had to chlorinate the water, and were at that time furnishing very satisfactory water, as satisfactory as could be expected from a polluted source.

Q. Dr. Mead, are you familiar with the estimates of the U. S. Geological Survey as regards stream flow of the Kanawha River during the year 1930 and especially during the low water season of that year?

A. I have examined them. I haven't them all in mind. The records are here, I believe.

Q. I direct your attention to Water Supply paper #713, at pages 66 and 67, Exhibit #82, that is the record of the estimates of the U. S. Geological Survey for stream flow on the New River for 1930, and especially the low water season?

A. The two pages referred to are "The Kanawha River at Kanawha Falls", and the other page is "On the north fork of the New River, Crumpler, N. C."

Q. I direct your attention particularly to the first page dealing with the flow at Kanawha Falls, and ask if you are familiar with that?

A. I have seen it and looked it over.

Q. Will you tell me from your examination of Government Exhibit #82, Water Supply Paper #713, page 66, what was the estimate of flow for New River for October, 1930?

A. The mean or average flow is given as 1130 second feet.

2526 Q. Dr. Mead, assuming (1) that as testified by the witness Pierce in this case the mean flow at the Radford dam site was 759 second feet for the month of October, 1930, and (2) that all the new roller gate type of navigation dams on the Kanawha River and the new roller type navigation dam at Gallipolis on the Ohio River, were completed and in operation, and (3) that the requirements for maintaining the navigations pools on the Kanawha River at their project levels are not more than 200 second feet, what, if any, effect would cutting off the flow at the Radford dam site for a period of forty-eight hours during a month such as October, 1930, have on the navigation pools on the Kanawha River?

A. It would have no effect on navigation.

By Mr. Jackson:

Q. Why?

A. Well, the difference between the two, that is, figures of the flow at Kanawha Falls and at Radford, would still leave 371 second feet, which would be ample for navigation if the amount of water used did not exceed 371 second feet.

Q. Have you finished, Doctor?

A. Yes.

Q. In that question I asked you, upon the hypotheses assumed, what would be the effect, if any, of cutting off the flow at the Radford dam site for 48 hours. In your opinion, would the result be any different, so far as the navigation pools are concerned, upon the hypotheses assumed if the cut-off were longer than 48 hours?

A. It would not.

Q. Why?

A. Because the flow would be sufficient to take care of navigation—the remaining flow.

Q. As a matter of practical operation, of the Radford power station, or any other station, with storage, would any other considerations affect the probability of cutting off the flow for longer periods of time during low water season?

2527 A. If we assume intelligent operation, no such condition should occur, for the purpose of the reservoir is to provide additional flow instead of subtracting from the flow at low water stages. It is the very purpose of the reservoir storage.

Q. Going back to the matter of stream flow, Dr. Mead, I neglected to ask you one question about which I wish to inquire. Do the same gauge heights at a given gauging station in a given stream always mean the same flow past that point?

A. Not necessarily.

Q. Will you explain the reason for your answer?

A. I presume I can show it better by a sketch, if you desire an explanation.

Q. Will you proceed then with your explanation?

A. I will draw a line representing the slope of the bed of the stream. In establishing the stream gauge we attempt to select a portion of the river that is fairly straight and fairly constant in condition, frequently selecting two stations more or less adjacent. The vertical line "A" represents one of the stations and "B" the other, depending on the size of the stream. It might be in a small stream not more than 50 feet, in a large stream a couple of hundred and perhaps in a large river like the Mississippi, half a mile. If I draw a line representing the flow of the stream when the same volume of water is passing station "A" and station "B", we have a condition that would ordinarily be called the normal flow of the stream. I was saying when the same amount of water is passing the station "A" and the station "B," we have a certain gradient and we normally call the condition the normal flow. Now, we have at various times during the season advancing and retiring floods, that is, the flood comes down the stream in increased flow. It can't pass this station without increasing the height and the corresponding

gradient. The flood comes on and we may come up to a point in here [indicating] and may get a temporary gradient represented by this particular line where the water is rapidly
2528 beginning to increase the volume at station "A" and beginning slowly to increase at station "B." The slope has increased and the amount of water passing station "A" is much greater at that particular time than the gauge height would seem to indicate.

Q. Mark the last gradient or last line you drew "C."

A. We will mark the first one "N" as the normal flow at that period. The new flow I might mark "N^1." The flood wave is coming in here and the conditions are not normal, not normal flow. Gradually this lower station begins to fill up and we get a condition perhaps where the flow at station "A" is higher than it was and station "B" has come up to a condition of normal flow, that is, with its higher water and under normal conditions the flow is the same at both points. As the flood goes by it may have risen considerably above the point I have marked "N^1" and the flood is beginning to subside, and there becomes a change and possibly we have a new line established, a line of flow where the upstream condition of gauge heights remains constant but the slope has decreased. Under this condition, which I will mark "3," "2," and "1"—"1" referring to the line with the greatest slope and "3" with the least slope. We might have all of these read at the same gauge height, but the amount of water passing would depend not only on the gauge height but on the slope, because it is slope that determines the quantity of water and that means simply the temporary advancement and retiring of waves. I think perhaps on the side, if I may be permitted, I might represent this by showing the formation of what we call a rating curve. The exact process of that is selecting the gauge point at which you wish to develop a regular gauging station. We measure the water ordinarily at the present time by a high grade current meter, which has been wonderfully developed since the early days. In my earlier experience we used to use floats where the selection of the channel was exceedingly important. We would take floats and time them between two stations. With varying distances across the river, their position would be carefully chartered and the time they passed the lower line, but at the
2529 present time we would probably start at this station and make observations at various depths and at various points in the cross-section. We would find that when this slope was an abnormal slope, that is, increasing more rapidly than the normal, the discharge by this point would be higher. In other words, our current meter readings might show—let me carry this point right across here on the gauge and I might determine it by three

readings under different conditions, advancing flood, normal flow, and retreating flow. This line would now represent quantities of flow and vertical gauge height. I might get, corresponding to this particular gauge height, three flows. When I determined other points, I would finally get a line in general corresponding to the curve that I have indicated there which I haven't made as heavy as perhaps you desire. That curve should pass through the point that I measured when the flow was normal. This point would mean that the flood was retiring, in other words, that the gradient was less than the normal gradient. This, which would show an excess flow, means that it was measured when the flood was advancing, when the gradient was more than normal and the quantity of water was greater. These would represent, and frequently do represent, such measurements, and then we are obliged to investigate the flow of the stream and establish a place where we can keep a constant watch on it. If we find a variation and if the work is accurate, it simply means they were made with a rising and falling river. If it is made with a normal flow we would get a series of points that would fall on the line. They will fall a little off, due to inaccuracy in the measurements, because, after all, a current meter is not an exceedingly accurate affair. It is only an approximate indication of what the stream or the body of water, canal, or whatever it may be, is flowing. It gives the velocity at various points in the vertical and also the horizontal of the cross-section and from that we establish a rating curve from which anybody can go to this gauge and read the gauge and turn to either a rating table or rating curve, which is a little more convenient, and find the elevation and read from the horizontal scale the approximate amount of water that is flowing at that time. The reading is off if there is a re-
2530 treating or advancing flood at that point. It is fairly accurate if the flow happens to be normal. I don't know how clearly I may have made this but it is a well-known condition that is familiar to everyone that is doing stream work. It is very common for a hydraulic engineer to have to make curves of this sort and observations because they are only made at certain locations on a river and we usually want to know what the difference is between the gauges that have been read by the existing facilities and the ones that would actually take place at the sites chosen for the development of the power plant.

Q. Dr. Mead, does normal flow, as you have used it in your illustration, mean the same as an established or steady flow?

A. I would say a steady flow, yes. I don't know what you might mean by an established flow.

Q. I meant the same thing.

By Mr. Jackson. I will ask the reporter to mark the chart upon which the Doctor has just made a diagram used in connection with his explanation as Defendant's Exhibit 599. I offer the chart, marked Exhibit 599, in evidence as part of the testimony of this witness.

Cross examination by Mr. Thompson:

Q. Doctor, on that exhibit 599, isn't it true that the United States Geological Survey has slope correction methods by which these slopes are adjusted to normal and these apparent discrepancies corrected before the results are published?

A. They endeavor to correct them before they are published. They are usually issued in a preliminary form and later in a corrected form.

Q. And that is what we get when we get them in the books, do we not?

A. Supposed to be. Usually it is.

Q. Do you not think, Doctor, that the efforts of correction are quite successful and reliable?

A. Oh, I think in general, yes. I think they do admirable work.

Q. Doctor, I was very much interested in your statement of your qualifications, particularly interested in Boulder Dam as I have had something to do with it. The Boulder Dam Project was built, was it not, upon information to a very, very great extent derived from the reports of the Geological Survey?

A. The Geological Survey made, I think, the first investigations. The Dam was, of course, constructed after detailed
2531 investigations were made at various sites.

Q. Wasn't it true that when they had the dispute between the Seven States as to the division of water that they relied enitrely upon the stream flow reports of the Geological Survey?

A. Well, I don't know to what extent they relied on them. As a matter of fact, those measurements at Yuma, of which they had twenty years' records, were not made by the Geological Survey. They were made by the Reclammation Service until very recently. They are now made by the Geological Survey.

Q. And didn't the records that they had at Lee's Ferry Dam or Lee's Ferry Bridge—you know where that is—up in Arizona?

A. Yes.

Q. Weren't they made by the Geological Survey?

A. I think they were. They are making them, I think, at all the stations on the river at this time.

Q. Did you happen to attend the meetings of the States when they had the hearing at Sante Fe out at Bishop's Lodge?

A. No, I did not.

Q. From your records and your reports and writings which I have read, and which are intensely interesting, isn't it a fact that there they had the Geological Survey reports and that the States accepted those reports as to stream flow without question?

A. It would all be hearsay. I wasn't there and I don't know what they accepted or didn't. As a general proposition I know that the Recla*m*mation Service has accepted those: as a matter of fact, our Colorado River Board couldn't agree to them, because we found them very inaccurate. It is a very difficult place there at Yuma. I think perhaps it is one of the most questionable gauging stations anywhere in the United States.

Q. Isn't that due to the fact that the tides of the ocean come up there?

A. No, they do not, within 100 miles. They come up to the head of the Gulf of California, but that is 100 miles away from Yuma, or about that.

2532 Q. But there was no dispute, was there, about Lee's Ferry?

A. I don't know that there was any dispute anywhere except that our Board believed that the average annual flow of the Colorado River was greatly over-estimated.

Q. And you had estimates, did you not, from the Geological Survey reports up in Colorado and Utah and down in Arizona?

A. We used them from various places, on the Salt River, and on the Grand River, on the Rio Grande, and other places.

Q. And they are really the main source of information for engineers when they are out working on rivers, such as you have, in building dams?

A. The best source ordinarily available, yes.

Q. In the Colorado River, you talked about the subject of silt which was also intensely interesting and I believe that you were one of those, were you not, who said that this silt would be a serious question with the Boulder Dam and that they would eventually have to build some kind of a reservoir above there?

A. I thought, then, and still think that the silt proposition is a very serious one, and that the dam will ultimately be rendered entirely useless on account of the depositions of silt.

Q. And I agree with you on that, unless they do something to stop that silt. Wasn't there a very, very strong recommendation and almost a fight to have a dam put up at what is known as the Glen Canyon area on the river, so as to prevent this silt coming down, the Glen Canyon dam making a very long pool where the silt would settle gradually?

A. Well, there is a pretty long pool behind the Hoover Dam at the present time, nearly 100 miles long, I think. There was talk of dams at points upstream. There have been so many of them that I don't recall each individually.

Q. Do you keep in touch with the Recla*mm*ation Service?

A. In a very general way. I know a great many of them and they send me most of the important documents.

2533 Q. Do you know that the Recla*mm*ation Service has given out the statement publicly, repeatedly, that the pool is already 100 miles back of the dam at Boulder Dam?

A. Yes; I understand it is.

Q. And that boats are running up and down there of fairly good size, that is, motor boats and the boats of the size of tug boats?

A. I don't know of anything except taking tourists up and down.

Q. And you knew, didn't you, from your study and your reports that the head waters of navigation was the Virgin River which comes down out of Zion Canyon?

A. I know that in the earlier times when the river was more open they did take small boats up as far as the Virgin River.

Q. They couldn't get a boat of any size up above Boulder Canyon but they would get out there and take what they call skiffs and go up as far as the Virgin River?

By Mr. JACKSON. I object to this as not proper cross examination. It has no relation to the examination in chief.

By the COURT. Objection overruled.

By Mr. JACKSON. May our exception be noted?

A. I know that there was some primitive navigation on the stream up to——

By Mr. THOMPSON:

Q. Virgin River. Now, you also said, didn't you, that there would have to be a re-regulating dam down below Boulder Dam?

A. I don't remember making any such statement.

Q. Don't you recall having made that statement before the West Virginia Commission in discussing the Boulder Dam?

A. I don't remember ever saying so. I didn't know that I mentioned the Boulder Dam before the Commission. I may have done so.

Q. I will be glad to show you a little later.

A. I will be very glad to see it.

Q. Would you think that a re-regulating dam would be necessary below the Boulder Dam?

A. Well, I don't know what its purpose would be. Of course, they are building a dam down at Parker now to take the water out for Los Angeles.

2534 Q. And the Parker Dam will be a re-regulating dam?

A. It would amount to that, I expect.

Q. In your report and writings on this subject, you recall, do you not, that there was no navigation for sixty years or more on the Colorado River from the Boulder Dam site down to Yuma?

By Mr. **Jackson**. I object to that as not proper cross examination and having no relation to the examination in chief.

By the **Court**. Objection overruled.

By Mr. **Jackson**. May our exception be noted?

A. I know there has been no navigation there recently. I don't know how many years.

By Mr. **Thompson**:

Q. That is what the Seven-States Pact said, wasn't it, that there wasn't any navigation on there for the last sixty years?

A. I presume that is true, if it says so. I don't remember the details of what they said or didn't say, but there has been no navigation for a long while.

Q. Didn't they also find in this report on the Boulder Dam, of which I think you were a member, that the discharge from Boulder Dam would create a situation where they could have navigation from Boulder Dam down-stream?

A. I don't remember that.

By Mr. **Jackson**. May our objection be noted to this as improper cross-examination?

By the **Court**. Objection overruled.

By Mr. **Jackson**. May our exception be allowed?

By Mr. **Thompson**:

Q. I would like to ask you about the situation on New River with respect to dams. I believe that you said that you had investigated the Radford site two or three times or it may have been four times?

A. I have been to the Radford site and made certain examinations and determinations.

Q. And you knew, did you not, that there were dams above the Radford dam?

A. Yes.

Q. There was Washington Mills Dam and the Buck and Byllesby Dams and then there were a number of very good dam sites, were there not, above the Radford dam?

A. I understand so. I never made any extensive examinations above, but I have no doubt that is true.

2535 Q. And you knew that there were dam sites below the Radford dam?

A. Yes.

Q. Some very good dam sites down the river, were there not?

A. Well, there were dam sites. I don't know what you may mean by very good ones.

Q. Where you could have created a pool and created power from them?

A. Sure, there were a great many places where you could do that along the New River.

Q. There was a dam site at Hinton, wasn't there?

A. About a mile above Hinton was the one that I examined.

Q. Then below Hinton there is the Sandstone Dam site? Do you recall that, about ten miles below Hinton?

A. No, I don't. I have never been to that. I have passed it on the train, but I don't know anything about it.

Q. You do know, do you not, in a general way, that the whole canyon or rather I believe they call it a gorge from Hinton down to Kanawha Falls, is susceptible of the construction of dams for the creation of power?

A. I presume that is true.

Q. And you know, of course, that the Electro-Metallurgical Company has a dam at what is know as Glen Ferris or Kanawha Falls?

A. I understand so.

Q. And that the Kanawha River is a series of pools created by dams?

A. Yes.

Q. So that as this New River and Kanawha River are looked upon, let us say, as one connecting stream, there is a situation where a great many dams could be located and power created?

A. Yes, I think that is perfectly true.

Q. You think also, do you not, that the creation of hydro-electric power on that river, should be under the control of one corporation; isn't that correct?

A. I think you would get the most out of the river by a single control, possibly. I don't know that it is at all necessary.

2536 Q. And if you had a competing corporation, let us say, down in North Carolina, but up-stream, that was controlled by a company in that State, might there not rise conditions where there would be some trouble between that corporation and the corporation down below, let us say the defendant here at Radford, if the two of them got into a very dry season and were trying to conserve water?

By Mr. Jackson. I object to that as irrelevant and immaterial.

By the Court. What is the purpose of that, Mr. Thompson?

By Mr. Thompson. I am trying to get the witness' view now as to stream flow and the effect of stream flow on this river. They have certainly spent a lot of time on stream flow—and how it will affect navigation and is going to affect power and everything else.

By the COURT. Is it suggested that it would be advisable for the Federal Government to control everything on the river?

By Mr. THOMPSON. I didn't say the Federal Government.

By the COURT. But you said one authority.

By Mr. THOMPSON. I said one corporation, Your Honor. Isn't that a fair question?

By the COURT. It might be a fair question from a business standpoint, but I don't see that it has anything to do with the case.

By Mr. THOMPSON. Suppose that you had one corporation in one State that is expressing views and acting differently from what another corporation would want, wouldn't that create some situation on the river?

By the COURT. It might.

By Mr. THOMPSON. That is what I am asking him.

By the COURT. What has that to do with the merits of the case we are trying?

By Mr. THOMPSON. Because you might not have the capacity down below in your reservoir such as counsel have attempted to assume here, or you might. I just want to see.

By Mr. JACKSON. What reservoir?

By Mr. THOMPSON. Radford reservoir, Buck and Byllesby Reservoirs and Bluestone reservoir.

By Mr. JACKSON. There is no suggestion, if it is meant to develop that, that somebody in North Carolina might withhold flow. It couldn't have anything to do with this defendant.

By Mr. THOMPSON. I didn't say anything about withholding flow.

By the COURT. I don't see that it has any applicability to the issues in this case.

By Mr. THOMPSON. Your Honor, we have had this witness testifying to generalities to the extreme. I am now trying to bring it down to the concrete.

By the COURT. All the question implies, or any answer to it would imply, would be that it would be desirable to have a general authority to control the activities on that river.

By Mr. THOMPSON. Am I not permitted to test this witness as to his views, if we are going to have a general authority or separate authorities? To know how we are going to control the flow of the River?

By Mr. JACKSON. I don't see that that has anything to do with this witness' testimony.

By the COURT. It is all so vague, it seems to me, and indefinite. I think that is one of the things that we would generally conclude, that power development on the length of the Kanawha River would probably be more efficiently carried on if every plant were under the control of one central authority to coordinate their activities.

By Mr. **Thompson**. That is just the question I am asking him, and if he will say "yes" to that, I will pass right on.

2537 By the **Court**. I think we can assume that. I think he has said "yes."

A. I don't think that was the question that was asked me. I say, in general, yes, you get more out of a stream if it is all managed intelligently and coordinated.

By Mr. **Thompson**:

Q. And if it were handled that way, that is, by one organization, you would not be liable to have friction, would you?

A. You ought not to. If a man has his own way he ought to get along with himself.

Q. So far as the control of the river is concerned?

A. So far as any business is concerned, control of the river or control of his power plant.

Q. Haven't you known people that had their own way and didn't get along with their own way?

A. I have known people that have had their own way and haven't got along very well.

Q. So that if you had your way about it, you would feel that the control of the creation of power and the operation of plants for creating power on New River, should be under one corporation, wouldn't you say?

A. Not necessarily. It depends on so many circumstances.

By Mr. **Thompson**:

Q. What are those circumstances?

A. Well, we have many rivers developed in Wisconsin where almost every power dam is under the control of a separate corporation that commonly have no relation to each other. I don't ever remember that we had any friction. We are not using the rivers in the most efficient way, however.

Q. In the Brule River that you testified to, that you built a plant on, you had a plant of very small capacity, didn't you?

A. I wouldn't call it a large plant or a very small one. There are many smaller and many larger. It is the only plant on the river, I think, at the present time.

Q. And most of those rivers that you speak of in Wisconsin, like the Brule and others, have only one proposition involved, and that is the question of power?

2538 A. The question of power, and, of course, that includes the question of storage.

Q. Storage and power, but no navigation, for example, on the Brule?

A. No, nothing except row boats.

Q. And you don't have any question of flood control there?

A. Essentially not; not for flood control; no, sir; except for storage, which is always flood control in a way.

Q. And you would not, of course, compare flat lake country conditions in Wisconsin, with conditions in the mountainous section through which the New River flows, would you?

A. I think some of our northern streams are fully as rapid and rugged in places as those in the Virginias. We have a development in one place on the upper peninsula of Michigan of about 600 feet.

Q. Which river is that?

A. I don't know that I can answer that; it is in the upper peninsula.

Q. Is that the Pigeon River?

A. I don't think so. It is a power development that belongs to one of the mining companies there. I have not seen it.

Q. That river is not navigable, is it?

A. None of those, no, sir; except that we are supposed to have navigable streams in the northern section of Wisconsin. This plant is in Pierre du Sac. I have never seen a boat go through it.

Q. You said that you were a partner of Colonel Scheidenhelm and that you had been partners for many, many years?

A. We have been associated in New York.

Q. And you were called in on this project, known as the Hinton project, generally speaking, were you?

A. Do you refer to the Hinton project as the project in West Virginia?

2539 Q. Yes, sir?

A. I never heard it called that, but maybe it is. The Hinton project where the dam—the first dam is about one mile above Hinton and the second about nine miles.

Q. That dam was to be a dam in this system of the Appalachian Electric Power Company, was it?

A. I understood so.

Q. And it was to be operated in its way similar to the Radford project? They were both being built, or were intended to be built, at about the same time, weren't they?

A. I understood so, yes, sir—the Radford proposition first and the others to follow. I never knew how they proposed to carry that out.

Q. This dam—originally you had the idea of building just the one dam at Bluestone or Hinton?

A. I don't know about that.

Q. When you were called in to testify before the Commission in West Virginia, Colonel Scheidenhelm was also called, was he?

A. He was there.

Q. Both of you testified at great length, did you?

A. I answered all the questions asked that I was prepared to. I don't remember now. It has been so long.

Q. He spoke first, didn't he?

A. I don't know about that.

Q. Do you remember whether or not he spoke at great length?

A. I don't remember.

Q. You don't remember that?

A. No, sir.

Q. Do you remember whether or not he outlined the position—the two of you were both representing the West Virginia Power Company, weren't you?

A. I don't remember, but we were representing people that had that interest in the dam. The names are gone from my mind and the details of my testimony are gone.

2540 Q. And you were appearing as an engineer of the firm to describe the situation to the West Virginia Power Commission, weren't you?

A. I could not even say if that was true. I was there as an engineer, but whether or not I was there as part of the firm or not, I don't know. We both made examinations there and gave such information as we had. I don't know that I can carry it any further than that.

Q. Who were you representing there at that time?

A. Well, I don't remember; they were the people that had the interests as to getting the license and the dams in West Virginia. What they called themselves, I don't know.

Q. That West Virginia Power Company you knew was affiliated with the Appalachian Electric Power Company, the defendent here? did you know that?

A. I know that the people that were interested in those two sites were also interested in the Appalachian Electric Power Company, yes, sir.

Q. And it is affiliated or owned and is a subsidiary of the American Gas and Electric Company, isn't it?

A. I don't know. I know they were related.

Q. I am mistaken about that—the Appalachian Electric Power Company, I should have said. I hand you what purports to be a certified copy of the Public Service Commission of West Virginia, by its Secretary Mr. Henderson, being Case No. 1548, West Virginia Power Company, Application for Permit to construct dams on New River for hydro electric purposes, (Blue-

one Project), excerpt from transcript of proceedings and testi-
ony, marked Government's Exhibit 253 for identification, and
k you to look that over and say if this is a report of the hear-
g, which you and Colonel Scheidenhelm attended?

A. (Witness examines record.) It is the same date as I recall.
o what extent shall I examine it?

Q. Just that you recognize it—any of it?

A. I don't believe that I would recognize it but I don't doubt
that it is.

41. Q. May I find the place here for you?

A. Yes, here is the name "Mead" right here [indicating].

Q. There [indicating] is where you began.

A. It seems to be the direct examination. I see my name and
dress and my age and so forth. I presume this is a transcript
the testimony.

By Mr. **Thompson**:

Q. Doctor Mead, when you attended this hearing at Charles-
n, West Virginia, that I have been referring to, did you know
at there was a project being constructed or planned at Number
k site in Virginia, near Pulaski, in Pulaski County, Virginia,
ostream from Radford?

A. At or near Radford?

Q. Yes, sir?

A. I knew that was one of the proposed sites, yes, sir.

Q. Did you know it was to have the general characteristics of
e project at Bluestone?

A. I don't remember very much about the proposed Bull Falls
am or what the storage capacity was. I knew it was a high
am there. I knew considerable about it then, but it has slipped
y mind.

Q. You knew, away back in 1926, that this company, the West
irginia Power Company, had applied for a license from the
tate of West Virginia, for a single reservoir to be located at the
inton site, let's call it?

A. I don't know whether or not I knew it or not, at that time,
don't know. They may have done so. I don't question it, but
hether or not I ever knew it or about the history of it, I don't
now.

Q. Do you recall that there was great complaint that went
o from the Electro-metallurgical Company that waves coming
om the single reservoir would affect navigation below and affect
nditions in the lower part of the river?

A. I don't know that.

By Mr. **Thompson**:

Q. I read you from page 140 of Colonel Scheidenhelm's testimony. Colonel Scheidenhelm was speaking in answer to the question from one of the Commissioners.

2542 "A * * * so that coming back to your point, if there were enough water available, the power system operators would gladly get more than 50,000 kilowatts capacity out of the Bull Falls development during the low water, so that the water that is turned out will not be turned out for any altruistic motive, it will be turned out to generate energy. The load would demand it; it would be economically advantageous to do it. Now, the result of this upstream storage will be to make more water available. The Radford project is to go to construction practically concurrently with the Hinton development, assuming this Commission grants the license. They are economically related as is the Bulls Falls development. Have I made myself clear?

"By Governor Conley. I think so."

Q. (Continuing.) I ask you if you recall that statement being made by your partner, Colonel Scheidenhelm, at the time of the meeting of the Commission?

A. I do not.

Q. Do you agree with what is set forth in that statement?

A. I agree with it, so far as I understand it. It seems to be a little blind—the latter part of it there—if they were "economically related" as is the Bulls Falls development. I suppose they are talking about Bulls Falls and Radford.

Q. Do you recall that you testified about the amendment of your plans down there, which has been for one reservoir and you were now suggesting to the Commission that there were plans and drawings and so forth for two reservoirs, one to be at Bulls Falls, which was to be your peak load reservoir, and a regulating reservoir at Hinton. Do you recall that?

A. I know that was the plan at that time. I don't remember what they were for exactly. I know we were there about getting a license for the company.

Q. I will read here from page 203, and I am reading your testimony.

2543 "Q. What have you to say of the advantage or disadvantages of the proposed structures under the amendment of application of two dams over the original plan of one dam?"

"A. Well, I have been familiar with dams more or less for a great many years over the Ohio and it would occur to me that the principle use of power on West Virginia streams must be for peak power purposes. The single dams from an operating standpoint would hardly be feasible financially. It would bring about such an interruption of flow, variation of flow, high flow and low flow, that it would seriously affect, I think, the operation of navigation in the lower river, whereas, with the plan as now proposed, with re-regulation, both purposes can be exercised in an entirely satisfactory manner. In other words, the upper plane and dip of the peaks, with the regulation of the lower plane, that would take care of the navigation and without injury to the riparian ownerships below the dam. Where a dam or stored water is to be used for several purposes, a re-regulating reservoir is very essential on the project. You asked me about the Boulder Canyon project. The time will come within not very many years when they will have to have a re-regulating dam below the Boulder Dam in order that water may be used for power purposes in lower Colorado and Arizona. The principles are just the same for the successful use of the water in these streams for the purposes for which I see them, and this present proposed proposition seems entirely satisfactory, while I should think the higher dam would be entirely unsatisfactory."

Q. (Continuing.) I am just asking you does that statement express your view.

A. I have no recollection of making a statement in that form.

Q. You have no recollection of it?

A. I don't remember. I don't understand the reference to Boulder Dam. We were anticipating the construction of a dam at Parker to take care of the Los Angeles supply, such
2544 dams as were necessary to—not to re-regulate but to divert
the water to the points to be used. I don't know why I should apply re-regulation of the Boulder Dam itself. This matter in regard to the use of this dam—a re-regulating dam would adjust conditions of operation, which otherwise would have to be adjusted by station operation, which would be less desirable. I don't know whether there is anything in here that I cannot agree to at the present time. A dam built at that point might possibly be operated so as to modify the flow for use—with extreme conditions of peak. This was an advantage—I don't remember off-hand the capacity of this dam at present. That would have something to do with it. Was that about 50,000 kilowatts—it must have been more than that?

Q. No, sir; Bulls Falls is approximately as large as Radford.

A. Or larger?

Q. A little larger, and you had re-settlement of the lower dams—it would not be as much. You don't say that you did not say that, do you?

A. No, sir; I presume I did, although in a case of that kind, there are other conditions beside the one in any direct statement. It is hard to take a direct statement and say why it was made, without knowing the entire conditions that existed and on which the statement was based.

Q. Would you care to read the rest of your testimony?

A. If there are any other conditions other than those which were expressed there.

Q. I would be glad to have you read it over.

A. I don't think I have time to read that big volume.

Q. You didn't say so much. It is in very big type and you can scan over it quickly.

A. (The witness examines record.) I think I have covered that. There are some things here I didn't say. It is mixed up.

Q. To refresh your memory, you were there to advocate two reservoirs instead of one, were you?

2545 A. I was there to give evidence about the character of the proposed work to be done, if the license were granted.

Q. You said, in substance, before that Commission, if they had one project, with the high dam at Bluestone, and ran it at peak load operation it would be serious and dangerous for navigation down below?

A. Not dangerous. I think I said it would probably interfere.

Q. With navigation down below. You said, didn't you, that, it would seriously affect the operation of navigation in the river below?

A. I presume so, if it is there.

Q. Now, did you say that in this last statement that I have just read to you from page 203, and by that, I don't mean the sentence, but the entire statement—do you say you did not make that statement before the Commission?

A. What is the statement you refer to? Let me see it. You mean the full statement?

Q. Yes, the full statement.

A. No, I said if it is here, I presume I did.

Q. It is on page 203.

A. (The witness examines statement.) Well, it is mixed up. There are some things in there I didn't say.

Q. Start with the words "In other words."

A. (Witness reading.) "In other words, the upper plane and dip of the peaks, with the regulation of the lower plane, that would take care of the navigation and without injury to the riparian ownerships below the dam." I don't know what that means.

Q. If you take care of the peaks, and so forth?

A. By re-regulation.

Q. Isn't that clear?

A. (Reading.) "The dip of the peaks," which means that by regulating the peak flows, that you get better results. It is poorly expressed. I did not use these terms, I don't think, but the idea is, as I get it, undoubtedly it is essentially as stated.

2546 Q. You also said that without re-regulation of the dams—the operating of this project as a single project with peak loads, it would seriously affect navigation below, did you?

A. Essentially, that is, I think, essentially that is the statement there.

By Mr. THOMPSON:

Q. Doctor, I want to call your attention to statement on page 227 of the hearing before the Public Service Commission of West Virginia, Case No. 1548, West Virginia Power Company, Application for Permit to construct dams on New River for hydro-electric purposes; being Government Exhibit No. 253, marked for identification. This is cross-examination, Doctor. It says:

"Q. Professor, you have spoken of the control of the stream flow by the Hinton Dam, its relation to floods and its effect upon navigation in the Kanawha River. I want to ask if this control would result from the normal operation of the power plant, or would the operation have to be supervised to bring about that result?

"A. I don't think so; I think it would be supervised, if it brought about any other result but I take it the Hinton plant and power plant would be operated pretty close to 100 percent load factor; that is a continuous load which the power dams could develop, and the Bull Falls Dam would be peak load plant, that would fill up the pond after it had been drawn down by the continuous operation of the lower plant. That is my conception of the operation."

Did you make that statement in that hearing?

A. If it is there, I expect I made it. I do not recall the statement.

Q. Do you adhere to that statement?

A. I think that is substantially correct.

The COURT. When was this hearing?

A. September 1930.

By Mr. THOMPSON:

Q. The 30th day of September, 1930, your Honor.

By Mr. **Thompson**:

Q. I refer you to this same record, page 127, in which Mr. Schiedenhelm is asked to describe the method of operating the dams in generating plants:

2547 "Q. Please describe the method of operating dams in generating plants?

"A. That may involve to some degree repetition of what is contained in Amendment of Application on my earlier statement. The function of the down-stream development is to turn out water in a re-regulated or relatively equalized manner. The need for it arises from the plan of operating the up-stream of Bull Falls development in such a way as to carry peak loads. The carrying of peak loads is an economic necessity. That is the project cannot be justified unless it does that. By the carrying of peak loads means the operation of a power station intermittently or at least with great variation, as compared with what we style a base load or uniformly operated power station."

Do you agree with that statement?

A. I think so. I do not see anything different.

Q. That, then, is your understanding of the operation of a peak load project?

A. In general, I think so.

Q. Continuing on page 128:

"The Bull Falls power station can be expected to operate during the hours of maximum demand upon the power system into which it is to feed practically those hours or the daylight hours, the working days, outside of those hours, perhaps, even during the noon hour, the output of power from the Bull Falls Station will be curtailed or even cut down to zero. That means the outflow areas, but that intermittent output from the Bull Falls development will empty directly into the reservoir of Hinton development. In the Hinton development that water will be reregulated. That is, although there will be a varying quantity put into the reservoir, the output will be relatively regular and uniform compared with the input. It is a necessary character-
istic, as I believe I pointed out, that the downstream res-
2548 ervoir, reregulating reservoir, shall have sufficient storage
capacity to allow for the accomplishment of that result.
It does have that necessity. In brief, then, the method of operating the project will be to operate the Bull Falls development intermittently as a peak load carrier, and the downstream plant, that is the Hinton power station, with relative uniformity."

Do you agree with that statement?

A. I do not see any point in it that I do not agree with it. I think it is essentially correct. It is not my language or my statement.

Q. No, that is Col. Scheidenhelm's.

A. Yes, I understand.

Q. Reading from page 138 of Mr. Scheidenhelm's testimony:

"Q. I still don't catch your idea, Colonel. Do you mean to say that if the water is not necessary to carry the peak load that you would let the water down through the dam during the dry period in order to keep the normal flow going?

"A. That might be the case, and the power company might be altruistic enough for that, but the fact is there is a need for the peak load and the operators of the power system would only be too glad if they had more water available. They are limited by the available water.

"Q. That would depend on the demand for power, wouldn't it?

"A. But that cannot be conceived, reasonably, even in times of business depression, not to require all the output possible."

Do you agree with that statement?

A. Well, I did not get it very clear. It seems to be an extract. I think it is essentially correct, if I get the meaning of it.

Q. Do you understand, Doctor, that there is, even in the most depressing times, a sufficient demand for hydro-electric power on the New and Kanawha Rivers to call for and consume all of that hydroelectric power?

A. I understand so. yes.

2549 By Mr. **Thompson**:

Q. You were present with Col. Scheidenhelm when he testified, were you not?

A. I don't remember. I was a part of the time. Whether I was there during all his testimony, I do not know.

2550 By Mr. **Thompson**:

Q. I want to read you from page 107. This is Col. Scheidenhelm speaking. It is by Commissioner Mahood.

"Q. What have you to say to the advantages or the disadvantages of the amended application of two dams over the original plan with one dam?

"A. The following considerations appear to me to be outstanding and they are all advantages in favor of the change from one dam scheme to a two dam scheme of development. First, the Bluestone project in its original form would have been economically feasible only after reliable examination; that is, after reliable examination for carrying big peak loads. Of necessity this would have resulted in greatly fluctuating stream flow in New River down-stream from the power site. and in particular from the power site and the junction of New River with Gauley River or, in other words, the head of navigation on the Kanawha River."

Do you agree with that statement?

A. I am sure you will have to let me see that to get it through my head, just what the statement is.

Q. Starting right there and going over here (handing witness record).

A. In answer to that, I would have to say this: Col. Scheidenhelm has gone very much more into the study of these various proposition than I. Some of things he said I could not substantiate because I have not gone into them. I do not doubt but what that is essentially correct, as near as I know, but I do not pretend to know as much about it as the Colonel, because it was under his immediate charge, and I was looking into general phases. I would not like to substantiate everything that is said there. Some of it I have no knowledge of at all. He has the knowledge, and I have no doubt that he is correct. I could not say I know it all. He had it under his immediate charge.

Q. Hadn't you made a study of this situation before you went before that Commission?

A. I studied certain phases of it before I gave evidence.

2551 Q. You gave evidence with respect to the peak loads and the operations down the river?

A. I think you read it this morning and I stated it.

Q. Let me read you [continuing on page 108]: "Secondly, it is believed by me, from the standpoints both of downstream riparian owners and water power developments, and also of the best interests of navigation on the Kanawha River, the applicant power company would not be justified in taking the risks of constructing or attempting to construct the original single stage Bluestone project, with its 140 feet dam at the Hinton site, inasmuch as that dam and power station, and in particular the operation of the power station, would be dependent upon the legal right and the practical ability to operate that power station primarily for carrying peak loads. The carrying of the peak loads means fluctuating output from the power station. In other words, variation in stream flow downstream from the power site." Do you agree with that statement?

A. As far as I know. I never made any study of the economics of this construction.

Q. Well, isn't this more than economics?

A. It is variation in flow and its possible legal effect on investment, I should take it. It sounds very reasonable, and I think it is correct, but you are asking me to confirm a lot of things I never stated, and I would like to have my position clear on it.

By Mr. **Thompson**:

Q. Let me ask you about a statement on page 109.

Mr. **Jackson**. A statement by whom?

Mr. **Thompson**. Col. Scheidenhelm.

By Mr. **Thompson**. "Thirdly, under the present scheme of development, which is the scheme proposed in the Amendment of Application, such peak load operation, with extreme variation in water output from the power station, can be carried on to the maximum practical degree at the upstream or Bull 2552 Falls development without any resistant interference with the rights of riparian owners or with navigation or the navigable capacity of the Kanawha River. The operation of the Hinton development will be subject to the necessity of reregulating the discharge of water from the Bull Falls development, and it has the function of operating and will be operated so as not to interfere substantially with navigation on the Kanawha River or with the rights of downstream riparian owners." I assume you agree with that statement, don't you?

A. Yes; I agree with that.

Q. Now, on page 685, Mr. Scheidenhelm has been recalled, and Commissioner Nethken is examining him: "When you speak of Hinton and Bluestone, you are referring to the same development?

"A. I should not have used those words, if I did.

"Q. When you referred to Bluestone, what did you mean?

"A. When I referred to the Bluestone project I intended to refer to the combination of the two developments. That is a sort of a preamble to the explanation of the fact that this hydroelectric development will not always have available to it the water to meet the demands up to the capacity of the machinery. Now, in the two developments or power developments of the Bluestone project, it is proposed to install a total of 142,500 kilowatts; out of that total, in the neighborhood of one-half, in fact, less than one-half, or approximately 52,000 kilowatts of capacity would be available even during the low water year. Let us say 1925, which is our practical measuring stick, for that purpose, and that capacity would have been available not for all the time throughout that low-water season, but only the basis of 25 percent load factor, that is throughout that low-water period, utilizing all the available storage of the Bull Falls reservoir, that capacity of 52,000 kilowatts could have operated reasonably only 25 percent of the time. Naturally that is for the best interests of the power company, but it is in- 2553 tended to feed that 25 percent of the time, which would be allocated to the periods of maximum low demands. It is the equivalent of six hours per day. Practically, I think it would result in operating for five days of the typical low-water season week, over a length of time in excess of six hours, and operating on Saturdays for a longer time than six hours and probably on Sundays not at all, so far as concerns the Bull Falls development, while the Hinton development is going along with comparative regularity, with this total of 52,000 kilowatts." Do you agree with what is contained in that statement?

Mr. JACKSON. I object to that as a statement of fact.

The COURT. You may answer.

Mr. JACKSON. Exception.

By Mr. THOMPSON:

Q. Is that the proposed method of operation?

A. I assume it was if Col. Scheidenhelm said so. I do not see anything there I differ with. I have not made study enough of the hydrographs of the low year to know whether it is just 25 percent or what, but I should judge that it is practically correct, and I think it is fully correct if that is the Colonel's testimony because he had made a thorough study of it.

Q. Doctor, you testified Friday with respect to silt in the Radford project, and, as I recall it, that the silt that might come down that stream would be caught in and held in the Radford project, except a very small amount which would go over the dam or be carried down the river. Is that substantially what you testified?

A. Substantially so; yes.

Q. Now, do you know where the Washington Mills reservoir is?

A. No; I do not.

Q. Upstream?

A. Is that upstream?

Q. Yes; it is up above the Buck and Byllesby.

A. No; I don't recall that. I know that there are some up there.

Q. Do you know how old that dam is?

A. No; I do not.

Q. Do you know the depth of silt as testified to in that 2554 reservoir by Dr. Barnes?

A. I heard your statement this morning. That is the only way I know.

Q. He testified on page 3889 that that dam, which is 33½ years old, has now a silt capacity in it of 80 percent. I call your attention also the fact——

A. (Interposing.) A silt capacity of 80 percent?

Q. Probably the word "capacity" is not the right word—silt deposit?

A. 80 percent of its capacity is filled up?

Q. Yes; that is right. He also testified that the Byllesby dam and the Buck dam are both 23⅔ years old, and that the Byllesby reservoir is silted to the extent of approximately 60 percent.

A. Is that the lower dam?

Q. That is the upper. Then the lower dam, which is the Buck, being of the same age, is silted to the extent of 20 percent?

A. Yes.

By Mr. **Thompson**:

Q. When a reservoir fills with silt, that destroys what we call channel storage to the extent that it is filled with silt, does it not?

A. I could not agree with your terms. I would not call it "channel storage." It is reservoir storage.

Q. Maybe I am, in my layman ignorance, incorrect, and I accept your statement.

Q. In other words it does destroy, what did you call it——

A. The reservoir storage.

Q. It does destroy the reservoir storage?

A. If it occurs in the area of the usable storage; if it gets into the bottom where we don't expect to use it, it don't do any harm whatever.

2555 Q. If you had that occur in a number of reservoirs on a river it to that extent might be serious at flood times, might it not?

A. I don't see just how.

2556 Q. Supposing Boulder Dam fills up with silt, will the problem of flood waters be any more serious than if you didn't have Boulder Dam there?

A. That is a pretty large question.

A. I don't see that it would.

Q. Wouldn't the water come rushing down there and spill over the dam without any chance for reservoir control?

A. Well it would have to cover the reservoir surface. If it was full of silt it would cover over the silt surface until it would come high enough to go over the spillways.

Q. And in Boulder Dam you have what is called a "box canyon" and that would easily happen if your reservoir were filled, the water would rise very high and go over the dam?

A. It would rise and go over the spillway if the reservoir were full of silt.

Q. Wouldn't you have a more serious problem with flood control than if the Radford project was not there at all?

A. I can't say you would.

Q. Wouldn't your storage capacity be gone if the dam was filled with silt, wouldn't your channel storage capacity be gone?

A. Your reservoir storage capacity would be gone, but if you had that reservoir filled with silt and the flood come down it would necessarily spread out over that whole reservoir and begin flowing over the dam.

Q. Whereas, if you didn't have it filled with silt you would have some opportunity, would you not, to catch the water in the reservoir and hold it back?

2557 A. That is what the reservoir is for, and it certainly would. The question you asked is so complicated it is hard to see its meaning or give you a definite answer in regard to its effect.

Q. Let us take the Bluestone reservoir. You recall, do you not, that one of the requirements of the Bluestone reservoir was that it should have a minimum discharge in low-water times of 2,000 second-feet?

A. I think I heard that; yes.

Q. And also one of the purposes of the dam was flood control?

A. Yes; I understood that.

Q. And there was also another purpose, and that was a usable storage for the creation of power?

A. Yes, sir.

Q. And I suppose also for navigation purposes, that is usable storage would naturally go down the river and would affect navigation, would it not?

A. I would consider it so.

Q. If the Bluestone were seeking to maintain its head there for the creation of power by keeping the usable storage part of it filled, and a flow came down from the Radford project, under such a condition would not the Bluestone have to let that water go through or else preempty some of its surcharge or flood storage?

Q. We will assume the Bluestone was not discharging any water for the purpose of creating power?

A. It would have to be used, stored, or wasted.

Q. If it were stored it would begin to occupy the space allowed for the surcharge of flood storage?

A. If the lower space were filled; yes, sir (R. 6083–6087).

Q. Let us assume that under the 308 report 2,000 second-feet are being discharged by the Bluestone and the Government is maintaining, or seeking to maintain, its usable storage capacity, and it has a surcharge storage above that for storms or high water if a flood comes down the river from the Radford project of 9,000 second-feet, will not the Bluestone have to 2558 take care of that 9,000 second-feet in the surcharge or flood part of the dam or else let it go through?

A. It either has to be stored, wasted, or used.

Q. Let it go through, I don't mean wasted?

A. Let it go through, that is what you mean by wasting it. I take it the very purpose of that upper part is to store floods and prevent damage downstream, and I don't understand why a flood of that nature wouldn't be regulated in the upper reservoir. That is what it is for, isn't it?

Q. But the Government is standing there, as I understand it, with an insurance to protect the situation down below, so that if a great storm comes rushing down they will have a storage capacity under the surcharge to take care of it; therefore, it is the Government's purpose to keep that surcharge in the clear all the time.

A. And not use it when needed?

Q. Have it always ready for storm conditions?

A. That is a distinction I can't quite comprehend.

Q. Supposing that they let that surcharge get filled with water?

A. Why should they let it get filled with water, they would use it to regulate with, wouldn't they; that is what it is for?

Q. It is to regulate flood control?

A. Any water that comes down the stream is a part of flood control, isn't it? It isn't labeled rainfall or flood.

Q. I understand there are certain flows described in the 308 report which under certain conditions this surcharge would have to take care of?

A. I understand it is to take care of any increase in flow that needed regulating.

Q. Your answer is that water would either have to be taken care of in the surcharge part of the reservoir or it would have to go through?

A. Under your assumption; yes, sir.

Q. If it went through, wouldn't it create a wave the same as if there hadn't been a reservoir there?

2559 A. I don't suppose it would differ very much from one that would go down the stream from away up above if the reservoir had not been built. A diminishing flow always occurs down the channel, and it would diminish in this reservoir, the amount that started over would be small at first, and as the reservoir fell it would increase.

Q. Do you know what the capacity of the gates at Bluestone are?

A. I don't recall them. I suppose for about the maximum flood.

Q. You do understand, do you not, the Bluestone cannot take care of all the run-off of the watershed above it?

A. It is limited of course to its storage capacity.

Q. Which is not sufficient to take care of it all?

A. I don't know if that is true or not. I assume it is. I wouldn't think it would be sufficient to take care of the total capacity of a large flood.

Q. It isn't sufficient to regulate the flow of the New River?

A. I wouldn't imagine it would be.

By the COURT. Is there any reason why you can't completely regulate the flow excepting at such periods as the natural flow rises above 11,000 cubic feet?

A. The natural flow at times of flood, as I recall it, sometimes runs up as high as 75,000 second-feet, and the floods long continued I should not think 235,000 acre-feet would be sufficient to smooth that out so you could make a normal or uniform discharge. I should think it would take a number of times that capacity, your Honor.

Q. Doctor, you said that in estimating the necessities for a reservoir such as the Radford reservoir, I believe you allowed for a capacity much larger than the largest flood record, is that right?

2560 A. I don't get that question.

(Question read.)

Q. I should have said the discharge, you make an allowance for much larger flow than would have to be taken care of in the highest flood condition you know of?

A. We commonly use the factor of safety. I mean by that, we provide for a flow greater than has ever occurred because of anticipating an excessive flo'd sometime in the future.

Q. And in your Radford project you did allow for that very much larger discharge?

A. I have no doubt we did, because we never do otherwise. I don't remember the details of that, though. I know well enough that it was done, but just how it was done or what allowance was made, I don't remember. I don't know that I ever knew.

Q. Also with respect to the average flow under minimum conditions such as, I think, you have fixed at 1,200 second-feet, you allow for the lowest years that you know about?

A. Yes.

Q. Isn't it possible, Doctor, for a drier period to occur than has ever occurred before?

A. Yes.

Q. So that it is possible to expect an even less run-off than we had in 1925 and 1930?

A. Yes.

Q. Why is it that the defendant here, did not figure a possibility of that kind; as I understand it, in fixing this average flow, you fixed it on the basis of the lowest flow of 1925 and '30?

A. I think I stated in my direct testimony that it would be the part of wisdom to keep somewhat below that in order to provide for a contingency of an extraordinary year. That is, the aim of our experience, that we must not be above that. How much below it would depend on how extreme the low years have been. If we thoroughly believed they never could be exceeded as a minimum we would work right up to it. If we had limited experience and were quite confident that at some time it would be much less we would keep considerably down from it. 2561

Q. The thing that has struck me, if I may suggest it to you, is that the engineers figure on something much higher in the way of floods than has ever occurred but they don't figure apparently on something much lower than the dry periods have shown?

A. I think they do. I think they try to provide for it in the way I suggested. The extreme of the flood is likely to be so much more severe in its effects, so much more serious, that we probably give that greater attention on that account. If you double the floods it might be a very serious thing.

Q. Floods have been on the increase, haven't they, from time to time?

A. I don't think so. I don't think they are any greater than they always have been for the last thousand years.

Q. When did you learn about this rule curve of 1,200 second-feet?

A. I don't know what you mean by rule curve.

Q. I don't know either, but I understand that is what counsel likes to call it.

A. I don't know. From what I have heard about it, it is a thing that we figure out very often. We make a hydrograph that shows the low-water conditions, and how it sinks below the level of the common discharge and the amount that sinks down gives a study of the reservoir capacity we have got to have and what the minimum flow would be under those special conditions and from it we can also judge if the conditions were greater, more serious, what effect that would have.

Q. Did you accept from Mr. Scheidenhelm, or whoever informed you, this figure of 1,200 second-feet?

A. Well, I saw the curves on which they were based, both the curves of '25 and the curves of '30. I didn't check them up in detail, if that is what you mean, I didn't check them up.

2562 Q. Those curves, as applied in a practical way, to this 1,200 second-feet, would require you to know the capacity of the reservoir, would they not.

A. Well, to determine the quantity of low-water flow you would have to know the capacity of your reservoir, or, on the other hand, in order to determine the capacity of the reservoir you needed, you would take that from the same study.

Q. Has anybody ever given you the actual capacity of the Radford Reservoir?

A. I don't suppose the actual capacity of any reservoir is known except approximately.

Q. That may be, but I mean the capacity that the defendent is proceeding on?

A. The capacity that I referred to is the capacity for utilizable storage and that has been determined, as I understand, by surveys which show it at 100,000 acre-feet. I didn't make those surveys and I don't know whether that is true or not, except that I accept the Colonel's statement.

Q. In other words, you have never seen drawings which show the actual area of that reservoir, have you?

A. Well, I don't know how a drawing could show the actual capacity of a reservoir. I have seen the capacity curve that shows the capacity of that reservoir to be 100,000 acre-feet.

Q. Have you ever seen topographic maps of the base or surface of that reservoir?

A. I don't recall whether I have or not.

Q. You don't know whether they are in existence or not?

A. Well, I have seen some maps of the reservoir, but whether they are what you have reference to or not, I haven't any idea.

Q. Were they completed maps or where did you see them?

A. Well, I saw them in the field and in the office. They were completed as far as the work we were using them for at the time was concerned.

2563 Q. Whose office did you see them in?

A. The New York office. I think we studied them there. I think we studied them in an office down in the field. I don't remember just what little place it was. It was up at the Crossroads.

Q. Do you remember when you saw them?

A. No.

Q. Would it be three weeks ago or a month ago, would you say?

A. A year or two; two or three years ago, I would say. It was at the time the investigations were being made for a dam site and to determine the tightness of the reservoir and other matters of that sort.

By Mr. THOMPSON:

Q. Doctor, you estimated, I believe or figured on the basis of an average minimum flow of 1,200 second-feet from the Radford project; is that not correct?

A. I estimated from the curves that I have that the maximum average flow through the extreme dry season would not exceed 1,200 second-feet.

Q. And that curve was supplied you, as I understand it, by somebody else?

A. Yes.

Q. I notice all the way through in your testimony you emphasize the word "average" and, as I understand that use of the word, that would permit the company for part of a day, let us say, or part of two days—I think you went as far as two days—to drop below the 1,200 second-feet and at other times to go above 1,200 second-feet. Am I correct in that understanding?

A. Yes; I think so, in a way. Of course, the 1,200 second-feet is what would normally be added to the dry-weather flow. No; I am mistaken about that. I mean you would add enough to the dry-weather flow to bring it up to approximately 1,200 second-feet. You might choose that one hour four times or five times or six times. That average would be over 24 hours, and in ten or twelve hours you might not use it at all, but the
2564 average use during any particular period ought not to
exceed 1,200 second-feet, and it preferably should be kept below that for the reason I have already explained.

Q. So that you could close down, as you say, for from 10 to 12 hours at a time and still keep that average?

A. Yes.

Q. And you could flow the stream or discharge up as high as 9,000 second-feet, could you not?

A. Yes; with a full reservoir.

Q. Next Monday is Labor Day. Couldn't you shut-down from Friday night until Tuesday morning?

A. I suppose you could shut-down indefinitely if you wanted to, if there is any occasion to. You wouldn't expect to do a thing of that sort in any reasonable operation of the plant.

Q. That is just what I want to talk to you about for a moment. You are a thoroughly experienced engineer and we all acknowledge it. Aren't there reservoirs that do close down from unexpected reasons for quite long periods of time in systems like the Appalachian?

A. Well, that is a pretty broad question. I wouldn't want to answer it either yes or no. Of course, we build reservoirs and close them down entirely and collect all the water that flows for irrigation purposes.

Q. That is a different situation.

A. Yes; that is quite different.

Q. But I am thinking now in terms of power projects.

A. As a rule, we do not shut-down a reservoir that is used for power purposes in this eastern country entirely; that is, we always expect to let the normal low-water flow proceed. The general proposition is that our reservoirs uniformly are to take off the peak, maintain the low-water flow which ordinarily we don't consider that we have any business to stop.

2565 Q. Didn't it occur on quite a few occasions—I wouldn't say often—but quite a few occasions during what we call the panic period when there was such a low demand for power that some of these reservoirs were closed down?

By Mr. Jackson. In low-water periods?

By Mr. Thompson. In low-water periods.

A. Well, I couldn't say about that. I don't keep posted on all the reservoirs in the country.

Q. Do you know the Martin Dam in the Alabama Power Company system?

A. No; I only know concerning that system in a very general way. I don't know about the storage.

Q. You don't know that that dam was closed down for 84 days at one period?

A. No; I don't know anything about it.

By Mr. Jackson. During low water?

By Mr. Thompson. During low-water period.

By Mr. Thompson:

Q. And you don't know that it has been closed down on thirty different occasions from five to seventeen days?

A. I don't know anything about it, so most any question you can ask me I don't know.

Q. I don't want to go beyond what you know about it?

A. I don't even know where it is.

Q. In your dams up in Wisconsin, they do close down from time to time, don't they—up on the Brule?

A. Our plants?

Q. I should say plants.

A. I am trying to think of any time they have been closed entirely. I don't know of any.

Q. Wasn't the Brule dam closed down in 1930?

A. It might have been. I don't know. I doubt if I knew much about it at that time. The company had sold that plant, I think, to the North American Company some years earlier than that, and I think the records of operation were sent to our office and we were advising them for some years. I don't know whether we do yet or not.

Q. You look after the western business of your firm, don't you?

A. Well, yes and no. I have some work that is done in connection with Colonel Scheidenhelm and some that has 2566 been done in the past with my associate, Mr. Seastone, and some I have done individually.

Q. You wouldn't say that none of those reservoirs that are under your jurisdiction out west were not closed down for quite a period of time, let us say several days or as high as two weeks during 1933?

By Mr. Jackson. Low water?

By Mr. Thompson. In low-water times.

A. I don't know any reservoir that would be closed down except the reservoirs on the head waters and they are closed down at all times except when more water is needed.

Q. In other words, they are storage?

A. They are storage reservoirs, built at the headwaters and owned by the combined water power interests on the stream and opened up only as the water is needed.

Q. Are any of those power reservoirs?

A. No; those are not power reservoirs. They are simply storage reservoirs, very much like those at the head of the Mississippi.

Q. I have here Defendant's Exhibit 594, which shows the Radford curve as applied to the system of the Appalachian, and ask you if that doesn't show a variation from zero to 9,000 second-feet?

A. It does.

Q. I was also interested in your qualifying language in answer to counsel, in which, talking about the 1,200 second-foot phase of the question—I am reading from page 5966:

"A. With a full reservoir there would be some very slight draft in June. I am supposing, if intelligently used, there would have been some slight draft in June."

I noticed that you made that qualification all the time. Aren't there times when reservoirs are not intelligently used? Human beings make mistakes, do they not?

A. I suppose that may occasionally occur.

Q. On Page 5967, you said:

"By Mr. **Jackson**. Not more than 1,200 [meaning, I presume, second-feet].

"Q. Under that method of operation, would the storage be exhausted at any time prior to the end of the low water season?

2567 "A. Not unless—I don't know that it ever gets so low so you can't find some time it might go lower and therefore you should cut under 1,200 feet. It may occur."

And you left there a reservation that such a condition might occur, didn't you?

A. Yes.

Q. There might be such a condition arise?

A. Yes.

Q. Then you said on the same page:

"Q. You said in the first part of your answer, assuming at the commencement of the low-water season the reservoir was full; please state whether, in your opinion, under proper operation, the Radford reservoir would have been full at the commencement of the low-water season early in June?

"A. Under proper operation it certainly should have been filled and practically full at the time of the low-water season."

You have the assumption there of the proper operation of this project and might not one man's judgment differ with another as to proper operation?

A. Not radically. The principles of operating a reservoir are so nearly fixed that there couldn't be very much divergence or difference of opinion on that subject.

Q. And then turning over to 5968, you said:

"Q. Would you consider it a reasonable or an unreasonable method of operation, if, under conditions disclosed in 1930, the utilizable storage of the reservoir had been depleted or exhausted prior to June 22nd or 23rd 1930?

"A. I should consider it an inexcusable blunder.

"Q. Are you familiar with the load requirements of the system of the Appalachian Electric Power Company?

"A. No; I don't know anything about it except in the way as I have stated of load curves in pretty near all the country in the main plants. I do not recall that particular load curve. I may have seen it and presume I have."

2568 Are you familiar with the report that Major General Taylor wrote to the Federal Power Commission in 1925, December 29th, in which he said that this Radford reservoir could be closed down indefinitely insofar as navigation down below in the Kanawha was concerned? Are you familiar with that?

A. I don't recall it. I may have seen it, but I don't recall the particular report.

Q. You regarded General Taylor as a distinguished engineer, did you not?

A. I don't know. Was he Chief of Engineers at one time?

Q. Yes.

A. I have only known him in a general way. I have known many of the Army Engineers and they are very able men, all that I have known.

Q. If he had said that the reservoir could be closed down indefinitely, then if it was to the benefit of the power company to close it down for any reasons, accident, mood of some person, or demand of the directors, that could have been done, could it not?

A. I suppose it is physically possible.

Q. But you don't think that that would be probable?

A. I can't see any reason for doing it. I think it would be a very peculiar condition that would bring about anything of that sort. I can't see any reason.

Q. You would admit, would you not, that it could be closed down indefinitely?

A. Well, it has to be made so it can be closed off, as far as that is concerned.

Q. Are you familiar with the license that the State of Virginia has granted to the defendant?

A. No.

Q. Did you ever hear of the license?

A. Yes; I heard there was a license but I never read it.

Q. Are you not familiar with that?

A. No; I am not. I knew there was a limit fixed of some kind but what it was I haven't inquired.

2569 By Mr. THOMPSON:

Q. I am reading again from General Taylor's report of December 29, 1925, that paragraph which I have already read: "It may be assumed as a possibility that the plant might be closed down completely for an indefinite period of time during a dry season and at a time when the storage above the dam had been drawn down."

Now, Doctor, I am asking you if you consider that is a possibility?

A. I do not.

Q. So that you don't agree with him there?

A. No.

Q. Second: "In the event of such a combination of circumstances, all water from the drainage area above the dam would be shut-off until the reservoir filled or until operations were resumed." Do you agree with that statement?

A. If what he says is conceivable, that would follow; I would agree that far, yes, sir.

Q. And now this—this is next to the last paragraph (reading). "Therefore, so far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project."

By the COURT. The paragraph read to the witness indicates they are somewhat contradictory, some of them. One of recites the possible shutting off of the water and immediately jumps to the conclusion that that would not affect navigation. There is an intervening paragraph.

By Mr. THOMPSON:

Q. This is the paragraph alluded to (reading):

"The drainage area above Dam No. 2, the upper dam in the Kanawha River, is 8,470 square miles. The drainage area above the site of the proposed dam is 2,396 square miles. The 2570 drainage area between the proposed dam and Dam No. 2 is therefore 6,074 square miles. Records of the measured flow for the years 1909-1916 are available for streams which drain a total of 3,714 square miles of this intermediate area. From these records the total flow of the drainage area below the proposed dam has been computed for each month of the years for which records are available. It is found from these computations that the run-off from this drainage area below the proposed dam is sufficient to supply the necessary water for navigation on the Kanawha River under the existing project."

By Mr. THOMPSON. Then comes the last paragraph. [Reading:]

"Therefore, so far as can be predicted from available data and records, it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project."

By Mr. THOMPSON:

Q. (Continuing.) That was written in 1925, before any new dams were constructed. Do you agree with that statement?

A. Assuming that each of the preceding conclusions is correct, that conclusion would follow. I would agree, if the statement is correct, which I have no doubt it is, that the conclusions are correct also.

By Mr. **Thompson**:

Q. Assuming an allowance of 250 second-feet by the Government to the Kanawha Valley Power Company, for lockage, at the Marmet and London dams—on each dam—assuming the flow of the river at Kanawha Falls on October 7th and 8th, 1930, to be 800 second-feet—860 second-feet—allowing for the time of travel of the corresponding flow at Radford dam site, October 3rd and 4th, to be 620 second-feet, would you—and that was October 3rd and 4th, would you, if you had control of navigation on the Kanawha River, with the London and Marmet dams in existence, have permitted, for the dates of October 7th and 8th—excuse me—for October 3rd and 4th, a cutting off of the flow of New River at Radford?

By Mr. **Jackson**. We object to the question, because that part of the hypothesis or assumption, that the Government reserved 250 second-feet, has no significance; and even stated hypothetically, it calls for the interpretation of the contract, and this is not a proper subject for the cross-examination of an engineering expert. Also because—we object further because it does not say whether or not the wicket dams in Kanawha River below Marmet have been removed, and whether or not Winfield and Gallipolis are in operation.

By Mr. **Thompson**. That is not pertinent in any respect, as counsel well knows. We are assuming conditions only with respect to London and Marmet and the question went to London and Marmet dams.

By the **Court**. Read the question.

(The question is read.)

By the **Court**. What was it at Kanawha Falls?

By Mr. **Thompson**. It was 860 at Kanawha Falls and 620 at Radford.

By Mr. **Jackson**. I would like to add to my objection that the first assumption is entirely based on some supposed contract right, and any assumption along that line would have to be an assumption of the lockage requirements that were on the river, at that time. It does not matter what the contract says.

By the **Court**. Wasn't that the same question that you asked this witness or some other witness.

By Mr. **Jackson**. No, sir. I asked a question, assuming what the requirements of the locks were. I did not ask him—assuming that there was a contract, but a certain amount for lockage, what would you have done, and what would have been the effect. I did not ask what would be done but I asked the effect. They have, instead of that, asked him assuming some contract. They have asked him, instead of his assuming what the lockage requirements were, they have asked him to assume that there was a certain contract.

By the COURT. He said "assuming" the allowance of 250 second-feet, whether or not by law or in fact—that is the foundation for the question. Assuming the requirement of 250 second-feet for lockage.

By Mr. THOMPSON. No, sir; but assuming an allowance of 250 second-feet for lockage at the two reservoirs.

By Mr. JACKSON. We object, because it should be an assumption of fact or an assumption as to contract rights, one or the other, so that we may know what it is.

By the COURT. Assuming 250 second-feet required for lockage and that the authorities in charge of the Government operations on the Kanawha River proceed on the basis of 250 second-feet—that that is required?

By Mr. THOMPSON. Yes, sir.

By Mr. JACKSON. If your Honor please, I do not wish to be persistent, but the question of whether or not certain water was required, in fact, and the question of whether or not there was some theoretical contract provision for water not needed in fact, would have a bearing on what my course of conduct would be. It seems to me when the question is put in that form and counsel refuses to define it, that it is objectionable.

By the COURT. He may answer it.

To which action of the Court in overruling said objection, counsel for the defendant excepts to the ruling of the Court, for reasons heretofore stated.

A. I understand that there are a great many dates interposed,
and some suppositions—I could not quote them fully—but
2571 I understand that you assume essentially that Kanawha
Falls was 860—yes, sir—second-feet, on that particular
date, and that at a previous date, which would have affected that flow—there was at Radford dam 620 second-feet, and you leave indefinite what, if anything, was coming down New River, except that he expected the 800, on that assumption—that it did affect—or the 860—that involves, as I gather it—if you close the Radford dam under these conditions, you would have 240 second-feet available for navigation purposes.

Q. For lockage?

A. Now, of course, it would depend on two things—as to whether or not that would affect navigation. First, whether or not you would use 240 second-feet, and, in the second place, if you did use more than 240 second-feet, you have storage, as I understand it, at what you call the London dam of 2,700 acre-feet; a three feet draw-down that would supply lockage and leakage for several days. Apparently, there is very little difference between the water available and the assumption that you made as to the use of 250, if that run along many months—that is many days, still the reservoir above London would take care of the lockage and render it unnecessary ~~to get more~~ water down the river.

By Mr. Thompson:

Q. I don't quite get your reply?

A. I might say that you gave several dates, but I think I understand definitely what you ask.

Q. The flow is cut off on the third and 4th. Allowing for the time period for water to travel down the river, which would be the 7th and 8th at Kanawha Falls?

A. You would have 240.

Q. Give it at Kanawha Falls at 860.

A. If you cut off 620, you would have 240?

Q. Yes, sir.

A. Assuming that you use 250, you will have 10 second-feet shy, unless you take it from the London pool. 2572

Q. Assuming for navigation purposes, that the government—that you have a three-foot draw-down at London dam; assuming that they kept the pool filled to the top, doing so with the three-foot draw-down; what would you say as to the necessity for allowing water to come down from the Radford project?

A. You would have ten second-feet short, if your assumption is correct.

Q. You said something very interesting this morning about the conditions of the Charleston water supply. I think you were the witness who said they got their water supply from the Elk River?

A. I mentioned it; yes, sir.

Q. You made a study of that?

A. I made an examination and report to the Commission, at their request.

Q. As I understand you, water was taken from the Elk River, close to its confluence with the New River?

By Mr. Jackson:

With the Kanawha.

Q. Yes, sir; the Kanawha River?

A. Yes, sir.

Q. Yes, sir.

A. It was taken, I don't know—a number of hundred feet up the river, I imagine.

Q. And at a time when the Elk River was practically dry?

A. Practically so, yes, sir; it was very little water.

Q. As a result of the flow, the New River—the flow of the New River, had backed up into the Elk River?

A. The Kanawha River?

Q. Yes, sir.

A. The Kanawha River—the flow was reversed in the Elk and the water flowed to supply the water needed by——

Q. What is that?

A. It reversed the flow in the Elk and water flowed from the Kanawha.

2573 Q. Into the Elk?

A. Yes, sir; to supply water needed for the pumps.

Q. So that, under these conditions, there was a pollution, as I understand it, of the water in the City of Charleston?

A. Yes, sir.

Q. Now, if you were in charge of navigation and the protection of riparian owners along the navigable parts of the Kanawha, under the conditions such as I have described about the flow from Radford, and at Kanawha Falls, would you, if you were in charge and had the final say, want to cut off the flow from Radford under those conditions?

By Mr. Jackson. We object to the question, because it goes to both the question of water supply and to navigation. It cannot possibly and does not have anything to do with water supply.

The objection is overruled and the defendant excepts to the ruling of the Court for reasons stated.

By Mr. Thompson:

Q. Assuming what I have told you.

A. I am trying to get them in mind. It is rather complicated. I should certainly want to see that there was enough water for navigation, I expect.

Q. And you would certainly want to know if there was enough water for riparian owners?

A. Yes, sir; I should assume there was a duty there to be attended to, by myself or someone else.

Q. If you were in charge, would you order the flow from Radford to go down the river—the natural flow of the river?

A. I could not conceive myself that the discharge from Radford would not be coming down the river at this time. You assume conditions that I do not believe practical. I do not think it could possibly occur in any reasonable system of operation. The fact that the reservoir is built to store water at high periods and let it out at low periods, would assure that the water would come down the river.

Q. Didn't you say that you could operate this project so as to cut off the Radford project for a period of eight hours at a time?

A. I think I said two days or a year, then said indefinitely, but that was on a supposition that was untenable. You have got to look at the reservoir for use as a practical proposition. If you are going to assure that, as the owner of the reservoir, I am willing to operate it to try to injure somebody, regardless 2574 of my own interests, I assume we could find somebody that would make the water low in time of low water and high in high water, but if I did that, I would lose my interests.

Q. No, sir. I would not expect you to kill or injure somebody, but you would have a self-interest there, which would be perfectly human and natural, and you would want to push that self-interest just as far as you could. That is, without becoming some outlaw or something of that sort, but in dry times, wouldn't you close down in order to get a head of water on Saturday afternoon, when the dam was off and not open until Monday or Tuesday?

A. I should expect in summer time to have 1,200 second-feet capacity.

Q. Yes, sir. But we come back to the question of average. I cannot get that out of my mind. Do you say this average amount you could cut-off for a couple of days at a time, without allowing the water to go down the river?

A. You could shut-down for a day or two at a time, I presume, without any very serious effect. Of course, in the operation of a plant of that kind, I would doubt if that would be done. I think it would operate certainly continuously for five days a week and I think it would operate to some extent at least on Saturday—I should doubt it, although it might be shut-down for Sunday.

Q. Wouldn't it be perfectly natural to do as General Taylor has said in his letter—in his report—to allow for a flow sufficient below there—from the watershed below there, to take care of the needs down the river, and on that theory, to close down in order to store for a head from Saturday to Monday, and on a Holiday, until Tuesday?

A. I think the General's assumptions are entirely untenable; and I could not conceive of the operation of the plant so as to affect rights below. Any operation—intelligent operation of the plant must consider the interests below—the riparian, navigation, and any other interests downstream; the plant would necessarily be operated so as to take care of those interests, or trouble

would result. When you ask about the physical possibili-
2575 ties of doing foolish things, you can do almost anything
conceivable on suppositions, if you do not care what happens, but intelligent people try to keep out of trouble, and I believe most people who operate hydroelectric plants have reasonable intelligence and they are particularly anxious to keep out of trouble and operate it intelligently and do not try to seek difficulties. I cannot see that this plant could be operated, or would be operated, in any way but along an intelligent line, that would take care of rights down below, navigation, riparian, and water supplies and all, and the water stored during the high state of flow would be used intelligently to increase the flow, both through the plant and through the river, in low-water conditions.

Q. Well, it might increase the average flow, but how about this interim period, where at times you got below the average flow, and then at times you got above the average flow. In other words, your interpretation of the word "average."

A. The average in a day—I was speaking when I referred to that, as the pretty well ironed-out average between Radford and the Falls. These little waves that occurred would be such that when they got to the Falls, they would be apparently uniform.

Q. You have testified as to the type of wave this company would or could use?

A. No, sir; I did not say as to the wave; no, sir.

Q. Defendant's Exhibit 594—that calls for Zero to 9,000 second-feet?

A. That particular——

Q. In a dry period, such as October 1930 or 1925, if you ran this project on a peak load basis, 9,000 second-feet in 8 hours, you would have to close down for the other 16, would you?

A. I assume so; but I don't think an intelligent use would involve any such use of water; in fact, this particular load curve you are presenting there, is in my judgment an idea of about the average load curve that would be used during the year. It might not be. It might not be at all feasible to use that particu-
lar load curve. It might be a half of that or a quarter of
2576 that, under low-water conditions. I would expect that
plant to be run by intelligent people that would use sense and take care of the necessary conditions to preserve their rights and the rights of other people. They have tried to do it in all the plants that I have been associated with, and that is a great many.

Q. The conclusion of your testimony on this point, as I gather it, is that intelligent people would not run it so they would take less, say, or a discharge of 8,000 second-feet for 8 hours a day, but that would not be done by people who were venal, and careless and selfish, if they saw fit?

A. It could be run in any way you might assume, under those conditions.

Q. Under those conditions.

By Mr. **Thompson**:

Q. You were asked a general statement this morning by counsel as to the flow of the river being indicated at a gaging station at a certain height on a river (let us say on New River—I kind of think that they got down close to New River), and that the flow down below was less than the flow at the point above; do you recall that?

A. Yes; I recall that.

Q. And you answered generally, I believe, that that would indicate that the Geological Survey reports of stream flow, or gaging station reports, had been taken carelessly or incorrectly, or something was wrong with them; is that correct?

A. Essentially; yes.

Q. What, if any, situation did you have in mind on New River with respect to those questions?

A. Well, the material increase in flow on a straight stretch of river, where there was perhaps no tributary, where the upper gages showed a very material increase over the lower gages, in my judgment that just can't happen in this country. It happens very commonly in the west. I have seen flows on the Tucson River coming down from the mountains and absolutely disappear and sink. In this part of the country with your ground
water curves towards the river (the water flows towards
2577 the river), and where there is earth and gravel, through
those especially, I know of no place around this part of the country, although in certain cavernous regions it might occur, but I know of no place along New River where seepage could take place. Of course, evaporation could take place, but that is a small element.

Q. You do not know the evaporation on New River, do you?

A. No.

Q. Nor the absorption in the river from plants?

A. There is not much absorption in the river from plants.

Q. You draw the conclusions that there must be a mistake by the Geological Survey men who were keeping charge of the gaging stations?

A. I would say a mistake in the reader or the rating of the streams. These rating stations change more or less from time to time, and very frequently you have to establish new ratings.

Sometimes they are off very materially, due sometimes to the filling at the cross section or the gaging station, or sometimes through the digging out, sometimes to obstruction by logs and matters of that kind, so I have found stations very seriously in error—as much as 50 percent.

Q. Were you talking about a supposititious case when this question was put to you by counsel, or did you have some specific case on New River in mind?

A. I had no specific case. I do not know of any personally on New River. I understood the question to have been if there was a very large decrease in flow between upstream and downstream on New River, and what it meant in my judgment, and I would say it would mean an error in one case or both.

Q. There was some testimony to the effect that at Caperton (Caperton is a place, I guess, 18 miles above Kanawha Falls, a stream gaging station), the gaging station records showed a certain flow; then there was testimony that a gaging station down at Kanawha Falls showed a flow that was less, 120 second-feet less, and then there was testimony to the effect that in between the Caperton gaging station and the Kanawha Falls 2578 gaging station there was the power plant of the Glen Ferris project, which is owned by the Electro-Metallurgical Company, and there was a chart produced showing that on the specific day when these two gaging stations records were kept, that at a certain time at Kanawha Falls, at 2 o'clock in the afternoon, there was a sudden cutting off of the flow of that stream that would account for the 100 or 120 second-feet, under such circumstances, would a situation of that kind clear up the problem that you say that you would not say was a mistake in the report of the Geological Survey—and I might add there was no corresponding falling off in the gaging station at Caperton?

A. I understand from your question that you are stating as a fact that the flow was interrupted in some manner and held back?

Q. In an artificial manner, I am assuming?

A. That might be the reason for the fluctuation of gages, and the point I meant to emphasize this morning was that with the stream in normal flow in this part of the country, there would be no materially less discharge at a downstream station than at an upstream station on the same stream.

Q. And that the only way that that could be changed would be by some artificial interruption?

A. Well, that is true.

Q. Isn't it quite possible, Doctor, that you may have a gaging station above a reservoir show a different flow from the gaging station below the reservoir—a greater?

A. Surely the reservoir might store all the water and there might be no water running lower, and it might make a certain amount of reduction in the flow.

Q. Doctor, if the Radford reservoir were not full and the flow in it were 9,000 second-feet, or even somewhat more, is it not reasonable to assume that the Radford plant might be operating on a peak load?

A. That depends on the demands of the system, I expect. It might be operating on the peak load at some time in a day.

2579 Q. If 9,000 second-feet were coming in, and you had the capacity for 9,000 second-feet discharge, isn't it reasonable to suppose, if you were on a load demand of that kind, that you would put it on peak?

A. I should think under those conditions that what you would do would be to bring the plant up to its capacity and operate it uniformly thru the day at 9,000. That would be the purpose of the plant and of the reservoir. Does that answer your inquiry?

By Mr. THOMPSON:

Q. I will ask you this question, Doctor: If the Radford reservoir were not full, and the inflow to Radford was equal to 9,000 second-feet, is it not quite likely that the plant would be operated so as to peak a portion of the inflow, using the remainder to replenish the reservoir?

A. I should think if there was not a demand for the power, they would necessarily save the water in the reservoir, and I do not see how they could peak 9,000 second-feet when 9,000 second-feet, as I understand, is the total capacity of the plant.

Q. The question here was the peaking of a portion of the inflow, using the remainder to replenish the reservoir?

A I do not quite recognize the language you use. I think you might use a certain amount at the rate of the 9,000 second-feet and operate other times during the day at less, allowing the difference to stay in the reservoir.

Redirect examination by Mr. JACKSON:

Q. Dr. Mead, assuming a hydraulic capacity of the power installation at the Bluestone reservoir to be 11,000 second-feet; is there any reason why any flow into the Bluestone reservoir not exceeding 11,000 second-feet should not be reregulated in the operation of the Bluestone power station?

A. I think it would be entirely controlled, reregulated or utilized or whatever you might call it, by the Bluestone plant.

Q. In connection with your cross-examination on gage errors in U. S. Geological Survey, I think you said, and said on 2580 your direct, that in your judgment the factor of error in recent estimates of stream flow would be on the order of 5%. Will you state whether or not you there refer to the average or possible errors in individual measurements or estimates?

A. The general average estimate of about how those things stand, in my judgment, as a whole; individually they may be very large errors. There are very large errors at times. I have found them.

Q. Can you give some indication of the errors of individual estimates?

A. They run from very small factors up to sometimes 50%.

Q. You also testified to the fact that the same gage readings at a particular gaging station on the same stream may relate to different flows depending upon whether the gage represents a condition of steady flow, rising flow or falling flow. Will you state what is the order of variation which results from those three different conditions at a gaging station?

A. Well I should think there might be an order of, I am naming now an extreme of course, of possibly 15% or 20%, usually less.

Q. You were cross-examined somewhat about the matter of the water supply at Charleston. Will you please state whether or not the taking of the water supply of a city from the same stream to which the effluent is returned substantially decreases the volume of flow below the point of return?

A. No; it does not. The average sewage of a city is pretty close to its water supply. That is the usual basis except where storm water is taken in and the sewage may be greater.

Q. The effluent and pumpage are practically equivalent?

A. Usually, but exceptions. Sometimes the sewers leak and it is increased, and sometimes the leakage is in and sometimes out, may be increased or decreased. A great many conditions arise.

2581 F. W. SCHEIDENHELM

Direct examination by Mr. JACKSON:

Q. Please state your full name and residence for the record.

A. F. W. Scheidenhelm, New York City.

Q. What is your occupation?

A. I am an Engineer, Consulting Hydraulic Engineer.

Q. Where do you practice?

A. New York.

Q. What has been your education?

A. Aside from an ordinary secondary school education, I attended college at Cornell University, completing the course for the degree of A. B. which I received in the year 1905, and the course for the degree of Civil Engineer, which I received in the year 1906.

Q. What has been your experience in the practice of your profession?

A. If I am to give that in detail I shall need some notes which I do not have before me.

A. (Continuing after securing notes.) After graduation from the Cornell University in 1906, and after several summers of practical work of one kind and another, I became in the summer of 1906 Structural Engineer with West Penn Railways Company, and beginning in 1907 was placed in charge of its Structural Department. At that time I installed a 6,000 KW additional capacity in its main steam-electric plant at Connellsville, Pa., which amount seemed large in those days, and was relatively larger than it is in these days. I had charge of design and construction of additional boilerhouse, condensing-water system, coal-conveying system, etc. Also, as Structural Engineer, I designed and constructed certain reinforced-concrete bridges and transmission towers.

I reported on various hydroelectric projects and dams for American Water Works & Guarantee Company.

1909 and continuing to 1911, I was in independent engineering practice, with headquarters at Connellsville, Pa. I acted
2582 as Chief Engineer of Pittsburgh Hydro-Electric Company; Consulting Engineer for Union Utilities Company of Morgantown, W. Va.; and as Chief Engineer of Georgia-Carolina Power Company. I made miscellaneous investigations on steam power, water supply, and hydroelectric projects.

From 1911 to 1914 I was Chief Engineer of Hydro-Electric Company of West Virginia and West Virginia Development Company, Pittsburgh, Pa. During that period, namely, from 1913 to 1914 I was also Vice President of Hydro-Electric Company of West Virginia.

1914 to 1915 I was Consulting Engineer at Pittsburgh, Pa. During that period I took a trip to the far west, which was a combination of business, pleasure and professional education. I visited thirty-four hydroelectric developments west of the Mississippi River.

1916 to 1917 I was in New York City, having gone there in early 1916 and became associated as the New York associate of Daniel W. Mead and F. W. Scheidenhelm, engaged in Hydraulic practice. Also, I was interested in an officer of the Scheidenhelm

Construction Corporation, engaged in certain construction in the vicinity of New York and in Connecticut.

From May 1917 to August 1919, I was in the Military service. After having received some degree of Military education I went to France. In due course I commanded the 26th Engineers and attached troops in charge of Water Supply of the American First Army front, during St. Mihiel and Meuse-Argonne offensives, and did various other things and came back to the United States.

From 1919 to date I have continued in the Consulting Engineering practice in New York practicing in water-power matters in association with Dr. Mead.

I have had direct responsibility as to detailed design and construction as follows:

Exploration and design of 20,000 HP development on Savannah River, Georgia, for Georgia-Carolina Power Company; 30 ft. by 2,500 ft. dam with locks. I carried that through the stage of securing approval of plans from the War Department in 1910 to 1911.

2583 I was in charge of exploration, design, and partial construction of State Line or Lake Lynn development, Cheat River, West Virginia (1911–1914), for the Hydro-Electric Company of West Virginia, a part of the so-called West Penn power system. That involved a dam 85 ft. by 1,100 ft. and installation of 48,000 H. P.; and an expenditure of $1,500,000 prior to the financial failure of the controlling financial interests, due to controlling Western irrigation projects. Later, in 1920, and continuing through 1925, I was Consultant to the reorganized interests under American Water Works and Electric Company, until the State Line dam on Cheat River was completed in somewhat larger form, so far as concerns capacity.

I was in charge of the exploration, design and partial construction of the Big Sandy Creek development in Pennsylvania and West Virginia in 1911 to 1914, for the Hydro-Electric Company of West Virginia. The dam there reached only its preliminary stages. It was to have been 200 feet high, to have involved a 3½-mile tunnel, a 600 foot head and 50,000 HP of installation.

The Lake Lynn installation, by the way, was finally made to a total of 70,000 HP. I was in error in stating its completion was in 1925. It was completed in 1926.

Some years earlier, 1914 to 1915, I had charge of the repair and reconstruction of the Stony River Dam, West Virginia, for the West Virginia Pulp and Paper Company. That dam had failed in 1914. There I had complete responsibility for the design and supervision for the reconstruction.

I reported, or acted as Consultant for banking houses, power companies, municipalities, etc., on various hydroelectric projects, during the period 1910 to 1933. This list includes the following, beside those which I have heretofore mentioned:

The Auglaize River, Ohio, 8,000 HP.

Blackwater River, West Virginia, 44,000 HP., and a total head of 1,400 feet, practically the highest, if not the highest project east of the Rocky Mountains. By highest project I mean highest head. Later it has been proposed to cut that development into two stages.

Fall Creek, New York, 15,000 HP.

A development on Shavers Fork, West Virginia.

2584 On Mongaup River, New York, of 28,000 HP. development.

Another on Neversink Creek, New York.

The development of the Province of New Brunswick Development on Musquash River, Canada, a report for the City of St. John, 10,000 HP.

An investigation and report on the dam of the Arkansas Light and Power Company, on the Cauchita River, Arkansas.

An investigation and preparation of preliminary plans for a development since constructed by ——— Power Company, Riviere des Prairies, Quebec, Canada, 120,000 HP.

An extended study on a series of projects on Cheat River in northern West Virginia, and to a minor extent in Pennsylvania. The total capacity of the series being approximately 700,000 HP.

As to the Oswego River, New York, a report for the City of Oswego on economics of utilization of the water power on that river, 7,500 HP.

The North Fork of the Kentucky River in Kentucky, 53,000 HP.

Tributaries of Craig Creek, near New Castle, Virginia, 7,500 HP., the result of that being an adverse report.

Smith Mountain project on Roanoke River, Virginia, 36,000 HP.

Talleys Falls project on Roanoke River, 30,000 HP. That is likewise in Virginia and near the North Carolina line.

A combination, hydro and pumping project near Steubenville, Ohio, 70,000 HP.

A so-called Little Tunnel project on James River, near Buchanan, Virginia, 16,000 HP.

A similar combination hydro and pumping project near Philo, Ohio, in the same amount.

Watauga River projects, North Carolina, 54,000 HP.

Table Rock project on White River, Missouri-Arkansas, the dam site and reservoir only being under consideration by me, 20,000 HP.

The Greenville development of the Tennessee Eastern Electric Company, on Nolichucky River, Tennessee, which was a problem of a sick dam.

The Passaic River, N. J., where I acted as expert in be-
2585 half of Passaic Valley Water Commission, representing
three municipalities in proceedings for condemnation of
Passaic Consolidated Water Company.

2586 In more recent years, that is, since 1925, beside an exten-
sive contact with projects on the New and Kanawha
Rivers, I had charge of the reconstruction, involving rearrangement and enlargement of the Reusens hydroelectric development on the James River, near Lynchburg, Virginia, with a total installation of about 17,000 HP.

Also, since that period I have served as Consultant to the Public Service Commission of New York on appraisals of about ten water-power sites or construction developments in New York State.

More recently I served as a member of the Board of Consulting Engineers on Norris Dam of the Tennessee Valley Authority of the United States.

Q. Have you made any special studies, or had any special experience in the matter of stream flows?

A. I have necessarily, as a Hydraulic Engineer, dealing with water power, had to do extensively with stream-flow measurements, estimates, and of course the practical use of stream flow. In earlier years I undertook various work which required stream-flow measurements, many of which were, the results of which, were published by the U. S. Geological Survey, through its Water Resources branch, and likewise made current meter measurements myself in behalf of the Survey.

Q. Are you familiar with the field of hydrology?

A. In reservoir work and dam construction the fields of hydrology and hydraulics and geology intertwine to a considerable extent. Hydrological problems have come up for attention from time to time largely in connection with the possibilities of leakage from reservoirs, leakage possibilities from stream-beds, leakage possibilities at dam sites. I made an extensive investigation as to the possibilities of leakage of a reservoir site in
northern West Virginia in a limestone country. I have
2587 investigated a similar problem in Tennessee, and in con-
nection with the Radford project, which is the subject of
this case; conducted a series of investigations extending over a

period of several years and costing at least a quarter of a million dollars, all having to do with the problem of hydrology.

Q. Are you a member of any professional or technical society?

A. I am a member of the American Institute of Consulting Engineers, American Society of Civil Engineers and Fellow, The American Association for the Advancement of Science.

Q. Are you registered as a professional engineer in any of the states?

A. I am, in New York, Virginia, and West Virginia at least.

Q. Col. Scheidenhelm, are you acquainted with New River?

A. I am.

Q. Will you state when your acquaintance with New River began and the occasion for such acquaintanceship as you have of New River?

A. My first professional contact with New River or anything in regard to it, for which I had responsibility, was in 1925; but I recall that in 1913 and for several years later I had knowledge of New River and possible developments on New River, but in a way for which I had no responsibility. In 1925 Daniel W. Mead and F. W. Scheidenhelm were engaged as Consultants by American Gas and Electric Company, in behalf of Appalachian Electric Power Company and other subsidiary corporations operating the power system which is interconnected and extends from approximately Lynchburg, Virginia, on the east to close to Chicago on the west.

Q. With what portions of New River are you familiar?

A. I have not personally been farther upstream than approximately Boyer's Ferry, which is up toward the North Carolina Line, although I have had various investigations and inspections made under my direction still farther upstream. From Boyer's Ferry down to the Byllesby development of Appalachian Electric Power Company I am not familiar, by reason of many inspections, but from the site of the Bullesby development 2588 down to the mouth of the river I think it is fair to say that I am quite familiar with the stream. I have not visited every bit of it, but the parts I have not visited are very limited in extent.

Q. I produce a chart, which bears the legend, "Profile of New and Kanawha Rivers from Forks of New River in North Carolina to Ohio River, showing existing and proposed power developments" and ask to have it marked "Defendant's Exhibit #600 for identification."

2589 Examined by Mr. Jackson:

Q. Colonel, I show you copy of the chart which was marked "Defendant's Exhibit 600" for identification, just before the adjournment of last evening. Please state what the exhibit 600 for identification is? I do not mean to tell what it shows, but just what it is?

A. It is a profile of New and Kanawha Rivers from the forks of New River in North Carolina to the Ohio River, showing existing and proposed power developments.

Q. Was that chart, Exhibit 600 for identification, prepared by you or under your direction?

A. It was prepared under my direction.

Q. And does it accurately portray what it purports to show?

A. It portrays it with what I believe is reasonable accuracy. I would not say there is not a minor mistake, but I accept it as accurate.

Mr. Jackson. We offer it in evidence, Exhibit 600 for identification.

Mr. Thompson. May I ask if it purports to show the railroad and the correct distances from the bank of the river?

Witness. The only way in which it would show that would be in elevation, and I think it is approximately correct in that respect.

By Mr. Jackson:

Q. Now, please state what is shown with respect to New River by the profile marked "Exhibit No. 600"?

A. It shows the profile of the river at a water condition which probably is about ordinary water level. It is not possible, on such a scale, nor was any attempt made to show any particular stage of the river, although certainly it is not a flood stage on the river.

In addition, there are shown certain paralleling railroad lines,
likewise shown in elevation, because it is a profile, and
2590 there are shown varying existing and proposed navigation
and power developments between the mouth of Kanawha
River and the junction of the North and South Forks of the New
River in North Carolina.

Also it indicates the ownership of the various power developments existing and proposed which, in elevation, are depicted on profile.

Q. Where is the Radford development?

A. The Radford development is near the right-hand end of the profile. The horizontal scale of the profile is in miles measured from the mouth of Kanawha River, and the site of the Radford development, according to that scale, in miles is at approximately mile 252. It is marked "Radford development" on the profile.

And where are the Buck and Byllesby developments with
ence to Radford, as shown on Exhibit 600?

The Buck and Byllesby developments are the next develop-
s in an upstream direction, and the Buck development is
ed "No. 4, Buck," at about mile 297. That development
named after Harold W. Buck, who has testified in this case.
e Byllesby development is about mile 300. That is also
n as New River Development No. 2. The numbers are those
ppalachian Power Company and subsequently Appalachian
ric Power Company.

that same series of numbers, the Radford development is on
ion known as New River Development No. 6.

Is there shown "New River Development No. 1"?

Just upstream from the Byllesby development is a develop-
"New River No. 1," and between Byllesby and Buck devel-
nts is a site on New River "Development No. 3."

By Mr. THOMPSON:

Could you tell us on No. 1, is that owned by some-
body?

By Mr. JACKSON. I was going to ask whose proposed de-
velopments are these.

As shown by the chart, which is according to the legend,
sites are owned by the Appalachian Electric Power Com-
They are developments which had been proposed by its
cessor, Appalachian Power Company.

By Mr. JACKSON:

Further to the right on Exhibit 600 are certain projects
nated, respectively, Boiler project and Osborne Falls project;
are they?

If counsel doesn't mind, to complete the story in an up-
n direction, there is another existing development on New
just upstream from the site of the Appalachian Develop-
No. 1. That existing development is at Fries, Virginia, at
mile 308. It is owned by Washington Mills, I believe.
en still further upstream, at about mile 321, is the Boyer
ct of Appalachian Electric Power Company, and still fur-
upstream, at about mile 343, is the Osborne Falls project
same company. Those two projects are at storage reservoir
cts, with which there would be combined some degree of
r development, but they may appropriately be described as
vater storage projects.

Have you now described all the projects upstream from the
ord development, as shown on Exhibit 600?

I have.

Q. Will you now describe the projects on New River downstream from the Radford project, as shown on Exhibit 600?

A. Between the site of the Radford project and approximately Glen Lyn, Virginia, there is no proposed water power development, so far as I know—at least none proposed at the present time except so far as concerns minor mention in the 308 report on the Kanawha River.

2592 On the profile is shown the Bluestone power project of West Virginia Power Company, a subsidiary of Appalachian Electric Power Company. That project extends from about mile 163½ to a point just below Narrows, Virginia. It consists of a two-stage development, the stages being known as Hinton development and Bull Falls development, respectively. The site of the Hinton development is about mile 163½, involving a low dam for a reregulating reservoir.

The site of the Bull Falls development is at about mile 172 at Bull Falls on New River. That is a high dam, intended for storage and power development.

Continuing down the river from the site of the Bluestone development past Hinton, there is shown Sandstone Falls, otherwise known as Richmond Falls, a development of an indirect type, proposed to be made by Electro-Metallurgical Company, which is identified as subsidiary or otherwise with the Union Carbide & Carbon Company. That development is in prospect.

Nearer the junction of the New and Gauley Rivers, and, specifically, at about mile 105, is the site of the dam of the Hawks Nest development of the same Electro-Metallurgical Company. That is a large development now in existence and in operation. It is of the indirect type. That is, the water is taken out at a diverting dam through headgates, and is carried through a tunnel for a distance of three or four miles to a power station at about mile 98.

Although the tunnel is three or four miles long, the distance by river is five or six miles, and, therefore, the tunnel length as shown on the profile has had to be stretched out, and it is shown dotted. That is because the profile is along the river and not along the line of the tunnel.

The tail water from the Hawks Nest power station empties
practically into the headwater of the Kanawha Falls de-
2593 velopment of the same Electro-Metallurgical Company.
That is a relatively small development. It was made about
1901, I believe.

Q. Is that sometimes called the Glen Ferris development?

A. It is.

Q. Have you completed your description of the projects on e New River, as shown on Exhibit 600?

A. I have, and I have gone into Kanawha River to the extent f the Kanawha Falls development.

Q. Are you familiar with the Kanawha River?

A. I am.

Q. To what extent?

A. I have traversed it from its mouth to its head, and have ad occasion to spend considerable time at various special places ong the Kanawha River.

Q. Referring to Exhibit 600, please explain what is shown ith reference to navigation and power developments existing or roposed on the Kanawha River?

A. In making this profile one was faced with the difficulty f attempting to show what would be in existence in the future nd what is in existence now, and on the Kanawha River portion f the profile there is an attempt to show both the conditions of e near future and likewise the existing conditions.

If one goes back two or three years in point of time, one will nd that the conditions on the Kanawha River involved ten low avigation dams, the two up-streams being of the fixed type and e eight downstream of the wicket type. In the meantime, the pstream four of those dams have been displaced. They are umbered 2 to 5, inclusive. There never was a No. 1.

In the lower left-hand portion of the profile, rather faintly, are own the locations of the existing dams, Nos. 6 to 11, inclusive, nd likewise the nominal pool elevations of each of those six ams.

The upstream four dams which were displaced, were displaced——

594 Mr. Thompson. Excuse me. Have you got any more of those maps?

Mr. Jackson. The photostat does not show very clearly, I ink, Mr. Thompson.

Witness. The profile shows nothing on the Ohio.

By Mr. Thompson:

Q. Is there any indication of wicket dams on the Kanawha?

A. Yes; there is on the photostat, I think, of the same profile. is very faint. The notations seem clearer on the original art. They are below the profile of the river itself, and there an arrow pointing upward.

Q. It is very faint?

A. The locations of the respective dams can be seen by an rrow pointing up to each site.

Q. There are five of those arrows?

A. I can count six.

Continuing then, the four upstream navigation dams of the old type have been displaced by two high dams of the roller-gate type. The upstream of these two dams is the London Dam, and, under the new system of numbering of the U. S. Engineer Department, is No. 3. The next in the downstream order is the Marmet Dam, and under the new system of numbering, that is No. 2. Each of those dams has a power development, constructed and operated by the Kanawha Valley Power Company, a sister company of the Appalachian Electric Power Company. These stations are operated under license from the Federal Power Commission.

Still further downstream, at about mile 30½, is the site of the Winfield navigation dam of the United States, under construction. The dam, which will have its pool elevation at 566 feet above mean sea level, will drown out the sites of the three existing and wicket-type dams numbers 6 to 8.

Q. Inclusive?

A. Inclusive.

2595 At the site of the Winfield dam, there is likewise under construction a power development by the same Kanawha Valley Power Company, similarly under license from the Federal Power Commission. It is being constructed and will be operated under a different license than that which controls the construction and operation of the London and Marmet developments. The London and Marmet developments are known together as the Kanawha project.

The Winfield development, upon the records of the company and presumably the Federal Power Commission, is known as the Winfield Project.

Still further downstream is shown the head of backwater of the Gallipolis dam now being constructed on the Ohio River by the United States. That dam will backwater up the Kanawha River to the foot of the Winfield dam, and, when completed, will drown out the sites of existing and old navigation dams numbers 9, 10, and 11.

The navigation project of the United States for and in connection with these new high dams is a nine-foot project. The former project and that which is still in operation in respect to pools Nos. 6 to 11, inclusive, is a six-foot project.

By Mr. **Jackson**:

Q. Col. Scheidenhelm, you just testified that prior to the recent improvements on the Kanawha River, there were ten old gation dams, of which Dam No. 2 was the furthest upstream; [right about that?

. Yes.

. What was the distance between the Radford dam site and old No. 2 dam?

. A. t 160 miles; perhaps a little nearer 163 miles.

. I think in your qualification you stated you have been sulting Engineer for the Appalachian Power Company and its affiliates since 1925?

A. That is correct.

Q. Will you please state what has been your connection the power developments of the Appalachian Electric Power npany and its affiliates on New River and the Kanawha River?

.. Perhaps the most convenient way of making that state- it would be to use the profile of Exhibit 600, and to begin the Kanawha River. That is at the lower left-hand end he chart.

By the Court:

. Col. Scheidenhelm, the plaintiff introduced here Exhibit 119, and purports to show the proposed improvements along Kanawha River. On that I notice set forth what they call Vhitethorne project, a proposed project, it looks like about miles below Radford and Monkey Shoals. That is not shown your map.

.. That is one of the projects which I have referred to as be- included in the so-called 308 report of the United States gineering Department upon Kanawha River, which report is, elieve, Exhibit 145 in this case.

. Is the same true then of what is known as Barren Springs ject?

.. Yes. There are others, undoubtedly. For instance, there headwater project set forth in that report known, I believe, Moore's Ferry project, with its site somewhere in the vicinity Boyer's Ferry. It is not there because it is in the neighbor- d of Moore's Ferry. It is not exactly there, but in that vi- ty. The Moore's project and the Boyer and Osborne projects the Appalachian Electric Power Company could not both t at the same time. There are undoubtedly other projects set h in that report. So far as I know, they are not authorized jects.

. Your diagram of that section of the river shows what you designate as the Bull Falls project; right below is reregu- lating dam. That section of the river is comprised within the Bluestone project, isn't it?

A. Well, one needs to keep clear which Bluestone project one speaks about. On this chart there is a project which is labeled "Bluestone Project;" that means the Bluestone power project of the Appalachian Electric Power Company.

Q. What I am getting at is this: You have designated here Bull Falls development, and immediately below it is "Hinton development," which, according to the legend, is "proposed power development of West Virginia Power Company." Those developments cannot be made under existing conditions, can they? I mean, isn't that portion of the river there being developed under the Bluestone project, which has been referred to throughout this case, a storage dam proposition of the Federal Government?

A. I was about to say that that same scope, from the Hinton dam site to the headquarters about Narrows, is comprised in the Bluestone reservoir project, which has been recommended by the Chief of Engineers and Secretary of War.

By Mr. THOMPSON. May I ask a question for my information at this time? Is this Exhibit #600—does it show so far as New River is concerned, only the projects which are constructed or proposed to be constructed by the Appalachian Electric Power Company?

By the WITNESS. As distinguished from what?

By Mr. THOMPSON. As from those proposed by the Government.

2598 By the WITNESS. That is correct so far as projects other than navigation projects are concerned.

By Mr. JACKSON. You refer to navigation projects on Kanawha River?

By the WITNESS. It is my understanding it is true on both the New and Kanawha Rivers.

Q. Will you proceed with your statement?

A. Beginning then at the lower end of the Kanawha River, in the case of the Winfield project of Kanawha Valley Power Company, I had a consulting relationship to it from its very conception, so far as concerns the power company, and continuing that relationship the general plans of the project were prepared under my direction. I conducted the negotiations between the Power Company and the Federal Power Commission, and likewise with the U. S. Engineer Department, so far as concerned certain navigation aspects of the matter, my relationship being with regard to all engineering matters involved. The construction is being carried on with such benefit as there may be under my consulting advice.

Proceeding upstream the relationships in respect to the London and Marmet Power developments were of the same order.

The London and Marmet dams were proposed in somewhat different form and under different names originally, by the U. S. Engineer Department. They had the names of "Pratt" and "Burning Springs" respectively, though I do not recall now which pertained to the London navigation project.

Various schemes of power development were proposed until finally the navigation project took definite form as set forth in a House Document, which I believe is an exhibit in this case, although I am not positive of that.

The negotiations were likewise conducted, so far as the engineering and economic aspects were concerned, under my
2599 general direction, and the general plans were so prepared.

The projects went to construction early in 1934, and because of the fact the Chief Engineer of Kanawha Valley Power Company was temporarily incapacitated by an accident, I acted as supervising engineer for several months in the case of the construction of the London and Marmet developments. I likewise am consulted in all important matters of operation insofar as affects any relationships with the navigation on the Kanawha River and in that connection with the U. S. Engineer Department.

Coming now to the New River and that portion between the Hawks Nest development and the Sandstone Falls development, there is a stretch of river which has a total fall of about 460 feet, and which occurs opposite [interrupted].

By Mr. THOMPSON. Where is that?

By the WITNESS. As I stated, between the Hawks Nest Development and the foot of the Sandstone Falls project.

A. (Continuing.) Throughout that area the riparian rights are owned largely as between Appalachian Electric Power Company and its affiliates, and Electro Metallurgical Company and its affiliates. I advised throughout the purchasing of those riparian rights by the Appalachian Power Company and its affiliates.

Q. Let me ask you at that point, what is the difference, if any, between the power market served by the Electro Metallurgical Company plants and the market served by the defendants?

A. The Electro Metallurgical Company supplies its own industries, and those of affiliated companies. Those industries are electrochemical or electrometallurgical, and in consequence thereof they have a relatively uniform load. On the other hand, the Appalachian Electric Power Company market is the ordinary public utility market, with a varying load; that is, it varies from time to time throughout twenty-four hours and over longer periods.

2600 Q. Will you continue with your statement with regard to these proposed projects upstream on New River?

A. As regards that stretch of river between the headwater of the Hawks Nest development and Sandstone Falls, the kind of power developments contemplated there, so far as the Appalachian Company and affiliates are concerned, will be of the indirect type. That is, they would be of the type like the Hawks Nest development, with low dams for purposes of diversion and pondage, and connected with tunnels which would have a length substantially shorter than the stretches of river between the diversion dam and the power station. Within that stretch of river the 308 Report of the Chief of Engineers refers to a series of low head developments, which of course are not shown upon this Chart, Exhibit #600, nor so far as I am aware are they shown on any published Governmental chart or map, and they are not referred to in any detail in the 308 Report.

Continuing them up New River, beyond the mouth of the Greenbrier to the Bluestone power project, West Virginia Power Company, I became familiar with that project probably about 1926. At that time it consisted of a single high dam at the site of the so-called Hinton development. That site is owned by West Virginia Power Company, as are approximately one-fourth of the lands involved in the power area. One might call it between the Hinton dam site and a point well up toward Narrows, Virginia.

By Mr. **Thompson**. You said one-fourth of the land?

By the **Witness**. Approximately. I do not know the precise amount.

A. (Continuing.) After studying that project it was changed under my advice into the form set forth in the chart. I had to
do with the application to the Public Service Commission
2601 of West Virginia for a license for that project, and have
acted as engineering advisor throughout the history of the
project since I first became identified with it about 1926.

Then continuing upstream one comes to the Radford project, or, as styled on this chart, "Radford Development". From 1925 until the present time I have had a Consulting Engineering relationship to that project.

Still farther upstream at the Buck and Byllesby developments I of course had nothing to do with the construction of those projects, they were built about 1911–1912; however, I have had to do with various repair work which proved necessary at the dams, and in the power stations.

Q. What, if any, engineering connection have you had with the Boyer's project and Osborne Falls project?

A. Both of those projects were laid out in my office, and I have, I believe, advised with regard to the acquisition of some of the lands with regard to those projects.

2602 Q. Colonel Scheidenhelm just state briefly the history of the Radford project.

A. The Radford project grew out of a plan of development proposed perhaps twenty-five years ago, by Appalachian Electric Power Company, under the studies and with the advice of Veilie, Blackwell and Buck.

Q. Is that Appalachian Electric Power Company or its predecessor?

A. I meant to refer to Appalachian Power Company, the predecessor of Appalachian Electric Power Company. There was a #5 development originally in mind, but, as stated by Mr. Buck, that was merged with the #6 development, and it now goes under the name of #6 development. When I became identified with the project, about 1925, the dam was proposed to be built at a dam site "A" and it was with reference to that dam site a Declaration of Intention was made, about June 25, 1925, to the Federal Power Commission. Subsequent studies of the dam site and reservoir caused me to recommend to the Power Company that the dam be constructed not at dam site "A" but at a site about one-fourth or three-eighths of a mile downstream. Such downstream site is the site at which construction is now being carried on. It is the site in respect of which the amended plans were filed with the Federal Power Commission, and were approved by the Chief of Engineers and the Secretary of War.

Q. Are those what are described as the revised plans in Government Exhibit 90–A, if you remember?

A. Yes, sir.

Q. Had you finished your statement?

A. I believe so.

Q. Between the time of the filing of the Declaration of Intention and the filing of the revised plans shown on Government Exhibit 90–A, were there any substantial changes made in the project?

A. Yes. Besides the shift in dam site, the height of the dam, or at least of the headwater level, was changed from about elevation 1840 above mean sea level to 1846. Likewise the 2603 design of the dam was changed substantially from its original form. As indicated at the time the Declaration of Intention was filed it was to be a dam with a long ungated spillway, and there were to have been flood gates at the left bank. In the revised plans the spillway was lowered somewhat and the plan involves the surmounting of that crest with a series of high sliding gates over the entire length of the spillway.

Q. What change, if any, was made with regard to the utilizable storage capacity?

A. The utilizable storage capacity was changed from about 40,000 acre feet to approximately 100,000 acre feet. That was accomplished in part by reason of the increase in height of water level or pool level, and in part by the lowering of the intakes or the pen stocks for the power station.

Q. What change, if any, was made in the capacity of the machinery proposed to be installed?

A. The capacity of the machinery installation as originally proposed was, as I recall it, 60,000 KW. It is now to be 75,000 KW., or in terms of hydraulic turbine capacity in rated form about 104,000 HP. That change was due in part to the increased head, in part to the increased available storage, and in part to the plans which had been made in the meantime for headwater storage.

Q. What is the significance of the plans made in the meantime for headwater storage?

A. The headwater storage would provide more water during the low water season and result incidentally in increased total energy output, because it would to some extent prevent the waste of flood water.

Q. What will be the capacity of the installed machinery in terms of water discharge at best efficiency?

A. Approximately 9,000 second feet.

Q. Colonel Scheidenhelm, are you acquainted with the power system of the defendant?

A. I am generally familiar with it, although not in ultimate detail, because it is a tremendously far flung system.

2604 Q. Does your familiarity extend to the steam generating stations and hydro-electric generating stations?

A. It does.

Q. Have you any familiarity with the market demands and load requirements of the Appalachian Electric Power Company system?

A. I have a general familiarity with that.

Q. Colonel Scheidenhelm, please state some of the elements of value of a hydroelectric project, such as the Radford project, to a large power system like that of the defendant.

A. There are various elements of value. One of them is what we call installed capacity value, that is the ability so far as machinery is concerned, and of water, to operate that machinery for the purpose of producing energy. That is distinct from the amount of energy that is turned out by that machinery. It is distinct from the work performed by that machinery. In the first element of value I have intended to include the regular normal utilization of that capacity as distinguished from emergency capacity.

Q. Is that reliable power producing capacity which you refer to or not?

A. In the main that is reliable power producing capacity, although if one takes the Radford project as an illustration, there is only a part of the total installed capacity that would be classed as reliable, and the remainder is available only from time to time for the purpose of turning out energy, or for the purpose of the second element of value.

That second element of value is the emergency use of the capacity for relatively short times when an emergency arises somewhere throughout the system. For illustration, emergency might arise by reason of lightning troubles which separate transmission lines, and thereby cut off a source of supply, power supply, for a portion of the system which has been receiving its supply from beyond the point where the trouble occurs. Under those circumstances it may be necessary suddenly and as nearly instantaneously as possible, to bring into play a new source of power supply. A hydroelectric power station is peculiarly adapted to come into play quickly.

Another illustration of sudden emergency might be an acci-
dent to a steam power plant, or conceivably equipment in
2605 a hydro-electric station somewhere else. That is, even
large power systems do have their troubles, although it is
bound to minimize them.

Now a hydro-electric power station like the Radford power station having its water directly at the power station, so there is not involved any time element of getting water started from pond to power station, is exceptionally well adapted for emergency. The time over which such emergency use extends is relatively short. It may be from a few minutes to, I would say, at most an hour and a half. Ordinarily it would be only one-half hour before other sources of power supply would be brought into play.

A third element of value consists of the work done by the power station. Expressed in another way it represents the energy which would otherwise have to be turned out by power plants elsewhere upon the system, and if such energy were turned out at steam electric power stations coal would have to be burned. I am not emphasizing the burning of coal as the measuring stick of the value, although it is true that in this region steam electric plants are essentially the measuring stick of value of hydroelectric plants, but rather I am referring to coal as representing the routine consumption of something representing energy or work.

The fourth element of value is existent with various hydro-electric projects, including the Radford project, and that is the benefit to downstream power stations of the same system by contributing stored water to those stations.

The fifth element of value is the ability of the station to operate without water, but in order to carry the ineffective portions of current developed throughout the system. Ordinarily we refer to it as wattless current. That is a relatively minor aspect of value.

There may be other elements of value which are relatively minor and which I have not enumerated.

By Mr. THOMPSON:

Q. I don't believe I follow you on that. Could you give that in a layman's language? You said wattless, did you not?

By the WITNESS. I did.

By Mr. THOMPSON:

Q. Would you explain that a little more?

By the WITNESS:

2606 That is related to what electrical engineers refer to as power factor. It has to do with the relation between the effective portion of energy which is produced, and the total produced in terms of kilovolt amperes. In a system like Appalachian Electric Power Company approximately 10% is ineffective. Now that ineffective current utilizes copper space in the generating equipment and in the transmission lines. It must be disposed of somewhere in the system. Sometimes it is taken far off by what is known as synchronous condensers, but it can be accomplished also within various power stations. I am not familiar in ultimate detail with that particular aspect of the hydro-electric business, because I do not claim to be, and am not as familiar with that particular aspect of a very broad field as I would like to be.

It is pertinent to state I think that a hydroelectric power station cannot simultaneously perform the functions of turning out effective energy to the maximum extent of its generators and at the same time absorb wattless current.

Q. In a power system like that of the defendant, is it necessary that any given generating station carry a specific portion of the system load.

A. It is not. The allocations of load throughout that system are dependent upon a great number of factors, which factors change from time to time. Steam plants and hydro-electric plants are used alternatively in various portions of the load, depending on conditions as they exist from time to time.

Q. Can you indicate some of the considerations which influence the part of the load which may be carried by particular generating stations; that is, what are the character of those considerations?

A. The considerations involved are the relative economics of operation of individual power stations or individual units within power stations. In the case of hydroelectric stations they involve the available water supply, both natural and that available from storage.

In general, variable portions of the load would be carried by hydroelectric stations, and in general the lower or non-variable portions of the load would be carried by highly efficient
2607 steam-electric power stations. The latter is generally not subject to much exception. The former is. By that I mean the allocation of hydroelectric capacity to the variable portions of a system load, is subject to change, particularly when there are higher flows available, for that hydro-electric station can operate more continuously and can and must do so in order to avoid waste.

Q. In the practical operation of hydroelectric generating stations are there any considerations other than those of economics of operation and distribution of system load that play any part?

A. There most certainly are.

Q. Generally indicate their character?

A. Such considerations, as in the case of hydro-electric plants, the rights of downstream riparian owners is an outstanding consideration.

Then there is the consideration of the water supply, which I have already mentioned, and that is not an element of system load by any means, and then there is any limitation which exists by reason of any possibility of interference with the navigable water downstream.

There are other considerations which may loom up from time to time. I am sure I have not indicated all of them, but I think those are the major items.

Q. If there were no limitations of the character you have last mentioned, what would be the desirable method of operating the Radford project?

A. That question needs to be answered in respect of two conditions. One is not unimportant, but is relatively minor in point of time, and as I understand it in respect of this case. That is, the condition when there happens to be a full reservoir at the Radford project and an ample stream flow, so ample as to equal

or exceed the installed capacity. Under those circumstances it would be sheer waste if the Radford power station did not operate uniformly at full capacity, and incidentally under those circumstances it would operate at a capacity not of 9,000 second
feet, which is the point of about maximum efficiency, but at
2608 something greater, about 10,000 second feet. The addi-
tional water utilized would be utilized at very low efficiency which could not be afforded except under conditions when otherwise there would be waste, but the principal use of the Radford power station, from the standpoint of time involved, would be when there is not enough water available, or when it is not desirable to utilize water beyond the economic prescriptions of the system as a whole.

Now your question being premised upon the absence of any limitations other than the system demands and the capacities of other power stations, and I would add water supply available from natural flow and storage, in my opinion the Radford power station would be utilized somewhere on the variable portion of the system load.

By Mr. Jackson:

Q. Will you please define what you mean by base load and peak load?

A. I have used the term "variable load", as meaning above that portion of the load which represents the minimum load upon the system within, say, a 24 hour period. The portion of the load up to that minimum represents a continuous load upon the system in an amount below which the load does not fall at any time within, say, a 24-hour period and that is styled a base load.

Q. Do the base loads and the peak load vary within themselves or are they relatively constant?

A. Both base load and peak load vary, that is, they vary from day to day, week to week, month to month, and season to season, all on the assumption that the total load in the territory has not changed. In addition, there are variations due to changes in the territorial load. In times of depression the load grows less. In normal times, at least so far in the economic history of this country, there is a growth in the load and there is still another factor that enters. I have referred to the territorial load, meaning by that the market demand within the geographic area served in a retail manner by the distributing company, but there are also
loads which come upon the system from inter-connected
2609 power systems, and not merely are there loads which
come from those interconnected systems, but there are portions of loads furnished from time to time by the Appalachian Company to such interconnected companies, all of the factors

f which enter into the picture, and determine where an individual plant will operate in respect of the total load of the ystem.

Q. You said a moment ago that there were times when a part f the load came from interconnected systems. That is not clear o me. Do you mean interconnected systems would be contributing power or drawing power?

A. By the expression "load from inter-connected systems" I meant the drawing of power by such inter-connected systems, that is, systems other than the Appalachian Company, from the Appalachian systems' power stations.

Q. I thought you said afterwards there would be times when Appalachian would be contributing power to the other systems, which seemed to me to be the same thing. That is the reason I wanted to get it straight.

A. It would be the same thing and I probably was confused in my statement. I mean to state that because of the interconnections sometimes power flows in substantial blocks from the Appalachian system, and particularly from its power stations to adjoining systems or inter-connected systems, and sometimes power flows in the opposite direction, that is, sometimes part of the retail load of the territory of Appalachian Electric Power Company is supplied from power stations of inter-connected systems, sometimes quite remote.

Q. Colonel, where would the Radford project fit into the load of the Appalachian System?

A. In my opinion it would fit into the load nearer the upper portion of the peak rather than into the lower portion of the peak, always having in mind, however, these limitations other than the demands of the system and the characteristics of other power stations within the system. Whether it would be entirely on the top or in what we style a sub-peak position, or still further down, depends upon a multitude of conditions which would have to be appraised by the operating staff at that time, but within the zone of the limitations that I have referred
2610 to, it would fit ordinarily within this broader scope of time into what may be styled some form of peak carrying operation of the system.

Q. Just before recess, in stating how the Radford project would fit into the load of the Appalachian system, you said that during a greater part of the time it would operate in some part of the peak but not necessarily at the top of the peak of the system. When you express the opinion that it would not necessarily operate at the top of the peak of the system, did you take into account the economic factors in the situation?

A. I should make clear, I think, that when I refer to some form of peak carrying operation I am referring to an operation within that part of the system load which is above the base load in short, to that part of the system load which varies within the 24 hours of a day, for instance. Unfortunately, the terminology of the art, or at least, my own terminology is lacking in words which cover the point exactly. Perhaps for present purposes I might describe the broad zone as the variable portion of the load, but at times I do refer to that as the peak portion, meaning the variable portion of the load. It is entirely conceivable to me that at times the Radford plant might, from the standpoint of economic factors alone, occupy the top of the variable or peak carrying position. At other times it might be operating further down, but in response to the question of counsel as to the necessity of its operating at the top, I would say that in my opinion it is not necessary to operate at the top of the variable portion of the system load.

By Mr. **Jackson**:

Q. In making that answer, do you take into consideration the economic factors?

A. I do. It is entirely possible, and even probable, that some other plant on the system, presumably a hydro-electric plant, would more appropriately assume the very top position. That depends upon the conditions obtaining at the time. I am referring now solely to economic factors, independent of the limitations of any consideration which would need to be given to the rights of downstream riparian owners or to any need for protection of the navigable capacity of some navigable water somewhere.

2611 Q. What is the characteristic of discharge from a hydro station operating on a base load?

A. It is relatively uniform. For practical purposes one might consider it absolutely uniform, though they never are absolutely so.

Q. What is the characteristic of discharge from a hydro station operating in the upper or peak portion of the load?

A. That characteristic is what I have already referred, to, variability.

Q. What is the characteristic of discharge of a hydro station operating on a subpeak load as compared with one operating at the very top of the peak?

By Mr. **Thompson**:

What do you mean by sub-peak load? I don't think we have had that defined here, have we?

A. In the term "sub-peak" there occurs that word "peak" to vhich I have already referred as being subject to more than one nterpretation. As used in that particular phrase "sub-peak", he word "peak" means the top of the variable portion of the oad and "sub-peak" means a load which is under the top of he variable portion of the load and yet is within that variable ortion: It may be at the bottom or it may be at some point ntermediately between the bottom and the top of the variable ortion of the load.

By Mr. Jackson:

Q. What is the characteristic of discharge of a hydro-station perating on a sub-peak load as you have defined it, compared vith a hydro station operating at the top of the peak?

A. The station or stations operating in a sub-peak position vould have a variable load but one involving less variation than n the case of a plant operating at the top of the variable or eak load.

By Mr. Jackson:

Q. Variable load is the same as variable discharge?

2612 A. They are analogous. I fear I went astray from the question. If the question was predicated upon discharge ny adjectives of characterization would apply essentially to discharge just as they would to load because, broadly speaking, the lischarge is directly proportional to the load, that is, in the case f a hydropower station, operating in a subpeak position, the lischarge is less variable than is true of the discharge from a tation operating at the top of the variable or peak portion of he load.

Q. Col. Scheidenhelm, is it possible to say now precisely how he Radford station would be operated?

A. It is not possible to say now precisely how it will be operated. I believe it is not feasible to go beyond the broad description which I have made. When the time comes for operation there will have to be taken into account the characteristics 2613 of the total load on the system, including both the territorial and the interconnecting portions of that load. Likewise, the characteristics of the other power stations of the ystem, including their capacity, their location, their relative conomics. There will have to taken into account the water upply available for the Radford station and likewise for the ther hydro stations, and there will most certainly have to be taken into account the necessity on the part of the operating staff to avoid taking any chances of incurring liability with regard to down-stream riparian owners or with regard to any

Governmental authorities insofar as navigation anywhere is concerned, and undoubtedly there will also be other limitations which will be dictated as matters of good business policy.

Q. Do those considerations establish a zone within which it is possible to say the future operations would fall?

A. Yes, they do establish such a zone. That is, laying aside the relatively minor part of the time when, in the absence of extensive headwater storage, the Radford plant would be operating at full capacity because of high water and full reservoir conditions, the Radford operation would fall somewhere within the variable portion of the system load.

Q. In determining the economic justification for a hydroelectric development, is such a project considered upon the basis of a relatively short or long life?

A. In that respect a hydroelectric development differs substantially from a steam-electric power development. The hydroelectric development would ordinarily be expected to have a life, of, let us say, from 50 to 100 years. Its economic justification must be appraised in the light of that long term of life. If a project follows the average of the experiences of hydro-electric projects built, it will have lean years, at least during the beginning of its operation. There are very few hydroelectric projects which have not had early years of red ink, so to speak, but the life of a hydroproject is so long that the debit balances of the early years can be spread over the remaining long period without weighing any individual year or years of that period too heavily.

With a development like a steam-electric power station the
2614 opposite is true. A steam-electric plant must begin to
earn its keep, so to speak, quite early in its life.

Q. Do those considerations have any effect upon the operation of a hydro-electric development in the early years of its life?

A. They would have this effect, that if because of absence of load or of excess of generating capacity elsewhere, or because of any limitations other than the normal economic factors, that is, if because of the limitations having to do with downstream riparian owners or any necessity for avoiding any liability in respect of effect upon navigation, if in regard to any of those things, it is necessary for some years to operate differently than mere economic factors would indicate, the result is merely in line with the ordinary experience of hydro-electric plants. As a matter of fact, under present circumstances, if the Radford plant should be brought into operation within, say two years, it is very likely that the system would have an excess of capacity to the extent of part of the Radford capacity; that is 75,000 kilowatts of additional capacity thrown upon the system at one time, may possibly be absorbed, but very likely it would be more than would absolutely be necessary at that particular time.

Q. Colonel, from what you have said as to the long life of hydro-electric plants, in planning or constructing a hydroelectric plant, do you take into consideration, for instance, other plans for head-water storage reservoirs or things of that character on the same stream?

A. That must necessarily be done. If in the case of a project like the Radford project there were any question as to the amount of capacity to be installed or the number of units to be installed, that question can properly be decided only before the plant or as the plant is being built. It cannot be postponed to the future without extensive costs, which undoubtedly would outweigh any conceivable advantage from a future change. Therefore, it is necessary to plan over the long range, to begin with, and capacity, for instance, must be set in the light of what is believed, in the light of the very best existing information, to be the reasonable prospect for the future.

Q. Then in designing and planning such a project, state whether or not consideration is given to other projects of the same company for development on the same stream?

A. Consideration would most certainly be given to other
2615 projects. Consideration would be given to the long range program.

Q. State whether in your view any re-regulating capacity below the Radford Reservoir is essential?

A. In my opinion, it is not, so far as concerns the Radford project.

Q. State whether or not under the plans of the defendant and its affiliates, for the development of power on New River, there nevertheless will be reservoirs having reregulating effect if those plans are carried out?

A. The plans of the Appalachian Electric Power Company and its subsidiary, West Virginia Power Company, do involve developments down-stream. They have gone so far as to include definite engineering plans in general, though not detailed, and they have involved expenditures running into great sums for investigations and acquisitions of lands and rights and dam sites. One of those projects is the Bluestone Power Project as shown upon Exhibit 600 which would involve a reservoir than which one could hardly conceive a better reregulating means for the Radford project.

By Mr. Jackson:

Q. Were those plans of the development of power developments on New River made before or after the Government proposal of the construction of its Bluestone project?

A. Years before there was any thought, so far as I know, of a Federal Bluestone reservoir project.

Q. Colonel, I believe you have already stated that in your judgment in the early years of operation of the Radford project, its capacity probably would not be needed by the defendant's system in full?

A. Yes.

Q. Does that mean that the Radford plant, under those conditions, would waste water?

A. No, indeed, but it means that the utilization of the Radford output in terms of capacity and energy would not be to so great an economic advantage as would result when the system needs the entire capacity. Thus the system of requirements are large enough so that all energy which can be produced at a hydro-station existing upon the system, including the Radford project, would undoubtedly be absorbed, and that means, to avoid waste, it would displace energy and capacity that would otherwise be produced by existing steam stations. To put the answer in another way, the saving would be definite, but would largely
2616 be merely in coal or fuel saving rather than coal and fuel
and labor saving, plus the fixed charges upon capacity which would otherwise have to be installed elsewhere.

Q. Does this circumstance that the defendant's system might not require the entire capacity of the Radford plant as soon as it is ready for operation affect the economic justification for the plant, in your opinion?

A. Yes; that is a consideration which has entered into my appraisal of the economic justification of the development and must enter into any intelligent appraisal of that situation. Having appraised it, however, the prospect of going along for any great length of time without the development of a demand for all of the available and reliable and emergency capacity of the Radford project is such that it does not outweigh the other advantages. The result is that the project as a whole, and in terms of its long life, is economically justifiable.

Q. You have testified that in your opinion, except during high water seasons, the Radford plant would be allocated some portion of the variable load of the Appalachian system. Please state whether on such an allocation the Radford plant would be operated on the same basis everyday, day after day and week after week?

A. It would not.

Q. By Mr. Jackson. Can you explain that a little more fully?

A. We are treating now, as I understand it, periods other than high water periods?

Q. That is right.

A. Within the period that may be broadly characterized as one of moderate and low flows, the specific kind of operation or method of operation would be determined by the availability of water in that stream flow and in the reservoir, and also there would be the considerations of load, power from other sources and those limitations which have to do with down-stream conditions to which I have already made reference. In the light of all of those, I believe that there would be variations from day to day and from week to week, but, generally speaking, I would think that there would be about the same kind of operation for the five days of the week, beginning with Monday and ending Friday; that over the other days of the week, Saturday and Sunday, the operation would be different.

2617 Q. In your opinion, would there be operation of the Radford station on Saturdays?

A. There would be some operation on Saturdays, but to a somewhat lesser extent than on other week days. The tendency—it is more than a tendency, so far as the Appalachian Electric Power Company's system is concerned—is to operate hydro-electric plants on Saturdays, but with maximum loads less than those on the five principal week days. The operation even extends into Saturday evening, or late afternoon peaks.

Q. In your opinion, is it reasonable to assume that there would or would not be operation of the Radford station on Sundays?

A. I would suppose, in the absence of any limitations other than strictly economic and service factors within the system, there would not be any operation on Sundays. However, it is a fact that there is a growing tendency on various power systems, and on the Appalachian Electric Power Company's system itself, to go into some form of Sunday operation, in prolongation, so to speak, of that tendency which has resulted in Saturday operation, but at present, I don't believe that tendency has gone far enough. My idea of the situation at present would be, in the absence of other limitations such as I have mentioned, there would not be any Sunday operation.

Q. In your opinion, it is reasonable or unreasonable to assume that the Radford power station would be shut down in prolongation of Sunday or Saturday, or Saturday and Sunday, by including either a Friday or a Monday?

A. That is very improbable. Certainly I cannot conceive of that taking place so far as to violate any limitations as regards down stream conditions, either of riparian owners or as affecting the navigable capacity anywhere.

Q. When you say limitations, do you mean any possibility of affecting those interests?

A. I mean limitations which would cause—limitations which would take the form of a decision by the operating authorities to avoid any possible risks of interfering with the rights of others or with navigable capacity.

By Mr. Jackson:

Q. Well, would the opinion you have just expressed,
2618 with reference to the reasonableness of an assumption of a shut-down in the week-end being extended to include either Friday or Monday, be affected by whether or not Friday or Monday might be a holiday?

A. No. Such circumstances are so rare that, quite aside from any other pertinent conditions, the savings which could result from not operating on Friday or on a Monday holiday, would be so small that it would just not be worth while to take any chances or risks involving the interfering with rights down stream. The saving would be of the order of a few hundred dollars, and there is another factor that would enter into that situation; with a large system, the mere inertia of an operating program or routine is such that, if upset for a single day, it involves a cost in effort and communication that interposes a barrier to any change in the routine.

Q. What is the operating plan for the utilization of the Radford storage?

A. The Radford storage will be filled during a period of higher flow and drawn upon during periods of lower flow. If it were used to the extreme extent of ironing out the low flow periods, so to speak, to the point of filling the valleys in the low flow periods, by means of a level line, a water filled valley, so to speak—then the operation would be governed by what would have been the experience during years of lowest flow, such as the years 1925 and 1930, on the basis of what would have been the experience during those years, had the Radford project been in existence. The storage of the Radford reservoir would not be drawn upon to any material extent prior to the beginning of such a low water period, and that beginning of low water period would find the reservoir full.

If the reservoir were operated so as to obtain the maximum energy output from the stored water, the aim would be to fill the low water season valley to the maximum and that would result in the equivalent of an average flow through the low water period of about twelve hundred second feet.

However, I am very skeptical as to whether that reservoir would be drawn upon to that extent—that is, to the extent 2619 of an average of 1200 second feet during low flow periods.

This is due to another factor in system operation, which I have not called by name, but that is very potent, and that is the policy of giving reliable service. The relation of the water in that storage reservoir to service on the system is very important.

If the reservoir is filled, it has a potentiality of full emergency service. I have already referred to that in connection with emergency capacity, but if the reservoir is almost empty, as it would be under such strict operation for leveling out the flow to the maximum extent in the low water season, then towards the end of the low flow season, the potentiality of emergency service would be present to a far less degree than with the reservoir more nearly filled.

The head, for instance, would be down and the total capacity which could be available, would have been reduced from 75,000 kilowatts to 53,000 kilowatts, and the time during which the 53,000 kilowatts would be available would be reduced in even greater proportion.

Therefore, I think that the tendency of system operation will be more and more to reserve portions of the 100,000 acre feet storage for insurance against emergencies.

Q. Colonel Scheidenhelm, as I understand you, the figure 1200 second feet is based upon the low flow of 1930?

A. That is true.

Q. How much——

A. (Interrupting.) I beg your pardon—1925 and 1930.

Q. How much does the storage augment the low flow for those years?

A. Roughly, it results in doubling the low flow.

Q. And that is on the site of the Radford Dam?

A. That is true.

Q. Well, assuming that one would not refrain from drawing down the utilizable storage gradually during low water—during the low water season, would that mean that the water would be used uniformly at the rate of 1200 second feet throughout that low water season?

2620 A. It does not. That 1,200 second feet would represent an average over months of low flow period, extending roughly over a total of six months. Within any one day, there would be fluctuations from the average of 1200 second feet. Undoubtedly, the average flow of one week would vary from the average flow of another week, but when one goes to periods as long as a month, I would expect it would be normal—it would be usual—the usual operation of a reservoir of this kind for the average flow of one month to practically equal the average flow of the other, and 1,200 second feet is the approximate equalized flow over the entire low water period.

Q. To what extent would the operation be affected by the character of a particular year, as a good or bad water year?

A. In a good water year, the daily use of water, meaning the average daily use of water, would, of course, be greater, and if it is a good water year, it will have manifested itself by better than low flows in July and August, and by that time, it will be apparent that a greater flow than the average of 1200 second feet can be utilized, and the result is a larger daily average utilization of water.

Q. Assuming that you encountered a year of greater drouth than previously experienced, would that have any effect on operations during that year?

A. Such a period would undoubtedly make itself manifest in the early summer, and if it should happen that, about the first of June, the flow in New River at the dam site, after making corrections for any interference and changes in the flow upstream, should fall or remain below 1200 second feet, that would be a signal, and any intelligent operation of the Radford project would result in cutting the cloth to suit the new circumstances—that is, it would result in a utilization of an average flow less than the flow of 1200 second feet.

Indeed, I would expect, for reasons that I stated, that the tendency would be to operate under 1,200 second feet, even in a 1930 low water year, rather than over that, but possibly the tendency to operate at 1200 second feet during low water years would remain.

2621 Q. What, in your opinion, would be the likelihood of all of the utilizable storage designed to provide 1200 second feet being drawn down and exhausted before the end of the low water season?

A. I consider that extremely unlikely. It is a theoretical possibility, if one wanted to follow out what has been referred to here under a nomenclature new to me, that is the rule curve, but aside from the theoretical possibility, I would not think it would happen. Rather the considerations of protecting the service, you would have some degree of reserve—some money in the bank, so to speak, and I would not expect the reservoir to be drawn down to the ultimate limit of the utilizable storage.

Q. What, in you opinion, would be the likelihood that the utilizable storage would be drawn down and exhausted prior to or early in a low water season?

A. That is merely an academic question. That is just utterly unreasonable.

Q. State your reasons more fully with relation to anything of that character.

A. I have, I think stated the essence of that. It merely means what perhaps may be explained by analogy. If a certain family is dependent upon an annuity received from an insurance company once a year, and received that annuity early in the year, then the part of wisdom is to spend only out of that in such a way as to make it last throughout the year. I think then that the use of storage is pretty analogous to that. The use or drawing down of storage ahead of low water year is unwise. It represents, in my opinion, unintelligent operation, for the reason that, during the low flow, there would not be a period for storing the water in the reservoir, and that would be contravention of the very purpose of providing storage.

Q. What effect would it have upon the reliability of the service of the Company?

A. This previous drawing down of the storage capacity of the reservoir would result in making an unavailable emer-
2622 gency capacity in the system and not merely an emergency capacity, but a great part of what would otherwise be reliable capacity.

It would result in reducing the daily average proportionate to the discharge and hence the output from the station from the level of approximately 1200 second feet to a level of approximately 600 second feet, which is in the neighborhood of low natural flow.

Q. In your opinion, is it to be reasonably or not reasonably assumed, or it is reasonable or unreasonable to assume that the Radford project would not be subject to shutdowns, other than possible week-end shut-downs of the character and extent you have described?

A. It would be reasonable to make that assumption.

Q. You have stated that the capacity of the Radford power station is approximately 75,000 kilowatts. Please state whether or not that is all reliable capacity.

A. In my opinion, that is not all reliable capacity. The question as to what is reliable capacity is essentially one of engineering judgment, and that must be exercised in the light of system requirements and possible methods of utilization.

The reliable capacity of the Radford project, I would appraise as somewhere between 35 and 45 thousand kilowatts. That appraisal, which is one that I have put before the company, is part of the economical justification of the project, as predicated upon the use of the project which, in my opinion, will be made of it during the periods of low flow, and it is, therefore, tied to the estimate of 1,200 second feet, or what one may call re-regulated flow during low water periods.

Q. Have you stated the factors that limit this reliable capacity—you stated fully how the water supply limits that capacity?

A. In that respect I would think my previous explanation would be applicable—that is, the natural flow of the stream augmented by the full extent of the utilizable storage throughout the low water period, strictly limit the output in terms of energy, and, therefore, limit also the output in terms of capacity. It just is not practical to utilize 1,200 second feet days on the aver-
age in such a way as to support a peak of 75,000 kilo-
2623 watts; moreover, as the reservoir levels approach a prac-
tical limit of 27 feet draw down, it becomes impossible from the standpoint of head alone for the power station to turn out 75,000 kilowatts.

At that limit, the draw down being zero and the utilizable storage also the available capacity is reduced to about 53,000 kilowatts, that limitation cannot be avoided.

The further difference between 53,000 kilowatts and the rate of 40,000 kilowatts or 45,000 kilowatts, of which I made mention, is due to the fact that the amount of energy available from the water to back up the capacity is limited.

Q. On that basis, Colonel Scheidenhelm, what would be the volume of water available for peak carrying during the five principal days throughout the low water season—the five principal days of the week?

A. I took it on the assumption that the average utilization throughout the low water season of 1200 second feet continually—the average of 1200 second foot days every day.

Q. This would be on the basis, as I understood you to say—it was the limited reliable capacity of the plant during the low water season?

A. Yes, sir; on that basis, the available water in terms of volume being 8400 second feet days per week, in my opinion, would spread over six days of the week with a greater utilization of the five days, Monday to Friday, inclusive, and the average utilization for one of these five days would be about 1,550 or 1,560 second feet days.

The utilization on Saturday would be lower, perhaps something on the order of 600 second feet days.

Q. What is the volume of flow which ordinarily would be available for use to the Radford power station?

A. Taking into account the natural flow and the available storage, I would say 2,000 second feet may practically be characterized as the flow ordinarily available.

Q. How does that compare with the average flow at the dam site?

2624 A. That is a little less than two-thirds of the average flow at the dam site.

Q. And how would such an ordinarily available flow be utilized?

A. If I may say first, by ordinarily available flow I believe is meant the ordinarily available flow for a point of time throughout the year or a term of years. As to the utilization of it, I would expect that it would fall within that zone that I have described as the probably zone of operation for the Radford power station. That would mean that there would be available for a week's output something like 14,000 second feet days per week on the average, and I would expect it to be operated in somewhat the same proportion as would the output resulting from regulated flow at the average rate of 1,200 second feet days.

Q. How much would that make available on each of the five principal days?

A. I could make a computation or refer to some figures I have here.

Q. You can get a memorandum and look at it, if you want to.

A. (Witness leaves witness stand and procures papers and returns to witness stand and figures.) I would say about 2600 second feet days, that is for each five principal days, with another thousand second foot day used on Saturday, making a total of 14,000 second feet days available for a week.

Q. Would a 2,600 second foot day be the maximum which could reasonably be available for some form of peak carrying operation during each of the five principal days of a week.

A. No, sir.

By the Court:

If they used 14,000 a week, and 1,000 on Saturday, there would be 13,000 through there, thus giving it only 2,600 second feet?

A. Assuming no operations on Sunday.

By Mr. Jackson:

Q. State whether or not in that distribution of the maximum amount which might be expected to be available in peaking for anyone of those five principal days—if anyone of those five principals days would be limited to 2600 second feet? 2625

A. No, sir, there could be variation among the five days, but I would think in the close neighborhood of 3,000 second feet days would represent the maximum which would be used under these circumstances.

Q. What, in you opinion, would be a reasonable form of peak carrying discharge at the Radford station for utilization of 3,000 second foot days' water in a single week-day operation?

A. I consider a reasonable form of discharge is that depicted on the chart forming Exhibit No. 594.

Q. Is that a form of discharge utilizing 3,000 second foot day?

A. Yes, sir.

Q. Does that assumed form of discharge from the Radford station, shown on Exhibit 594, compare in relation to the load requirements of the Appalachian Electric Power Company?

A. Yes, sir.

Q. What is that relationship?

A. That represents, in my opinion, a reasonable allocation of load. It cannot particularly be set up to represent any special allocation that would ever occur, but it would be very close to something, in my opinion, that would occur time and again.

It is my idea of a reasonable expectation as to one of the heavier forms of peak carrying which could be expected to be taken by the Radford project. It represents an operation that would be towards the top rather than further down on the system load. It represents an operation above rather than in a sub-peak position.

Q. Well, do any other assumptions enter into the form of discharge shown on this Exhibit 594?

A. I believe it has already been brought out that that chart is predicated on a week day operation, and upon such a week day operation as will utilize the discharge of water, I will say, of 3,000 second feet days.

The allocation of load is predicated upon the assumption that there would be no limitations of any kind by way of neces-
2626 sity for preventing any interference with navigable capac-
ity on the Kanawha River or any necessity by way of modifying the operation so as to prevent the incurring of any risk or liability of interference with downstream riparian owners.

Q. This form of discharge on Exhibit 594 has been worked out purely upon considerations affecting the system load and the system stations. Is that right?

A. Yes, sir. It is predicated solely on the economic factors other than those relating to downstream conditions.

Q. Its form was not modified in any respect by reason of any possible relation to riparian property owners downstream or any navigable conditions on the Kanawha River?

A. That is true.

Q. And does that mean, in your opinion, that the question of property rights downstream or navigable conditions on the Kanawha River would play no part in the adoption of a method of operation of such a plant?

A. By no means does it mean that.

Q. Was this form prepared for the purpose of testing the result of such a form of discharge?

A. Yes, sir, it was prepared for that purpose and, while not in the precise form of this chart—this chart was furnished by me to Professor Harold A. Thomas for the purpose of his studies and tests.

Q. You have testified that, in your opinion, the form of operation shown on Exhibit 594 would be a reasonable one?

A. Yes, sir.

Q. Are there other possible forms of the operation of this project?

A. There are many, many other forms. Of course, there enters the question as to how minor a variation one can have and still keep within the same form, but I am taking into account minor variations when I say that—but it is within the general scope, the general zone of the kind of operation which I would expect for that project, if there were no limitations of the 2627 kind so stated, but I would think it was nearer the upper limit of the available load that would be carried by the Radford plant, rather than being the approximation of the average availability or available load that would be carried by Radford.

Q. What I wanted was other methods of the operation of this project, which, in your opinion, would be reasonable, whether in the scope of field operation, it includes a number of methods of operation or not?

A. I think it does include a number of methods of operation, when one goes into the field of theoretical operations. I think, so far as the upper limit of variations is concerned, that anything materially more variable than this would not be reasonable.

Q. Are there many variations below that limit?

A. Below that limit there are many, many variations.

Q. Are you familiar with the testimony of Professor Thomas in this case?

A. Yes, sir.

Q. Have you given any consideration to the rectangular or block form of discharge from the power station? Mr. Thomas testified that he considered that in connection with his study of the power tides from the Radford station?

A. I have. I gave consideration to that form, prior to the work of Professor Thomas, and was responsible for his studies and tests with that possible form of operation, but I looked at it as embodying the literal meaning of possibility without any possibility of being probable, let alone certainty; I considered it to be a theoretical form—a theoretical plaything rather than anything in my opinion tnat would be reasonable to conceive as a natural occurrence.

By Mr. **Thompson**:

Q. That is the rectangular wave?

A. Yes, sir.

By Mr. **Jackson**:

Q. Why did you consider the rectangular form of wave?

A. I felt that it represented the extreme outer limits of possibilities in the matter.

2628 Q. Physical possibilities?

A. Physical possibilities of discharge in a total volume of 3,000 second feet days, being the extreme outer limit. I say anything reasonably conceivable of occurrence would fall inside of it. From that standpoint, it was not merely of general, but of special interest.

Q. What would be the volume of this rectangular wave?

A. 3,000 second feet days in the form I studied the situation and in the form I requested Professor Thomas to study and test it.

Q. That is meant that the wave was of a duration of that amplitude?

A. It was of that duration with an amplitude of 9,000 second feet propagated instantaneously and continuing throughout eight hours and then dropped to zero instantaneously. Practically that sort of thing does not occur.

Q. What was the respective duration of the discharge represented by the form of the discharge shown in Exhibit 594, and the form of discharge shown by rectangular block wave?

A. The latter, the block form, discharged from Radford station would have a duration of eight hours and that form represented in Exhibit 594 has a duration of 16½ hours.

By Mr. **Jackson**:

Q. Col. Scheidenhelm, are you familiar with what has been referred to in this case as the 1930 wave tests?

A. I am very familiar with them.

Q. Will you please state if you know the circumstances under which those tests were made, including your relation, if any, to the tests?

A. In order to understand how that series of tests of power waves or power tides from the Buck and Byllesby station came about, it is well to refer to the fact that beginning with the making of Declaration of Intention on the part of the Appalachian Electric Power Company in respect of the Radford project, various studies were made from time to time by the United States, District Engineers Office, at Huntington, and to some extent presumably by the Federal Power Commission, with regard to the fluctuations which existed or took place in the flow of New River, due both to the routine peak carrying operations of the Buck and Byllesby hydro stations and the natural fluctuations in New River due to rains.

2629 Those studies of the Engineers Office at Huntington cover various periods of time in the years 1925 to 1927, and perhaps later. The studies themselves, I think, did not begin until 1926, but the first periods studied in 1926 were those of flows which actually occurred in 1925. After each of these studies, there were conferences on my part with representatives of the United States Engineers Office at Huntington, and consideration was given to the results. Each time the attitude of the Huntington office was essentially to the effect, in statements to me, that the results are inconclusive. That condition carried on for several years, and with a view to doing something which would be constructively and positively helpful in solving the problem which appeared to be troubling members of the staff of the Federal Power Commission, I proposed a series of tests which went far beyond the routine operating variations out of the Buck and Byllesby hydro stations. That resulted in the so-called 1930 power wave tests.

Q. Describe briefly how those tests were made?

A. Those tests were accomplished by having the Power Company in effect turn over to me the operation of th' Buck and Byllesby hydro stations, including power plants and reservoirs. In order to obtain variations in discharge from those hydro stations greatly in excess of the natural power station discharges, it was necessary to use, and there were actually used, the spillway crest gates and the pondage of the Byllesby and Buck reservoirs. Water was allowed to be stored back of the Byllesby crest gates until, in most cases, there was actually some flow over the tops of the gates. The same was done in the case of the Buck station. In the meantime, there was no operation of the power station, so that the stream flow downstream from the power station was as low as was permissible, without interfering with the needs of a certain riparian owner. That riparian owner was National Carbide Company, or, possibly, National Carbide & Carbon Company, which had a plant located just a few miles downstream from Byllesby and Buck. These water requirements were met through the tests; but, with the exception of that particular item, the discharge was withheld until both ponded over top.

2630 When that point had been reached, then, as nearly simultaneous as possible, the power station at Byllesby was put into full operation, and the crest gates on the spillway of the Byllesby station were opened, thus releasing a tremendous wave or discharge of water, which very soon found its way into the Buck pond, and, when that wave reached the Buck dam and power station, then, as nearly simultaneous therewith as possible, the Buck station head gates were opened and the spillway crest gates of the Buck dam were opened. Thus the combined capacity of the two power stations and their spillway gates discharges were utilized to create as great discharge as possible.

Q. What was the maximum discharge during those tests?

A. The discharge reached a maximum, of course, at the Buck power station or just at the foot of the Buck development. At that point there were no reliable means of measurement, but at the Ivanhoe gaging station, located two or three miles downstream from the Buck station, it was possible to measure amplitude.

Q. Will you state what was the maximum discharge during your tests, first, as shown at Ivanhoe?

A. At Ivanhoe the discharge reached a maximum which, I believe, was a little short of 14,000 second feet. In my opinion, at Buck station the discharge must have reached an amplitude in second feet somewhat in excess of 15,000.

Q. Were these tests carried on in cooperation with anyone by the power company?

A. They were carried on in cooperation with the United States Engineers' Office at Huntington, with two District officers of the Water Resources Branch of the United States Geological Survey, and with the staff of the Federal Power Commission.

Q. What part, if any, did the representative of the Water Resources Branch of the United States Geological Survey take in the tests?

A. The District Engineer for Virginia, Mr. Dirzulaitis, co-
operated by installing temporary automatic recording
2631 gages, in rating or re-rating various gaging stations, and
in taking off the charts and computing estimates of discharge in the light of those charts. Similar cooperation was rendered by the Geological Survey District Engineer for West Virginia, Mr. Kessler, whose headquarters are at South Charleston, West Virginia.

Q. What was the relationship of the United States District Engineer at Huntington to the tests?

A. The tests were planned in thorough cooperation with his office and in personal conferences with him and his staff.

Q. Who was the District Engineer at that time?

A. Lieutenant Colonel Ardery, now Colonel Ardery.

The District Engineer instructed the personnel along the river to make special frequent gage readings at most of the locks and dams, and, for that purpose, I believe supplied some special personnel. Also, careful observations were ordered to be made, and were made, of all of the dams, including the wicket performance, and of course, the records of the maneuvering of the wickets at each of the eight wicket type dams which were then in existence.

Q. You say there were eight wicket type dams then in existence?

A. Yes.

Q. Were dams 2 and 3 then in existence?

A. They were then in existence. They were of the fixed type.

Q. What was the relationship, if any, of the Federal Power Commission, or its agents, to the tests?

A. The tests had been discussed in personal conference with the then Chief Engineer of the Commission, Lieutenant Colonel Max Tyler, who had just been nominated Brigadier General of the Corps of Engineers.

During the tests there was sent to observe a member of the Engineering staff, Mr. N. B. Keeler, who was present during a part of the time on Kanawha River.

Q. State whether or not these tests were made directly under your supervision?

A. They were. I had general charge of the operations, and of course I kept in touch with the system operating staff of the
Appalachian Electric Power Company as the power sta-
2632 tion had to come on suddenly, and at times when the sys-
tem operating force needed to know such was going to happen in order that they might be prepared to absorb the power outputs of the Buck and Byllesby power stations because, perforce, the operation of the power stations was conducted solely for the best interests of these tests and not as the stations would normally be operated. That is, sometimes the discharge from Buck and Byllesby plants occurred at nights, at times when otherwise there would not be any special heavy output from the power station. I had an assistant in charge of the test operations at the Buck and Byllesby power stations, and another assistant in charge of operations at the navigation dams along Kanawha River.

Q. Was the discharge at Buck and Byllesby limited to the capacity of the power stations?

A. It was by no means limited to such capacity.

Q. Colonel, please state the results of the 1930 wave tests, so far as concern the action of the waves or power tides in their travel down-stream?

A. The outstanding result of the tests was a substancial reduction in the amplitude of flows of the tides from the amplitudes as they obtained in passing Ivanhoe gaging station until, when those tides or waves reached the Kanawha River, they were essentially minor in amplitude. Also, there were substantial reductions in volume of the waves. The precise amount of this reduction is rather difficult of determination because of certain gaging station characteristics, but the amplitude in feet or stage is not subject to any complication, and that involved very definite and very extensive reduction from Ivanhoe down to Kanawha Falls and to the several locks down-stream on the Kanawha until the waves became undistinguishable.

Q. Did any of these power waves or tides increase in amplitude at any point of their travel downstream?

A. I am not certain that any increase in amplitude in second feet took place, but it is not unlikely that there were some minor increases in amplitude within the first 20 or 30 miles of travel of the tides down-stream from the Ivanhoe gaging station, but once that distance had been traversed, the reduction in amplitude became marked and continuous.

Q. Assuming there was a small increase in amplitude, say a short distance below the point of discharge, what, if any, significance would that fact have on the questions which you were considering?

2633 A. On the questions which we were then considering, it had no significance because the important question was what would be the result of those power tides after they had traversed the distance of ordinarily 200 and 300 miles—namely, what was the result in the Kanawha River.

Q. Was there any effect on the power tides by in-flow as they passed downstream?

A. Yes, During the period of the tests, there were various natural tides resulting on the main river and on tributaries, so there were various complicating in-flows which affected and in some cases augmented the power tides.

Q. How far downstream could these power tides be detected?

A. They were all distinguishable as far down-stream as Lock No. 5. A few were distinguishable as far downstream as Lock No. 9. Others were not. None of the waves were distinguishable at the last lock on Kanawha River, No. 11.

Q. Did you state the fact with reference to the condition at Lock 9, or not?

A. I do not recall at this moment. I have the impression—I think I had better refer to my record in that respect.

Q. Here is your record (handing same).

A. I misstated the conditions in respect of Lock 9. I was in error in stating that any waves were distinguishable at Lock 9. At least, that is the extent of such records as I have, and it is true equally of Locks 10 and 11.

Q. Colonel Scheidenhelm, I show you a chart, which is in evidence as Government Exhibit 143, and ask you whether you are familiar with that chart?

A. I am.

Q. State, if you know, whether that chart shows all of the operations, or maneuvers, of the dams during the wave tests?

A. It does not.

Q. Is it substantially complete in that respect, or not?

2634 A. No, It is very incomplete. There are a few maneuvers indicated, but by far the greater number are not indicated thereon.

Q. During these wave tests, did the wicket operations affect the volume and amplitude of the waves shown on that chart?

A. They did.

Q. Will you state why and how that was?

A. Well, as wickets are lowered at a moveable type of dam—that is at a wicket type of dam—the result is to release water from the pool controlled by these wickets, and, therefore, is augmented the flow which would otherwise obtain past the dam. If a wave or tide happened to be passing that particular dam, then there is contributed into the volume of that wave a part of the pond capacity of that particular pool. Conversely, if wickets are raised, then there is subtracted something from the volume of a passing wave, but there is a change in gage reading of the pool level, such as to distort what otherwise would be the conditions obtaining at that site. It may result in an increased amplitude reading in terms of stage.

Q. State, if you know, whether the hydrographs of the 1930 wave tests, insofar as they disclosed any amplitude in second feet, are based upon a single rating curve?

A. For each gaging station there was applied only a single rating curve.

Q. What, if anything, is the effect of that circumstance with reference to the degree of accuracy of the readings of amplitude and volume in second feet?

A. The necessary consequence is that there was not taken into account the effect of rising and falling stages. The rating curves

are generally applicable for conditions of steady flow, but there were natural changes in flow taking place in both New and Kanawha Rivers throughout the 300 miles of this full size laboratory, and, in addition, the very power tides themselves meant rising and falling stages. That is axiomatic of a power tide or wave, and the various discharges corresponding to a given gage height, could not be reflected by the use of a single rating curve for a given station, as was actually done. In consequence, the hydrographs contained in them errors as to the magnitude, of
which we have no precise knowledge, but can make esti-
2635 mates, if necessary, though I would hesitate to do so; but
we do have knowledge that on ascending and descending
stages they are not correct.

Q. Are those errors in hydrograph applicable to stage as well as volume?

A. They are not applicable to amplitude in stage, but merely in terms of discharge, or in terms of volume, because a function of volume is the amplitude in second feet, namely, in flow.

Q. You have already stated that during these wave tests there were substantial reductions in amplitude in second feet, as the waves passed downstream? Will you state whether there were reductions in amplitude expressed in feet of stage as the waves passed downtream?

A. There were very great reductions in feet of stage.

Q. Can you give some examples of that from the records of the tests?

A. Yes. The greatest amplitude of a wave in stage was apparently that of a wave which for convenience we numbered #15 at Ivanhoe as this wave came by the water rose practically seven feet in a very short period of time. By the time that wave had reached Lock #2 it had decreased in amplitude to five inches. The least amplitude in inches of any wave was in the case of #16, which had been propogated in somewhat similar fashion. In that case the amplitude at Lock #2 was three inches. However, those were especially peak waves which were of high amplitude in second feet, and by reason of the limitations in water supply were not of great duration.

Q. You mean high amplitude in second feet or in stages?

A. Both.

Q. In stating these amplitudes in stage, as I understand it, you are again stating the amplitude in stage at Ivanhoe station and not the point of discharge at Buck dam?

A. That is true. At Buck discharge must have been greater.

Q. What was the greatest amplitude in stage of any of the test waves at Lock #2?

A. It was approximately nine inches in the case of wave #6, hich had had an amplitude in stage of four feet eight inches at Ivanhoe. However, that maximum amplitude at Lock
36 #2 was in my opinion affected by a rain inflow. I do not know to what extent its amplitude was increased because f a natural increase locally in the Kanawha or from some earby tributary, but it did affect it somewhat.

Q. Referring to wave #4 of these tests please state the amplide in stage at Ivanhoe and at Lock #2.

A. At Ivanhoe the amplitude was approximately four feet. t Lock #2 it was approximately six inches.

Q. Please state the amplitude in stage for wave #10 at Ivane and at Lock #2.

A. At Ivanhoe it was approximately six feet. At Lock #2 it as approximately seven inches.

Q. Please state the average reduction in amplitude measured stage for all of the waves of the 1930 wave tests between vanhoe and Lock #2.

A. For the eighteen waves the average amplitude at Ivanhoe as about five feet three inches. At Lock #2 the average amplide was about five inches. I might say that the amplitude in age as I have given them in figures represent the vertical distance between the crest of the wave and the base flow, as reprented in turn by a straight line connecting the lowest points troughs on either side of the wave crest.

Q. Were there any complicating conditions during the 1930 ave tests?

A. There were the conditions of rains which caused natural hanges in flow in New River and in Kanawha River and various ibutaries. There is hardly any, if indeed any, wave of the vies that was not so affected.

Q. State whether any of the power tests, or waves, which me into the Kanawha River during the 1930 wave test, as a sult of those wave tests, caused any interference with navigaon on the Kanawha River?

A. They did not.

Q. Col. Scheidenhelm, what, if any, investigation did you make f the results of these waves on the Kanawha River during the 1930 wave test?

637 A. Well the object of the series of tests was not merely to propagate the waves or tides, but to find out what they ould do. Now it was manifestly impossible for anyone individl to be everywhere at the same time, but I had observations ade everywhere; they were reported to me. My assistants reorted directly. I conferred with the representatives of the

District Engineer office and the District Engineer himself, and I am as certain of the results of that particular investigation as I would be of any other engineering investigation which I would be called on to make, and as a result of which to make a finding for myself.

Q. Colonel Scheidenhelm, state whether or not these tests were made under your supervision and direction.

A. They were, entirely so.

Q. State whether or not you have studied and examined the records of the conditions produced by these waves as they passed through the Kanawha River.

A. I have done so in respect to both changes in elevation of water in the respective pools and as regards the maneuvers of the wicket gates in the cases of the eight movable dams.

Q. Please state whether any of the power tides or waves which came into the Kanawha River as a result of the tests of March, 1930, caused any interference with navigation on, or the navigable capacity of, the Kanawha River?

By Mr. Thompson. I object.

By the Court. Objection sustained.

By Mr. Jackson. Exception. May I ask if that is on the ground of the form of the question or ground of incompetency?

By the Court. Ground of competency. He has recited all the facts he knows about it, and you have the testimony of other witnesses in here, the Government agents themselves who were down there when the waves came down, and who said it would not interfere.

By Mr. Jackson:

I realize it is cumulative, your Honor.

Q. Please state, Colonel Scheidenhelm, whether in your opinion, any of the waves produced by the 1930 wave tests, in passing through the Kanawha River, caused any interference with navigation on, or navigable capacity of that river.

By Mr. Thompson. Same objection.

By the Court. Objection sustained.

By Mr. Jackson:

Exception.

Q. What were the character of the changes, if any, in stream stages on the Kanawha River navigation pools during the wave tests of 1930?

A. The characteristic was the minor extent of the variation and the gradual manner in which those variations occurred. One could stand for hours along the navigation pools and not be able to observe any change except as after awhile the gauge revealed it.

Q. What would be the effect, if any, of changes in stream stage of that nature on the navigation pools on the Kanawha River, on the operation of a boat?

By Mr. THOMPSON. I object to that. It is getting around to the same question.

By the COURT. Objection sustained.

By Mr. JACKSON. Exception. Is that on the form of the question or competency of the witness?

By the COURT. I expect it is the competency of the witness. Most anyone could tell what effect it would have on a boat as well as Col. Scheidenhelm.

By Mr. JACKSON:

Exception.

Q. Colonel Scheidenhelm, are there any natural tides in New River?

A. There are. Not at this moment perhaps, but they are natural phenomena on New River.

Q. Will you explain what you mean by that?

2638 A. Well rain tides come in which have much the same characteristics as power tides for illustration, and they occur from time to time with varying degrees of intensity. If there is enough rain or melting snow, the tide can take the form of a great flood. There are variations all the way from that down to minor floods or rain tides.

Q. How do natural tides which occur in New River, compare in magnitude with those which were produced by the 1930 wave test?

A. Time and again natural tides occur which substantially exceed in amplitude and in volume any of the 1930 test tides.

Q. State if you know whether the old wicket type navigation dams on the Kanawha River were and are prepared for natural fluctuations of a magnitude greatly in excess of the fluctuations caused on the Kanawha River by the 1930 wave test.

A. They are prepared to cope with the natural tides substantially in excess of the 1930 series, and for that matter they do.

Q. State whether the waves or tides produced by the 1930 wave test would correspond with a substantial degree of peak operation of the Radford project.

A. They would.

By the COURT. I expect you testified about it, but I didn't catch it. For what length of time was this water released during these tests?

By the Witness. Meaning in regard to an individual tide or the whole series?

By the Court. I mean an individual tide. If you wanted to create a water tide down the river how long would the water run up at Buck dam for an individual wave?

By the Witness. (After referring to notes and exhibit.) Exhibit #227 is one which shows the duration in point of time at Ivanhoe.

2639 I do not believe I have with me the precise time of release of the water at Byllesby and Buck, respectively, but they approximate those stated for Ivanhoe. In the case of wave #1, reading the chart by inspection and without scale, it looks like six or seven hours of duration for the #1 wave, or perhaps eight hours, and #2 about the same. When it came to the higher tides, however, the capacity of the Byllesby reservoir was not such as to permit the discharge of the water for so long a period, and they reached a maximum, which was always a point, and then decreased, that is why I said that in the case of the waves which had the maximum amplitude Nos. 15 and 16, and maybe 14–a, that they were not what I would style typical—I doubt if there is anything strictly worthy of the name typical in the series, because there were varying conditions throughout, but certainly those which were released at intervals of about eleven hours were hardly typical of anything that later could occur at Radford, but as to the earlier ones which had durations of from six to eight hours, and some of the others of lesser duration, their maximum amounts were more nearly those that would be typical of conditions at Radford. Have I answered the question?

By the Court. I think so.

By Mr. Jackson:

Q. Colonel, to what extent, if at all, have you made any study of the possibility of causing any interference with the navigable capacity of the Kanawha through operation of the Radford power plant or any other power plant up-stream from Kanawha River?

A. I have made extensive studies over a series of years.

Q. And what was the purpose of your studies or the occasion for them?

A. Primarily to determine what should be my advice to the client as regards the safety of constructing and operating power developments which might conceivably be concerned with the conditions on the Kanawha River.

2640 Q. Assuming the Radford project to be in operation and the physical conditions with reference to the navigation structures on the Kanawha River to be the same as those existing at the time of the 1930 wave tests, in your opinion would it be possible for the Radford project to operate according to some peak carrying method without causing interference with the navigable capacity of the Kanawha River?

A. It would.

By Mr. JACKSON:

Q. Col. Scheidenhelm, assuming the conditions on the Kanawha River with respect to structures, navigation dams and the like, to be the same as those which existed during the 1930 wave tests, state whether, in your opinion, a substantial peak operation of the Radford project would impair the capacity of the Ohio River?

A. It would not.

By Mr. JACKSON. The question was amended to include "navigable capacity", as the Court suggested.

By Mr. JACKSON:

Q. State, if you know, whether the wicket type dams will be in the Kanawha River when the Radford project is completed and ready for operation?

A. They will not.

By Mr. JACKSON:

Q. Would the possibility of affecting navigable capacity of the Kanawha River by any method of operating the Radford power station be greater or less after all of the wicket type dams on the Kanawha River have been displaced by the roller gate dams?

A. Any such possibility would be less after the new Kanawha Roller type dams are in place, including the Gallipolis dam on the Ohio.

Q. Are you familiar with the London dam?

A. Yes.

Q. State whether there is any pondage at that dam?

A. There is.

Q. How is it utilized?

A. There is an available pondage of three feet in depth between elevation 614 and 611 above mean sea level, and it is utilized in routine operation by the Kanawha Power stations of the Kanawha Valley Power Company.

2641 Q. How much pondage is available at London dam?

A. In the neighborhood of 2,700 acre feet, probably something more.

Q. You say there is three feet pondage. What is the elevation of the upper and lower limits of this pondage?

A. The upper is at elevation 614 and the lower at elevation 611.

Q. Do you know where the head of navigation in the project on the London pool is located?

A. Yes, it is at Mile 90.57, above the mouth of the Kanawha.

Q. State, if you know, whether the project depth remains at the upper end of the London pool when it is drawn down to elevation 611?

A. When the pool is drawn down to elevation 611 there is still at least the project depth of 9 feet at the head of navigation.

Q. What, in your opinion, is the importance, if any, of the London pondage as regards re-regulation of fluctuating flows from up-stream?

A. It is important in that it can do it. It is important that it can do it to a substantial degree. In my opinion, it can re-regulate any power tides which conceivably can be propagated at the Radford power project by means of the installation proposed there.

Q. Disregarding the three foot draw down in the case of the London Pool, state, if you know, whether the Kanawha navigation pools are kept at precisely constant levels?

A. They are not.

Q. What is the extent of the variation?

A. The variation is different in degree and in time of occurrence. There is nothing regular about them. In the case of the Kanawha pools the variations have occurred.

Q. Which Kanawha pools do you mean?

A. In the case of the Marmet pool the variations are several inches above the pool level and several inches below. By understanding with the United States District Engineer Office, the variation below pool level is being limited to a .3 of a foot. The limitation I am referring to is the limitation on the part
2642 of the operators of the power stations at London and Marmet stations. However, there are variations which result from the plain inability of operators at Locks and dams, regardless of power stations, to keep the pools absolutely level.

Q. As a matter of practical operation, will there be any fluctuations of a similar character in the Winfield and Gallipolis pools when they are completed?

A. Necessarily so.

By Mr. **Jackson**:

Q. Are you familiar with the dams on the Kanawha River?

A. I am.

Q. How long have you been familiar with them?

A. Something like ten years.

Q. Have you seen them from time to time, or not?

A. Yes.

Q. Have you observed their operation?

A. Yes, I have observed their operation and their records, both, as I have them at the office, as they are in the District Engineer's office, and as they are contained in the Lock Master's Offices at the several locks and dams.

Q. I will ask you what are the present conditions as regards variation of pool levels in the cases of pools formed by the wicket type dams still remaining in the Kanawha River?

A. Speaking of the pools generally, that is, without reference to any individual pool, the variations in head water at the given lock and dam, are normally over a range of 18 inches to 2 feet, although there are occasional variations which are substantially greater, especially in the upper direction. The wicket type dams in their operation necessarily result in a dropping of the pool level when the wickets are lowered and that may be to the extent of one foot or more below the pool level as and immediately after the wickets are dropped. On the other hand, wickets once up are not thereafter dropped as a matter of operating practice until the depth of water over the top of the wickets approximates one foot. So far I have referred to the variations 2643 of the head water at the dams in the general case. At the upstream ends of the pools there are still greater variations because of the back-water effect.

By Mr. Thompson:

Q. You mean by head water, the upper end of the pool, do you?

A. By head-water I mean the upper level of the water at a given lock and I am referring to it adjacent to the dam and lock, so to speak, and not at the upper end of a given pool, but I did refer to the upper end of the given pool and stated that there the back water effect comes into play and there are still greater variations. In the case of that wicket dam pool which is immediately down stream from the Marmet dam, the variations at the downstream end of the pool, that is, the head-water at Lock and Dam #6, does not differ in its performance substantially from what I have related as an average condition at the existing six wicket type dams, but at the up-stream end of that pool the variations due to the operation of the Marmet power station result in variations which, in amplitude, are greater than probably exist at the downstream dams in respect of the up-stream ends of their respective pools.

A. The variation in the head of the #6 pool is the same as the variation in the tail-water of the Marmet Power Station and the variation there extends to approximately 3 feet above the #6 pool level. I am referring to a variation caused by the power station.

By Mr. JACKSON:

Q. Please state what, if any, effect these fluctuations in pool levels of the London and Marmet pools and future Winfield and Gallipolis pools will have upon any fluctuating flows into those several pools? 2644

A. I have referred to two kinds of variations, one of a few tenths above and below the pool level, and the other variations being of the order of several feet in the wicket type dams. Am I to understand that counsel's question refers to those of several tenths above and below the normal pool levels?

By Mr. JACKSON:

Q. Yes, it is confined to the London, Marmet, Winfield and Gallipolis pools?

A. In that respect the result will be to even out any fluctuating inflows into any of the given pools, and to reduce the variations of out flow as compared with the variations in inflow.

Q. State to what extent, if any, in your opinion, these fluctuations last described by you would re-regulate any conceivable power tides from the Radford power station?

A. In my opinion it would even them out to such an extent that the flow passing the Gallipolis dam could not reveal any variations due to variable inflow into the London Pool and that might, and probably would, be true in the case of the Winfield dam and, to a lesser extent, in the case of the Marmet dam. One can't tell precisely at what point the variations would become indistinguishable but by the time the relatively large pool areas of the Winfield and Gallipolis dams are brought into play and the very minor fluctuations in those pools taken into account, there can, in my opinion, be no residual variation from any power tide which the Radford project could conceivably cause in the London pool.

By Mr. JACKSON:

Q. What, in your opinion, will be the effect, if any, of the operation of the London, Marmet and Winfield power stations upon any power tides that might reach the Kanawha River from the Radford station?

A. The variations in flow through the respective power stations on the Kanawha River, varies to so great an extent that any residual power tides and variations due to power tides from the Radford station simply would not be recognizable and could not have any effect downstream from the London power station.

2645 Q. When you speak of fluctuations in flow caused by the operation of the London and Marmet power stations, can you state how those fluctuations, resulting from the operation of the London and Marmet power stations, compare with any power tides which could conceivably pass into the London and Marmet pools from the Radford station?

A. Well, the upper limit of any power tide from the Radford station would be an absolutely undiminished tide from that station, that is undiminished in amplitude in second feet, something which, in my opinion, is just impossible of occurrence. If it did, it would have an amplitude which would be slightly less than the discharge capacity of the London and Marmet power stations and substantially less than the discharge capacity of the Winfield Power Station. However, the variations which can be due actually, in the London pool, to any power tides propogated at the Radford station, assuming absolutely no re-regulation enroute, or in the London pool, would be of an order of less than half of the discharge capacity and hence of the variations in flow at the London Power Station and the others down-stream.

Q. In the first part of your answer, you said that if there was no change in a power tide between the time it left Radford and reached London Pool. I didn't understand that statement.

A. If there were no reduction in amplitude in a tide with the result that it caused a variation of 9,000 second feet.

Q. In your opinion is it possible for a tide discharged at the Radford Power Station to come down to the London and Marmet pools without any reduction in amplitude?

A. Absolutely out of the question.

Q. In your statements with reference to the comparative potentialities of fluctuations in the London or Marmet pools from Radford power waves and the fluctuations produced by operations of the London and Marmet stations, did you limit your opinion to the amplitude of variations in flow represented by the power tides themselves?

A. When I stated that the variation in discharge out of the London and Marmet and Winfield power stations would 2646 very greatly exceed the possible variations in any power tides from the Radford station, I had in mind the actual variations which might occur, on the assumption, however, of no reregulation either enroute or in the London pond.

By Mr. Jackson:

Q. That is not what I am getting at, Colonel. Are there such things as secondary variations?

A. There are.

Q. I want to know whether in your answer about the comparative fluctuations resulting in these pools, you took into consideration the question of secondary variations?

A. I did not. If I were to make a comparison on secondary variations the ratio would be far different, I think secondary variations would be so insignificant from the power tides propagated at the Radford station that it just would not enter the picture at all, whereas, secondary variations due to the operations of the London, Marmet and Winfield stations would be perceptible, entirely so, as those due to London and Marmet now are.

Q. Colonel, have you made any investigation of leakage through the London or Marmet dams and locks?

A. I have.

Q. What do you estimate the requirements needed to offset leakage at the London and Marmet dams and locks?

A. A total, under present conditions, for the locks and dams at each site of about 40 second feet, not over 40 second feet, per site, probably more nearly 30 or 35 second feet. However, after making some allowance for wear of the seats of the gates at locks and dams prior to a period of renewal or repair, I would say an allowance of 50 second feet should cover the total at each site for dam gates and locks.

Q. Have you made any investigation of the water requirements for lockages at the Marmet and London dams?

A. I have.

Q. What, in your opinion, is the water requirement for lockages at the Marmet dam under present conditions?

A. Not over an average of 50 second feet.

2647 Q. In determining the minimum water requirement for keeping the new navigation pools on the Kanawha River filled, what factors need to be taken into account?

A. The leakage through dams and the lock gates, the requirements for lockages in the sense of emptying of lock chambers, the leakage under or around the dams including the power stations as dam structures, any leakage through the gates, including the turbine gates of the power stations, and evaporation.

Q. Assuming a critical low flow season and no flow allowed through locks, dams or power stations excepting such as is necessary for lockages, what, in your opinion, would be the minimum requirement of water to maintain the new navigation dam pools under present conditions?

A. Between 135 and 150 second feet.

By Mr. JACKSON:

Q. What were the number of lockages last year?

A. May I refer to my data?

A. The total lockages at the Marmet dam for the year ending une 30th, 1936, was 2640, of which close to one-half were lockges for the purposes of dredging operations, which were unsual in quantity. Down to Lock 8——

By the COURT:

Q. What dam?

A. Marmet dam, sir.

By Mr. JACKSON:

Q. You say "unusual." Did that have anything to do with nstruction or not?

A. I cannot say positively that it had to do with construction, ut in my opinion, they were, yes, sir.

Q. Proceed.

A. Now, the total number of lockages does not represent the tal number of emptyings of lock chambers.

It is a common practice of the Engineering branch of the War epartment to assume a figure of .75 for that purpose, that is, assume that, out of the total number of lockages, ¾ths of that umber will be or represent emptyings of lock chambers. Hower, the practice is not the same throughout all the branches of the service, and at the Huntington office, apparently the 648 figure .85 is used for that purpose, and I have so used it.

In consequence, the average number of lockages, without aking any deductions for special lockages on account of dredgng, would have resulted in an average number of emptyings of e lock chambers in the amount practically of Six per day. I ssumed an average of Seven.

Q. What is the volume of water required per lockage per day t the Marmet dam?

A. The volume of water required per lockage per day: The olume of water involved in single emptyings of lock chambers, ith the pools at their normal levels, that is, both head and tail ool, is approximately Six second foot days.

Q. Will you state how many lockages last year were for redging and how many lockages there were for ordinary travel?

A. In that year at Marmet, there were 1,232 lockages for redging; there were 70 lockages on account of construction of e locks themselves, or of the hydro-electric stations, and 1,338 ckages for ordinary traffic.

Q. Assuming the doubling of the number of lockages for last ear, what would be the total requirements, with the other conditions remaining the same—that is, the ones stated in answer—in connection with the previous question to you, to-wit: no flow allowed through the locks, dams or power stations, except such as is necessary for lockages?

A. Doubling all of the lockages, both for ordinary traffic and for special and temporary purposes, I would estimate that the total water requirements for maintaining the pools full, would be between 175 and 200 second feet.

Q. What, in your opinion, would be the reasonableness of assuming the doubling of the lockages for dredging?

A. In my opinion, that is far from reasonable. There is no sound basis for it.

Q. State whether or not, in your opinion, any power tide from the Radford power station will be perceptible in the Ohio River down stream from the Gallipolis dam?

A. In my opinion, it will not be perceptible.

Q. State whether or not, in your opinion, it is reason-
2649 able or unreasonable to assume that the flow past the Rad-
ford dam would be cut off during the low water season for
several weeks or longer?

A. It would be very unreasonable to make such an assumption.

By Mr. Jackson:

Q. Assuming, nevertheless, that the flow of New River at the Radford dam or power station is completely cut off for a period of indefinite length, and that the London, Marmet, Winfield and Gallipolis dams are completed and in operation, in your opinion, would such a condition prevent the maintenance of the navigation pools on the Kanawha River?

A. It would not prevent the maintenance of the navigation pools on the Kanawha River, at their normal level.

Q. And give us your reason——

A. Well, the cutting off of the flow at the Radford dam site completely would, of course, remove the contribution of that portion of the drainage area, and there would remain solely the run-off or contribution from the drainage area downstream from the dam site. Under the lowest bases of estimate of the residuary flow from the down stream area, which would obtain at Kanawha Falls or points down stream, there would be, roughly, twice as much water as in my opinion, would be necessary for maintaining those pools at their levels—at normal levels. In that connection, I am taking into account the average monthly flows, rather than the occurrences of a day or two, because, in such a period, what happens upstream on a given pair of days, for instance, cannot be a true measure of what will happen down-stream on the two days, or in the ensuing two days, even fter making all the allowances for lag. Put in another way, he water that originates upstream, in any given two days, will not n two days pass—will not within two days pass any given own-stream point, as long as there is any variation in flow. ecessarily, if there are any two days, which, on the Kanawha iver are the subjects of estimates of especially low flows, the ows adjacent to these days are greater.

In other words, there is a variation of flow and it is just im-
roper to attempt to match up any two days of the Kanawha
flow, under these conditions, with any two days upstream,
650 and the same is true of any other group of days, until
one gets into a broader area than a few days.

Roughly speaking, throughout the low water period, the minium excess of flow from the drainage area downstream from he Radford project would be on the order of 100%.

Q. Turning from that hypothesis, which supposes the flow cut ff from the Radford plant during the low water season, state n your opinion what would be the actual effect of the operation f the Radford project, as regards the flow in the Kanawha iver, during low water period?

A. It would substantially increase the low water flow into the anawha River.

Q. State whether or not that effect would extend into the hio River?

A. It would necessarily extend into the Ohio River, yes, sir.

Q. Please state what was the flow of Little River at its mouth hroughout the month of October, 1930?

A. (Examines papers.) Based on the estimate of the flow for ittle River, at made by the United States Geological Survey for raysontown, Virginia, for that month, and in the light of my nowledge of the situation generally, I would say that the flow f Little River, at its month—

A. its mouth—throughout October, 1930, approached in the eighborhood of 135 second feet.

Q. Colonel Scheidenhelm, you have expressed a number of pinions regarding the possible effect of the Radford power staion on the Kanawha River. In expressing those opinions, did ou take into account any possible reregulation of the Radford ower tides between the site of the Radford project and the anawha Falls?

A. I did not.

Q. This morning, you referred to what you described as the luestone power project of the West Virginia Power Company. Vill you briefly describe that project?

A. (Witness examines papers.)

A. The Bluestone power project of the West Virginia Power Company, with its two stages of development, named Hin-
2651 ton and Bulls Falls, respectively, would have installations
as follows:

At the Hinton development, 22,500 kilowatts or 31,500 horsepower. At the Bulls Falls development, 120,000 kilowatts, or 170,000 horsepower. That is, the total installation in the two stations, in the terms of horsepower, would be 200,000 horsepower.

The Bulls Falls development is intended to empty into the Hinton reservoir—that is, empty the power discharge of the Bulls Falls power station into the Hinton reservoir, which reservoir is to have a fluctuating water surface and relatively uniform discharge.

In other words, the Hinton development is intended to be a reregulating development. The Bulls Falls development is a combined storage and power development.

Q. Why did you recommend this form for that project?

A. Because in the case of a large power development, with great capacity, located at the head of a very steep portion of the river, and in proximity to downstream riparian owners, and in proximity to navigation works on the Kanawha River, as they existed at that time—at the time that I made the recommendation, it was my opinion that the West Virginia Power Company should not take the risk of being subject to liability for interference, or claims for or liability for interference with these riparian rights or with the navigation structures on the Kanawha River.

Q. As I understand you, this has been changed, under your supervision, from an earlier project of single stage to two stages?

A. That is true.

Q. Was the change from the single to the two stage development of the Bluestone project, brought about or affected in any way, by any proposed method of construction of the Radford project?

A. It was not.

Q. What is the present status of the Bluestone project of the West Virginia Power Company?

A. The status of development or the progress in the direction of consummation is, that the West Virginia Power Com-
2652 pany owns the dam sites and owns lands and rights of
approximately one-fourth of the total necessary. In 1929 and 1930, steps were taken, by way of intensive explorations and planning, looking towards early construction, and previously pending application for a license before the Public Service Commission of West Virginia, on the part of the West Virginia Power

Company was amended so as to cover the change from a single high dam development to the project that is shown on Exhibit No. 600.

That Application was pending before the Public Service Commission of West Virginia for some months; hearings were held but before the Commission made a decision with respect to the issuance of the license the Supreme Court of Appeals of West Virginia declared unconstitutional that Act under which the Public Service Commission of West Virginia was operating, in respect to water power development.

Q. State if you know whether or not this Bluestone project of the West Virginia Power Company is still included in the plans of the defendant and its affiliates with the developing of power stations on New River?

A. Yes, sir. The only condition under which I can conceive that it could not be brought into being, would be for the Bluestone reservoir project recommended by the Chief of Engineers, or some other form which might be approved by Congress, to be constructed.

Q. From the standpoint of any possible effect of the Radford project or the effect of the Radford project on the development of the Bluestone site, does it make any difference whether or not the so-called Bluestone project be constructed in accordance with the plans of the West Virginia Power Company, or in accordance with the plans which have been set out by the Government, in Exhibit No. 145?

A. I believe it makes no difference in respect to the effect of the Radford project on the Bluestone project, if I understand the question correctly.

Q. Yes, sir.

By Mr. **Thompson**. What do you mean by that? The
2653 effect so far as the flow of water is concerned, or whether or not you go ahead with the Radford project?

A. I assumed the question to mean an effect upon the operation of the Bluestone project.

By Mr. **Jackson**:

Q. What I want is whether or not the effect upon any possible power tides from Radford will be materially different, if the so-called Bluestone project be constructed in accordance with the plans of the West Virginia Power Company, instead of in accordance with the plans of the Government, as shown in Exhibit No. 145?

A. That puts the situation in the converse of what I understood the situation to be. My answer is, in that latter respect, the effect of either the Bulls Falls development of the West Virginia Power

Company's Bluestone reservoir project, or the Bluestone project of the United States, will each have the same effect upon the power tides from Radford.

Q. What will that effect be?

A. That effect will be essentially to make them lose their identity; in effect, to re-regulate these power tides so that they will not be recognizable and not appear as such down stream at Bulls Falls or Bluestone dam respectively.

Q. Are you familiar with the revised plans for the Radford project, shown in Government Exhibit 90–A?

A. I am.

Q. State whether or not the Radford project is now being constructed in accordance with those plans?

A. It is.

Q. I think you have testified that you are familiar with the power developments at the Government navigation dams on the Kanawha River?

A. Yes, sir.

Q. In your opinion, what, if any, effect will the construction and operation of the Radford project have upon the value of the power of the Government navigation dams on the Kanawha River?

A. Its effect will be beneficial upon the value of the power.

By Mr. **Jackson**:

Q. Assuming the Government constructs the Bluestone project, what effect, if any, will the construction and operation of the Radford project have upon the value of the power to be developed at the Government Bluestone project?

A. In my opinion, it will have a very substantial beneficial effect upon that project.

By Mr. **Thompson**:

Q. That Radford will have on Bluestone?

A. Yes.

Q. Will you give your reasons, please?

A. The principal element affects both the Bluestone reservoir project power and the Kanawha River navigation dam power, and that is the increase in the low-water flow at each of those sites. The increment in flow being roughly 600 second-feet over the low-water flow at Radford is a constant increment, and it has a larger ratio to the low-water flow at the Bluestone site than to the flow of Kanawha River at the several navigation dams. Therefore, the proportionate benefit will be greater at the Bluestone site than downstream, but in each case it will be beneficial.

The increase in low-water flow, however, is not the only benefit. The fact that the Radford storage reservoir would be filled out of high flows and flood flows means that to that extent there will be less water in floods at points downstream. That has no great bearing on the power available to be developed at the Bluestone site, but it does have an effect at the navigation dams. That is because the power stations at the navigation dams are all relatively low head, and from time to time the head becomes such as to put the power plants out of operation—that is, when the head drops sufficiently, the power stations at London, Marmet, and Winfield cannot or will not be able to operate, and the period of outage will be decreased by reason of the waters put into storage from time to time in the case of the Radford development.

By Mr. **Thompson**:

Q. That was on the assumption that the Bluestone was not built?

2655 A. The statement holds good as I have sought to distinguish it, regardless of Bluestone—that is, the storage of Radford is effective with regard to the Kanawha navigation dams, whether or not there is a Bluestone development.

By Mr. **Jackson**:

Q. State, if you have not already covered that, whether the Kanawha Valley Power Company relies upon capacity in the terms of power installation of the London and Marmet projects during low water flow?

A. Of course the Kanawha Valley Power Company does and it has been able to enter into a contractual relation with the Appalachian Electric Power Company in the light of that condition.

Q. You just stated in times of high water, I believe, that these power stations at London and Marmet are temporarily out of service; that is right; isn't it?

Q. Temporarily out of service during certain high water conditions. I might add that their capacity is reduced at lesser high flows, even though they are not completely out of operation. Any rise in tail water of those stations cuts down the head, and, therefore, the power capacity at the Kanawha navigation dams.

Q. Well, when high water obtains on the Kanawha River to such extent as to temporarily prevent the operation of the London and Marmet hydroelectric stations, what would be the probably condition of power availability at the Radford station?

A. At that station the probability would be a relatively high flow, and, therefore, a relatively greater available power output.

Ordinarily, under those circumstances, the reservoir would be full and the station could be running to the full capacity of 9,000 second-feet or 10,000 second-feet without any wastage. To be sure the tail water at the Radford development would rise somewhat, but that rise, compared with the total head, is minor and would be far more than offset by the increase in the available flow through the power station.

Q. Would that permit the Radford station to make up any substantial part of the power loss by reason of the London and Marmet stations being out of operation?

2656 A. It would serve as a general effect in respect of loss of power supply at that particular time for the system as a whole.

Q. State whether or not what you have said about the operating limitation of the London and Marmet power stations will be applicable to the Wingfield station?

A. That will be essentially so.

Q. Col. Scheidenhelm, in your capacity as Consulting Engineer for the Radford project, did you have anything to do with the determination of what lands and the extent of lands which should be acquired?

A. Yes, I advised throughout in that respect after I became identified with the company and the project, about 1925.

Q. Have your duties as Consulting Engineer required you to maintain familiarity with the amount of land required for the project?

A. Yes.

Q. Will you please state how much land has been acquired by the defendant for the Radford project—just in round figures?

A. The company has acquired all of the land to be overflowed.

Q. How much is that?

A. That totals approximately 5,000 acres.

Q. Will you state, if you know, the cost of acquiring these lands and property rights to the defendant?

A. I do not know the precise amount, but it is over one million dollars.

Q. Has anything been spent in exploratory or other work preparatory to construction?

A. Yes, substantially over quarter of a million dollars have been spent for that purpose under my direction.

Q. Has anything been spent on construction?

A. Yes.

2657 Q. How much, approximately?

A. I am not familiar with the details in that respect, but I know it is again substantially in excess of a quarter of a million dollars—probably nearly half million dollars.

Q. Will you state, if you know, what was the purpose of expenditure in acquiring these lands on which the Radford project is being constructed?

A. The object was to acquire them for that particular power development.

Mr. **Thompson**. Is he speaking as agent or representative of the company, or as Consulting Engineer?

Mr. **Jackson**. As Consulting Engineer.

Mr. **Thompson**. In buying land.

By Mr. **Jackson**:

Q. Please state, if you know, whether the defendant has any use for the land so acquired other than for the development of this water power?

A. It has not.

Q. Have you ever made any appraisals of hydroelectric power sites?

A. I have.

Q. Have those appraisals included the valuation of lands used or suitable for use for the development of hydroelectric power?

A. They have.

Q. In the course of your professional work, have you had any occasion to make any such appraisals for banking or investment houses?

A. Yes, sir.

Q. And in the course of your professional work have you become familiar with the values of lands adapted for development of water powers?

A. I have, in the cases of individual developments and in the broader sense have become familiar with the values of power sites as such, including the lands and rights comprising them.

2658 Q. What effect, if any, in your opinion, would be the inability of the defendant to develop its property at the Radford site for water power purposes, without subjecting the property to recapture by the Federal Government, under the terms of the Federal Water Power Act, and without subjecting the operations to the other requirements of the Federal Water Power Act, have upon the marketability or value of the property now owned by the defendant at the Radford dam site?

A. In my opinion it would substantially reduce or depreciate the value, and because of that would undoubtedly affect the marketability of the lands for the purpose of power development.

Q. Col. Scheidenhelm, are you familiar with the plans for the Government Bluestones project as they are set out in Government Exhibit #145?

A. I am reasonably so.

Q. Please state whether those plans do or do not provide for any peak load operation of the Government Bluestone power station?

A. In my opinion the description of the proposed operation of the power portion of the Bluestone reservoir project necessarily imply substantially peak carrying operation.

By the COURT. It is a fact this Bluestone project contemplates the regulated flow of not less than 2,000 feet a second. Does that in any way interfere with or modify its operation for power purposes.

By the WITNESS. My opinion, as expressed in my previous answer, and as bearing upon the answer to your Honor's question, is affected largely by the statements contained in paragraph #65 of page 116 of House Document #91. If the words "minimum regulated flow of 2,000 cubic feet per second" stood by themselves one could not tell whether or not it was contemplated the flow would be uniformly 2,000 second-feet throughout the low water season, or whether there was involved some degree of variations within a day or a week, or otherwise, but maintaining the average of 2,000 second-feet through the day or otherwise—my interpretation of that particular paragraph of the report is that it contemplates a variation at least within the twenty-four hour period. The wording there is very clear in its significance to me in that respect, but I am not ready to say it contemplates a variation outside of a given twenty-four hours. That might or might not be the case.

2659

By the COURT. It seems to me the Radford project and the Bluestone project, from the standpoint of operation for power purposes in the nature of the load they will carry, are essentially the same kind of project, both with a high head, and look to me as though they would be operated the same way and meet the same demands, excepting insofar as this regulated flow of not less than 2,000 second-feet might affect that. Hasn't it been testified here it is contemplated at Bluestone there would be an installed capacity of something like 10,000 second-feet?

By the WITNESS. 11,000 under maximum flow conditions.

By the COURT. All right, that would indicate to me it was exactly the same sort of power development that would be operated at Radford, substantially the same, and carry the same sort of general scheme of an electrical power system. I am wondering how far that is affected or modified by the requirement for regulated flow of not less than 2,000 second-feet?

By the WITNESS. If it were specified that that regulated flow should be uniform then that might be controlling, but it would be inconsistent from the technical engineering standpoint, with

the statements made elsewhere in the report and in that particular paragraph on the question of uniformity or variability of discharge from the power station, but there are various statements in paragraph 65 which lead me to the inescapable
2660 interpretation for myself that the operation of the plant
is intended to be on a varying basis, such that approximately two-thirds of the total output would be developed within one-half of the twenty-four hours of the day, and the remaining one-third within the other one-half.

Q. When you refer to paragraph 65 is that on page 116 of Exhibit #145?

A. Yes, sir.

Q. I want to invite your attention to statement on pages 2 and 3 of Government Exhibit #145 (reading): "On the New River and its tributaries the plans provide for a series of dams with a storage reservoir capacity of nearly 1,400,000 acre-feet, the utilization of upward of 2,000 feet of head, and the development of 454,000 primary horsepower or nearly 1,500,000 primary peak horsepower at 30 percent load factor."

I will ask you what that means in terms of an engineering method of operation?

A. Well the reference to 454,000 primary horsepower is clearly to the continuous power which could be obtained during the lowest flow seasons with the benefit of all available storage year after year. It represents the power which would be available if the regulated flow were utilized uniformly. By analogy, referring to the question the Court propounded, a few minutes ago, it would correspond with the power which would be developed from the Federal project at Bluestone if the 2,000 second-feet of regulated flow were used uniformly; however, coming back now to the sentence in point, at the foot of page 2, or top of page three, of House Document 91, it is evident from the remainder of the sentence it is not proposed to use the regulated flow uniformly. Rather it is proposed to develop 1,500,000 primary peak horsepower. The words "primary peak horsepower" mean that that equivalent uniform or continuous horsepower of 454,000 would be utilized on a peak carrying or variable basis, such that the maximum output would be not 454,000 but
2661 rather 1,500,000 horsepower. The ratio of 454,000 to
1,500,000 is approximately 30%, and that interpretation is borne out by the reference in the last few words of the sentence "30 percent load factor."

Q. Does the term "primary peak horsepower" mean that is the amount of horsepower that would be dependable available through part, or only part, of each day?

A. It represents the maximum peak power point which it would be proposed to yield.

Q. I direct your attention to paragraph 10 on page 3 of Government Exhibit #145, where it refers to plans on the main stem of the river, which says (reading): "* * * the regulated flow of the tributaries would afford at the Kanawha Falls plant and the three navigation dams a total of 51,000 primary horse-
2662 power or about 123,000 primary peak horsepower at 41 percent load factor."

I will ask you what that means in terms of engineering operation?

A. It has the same significance as in the sentence which you previously read, that is the minimum regulated flow, whatever it might be was assumed to be used uniformly if there were to be derived from it 51,000 primary horsepower, but if there were to be derived from it 123,000 primary peak horsepower it would necessarily not be used uniformly, and the result would be the peak load developed from that same water would be about 2½ times the average power output or load.

Q. According to the method of operation as indicated in Government Exhibit #145, how much variation might occur during the course of a single day in a discharge from the proposed Government power installation in the Bluestone dam?

A. Well, during the low-water season the variation might be from zero to about 10,000 cubic feet per second. During periods of higher flow the variation would be presumably from a flow somewhat in excess of zero up to a maximum of 11,000 cubic feet per second.

Q. Colonel Scheidenhelm, assuming a 4½ foot rise in the river above normal at Radford, please state what proportion of the time such a stage would obtain at Radford?

By Mr. Thompson. That is at the dam site?

By Mr. Jackson. No, at Radford, not quite the dam site.

By Mr. Thompson. You mean at the City of Radford?

By Mr. Jackson. Yes sir.

A. The question arises as to what is normal flow, and as to that I can show two figures within which I would think that normal flow would lie. If I assume that normal flow at Radford corresponds with a flow of 1,000 second-feet at the Radford dam site then 4½ foot stage above normal would be
2663 available about 1½% of the time on the average, or an average of about 5½ days per year.

If, on the other hand, I assume normal flow at Radford corresponds to 2000 second feet at the Radford dam site, then a 4½ foot stage above that normal stage would be available $1\frac{3}{10}\%$ of the time, or about 4½ days on the average, I believe, per year.

Examined by Mr. **Jackson**:

Q. Col. Scheidenhelm, is either the Byllesby or Buck dams and power stations operated under Federal license?

A. Neither of them is operated under Federal license or permit.

Q. When did the defendant, or its predecessor, commence the acquisition of land for the Radford dam site—how long ago?

A. About 20 to 25 years ago.

Q. During the course of the cross-examination of Mr. Gerdes, there was identified a sheet entitled "Maneuvers of dams on the Kanawha River during wave tests, 1930," marked "Defendant's Exhibit 543 for identification." It was our understanding that Mr. Gerdes retained that sheet marked for identification, and they think that we have it. We have a sheet which is agreed to be correct, subject to check, to be marked "Defendant's Exhibit 543."

(Exhibit 543 offered in evidence.)

2664 By Mr. **Jackson**:

Q. Col. Scheidenhelm, will you please state if wave No. 10, of the 1930 tests, was affected by any maneuvers on the dam?

A. Referring to Exhibit 228, and in particular to the course of the wave which is numbered rather lightly in that exhibit as No. 10, there were, on March 23, 1930, two maneuvers of dams on the Kanawha River which affected that wave in its passage at Dam No. 6 and Dam No. 7, respectively.

At Dam No. 6, on March 23, there were raised fourteen wickets between 8:30 and 9:30 A. M. At Dam No. 7 there were raised twenty wickets at about 10:30 A. M.

By Mr. **Jackson**:

Q. What was the effect of that maneuver on the amplitude, if any?

A. In each case the effect of the raising of the wickets was to raise the headwater at the respective dams, and, thereby, to increase the gage reading, and thereby to increase the plotted amplitude in stage for the given wave No. 10, and thereby also to increase the correspondingly deduced amplitude in cubic feet per second.

Q. Col. Scheidenhelm, is the slope of New River in the immediate vicinity of the Radford dam site comparatively steep or comparatively flat?

A. It is comparatively flat. At the Radford dam site there is one of the longest pools on the river. From the head of Ingles

Rapids, going in an upstream direction past the mouth of Little River, past the dam site, past Dunkard's Bottom and on to the foot of what was formerly called Moore's Gravel, the river is comparatively a single pool with a length of something over three miles. When there is a flow somewhat above average, the pool condition extends the greater part of a mile further upstream—that is, to the foot of the rapids at Falls Branch, on what is called the Howe place, and is shown on Defendant's Exhibit 545.

Q. What is the longest or flattest pool?

A. Around the Horse Shoe Bend and terminating somewhat down-stream from that point at the head of Sifford's Falls, there are two long pools which have a total length of about ten miles. The five mile stretch up-stream from Sifford's Falls is the flattest portion of the river—that is between the North Carolina line and its mouth. There is probably nothing further up-stream that is any flatter.

Mr. JACKSON. Your Honor will recall that counsel are trying to get certain information which, if it can be obtained, I may want to ask Col. Scheidenhelm to comment on briefly. I will confer with counsel about the status of that.

The COURT. You say that is all?

Mr. JACKSON. Yes, sir.

By the COURT:

Q. You touched on one subject I want to inquire about. You were asked whether the Buck and Byllesby projects had been constructed under Federal license.

Mr. JACKSON. Yes, sir.

By the COURT:

Q. I would like to ask whether they were constructed under authorization of the Secretary of War and Act of Congress?

By Mr. JACKSON:

Q. Are you familiar with that?

A. Yes, sir.

Q. What is that fact?

A. They were not authorized in any form by the Federal Government.

Q. There was no Act of Congress?

A. There was no Act of Congress under which these dams were built. There had been Acts of Congress at earlier times.

Q. Was there any permit from the Secretary of War?

A. There was not.

By the COURT:

Q. Is it a conceded fact that the Federal Government has never made any effort to have removed the Buck and Byllesby dams as affecting navigability of the Kanawha River?

A. The fact, as stated by the Office of the Chief of Engineers and subsidiary officers in the field is that it was brought to the attention of the Chief of Engineers that those dams had been constructed without any permit, and there was ensuing correspondence, the details of which I do not know, although they are contained in a Senate document, No. 15. I do not recall the number of the Congress or the session, and nothing further was done about it. The fact was definitely known to the Chief of Engineers.

By Mr. JACKSON:

Q. I think it will be conceded that no steps were taken to remove the dams?

A. Certainly within the records of the power company, there is nothing to the effect that any step was taken.

The COURT. Does the record show the fact that any application had been made for the removal of this dam as affecting the navigable capacity of the Kanawha River? I inquire from the standpoint whether the Federal Government has ever abandoned the question of navigability. What I had in mind was the question of the present good faith of the Government in asserting that these dams are obstructions to navigation.

There is one other question which I think ought to be made a matter of evidence before you finish, either by concession or by formal proof, and that is whether or not this proposed project, the subject of litigation, requires the use of land or other property of the United States Government.

Mr. JACKSON. I will ask about that.

By Mr. JACKSON:

Q. Col. Scheidenhelm, you testified yesterday about the lands that had been acquired for this project: Please state whether or not any part of the project will involve the use of any land or any other property of the United States?

A. No land of that character will be involved.

Q. Does the defendant own all lands that are to be used for the project?

A. The defendant owns all the lands which will be overflowed by the Radford dam.

Q. On which any of the dam will rest, or the power site will rest?

A. At the dam site it owns a substantial amount of additional land extending out from the dam, to provide for area for construction purposes, and likewise downstream from the dam in connection with the quarry which will be used in supplying the rock for the construction of the dam.

By the **Court**:

Q. Does the Federal Government own any other property which will be involved in this?

A. None within my knowledge, and I am absolutely sure it does not.

Q. Do you know, Col. Scheidenhelm, whether the conveyances of land along New River in the vicinity of this project (any ordinary conveyance from one citizen to another) run from center of the stream or to the edge?

A. They run variously.

By the **Court**:

Q. It may be variable in that matter?

A. Yes. Some refer to the river as the boundary, and others more specifically.

By Mr. **Jackson**:

Q. You have seen the conveyances, have you not?

A. I cannot say I have seen all of them, but I have seen a multitude of them.

CROSS EXAMINATION

By Mr. **Thompson**:

Q. Colonel, you served during the war, did you not, with the United States Army?

A. I did.

Q. You are not in the United States Army now, are you?

A. Not except in the sense that I am a commissioned officer of the United States Army Reserves.

Q. And do I give offense when I address you as "Colonel" or not?

A. I hope you would not give me offense, no matter how you addressed me.

Q I was reading the record over, and I apparently gave counsel offense yesterday, and I was trying to figure out how or why I gave offense, and I do not know how.

A. I have heard you pronounce my name differently from what it is pronounced.

Q. It was not any question of detail. It was my pronunciation.

A. I cannot speak for counsel.

Q. I believe you said that you became connected with the defendant company in about the latter part of 1925?

A. I do not believe I stated the latter part of 1925.

Q. Well, about what part of 1925?

A. I haven't looked it up, but my impression is that it was the early part of 1925.

Q. And when you did become a representative of the company, it was necessary, or you did visit the offices of the Federal Government in Washington quite frequently, did you not?

Mr. JACKSON. I object to the question as it assumes that he became a representative. I do not know what he means by that. If he means that he became engineer, it is satisfactory.

The COURT. He stated his connection with it—I think as Consulting Engineer.

A. As regards this particular project, I did not, immediately upon being retained by American Gas & Electric Company, by itself and subsidiaries, come into contact with the Radford project. I do not recall at the moment just when was the first time that I did get into touch with this project, but it was not for months afterwards, nor, I believe was it within 1925.

By Mr. THOMPSON:

Q. Were you retained by the American Gas & Electric Company or by the Appalachian Electric Power Company, or by the Appalachian Power Company?

A. Originally by the American Gas & Electric Company.

Q. And do you represent the American Gas & Electric Company now?

A. I served it as Consulting Engineer.

Q. And you are on a retainer with it, are you not?

A. No.

Q. You do special work and are paid by it; is that it?

A. Yes.

Q. And are you regularly retained by the Appalachian Electric Power Company?

A. Not in the sense of a retainer, as we know it in the engineering profession.

Q. Are you a stockholder in the Appalachian Electric Power Company?

A. I am not.

Q. Are you a stockholder in the American Gas & Electric Company?

A. No.

Q. Or any of the affiliates of either company?

A. No.

Q. Now, you did have frequent dealing, did you not, with the Federal Water Power Commission?

A. I had frequent dealing with the Federal Power Commission.

Q. You were always received courteously there, were you not?

A. If there was any discourtesy, I do not recall the particular time.

Q. The Commission let you go through its files, did it not, from time to time?

A. Not in that sense, no.

Q. Didn't it submit its files to you so you could go through them and look them over?

A. With regard to the Radford project——

Q. (Interposing.) Of course, I mean the Radford project?

A. (Continuing.) There was placed before me at one time a file of correspondence and other matters with regard to the project, but, at that time, there was definitely withheld another file, the precise detail of which I do not know, and that I have never seen.

Q. Did that have to do with the Radford project—the one which you say was withheld?

A. Yes.

Q. You know, don't you, Mr. Fraser Horn, of counsel for the defendant, has gone over the files and has had copies made of the papers in the Radford project matter?

A. So far as I know, and I believe I know the complete fact, he saw the same files that I did, and was refused access to the same file to which I was refused access.

Q. Can you give any idea of any files you have been refused access to?

A. My recollection is that it was a technical file which may have had a name dealing with the word "Fluctuation."

Q. Was it the wave study file?

A. I did not see the file.

Q. Then you have also, during this time, had access, have you not, to the files in the office of the District Engineer at Huntington?

A. No.

Q. You have been there many times, have you not?

A. Yes.

Q. You have always been received with extreme courtesy, have you not?

A. Certainly with courtesy.

Q. And they have let you copy and photostat documents in there, have they not?

A. Certain of them.

Q. Have they ever refused you any information which you have asked for?

A. Yes.

Q. What?

A. I do not recall specifically.

Q. Is that the one that was brought up here by Mr. Jackson in his statement to the Court?

A. Oh, no. Time and again at the Federal Power Commission, at the office of the Chief of Engineers, and at the office of the Division Engineer, and at the office of the District Engineer, the statement would be made, and quite properly so, that the matter was such that they could not show it to me.

Q. All the matters that were proper to show, they did show you, didn't they?

A. That would be for them to say. I don't know.

Q. Has there been any refusal, you know of, of a right that you had as a citizen?

Mr. **Jackson**. I object to that question.

Mr. **Thompson**. I am practically repeating your words in your statement you made before the Court.

The **Court**. Let him answer.

Mr. **Jackson**. Exception.

A. I presume you mean a right which I had to correspondence or documents in any of the offices?

By Mr. **Thompson**:

Q. Yes.

A. Yes, I think so.

Q. Can you give us one or two examples? I am referring now particularly to the Radford matter.

A. Well, I just have impressions, not having searched my memory or my own records, or otherwise, for an answer to a question like that, but I have the impression that, as time grew on, there was a reticence to show various documents. I had the impression that the records involving various fluctuation matters, for instance, should have been shown.

Q. But you cannot give any definite times or any persons who have refused you your right as a citizen to the files of the Federal Government in respect to the Radford project?

Mr. **Jackson**. I object to the question, as I do not know that the witness is competent to define what his rights would be.

The **Court**. I do not think the question is properly phrased. Ask how he was treated.

By Mr. **Thompson**:

Q. Well, how were you treated by the War Department (that is the Engineers Office), and how were you treated by the Federal Power Commission, with respect to the Radford project?

A. Well, I think in general very well, but on the specific point on which you are touching as to placing me in touch or exhibiting documents which I believe were pertinent to the matter, there were various occasions, both at the office of the Chief of Engineers and at the Power Commission, when there was a refusal to exhibit documents.

I have in mind one instance at both places. It began at the Federal Power Commission. At the time there were placed before me, and for more detailed perusal, by Mr. Fraser Horn, certain files, it was definitely understood that upon the occasion of my next trip to Washington I would have access to the files on the subject involving fluctuation. I do not know by what title that file was known.

The only reason for not going into it at that time, so far as either I was concerned or the then Chairman of the Commission, Mr. George Otis Smith was concerned, was that I did not have the time to do it, but, by the time I came to Washington next, the situation apparently had been changed.

There had been engaged special counsel for the Government in the matter, and the access to the file was refused.

As regards the office of the Chief of Engineers, there had, in general, been made available documents and reports, and I recall that within the past year I desired to see a report of a District or Division Engineer which dealt with New River in the case of a report upon the Bluestone project, and that report I was permitted to see. And, again, I did not have time to completely look over it, but, again coming, I was told that orders had been issued not to show that document.

Q. Well, you do not claim that you were refused the right to see documents which you, as a citizen, had a right to see, do you?

A. I would say that is a legal question.

Mr. **Jackson**. We object to the question, as to what the witness' rights are.

The **Court**. I sustain the objection.

Mr. **Thompson**. Exception.

By Mr. **Thompson**:

Q. You are an officer of the Franklin Real Estate Company, are you not?

A. I am not.

Q. You have been, have you not?

A. Never.

Q. Have you been a director?

A. Never.

X Q. You have spoken of being Consulting Engineer of the Defendant Company. Have you ever been the Supervising Engineer of the Company?

A. Not of the Company, no.

X Q. Or of any of the projects of the Company?

A. I have been Supervising Engineer temporarily with regard to the construction, and preparation for construction, on specific projects.

X Q. Have you ever constructed a power project?

A. Well I have acted as Chief Engineer of the companies actually constructing them.

X Q. But have you [interrupted].

By Mr. **Jackson**. Had you finished your answer?

A. I don't know how one could get closer to the construction of a project than to act as Chief Engineer of a company in the design and the construction of the project. One cannot lay bricks and mix concrete and do all of that in building a large power project, although I have done each of those things in connection with smaller work in my earlier days.

Q. Have you ever constructed as Construction Engineer a power project?

A. Not from beginning to end.

Q. Have you ever operated a power project, speaking now as an Operating Engineer?

A. Not as a regularly engaged shift operating Engineer.

Q. When the London and Marmet power plants were constructed Mr. Slocum was the Defendant's Engineer, wasn't he, or the Engineer for the construction of those power plants?

A. He was Resident Engineer.

Q. Didn't he testify [interrupted].

A. May I finish?

By Mr. **Thompson**. Yes, I thought you had finished.

A. He was the Resident Engineer, with the title Construction Engineer in charge, but that title meant in all respects the local responsibilities of the work.

Q. And I believe you said there was a couple of months there when you actually went down on the project, or is that correct?

A. No, I didn't state I spent several months on the project.

Q. You were Supervising Engineer then?

A. That is true, that is, I actually performed the duties as pinch-hitter so to speak for the Chief Engineer of Kanawha Valley Power Company, who had met with an accident, and it was a rather critical period in starting the construction of the London and Marmet developments. There were all the details to be cleared up with local land owners and getting contracts formulated and let, certain force account work and everything necessary toward getting the projects under way in order they might be completed within the rather exceptionally short time they were completed. I did the same kind of work which the Chief Engineer would otherwise have had to do.

Q. A Consulting Engineer may come in on a project after someone else has set up the plans and give his judgment; isn't that his function?

A. That may be his function in a specific case, but that is not by any means a statement of the field of the Consulting Engineer, nor of the field which I have occupied with regard to these projects.

Q. I just asked you the general question; you are giving us a grand talk each time I ask you a question. I asked the general question as to the functions of a Consulting Engineer in a general respect.

A. Will you read the question if I have not answered it properly?

Q. You have answered only away beyond the question. Now does a Consulting Engineer declare policies on a project?

A. In general he might declare them to his heart's content, for himself, but that does not mean the policies would be accepted by those who have responsibilities of ownership.

Q. Did you ever declare policies for the project on New River, taking for example first of all the London and Marmet dams?

By Mr. Jackson. What is meant by declaring policies? I think that should be somewhat more explicit before it can be answered.

By Mr. Thompson. Policies of operation—policies of accomplishment.

A. I have time and again formulated what I believed to be appropriate policies for the owner of a project to adopt, and have recommended those policies, and in most cases I would suppose they had been accepted, but not in all cases have they been accepted.

Q. Have you ever been authorized by the Appalachian Electric Power Company or the Kanawha Valley Power Company to express its policies?

A. Undoubtedly, on occasions.

Q. And those occasions you became more than a Consulting Engineer, didn't you?

By Mr. JACKSON. I object to that question as argumentative, whether or not he did is a conclusion for the Court to draw, if material.

By the COURT. He may answer.

A. On various occasions and for specific purposes I was authorized to make statements of policy, statements which would bind the company.

Q. When you were before the West Virginia Public Service Commission you and Dr. Mead, you were speaking, were you not, for the company?

By Mr. JACKSON. I object to that. It appears he was a witness at that hearing.

By the COURT. He may answer. He asked if he did not appear for the company.

A. I cannot say I appeared before the Commission as representing the company. I appeared as an Engineer.

Q. You did state the policies of the company before that Commission, at the hearing had in 1930?

A. I may have. I don't recall.

Q. I hand you what has been identified previously as Government Exhibit #222 for identification, being a letter on your letterhead, addressed to Major H. M. Trippe, dated February 8, 1927, signed by you. I believe that is your signature.

A. That is my signature.

Q. I read to you the last paragraph of this letter: "So far as concerns water requirements from upstream—particularly from New River No. 6 or Radford development—the subject was discussed at the office of the Chief of Engineers while I was at Washington early last week in company with Mr. Bevan of Viele, Blackwell & Buck. We have had the privilege 2665 of seeing your report on the application for license. Study is now being made of a clause to be suggested for the purpose of covering the protection of navigation and at the same time allowing as far as practicable the operation of the proposed hydro plant on a peak-carrying basis—for that is the only basis on which that development is economically justifiable." That is your letter, is it not?

A. Yes, sir.

(Exhibit 254, being Letter dated Nov. 14, 1927, to Major E. D. Ardery on "New River Development #6 (Radford), Geological Examination," from F. W. Scheidenhelm was offered in evidence.)

(Exhibit 255, being Letter dated Nov. 17, 1927, to Major E. D. Ardery on "New River Development No. 6 (Radford), Geological Examination," from F. W. Scheidenhelm was offered in evidence.)

(Exhibit 256, being letter dated Oct. 16, 1931, to Major Fred W. Herman, pertaining to maintaining pool levels at dams 2, 3 and 4 on Kanawha River from F. W. Scheidenhelm was offered in evidence.)

(Exhibit 257, being Letter dated Sept. 18, 1934, to Major John F. Conklin on "Hydro electric Project of Appalachian Electric Power Company on New River near Radford, Virginia," from F. W. Scheidenhelm was offered in evidence.)

(Exhibit 258, being Letter dated Apr. 2, 1936, to Major John F. Conklin on "Radford Hydro Project of Appalachian Electric Power Company, Capacity Curve of Reservoir," from F. W. Scheidenhelm was offered in evidence.)

(Exhibit 259, being Letter dated Apr. 12, 1932, to Major Fred W. Herman, on "New River Power Wave Study," from F. W. Scheidenhelm was offered in evidence.)

(Exhibit 260, being Letter dated Apr. 20, 1932, to United States Engineer Department, signed by Daniel W. Mead and F. W. Scheidenhelm in type, under that "By R. H. Stearns" was offered in evidence.)

(Exhibit 261, being Telegram dated Dec. 10, 1930, to F. E. Bonner, Executive Secy., Federal Power Commission, from F. W. Scheidenhelm was offered in evidence.)

Q. When the Appalachian Electric Power Company filed its application, I think in 1926, originally, with the West Virginia Power Company—I mean in 1924, with the Public Service Commission, you had—I believe you testified yesterday the intention then of having just one dam, did you not?

A. I had nothing to do with any application filed in 1924, and I had no intention at any time in regard to a single dam, but it is my understanding that the predecessor of the Appalachian Electric Power Company, or more likely, the West Virginia Power Company, itself—because I believe it was in existence then, had such a plan.

Q. Isn't it a fact that the reason for the change in this from one dam to two dams was caused by the objection of the Electric Metallurgical Company, or the owner, the Union Carbide Company, on the ground that, if you had just one dam there, the waves would be destructive of navigation down below and would be destructive of the interests of the Electro Metallurgical Company at Glen Ferris Dam?

A. I think in reply that I should separate that into two parts: The reason for the change and the other reason for the opposition on the part of the Electro Metallurgical Company:

As regards the change, it is true that, so far as my recollection of the matter is concerned, it initiated—it was due largely
2666 to the fact that the Electro Metallurgical Company had riparian rights downstream, part of which it was utilizing and part it proposed to utilize, and this utilization of the water power was on the basis and presumably it would be continued on the basis of a relatively uniform use throughout twenty four hours of the day, seven days a week and so on, and that the use to be made of the power development by the West Virginia Power Company in the Bluestone region would ordinarily involve some form of peak carrying operations, with some form of variable flow, and those two things were not compatible.

If sufficient distance intervened between the development having a variable discharge and the power development showing, relatively, a uniform discharge, then question might arise. It did arise in the case of the Bluestone project, because there was a very short distance—only a few miles—from Hinton Dam site to Sandstone Falls not far below Hinton, and, moreover, that section of the river has a very steep slope, so there would be relatively less dampening out of any fluctuations.

As regards the other phase of the question that you ask, I have no doubt that the Electro Metallurgical Company expressed concern—some solicitude for navigation of the Kanawha River, but I suspect its primary cause was in regard to its own riparian rights and use of those.

Q. It did own the site at Sandstone Falls—Hawley first owned it and then it was sold to the Electro Metallurgical Company, wasn't it?

A. It is my impression that Sandstone Falls was by that time owned by the Electro Metallurgical Company or its affiliates and others were by the Electro Metallurgical Company, as there are now downstream from the Sandstone Falls, including Hawks' Nest and Kanawha Falls, existing developments.

Q. You were present at a hearing before Major Trippe on September 28th, 1926, at Radford, on the hearing of the
2667 application of the Appalachian Electric Power Company for a license to construct a water power project?

A. I stated that I was there as an observer.

Q. At that time, didn't the Electro Metallurgical Company make a protest?

A. In that connection—whether or not it was at that time or later on, I don't know, but it was in that connection.

Q. They announced that they would protest and later sent in a letter, didn't they?

A. I would not be surprised if that were true.

Q. That is in evidence as Government's Exhibit No. 101. Prior to that time, this company that you represent in no way ever indicated to anybody that they expected to change from a single dam to the two dams. Isn't that a fact?

By Mr. Thompson:

Q. Do you know?

A. The fact probably is that the idea of a two stage development did not originate with anybody until it originated in my mind, and in 1926, I don't believe I had studied the situation.

Q. So that your thought about the change came subsequently to 1926?

A. It did, within the limits of my recollection.

Q. Very briefly, you have testified that there is a site for a reservoir at Sandstone Falls. Is that a correct statement?

A. I would not call it a reservoir.

Q. A power site?

A. Yes, sir, there is a power site there.

Q. And the place is designated or has been designated from time to time as the gorge between Hinton and Kanawha Falls. There are, are there not, dam sites or power sites down through that gorge?

A. Well, it is a continuous succession of dam sites, but for economical development in that region, one is concerned more with the question of tunneling divers distances than with dam sites. 2668

Q. You could construct dams there, though, to a height of forty feet and get a height sufficient to create power along there, could you?

A. Yes, it would be physically possible to construct them, but I don't believe they can be constructed to that height without a substantial change or cost for a change in the Chesapeake and Ohio Railroad tracks.

Q. Isn't its road-bed higher than 40 feet—something over 50 feet up from the bed of the river?

A. I don't know what the precise distances are. I am certain it is not 50 feet everywhere; that it is less than 50 feet in many portions, and I am doubtful if a 40 foot height could be constructed in a sufficient number of places to allow that figure to be used as a generalization with respect to the situation.

Q. The Electro Metallurgical Company, when it constructed the Hawks' Nest project had gates to more than 50 feet in height. Is that correct?

A. I think that is approximately correct, but one would naturally choose, and undoubtedly the Electro Metallurgical Company chose, a place where that could be done, and it is simply my point that that is not universally true. I think that is the exception.

Q. They actually moved the railroad tracks there, didn't they?

A. Not within my knowledge.

By Mr. Thompson:

Q. Colonel, I call your attention to defendant's Exhibit 594, and in your testimony of yesterday at page 6237, at the top of the page, in which you say: "I consider a reasonable form of discharge is that depected on the chart forming Exhibit 594." I believe you testified, did you not, one of the reasons you stepped this wave up gradually?

A. No, I don't think I testified to that effect.

Q. Would you say that that was one of the reasons why it was a reasonable form of wave?

2669 A. No, I don't think so. It would have steps in it. Any reasonable form would have steps.

Q. It would be a much more reasonable form of wave than if the wave was perpendicular—the left-hand side, we will say?

A. Yes, that is true.

Q. It is a fact a wave that is perpendicular seldom exists, is it not?

A. I take it by "wave," the discharge from the power station which would result from an instantaneous opening up of the complete power situation. That is very rare.

Q. On page 6240, you stated as follows:

"Q. Have you given any consideration to the rectangular or block form of discharge from the power station? Mr. Thomas testified that he considered that in connection with his study of the power tides from the Radford station?

"A. I have. I gave consideration to that form, prior to the work of Professor Thomas and was responsible for his studies and tests with that possible form of operation, but I looked at it as embodying the literal meaning of possibility without any possibility of being probable, let alone certainty; I considered it to be a theoretical form—a theoretical plaything rather than anything in my opinion that would be reasonable to conceive as a natural occurrence."

That is your testimony yesterday, is it not?

A. Well, I think it is except for a few garbled words.

Q. Now, turn to Government Exhibit 227. That wave No. 1, isn't that practically perpendicular?

A. It is very close to it.

Q. Do you think that is a fair test of the type of wave to be used in testing as to waves going down this river?

2670 A. A fair test in what respect?

Q. A fair test of the fact that you say such a wave as the rectangular wave (that is with a perpendicular side to it) is only in the realm of the theoretical and not practical?

A. No. I said, I believe, and still say, that any instantaneous, or almost instantaneous, bringing on of the complete capacity of a power station containing a number of units, is not beyond a possibility, that would occur in cases of emergency. Also the cutting off of the discharge of a power station practically instantaneously, by reason of the interruption in connection with the transmission circuit, but I do not conceive that it is a reasonable expectation with regard to a station like the Radford station, that it would open up the complete capacity instantaneously and continue operating at that capacity for eight hours, and then cut off instantaneously.

Q. Yes, but were not you giving a test here in 1930 by which you were going to judge the Radford project and its discharge and the effect of that discharge upon the river?

A. I do not believe it is proper to say "by which I was going to judge the Radford project or its discharge," but the aim was to propogate various forms of power tides or waves, so that from them there might be gained as much light as possible with regard to the future prospective performance of power tides or various forms which might be propogated by the Radford station.

Q. You were in charge of this demonstration which they used up at the Buck and Byllesby, were you not?

A. Yes.

Q. You were practically the man at the throttle, weren't you? If they don't use a throttle, what do they use when they open up for waves?

2671 A. It is hardly a throttle, but the metaphor may do.

Q. You were the man who was there and conducting how the waves or discharges were going, were you not?

A. The waves were released under my direction.

Q. And when you released those waves, wave No. 1——

A. (Interposing.) I didn't release them.

Q. You had somebody else release them?

A. Yes.

Q. And under your charge and direction?

A. Yes.

Q. Wave No. 1 is practically perpendicular, isn't it?

A. Well, at the Ivanhoe Gaging Station it was practically so, and undoubtedly it was at least as much of that form at Buck.

Q. And wave No. 2 was the same way, wasn't it?

A. Yes.

Q. And wave No. 3 was the same way?

A. Yes.

Q. And wave No. 4 the same way?

A. Very closely.

Q. Wave No. 5 also the same way?

A. Not so much.

Q. It is almost imperceptible, the change, isn't it?

A. It depends on who was looking.

Q. You are a good looker; what do you say about it?

A. I say it is not.

Q. Wave No. 6, isn't it?

A. Very closely.

Q. And the left side of wave No. 7 is, isn't it?

A. Yes.

Q. So that these waves had at least one side, the side of a 2672 rectangle, as they came from the discharge; is that right?

A. They had practically a vertical front as they left the Buck site, and as they passed the Ivanhoe Gaging Station site.

Q. In view of what you testified to yesterday, was that a fair basis on which to make a test for that type of wave?

A. If anything, my impression is that it would, with the amount of water available, result in lower amplitude downstream if one were to depart from that.

Q. Read my question.

NOTE.—The question was read.

A. Well, I think it would probably have been somewhat more illuminating if, at that time, one had known precisely what kind of operation there would be at the Radford power station and released a wave which, in its performance in passing the Radford site, would have had precisely that future form and met precisely the stream bed conditions as regards base flow, and otherwise, which would be met under future operations. Under those circumstances, one would have had the equivalent of the action of real Radford power tides, released from the power station, but there was no such opportunity. One could not know then any more than now what the process is.

Q. But I am asking now, in view of all your foresight and hindright in these matters, are these forms of waves a fair test, when you are going to relate it to the conditions at the Radford project?

A. I do not think there is a one of the lot that represents a specific form such as would ever be released from the Radford power station, or even is that true in passing the Radford dam site, but it is more nearly true of their forms in passing the Radford dam site.

Q. Being an expert in this wave matter, and having given us this design in this defendant's Exhibit No. 594, why couldn't you have stepped those waves up a little, as was done in 594?

2673 A. Leaving aside the matter of being an expert in wave matters——

By Mr. **Thompson**:

Q. (Interposing.) I thought you were.

A. (Continuing.) I will say it would have been possible to have stepped those waves somewhat, and to have used somewhat different forms than were used.

Q. Then why didn't you do it?

A. I don't recall the reason. I think, for one reason, that we didn't know as much about it as we do know, and we do not know everything about it now. We know a lot more about it than we did then.

Q. What was the volume of wave No. 1 as it came out from the discharge, and as shown on the map, above Ivanhoe?

A. I do not know off-hand, but I can give you an estimate made by an assistant.

Q. You testified yesterday that the discharge reached a maximum of a little short of 14,000 second-feet, and somewhat in excess of 15,000 second-feet at the Buck; where was the discharge of these waves that you were showing us of 14,000 and 15,000 second-feet?

A. My reference, as I recall it, to a discharge a little less than 14,000 was an estimate at Ivanhoe Gaging Station, and the reference about 15,000 was a pure judgment estimate on my part to the effect that if a given wave had an amplitude in second-feet of a little under 14,000 second-feet at Ivanhoe, it would have an amplitude definitely greater as it left the Buck site.

Q. That was a guess then, was it not?

A. Purely so, and I think I stated that in effect.

Q. How long did this discharge of 15,000 or 14,000 second-feet last?

A. As I stated, it was very brief. It was peak discharge—I mean peaked in form.

2674 Q. So you would not have the Court to believe that at any time these waves were made on 15,000 or 14,000 second-feet discharge, would you?

A. I thought I was rather careful to state with regard to the waves of maximum amplitude, namely, waves 15 and 16, that I did not consider that they were typical of anything.

Q. And you have no wave here made from a continuous discharge of 14,000 second-feet or 15,000 second-feet?

A. If by that you mean over any prolonged period, such as 6 or 7 hours, or even a few hours, the answer is no.

Q. As a matter of fact, you could not discharge over that time there, an hour or an hour and a half, at the rate of 15,000 second-feet, could you? It is less than that, isn't it?

A. No, you could not. That was the limitation of the amount of water available there. That is the head began to drop, and, therefore, the discharge automatically decreased.

Q. Was one of the reasons why you did not make the waves of greater duration, or of greater volume, because there was not sufficient water in the reservoir?

A. Yes. That is the sole reason that we did not get greater prolongation of them. As a matter of fact, after this series of tests was completed, we endeavored to find a time when conditions on the river would be better adapted for getting waves of still greater volume, greater amplitude and longer duration at the time of propogation. I think I was after a period when the in-flow into Byllesby was something like 3,000 second-feet, hoping to get about that condition, but the condition did not occur within a number of months, perhaps a year, after these tests were completed, and then other matters interfered, and I was unable to bring about the making of these further points.

2675 Q. So your trouble there was you did not have capacity in your reservoir to have waves of any other length, or capacity, or duration, or volume?

A. That was the obstacle to having waves of greater amplitude and correspondingly greater duration. We had pretty fair volume in some of these waves, however. There were certain waves which had volumes which were in general order, although not equal to that of the discharge, as per Exhibit 594. There was one wave, and perhaps more than one, that had a volume approximately equal to the daytime load, as indicated on Exhibit 594.

By Mr. THOMPSON:

Q. Which wave was that?

A. In the case of No. 11, the volume of that wave itself was about 2900 second feet days, which is a little greater than the principal element of discharge for Exhibit 594. In the case of wave 10, it was a little lower.

Q. A little lower?

A. Yes.

Q. And wave 10 is practically perpendicular, isn't it?

A. Wave 10 was almost so at the point of initiation.

Q. Now, isn't it a fact that there are two causes of flattening by waves, and both of them are gravity? In other words, if you have a fountain piling water up in the air, it comes down, and that is pulling down of the earth; and isn't the second factor that there is a flattening out because of the downstream pull on the water?

A. I certainly can agree as to the law of gravity effect, but as to the other I confess I do not understand.

Q. I ask you if this kind of wave you named such as 2676 1, 2, 3, and 4, with the perpendicular line indicating that the discharge was immediately at its extreme, wouldn't those waves naturally, with a short trough between them, wouldn't the tendency there be for those, to use a layman's word, to melt down going downstream? In other words, to level off?

A. Are you referring to 1 to 3?

Q. Yes.

A. I do not think that is true with respect to those more than others.

Q. Wouldn't that be true with respect to those as with respect to defendant's Exhibit 594, where you have such a large base?

A. Given a sufficient distance for travel, I doubt whether the precise form of propogation has a great deal to do with it. If one looks at that same exhibit 227, the forms of the waves, after they have once accommodated themselves to the stream bed and the steepness of slope of New River, do not differ greatly. I have been, myself, unable to determine, from looking at the form of a wave as it passed Hinton, or even the Radford site, to tell what kind of form it had at the point of propogation. They have, roughly, the same general forms after they get started down the river.

Q. Now, turn to Government Exhibit 226; on page 5848, Professor Thomas said:

"Q. Would you say the mode of operation of #226, as indicated by that chart, was as reasonable as the mode of operation on defendant's Exhibit 594?

"A. I can't say one is more reasonable than the other. In my opinion they are both of the same general type."

Now, looking at Exhibit 226, I note there that there is an allowance made for Saturday and Sunday; in other words, 2677 the discharge dropped very decidedly on Saturday and Sunday.

A. What do you mean by "allowance made?"

Q. I corrected it by saying a discharge. Now, why didn't you, in making these tests, make some such allowance as that at the Duck and Byllesby dams in 1930?

Mr. **Jackson**. An allowance of what—of shutting down?

Mr. **Thompson**. A stopping off of the peaking during Saturday and Sunday?

A. Well, there are several reasons, I suppose. I don't know whether it would have been done if physical conditions had permitted it, but actually the limitations of pondage at Byllesby made it imperative to let go, so to speak, once the pond filled up and the water over topped the gates.

Q. Then you would not have a wave on any test here in 1930 comparable to the situation such as you would have had at Radford on Saturday and Sunday, would you?

A. No. That element was recognized and covered by the studies and experiments of Professor Thomas.

Q. Now, isn't it a fact that the trough of the wave between Friday and Monday is much longer than the trough between the waves of Monday, Tuesday, and Wednesday?

A. It is longer than the troughs between waves propogated successively on Monday, Tuesday, and Wednesday.

Q. And isn't the problem down below, after all, a wave which has a very long trough or a very long crest, rather, as compared with little short waves, as you have shown here on Exhibit No. 227?

A. I am not certain that it is, no.

Q. You would not say that it was not, would you?

A. I would not say that the results obtained by Professor Thomas did not take those factors into account.

Q. I am asking you about yourself—your views, and not his views.

2678 A. Repeat the question.

A. I should continue by stating that the reason for my statement is that I am not at all certain that that is the problem; and I assume you mean the major problem, the difficult problem. My reason for the view that it is not such as the result Professor Thomas obtained. He specifically considered that aspect. That is not covered in this series of 1930. That is, there was no gap between propogation of waves such as would correspond to a week-end shut-down of Sunday or Saturday night. There is nothing so long as 24 hours. It was impossible for the reservoir would not hold the water.

Q. What I am saying is, that that 1930 test was not a fair representation of the type of wave which you will discharge out of your Radford project if you operate it in a form such as is shown on Exhibit 226, or as your wave on 594?

A. When you use the word "fair" or "unfair" in connection with the 1930 series of tests, it carries an implication that any given form of wave propogated at Buck and Byllesby was intended to represent a given form of operation at Radford. Now, such is not the case. It was rather intended to cover a variety of forms of power tides under the best conditions that were available then. I have no doubt that the tests could have been conducted with greater intelligence if the available facilities could have been used, but with our limitation of mind and the physical conditions, we did the best we could. The object was to develop information on the basis of which further studies could be made, and Professor Thomas took it up from that point and made studies which, among other things, involved the integrating model——

WITNESS. I have not attempted to say what Professor Thomas said. He, of course, can and ought to speak for himself, but you were asking my view, as I understand it, as to what conclusion I would draw, and I must say that my own conclusions, as 2679 of the present time, are affected not merely by the results of the 1930 wave tests but by the studies and tests which were made by Professor Thomas under my general direction.

Mr. THOMPSON:

Q. So that, if I gather correctly from you, these waves were discharged down there with what knowledge was had at that time, but now would be regarded as almost going in the dark, so far as the waves are concerned?

A. I don't think you understood correctly what I said, no.

Q. Well you have not given waves here that are in any way comparable to the system of waves you would be discharging at the Radford project, have you?

A. I would say they can be compared, that some deductions can be made from them, that they cannot be used within precise limits but certainly the behavior of power tides traveling over a distance of two or three hundred miles on New and Kanawha Rivers is indicated in various respects and to a good purpose for drawing further conclusions, particularly when one works with models, which with a sufficient degree of accuracy can duplicate these results of 1930, then it may be reasonably assumed those same models will reasonably duplicate results from other forms of power tides generated at the same point, traveling by the same gaging stations.

Q. You did not work with any models?

A. Personally I did not.

Q. So that is hearsay from what Professor Thomas said?

A. Not completely. When he said he had certain results I accepted his statements that such and such results followed.

Q. That is hearsay, isn't it?

A. As far as results of computations and experiments and so on are concerned it is hearsay of the same kind I have in

2680 my office if an assistant says to me "I did so and so with such results."

Q. Were you present when Professor made any tests?

A. I saw the models work.

Q. You saw the tests made?

A. Not all of them.

Q. How many did you see?

A. Very few.

Q. When did you seem them made?

A. During the course of this suit.

Q. Did you see the test of a wave like wave #4 for example?

A. No.

Q. What waves on here did you see run through his model?

A. None.

Q. Now let us go to wave #4 on Government Exhibit #227, and let me ask you if the gradient from Ivanhoe to Radford isn't very much steeper than from Radford down to Hinton?

A. Well except for the section between the Norfolk & Western crossing at Pepper Tunnel and the flat section of the river around the Horse Shoe Bend I don't think it is substantially different.

Q. When you considered the question of these waves going down the river, for instance wave #4, did you take into consideration the fact that Radford is approximately fifty miles nearer than the place from which the wave was discharged, that is fifty miles nearer to Kanawha Falls or lock #2?

A. Yes, that is an obvious fact.

Q. Wouldn't a wave that started from Radford, a 9,000 second-foot wave, beginning say on Monday morning, and lasting for eleven hours, discharging for eleven hours, wouldn't that be much more liable to keep its form than a wave that would start from Ivanhoe?

A. What kind of wave from Ivanhoe?

2681 Q. The same, say 9,000 second-feet—I am considering a wave of the same volume, wave of 9,000 second-feet?

A. And the same form?

Q. Yes.

A. Except for that relatively short flat section around the Horse Shoe Bend I wouldn't think there would be a great deal of difference. Possibly out of the Buck station or Ivanhoe, as you refer to it, there might be a little more assumption of what I think is the general form set forth on Exhibit #227. Of course if you mean that is measured at a given point downstream I would say that it follows as a matter of course that a wave of given volume and form, released at Radford, would persist somewhat further downstream, would adhere more nearly to its original form as measured at some downstream station than a wave of the same volume and same form released at Ivanhoe, providing all other conditions are the same, including water in the stream bed, that is the relative emptiness of the stream bed.

Q. Now this wave #4, was there any interference with it, with respect to the raising and lowering of wickets?

A. As far as measured in the Kanawha River I believe there was not. I shall check that. There was a wicket operation I believe just before the preceding wave came to its succeeding trough, and that was in the case of lock #6, I believe, but it is very questionable whether that influenced the form of volume or amplitude of wave #4 at lock #6. It might have, but I think it is questionable. I should say the probability is it did not.

Q. Following wave #4 down the river, what do you find its volume to be at Radford?

A. At the Radford dam site about 1,620 second-foot days.

Q. What is that in acre feet?

2682 A. About 3,200 acre-feet.

Q. And what is it in acre feet when it gets down to lock #2?

A. About 2,800 acre-feet.

Q. So it retains 60% of its volume, does it not, when it gets down there?

A. Well I don't believe it actually did. Various information indicates quite definitely that is not true.

Q. Didn't Professor Thomas agree it was approximately 2800 acre feet?

A. He was giving the same sort of information which I have indicated here when I said—what was it—1,620, perhaps I should not have stated that that was the amount. I have even during the pendency of this suit checked up on that Allisonia gaging station, which is in operation, and the rating curve, which is subject to check from time to time, and have been informed by the office of the District Engineer of the Water Resources Branch of the Geological Survey for Virginia that the rating for Allisonia is somewhat in error, and that carries an implication very strongly to me that the difference between the Allisonia and the dam site "A" rating curve, which was only a temporary one, and based on very few measurements, is in error. The whole thing looks fishy to me, so to speak, with regard to that wave #4 and others at the dam site. For instance, if I read down the column of computations made in my office for Wave #4 I have these figures for volume:

At Ivanhoe 2160 second foot days.
At Allisonia 2060 second foot days.
At Dam Site "A" 1620 second foot days.
At Eggleston 1770 second foot days.
At Glen Lyn 1740 second foot days.
2683 At Hinton 1,720 second-foot days.
At Caperton 1,200 second-foot days.
At Kanawha Falls 1460 second-foot days.

Now those variations say to me one cannot rely on them. I wish we had more accurate data. I wish we knew more about it than we do, but the indication is very strong and outstanding to me that the dam site "A" rating, the one ordinarily referred to here as the Radford rating, is wrong, and the Allisonia is somewhat wrong, which makes the dam site "A" rating appear all the more in error.

Q. Well if as you say this thing looks kind of fishy to you, what is the worth of all these waves then; aren't they useless; aren't they based on a lot of useless data?

A. No, one element of all these tests that is very clear cut and is not in error except as regards possible slips now and then by gage readers, as for instance at the navigation locks and at Pack's Ferry gage is the amplitudes in feet. Stages in feet are of a pretty close order of reliability.

Q. Take #4, how about it in feet, when did you discover these errors you speak of?

A. We have had doubts about them for a considerable period of time, but various things brought out in the suit, in connection with the examination of various witnesses, caused us to make some inquiries and see whether any additional information had been worked up.

Q. Didn't Professor Thomas testify at Radford it was 1620 second foot days?

A. He gave the same figure I have here, and that is what appears on the face of the chart. That he did not use at his control gaging stations in his integrating model. He was concerned with amplitude in stage at those points.

Q. Isn't the real question the amplitude in volume rather
2684 than stage, when it comes to navigation?

A. I don't think it makes a hoot in Hades what the volume is as long as it is spread out over a period of twenty-four hours. One can stand on the river and wear one's eyes out waiting for the river to rise. It is the amplitude that counts.

Q. Might you not, with your trained eye, not be able to see the river rise, and still a volume down there to cause a disturbance in one of these pools?

A. I would not attribute any importance to my own eyes, they are just normal, and that is true of any one else. Take wave #4 on its amplitude scale on Exhibit #228. It took it something like eight hours to rise something less than three inches, or at most three inches.

Q. It was six tenths of a foot high at lock #2, wasn't it?

A. I was referring to lock #6, if I did not state so.

Q. How about lock #2?

A. At lock #2 it took between five and six hours to rise a total of 45/100 of a foot, a little over five inches.

Q. You could observe it, could you not, it was observable on the records every day, lock #2, one-half foot high, wasn't it?

A. Yes, by plotting any one of these and bringing the horizontal scale together one may make it show up, but to recognize on the river a rise of something under one inch an hour is not possible for the human eye.

Q. At lock #4 it was 7/10 of a foot high, wasn't it?

A. That is true.

Q. And at lock #5 it was 6/10 of a foot high, was it not?

A. I think that was 5/10.

Q. Well call it 5/10.

2685 A. I think it is 5/10. On Government Exhibit #228 the trough is labeled at elevation 10.60 gage reading and at the crest 11.10, and the difference between the two is 50/100 of a foot.

Q. Are you measuring from the line—from trough to trough up to the crest?

A. I thought we were talking about the variation one would observe standing along the river, and that would just be a comparison with a preceding trough.

Q. Wouldn't the fall be one whole foot, and that being true, instead of 6/10, look at your wave going down the river #5 [interrupted].

A. You are referring to the trough from the crest of this wave #4 to its succeeding trough?

Q. That is right.

A. That is true so far as standing along side it and observing it is concerned, but that trough was not all due to the wave. That water is superimposed on a falling tide of the river. Now it follows also that the rise at lock #5 would have been somewhat greater than five inches, if one spoke technically as to the amplitude of the wave; and that it would measure to be somewhat greater than might make it 5½ inches.

Q. We are pretty nearly in accord then. Now on #6?

A. #6 wave or #6 lock?

A. #6 lock #4 wave?

A. Well the change there is a scant $^3/_{10}$ of a foot, as plotted from the preceding trough to the crest, and it wouldn't make any great difference even if measured from an inclined line which would probably make it a full $^3/_{10}$ instead of a scant $^3/_{10}$ of a foot.

Q. Lock #9, what do you make it there?

A. Well there the conditions were such that the Hunt-
2686 ington District Office and I agreed the wave was
undistinguishable.

Q. It is a fact, isn't it, that wave #4 so far as you state is observable or recorded as far down as lock #6?

A. Yes.

Q. And even these poor waves such as this one, which was apparently shot up perpendicularly, does carry that far down the river?

A. So long as you don't ask me to agree they are poor waves, if you said they were inconsequential [interrupted].

Q. So far as making any comparison with the kind of wave you have been showing us would be propogated at Radford they are practically useless?

A. They were neither inconsequential nor useless.

Q. Let's go to wave #10 a moment. I think you said this morning that there were actions by the rising and falling, or lifting and falling, of the wickets at #6 dam and #7, fourteen wickets, I think raised at #6?

A. Yes.

Q. So there wasn't any interference until you got down to #6 on this wave #10, was there?

A. I believe that is true.

Q. How many wickets are there at lock #6, if you know?

A. I don't know off hand.

Q. Isn't it about 139 or 140?

A. I don't know the number of wickets that were shifted, but such as definitely affected the water level in the river, otherwise those wickets would not have been shifted. That is a routine operation of that particular dam.

Q. In response to a question of counsel I think it was this
morning, you gave the average reduction in amplitude of
2687 all the waves, I think there were seventeen, I am not cer-
tain about that——

A. Eighteen I believe.

Q. You gave that as five inches, did you not, or five and one-half, or something of that kind?

A. I intended to state and believe I did state that the amplitude in inches as shown by the eighteen waves on the average at lock #2 on the Kanawha River was approximately five inches.

Q. That being so, and assuming now the operation, construction and operation, of the London dam, without a draw-down, would it not seriously affect, such a wave, seriously affect navigable conditions in the London pool?

A. I believe it would not.

Q. The word has been used here by your counsel several times as to whether the pool was kept or these pools were kept at a "mathematically accurate elevation." Do you understand whether they are or not?

A. I understand they are not.

Q. What variation is permitted by the Government in the Marmet pool, if you know?

A. 3/10 of a foot, that is below. Then actual variations take place above. That is merely a temporary working basis.

Q. How much above, what variation above?

A. There is no fixed limit.

Q. What is the ordinary variation above the ordinary pool level, if you know, of the Marmet pool, due to ponding from the London pool?

Q. Don't you know the Lock Masters down on both the London and Marmet, particularly the Marmet, are under command that the moment that pool level drops 1/10 of a foot they are ordered immediately to rectify it?

A. Presumably by opening a gate at London.

2688 Q. Any way [interrupted].

A. I do not—I don't believe it is true.

Q. And if it goes 1/10 of a foot above normal pool level they have the same order?

A. Well they have an order to keep the pool at approximately the normal level on the upper side. I think they would endeavor to keep it within a range closer than 3/10 and I believe that ordinarily they do. There have been various times when the amount over the gates was greater, I don't recall any recently greater than about 15/100 or 2/10 but as to variations lower than normal pool level in the amount of 3/10 of a foot I do not believe it is a fact there are instructions to the Lock Masters at London to release water from the London plant as soon as the Marmet pool is as much as 1/10 or 2/10 of a foot, or even 3/10 of a foot, below the normal pool level, nor is there any instruction to the power company that it shall release water under those conditions from London.

Q. What is the normal pool level of the Marmet pool?

A. In terms of elevation above sea level it is 590 feet.

Q. Is that an even figure?

A. Yes, sir. I might say that regardless of what the instructions are to the various Lock Masters and gate operators, that it is just not physically possible to keep the pools at an absolute level.

Q. But are they not ordered to keep it as close as possible, even to a mathematical point, if they can?

A. Not for that London pool and its three-tenths.

Q. How about Marmet?

A. I should have said Marmet pool and its three-tenths, and, of course, at London the variation is three feet, plus whatever the variation on the upper side above the pool level may be.

2689 Q. I think you said, Colonel, that you were instrumental in negotiating the contract for the establishment of the power plant and the regulation of stream flow and all that went with it at the Marmet dam. Am I correct about that?

A. I participated in that negotiation in my engineering capacity.

Q. Wasn't allowance made there of 250 second-feet for lockage upon which you computed your figures for the rental?

A. There is, of course, no contractual arrangement in that respect at all. The fact is that when the economics of the problem were figured at the various offices of the War Department, particularly at the District Office, there was an allowance for leakage and lockage made in the total of 200 or 250 second-feet. I do not recall which, an allowance in the sense that their estimates of total flow, volume of flow, or rate of flow at any given time, were reduced by 200 or 250 second-feet, so as to reach a figure which they felt surely would represent availability for power purposes.

By Mr. THOMPSON:

Q. I wish that you would turn to Government Exhibit 156. For the record, I should say that this is the hearing before the State Corporation Commission of Virginia held July 28, 1932, Ex Rel Appalachian Electric Power Company, Application for License to Construct a Hydro-Electric Development on New River near Radford, Virginia. Turn to page 56 and I want to read to you from a paragraph there. The heading of the page is "Scheidenhelm."

"A. We propose to install four vertical shaped hydro-electric turbines. Each is to have a rated capacity of about 26,000 horsepower at approximately 110 feet net head with a combined capacity for the same rating of approximately 104,000 horsepower. When operated at that head of 110 feet, and at the point of maximum efficiency, these turbine are intended to utilize

2690 about 9,000 second-feet of water, which is about 2.7 times the average flow. When the turbine gates are fully opened and 110 feet of net head is available, the consumption of water would actually be about 10,000 second-feet or, roughly, three times the average flow of 3,300 second-feet. That is one reason—that is the reason—why it seems unnecessary to provide for any enlargement in the future. The relation of the proposed installation to the stream flow is beyond that which is ordinarily installed in a development of this kind. It is made possible by reason of the large power market of the Appalachian Electric Power Company." Did you make that statement before the Commission?

A. I think I made it in that general form, although there are some stenographic errors in it.

Q. Looking at the bottom of page 57: "Q. I would like to ask you for your expert opinion with respect to the adequacy and suitability of these proposed structures, for the efficient utilization of the water power which is available here, with a brief explanation in support of your opinion. A. That question might well be answered in two parts. The first part, referring to the capacity of the power plant, has in reality already been answered; that is, the hydroelectric units will be of sufficient capacity to utilize water in an amount three times as great as the average stream flow and that is a ratio which is well beyond ordinary possibilities. That is due to the fact that this large power system can absorb a development from this power station. The second phase of the answer to the question has to do with the character and efficiency of the equipment. As to that, I may say that the intention is to have turbines of highest efficiency and that efficiency will be well above 90 percent, and likewise the generators, which efficiency will be well up to 96 or 97 percent, so that once the water reaches the turbines it will be used to the very greatest efficiency." Did you make that statement?

2691 A. I think I made it in essentially that form.

Q. On page 81: "Q. Will you state what recreational, scenic and commercial benefits may be expected to flow from the construction of the project reservoir? A. The reservoir will be, in effect, a lake, a fresh water lake, which by reason of its geographical location, will make it unique. Also its size will make it unique. It will be the largest lake in Virginia. It will be close to an important highway, the Lee Highway. It will have no near competitor, no practical competitor at all by way of a lake for recreational purposes in that part of the country. The nearest large bodies of water, I believe, are all artificial and are a substantial distance. West Virginia has no body of water so large. In North Carolina there may be some on the other side of the mountains. Lakes of this kind are found to be used very generally for recreational purposes, particularly in the summer time for swimming and boating and fishing." Did you make that statement?

A. I believe I did.

Q. Then you make a reference to the Lake Lynn Development on Cheat River. How long is it since you have seen Lake Lynn?

A. Several years.

Q. There is a very active boating on there now, is there not, by motor boats and other boats of that kind?

A. I have no knowledge of that.

Q. Turning to page 92: "What is your opinion of the question as to whether or not this project will involve unreasonable interference with stream flow? A. Any dam that is put across a stream and has gates in it involves some potentiality. However, the applicant realizes that there must be no unreasonable interference with the stream flow and has made the investigation up to this point, and expects to make further investigation if 2692 permitted, with the positive realization that there must be no unreasonable interference with the stream flow but in that connection I would like to point out that this project is unique, very unique, in that there is a source of water supply immediately downstream from the dam which in itself is partly marketable." Did you make that statement?

A. Certainly not in that form.

Q. What form did you make it in?

A. I don't know.

Q. Is there anything wrong with the statement or did I read it incorrectly?

A. No, but the Court Reporter must have taken it down incorrectly—not the Court Reporter, the Commission Reporter.

Q. Wherein is it incorrect?

A. Well, the last thing that caught my attention was "marketable." That certainly doesn't belong there.

Q. Is that the only correction you would make?

A. Well, I don't know. I would want to study that.

Q. What word do you think you used?

A. I don't know.

Q. Would you say that substantially what I have read you said?

A. I am inclined to think that the general import is correctly conveyed.

Q. Did you have corrections made of the record after the hearing?

A. This doesn't look like it, and I don't recall any.

Q. Did you get a copy of it?

A. Well, I probably did but these commission records come along a long time afterwards and certainly I could not

2693 have seen this and made any corrections in the record. I could not have seen the original transcript of this.

Q. Would you suggest where you would correct it, what words you would correct?

A. Well, I don't suppose I ought to be put in the position of giving my testimony over again. I have stated that the general import, I believe, is correct.

Q. (Reading on:) "May I call the Commission's attention in that respect to Exhibit B. Just downstream from the dam site as shown on Exhibit "B", distant a half mile, is an influent tributary of New River named Little River. It empties into New River within the limits where riparian ownership is in the applicant or its affiliated corporations. That stream has a drainage area of a little over 300 square miles. At the gaging station at Grayson (I understand that is Graysonton) the drainage area is, I believe, 302 square miles. It's low water fall is remarkable (I rather imagine the word 'fall' should be 'flow'). It has been gaged and measured and is being measured by the Water Resources Branch, or bureau, of the State Commission on Conservation and Development, and, according to the records of that Commission, in the low water season of 1930, which was practically the same in its effect on the water supply as the low water season of 1925, the minimum flow of Little River was 77 cubic feet per second. That flow persisted for only a day or two. In fact, for the five days centering upon the minimum flow the average stream flow was reported by the Commission's Engineers as being 95 cubic feet per second, 118, 77, 82 and 80 second-feet respectively. The following day the flow went up to 159 second-feet." Did you make that statement?

2694 A. Well, it sounds as though I made it. I don't know about the figures, whether they were taken down correctly.

Q. I want to call your attention to a hearing before the Public Service Commission of West Virginia, page 1548, West Virginia Power Company application for permit to construct dams on New River for hydro-electric purposes, and I am reading from Government Exhibit 253 for identification, from page 107: "Q. What have you to say as to the advantages or the disadvantages of the amended application of two dams over the original plan with one dam? A. The following considerations appear to me to be outstanding and they are all advantages in favor of the change from one-dam scheme to a two-dam scheme of development: First, the Bluestone project in its original form would have been economically feasible only after reliable examination, that is, after reliable examination for carrying big peak loads. Of necessity, this would have resulted in greatly fluctuating stream flow in New River down-stream from the power site, and, in particular, from the power site and the junction of New River wtih Gauley River, or, in other words, the head of navigation on the Kanawha River." Did you make that statement?

By Mr. Jackson. I object to the question. The witness was cross-examined about this this forenoon and this isn't contradictory of anything he has stated.

By Mr. Thompson. I didn't cross-examine him on that at all.

By Mr. Jackson. You cross-examined him about the plans.

By the Court. I will let him answer that question.

By Mr. Jackson. Let our exception be noted.

A. I undoubtedly testified on that subject matter but it certainly is a garbled record.

By Mr. Thompson:

Q. You don't think that stated your views then, do you?

A. Well, I think there is some import that would come from it in spite of all the garbling.

Q. You have got a copy of it there, haven't you?

A. Yes.

Q. Where did you get that copy?

2695 A. We got that from my office and it got to my office from the Public Service Commission of West Virginia.

Q. Did you ever ask them to make any changes in that record?

A. Not within my knowledge.

Q. You read it after you got it, didn't you?

A. Not within my knowledge.

Q. You just made this statement and then went away and never afterwards looked at any record of what you had said before that Commission?

A. I don't know whether I did or not.

Q. I am reading from page 108. [Reading:]

"Secondly, it is believed by me, from the standpoints both of down-stream riparian owners and water power developments, and also of the best interests of navigation on the Kanawha River, the applicant power company would not be justified in taking the risks of constructing or attempting to construct the original single stage Bluestone project, with its 140 ft. dam at the Hinton site, in as much as that dam and power station, and in particular the operation of the power station, would be dependent upon the legal right and the practical ability to operate that power station primarily for carrying peak loads. The carrying of the peak loads means fluctuating output from the power station."

Q. (Continuing) Did you make that statement?

A. I believe I did.

Q. What do you mean by the words "legal right"—"dependent upon the legal right?"

A. That is six years ago. I would have to guess what I meant by it then.

2696 By Mr. Thompson:

Q. You said it was dependent on the legal rights. You mean they had doubt about it?

A. Probably the principal things were that there might be rights of the downstream riparian owners.

Q. But that description of the power station carrying peak loads, that is your view, is it?

A. It being the intent that carrying peak loads and fluctuating output are synonymous. It does not necessarily mean the top of the variable load.

Q. You used the phrase big peak loads. What is that?

A. That proposed power station, whether it be a single stage or at Bull Falls—a big hydroelectric station with a capacity as compared with the Radford plant here from 70% to 100% greater.

Q. You didn't intend to have a peak load at the Hinton reservoir, did you?

A. If you mean the Hinton development of the Bluestone power project divided into two parts, no; if you refer to Hinton dam as being erected at the Bluestone site, and I note I used the words "with its 140 foot dam at the Hinton site," the answer would be "Yes."

Q. You mean a big peak load at the Hinton site?

A. Yes, sir.

Q. On page 109, I read as follows [reading]: "Thirdly, under the present scheme of development, which is the scheme proposed in the amendment of application, such peak load operation, with extreme variation in water output from the power station, can be carried on to the maximum practical degree at the upstream or Bull Falls development without any resistent interference
2697 with the rights of riparian owners or with navigation or
the navigable capacity of the Kanawha River. The operation of the Hinton development will be subject to the necessity of re-regulating the discharge of water from the Bull Falls development, and it has the function of operating and will be operated so as not to interfere substantially with navigation on the Kanawha River or with the rights of downstream riparian owners."

Q. (Continuing.) Did you make that statement?

A. I did, I believe, in essentially that form. There are errors in it.

Q. Is it your understanding that a reservoir of the type of Bull Falls, if you did not have a re-regulating reservoir, that it would endanger navigation below?

A. I do not think that that has relation to the fact that Bull Falls has a reservoir or that there is one there, but rather to the question as to the capacity of installation which was proposed there and the use proposed to be made of it, and its location with reference to down stream riparian owners and the navigation of Kanawha River. For instance, the Bull Falls development would have a water capacity of about 15,500 second-feet at the point of maximum efficiency of its power installation, when the Hinton reservoir—that is the Hinton re-regulating reservoir is filled; about 16,000 or more, with the Hinton re-regulating reservoir drawn down. It would be as much as 18,200 second-feet when the Hinton reservoir is down but with the capacity at Bull Falls operating at full gate. That is a great deal of capacity to be thrown into a stream when the distance from down stream riparian owners is only about 10 miles to the nearest ones, and there are various ones located in a distance of 70 miles 2698 and the head of navigation is a distance of only 80 miles.

Q. Is it your understanding that, if they had a dam at Bull Falls, and were running at peak load, and they had no reregulating dam below, it would affect navigation?

By Mr. Jackson. We object to the question, unless he specifies the size of the reservoir.

By Mr. Thompson:

Q. Taking the size of the reservoir described here. It was before the Commission.

A. There is still another factor, speaking of navigation.

Q. No, sir; can you answer that question "yes" or "no"?

A. No, sir.

Q. Read the question and see if it is not susceptible of such an answer?

(The question is read.)

By Mr. Jackson. Show that the question was amended to show that you mean the size of the reservoir at Bulls Falls.

By Mr. Thompson:

Q. A reservoir of the Bull Falls size?

By Mr. Jackson. And the same size of machinery.

By Mr. Thompson. Yes, sir.

A. One needs to draw into the answer the nature of the navigation facilities, on the Kanawha River.

Q. I don't think so. I did not ask you about the Kanawha River.

A. But I must make the answer.

Q. You must make the answer, but that question is simple enough for you to answer.

A. Not without a qualification as to the kind of navigation facilities.

Q. Do you object to making an answer?

A. Yes, sir.

By Mr. Thompson. All right, the record will show that.

By Mr. Jackson. Let the witness answer the question. He says he cannot answer it "yes" or "no."

By the Court. He says he cannot answer it "yes" or "no."

By Mr. Jackson. He should permit him to answer it, however.

By Mr. Thompson:

Q. Assuming a reservoir the size which you were desirous of getting a license for at Bull Falls—that is, your company; and assuming it to be operated as you described it to the Commission in West Virginia—if it were operated at peak load, would that effect navigation down below on the Kanawha River?

A. You are asking or referring to navigation facilities as they existed in 1930, at the time of this testimony?

By Mr. Thompson:

Q. Well, say in 1930, yes.

2699 A. That is, with the old wicket type dams?

Q. Yes, sir.

A. That had potentialities of affecting navigation.

Q. Did it have potentialities for doing so, or would it actually affect navigation, according to your views, if they had London and Marmet and Winfield dams completed?

A. I don't know; I have not studied that.

Q. I will read from page 127——

A. (Interrupting.) I am inclined to think it would have some potentialities, under those circumstances.

Q. I will read from page 127 here [reading]:

"Q. Please describe the method of operating "dams in generating plants?

"A. That may involve to some degree repetition of what is contained in amendment of application on my earlier statement. The function of the downstream development is to turn out water in a reregulated or relatively equalized manner. The need for it arises from the plan of operating the upstream or Bull Falls development in such a way as to carry peak loads. The carrying of peak loads is an economic necessity. That is the project cannot be justified unless it does that. By the carrying of peak loads means the operation of a power station intermittently or at least with great variation, as compared with what we style a base load or uniformly operated power station."

Q. (Continuing.) Did you make that statement?

A. I believe in essentially that form, yes.

Q. On page 128, I read as follows [reading]:

"The Bull Falls power station can be expected to operate during the hours of maximum demand upon the power system
2700 into which it is to feed practically those hours or the daylight hours, the working days, outside of those hours, perhaps, even during the noon hour"——

By the WITNESS. That read [indicating paper] "ourside."

By Mr. THOMPSON. That has been corrected to read "outside." [Reading] "perhaps, even during the noon hour, the output of power from the Bull Falls station will be curtailed or even cut down to zero. That means the outflow areas, but that intermittent output from the Bull Falls development will empty directly into the reservoir of Hinton development. In the Hinton development that water will be re-regulated. That is, although there will be a varying quantity put into the reservoir, the output will be relatively regular and uniform compared with the input. It is a necessary characteristic, as I believe I pointed out, that the downstream reservoir, re-regulating reservoir, shall have sufficient storage capacity to allow for the accomplishment of that result. It does have that necessity. In brief, then, the method of operating the project will be to operate the Bull Falls development intermittently as a peak load carrier, and the down-stream plant, that is the Hinton power station, with relative uniformity."

Q. (Continuing.) Did you state that?

A. I think essentially in that form. I think in the next to the last sentence, the word "necessity," is an error, and that should read "capacity." There are probably other errors in it, but the general purport is what I stated, undoubtedly.

Q. You agree with the statement or say that you made
2701 the statement "the output of power from the Bull Falls station will be curtailed or even cut down to zero," page 128?

A. Under the circumstances, yes; if there was a power station near which could go to zero, it would be Bull Falls, with a re-regulating reservoir.

Q. I read at page 130 [reading]:

"For instance, the parent of the applicant company, the Appalachian Electric Power Company, has nearing completion plans for a power development at its so-called No. 6 site in Virginia, in Pulask county, upstream from Radford. It is proposed there to make a development which, in the general characteristics, will be much like the Bull Falls development. The storage capacity is proposed to be 100,000 acre-feet. That is enough water to cover 100,000 acres to a depth of one foot. That may be compared with the capacity of the Bull Falls, in the amount of about 125,000 acre-feet, that is, that this Radford development alone will have about 80 per cent of as much as Bulls Falls. In addition it is logical to assume that there will be further development of storage upstream from the Radford power site in Virginia."

Q. (Continuing.) Did you make that statement?

A. I believe I made that in essence.

Q. If the Bull Falls project, being of similar construction and general characteristics, has need of a re-regulating reservoir, wouldn't the Radford project have need of a re-regulating reservoir?

A. That does not follow at all; no, sir. There is a distinct difference in that. The general characteristics are the same in that the height of the dam is sufficient in each case so it will be called a high dam, as compared with the Hinton re-regulating 2702 reservoir dam, which is only about 45 feet high and would be called relatively low—a relatively low dam. Certainly, so far as the dam is concerned, you would not say that the Hinton dam has the general characteristics of the Radford dam. The Bull Falls development is of the same general nature. The heights of the dams are roughly 118 feet, as compared with 143 feet. The reservoir capacity is not so tremendously different between Bull Falls and Radford, but Hinton would be entirely different in characteristic, as regards reservoir capacity.

The water capacity of the two stations, as proposed, would be radically different. Radford was proposed for 9,000 second-feet capacity.

Q. Are you reading from something?

A. From some figures that I have, yes.

Q. You are reading from notes, not simply figures, are you.

A. They are figures that I am reading. [indicating paper.]

Q. Where did you get them?

A. From an assistant.

Q. Where?

A. From an assistant that I had make them up for me.

Q. Who is the assistant?

A. It happened to be Mr. John Snethlage, in this case.

Q. He made them up yesterday, did he?

A. No, some of them were made the day before yesterday, and yesterday.

Q. Since we have examined Dr. Mead?

A. That is true, yes, sir. May I complete my answer?

Q. It would be better if you would complete it without reading from that paper.

By the COURT. He could not be expected to carry it in his head. He may read it.

A. I am not reading anything but the figures, which I do not carry in my memory. I was coming to the water—to the 2703 comparison of water or the discharge capacity. The Radford project is to be at a point of maximum efficiency at a capacity of approximately 9,000 second-feet; whereas, Bull Falls development would have a capacity varying from 15,500 to 16,200 second-feet, at the point of efficiency, the variation depending on the stage of water of the Hinton reservoir, so that the Bull Falls development has about ⅔ or is about ⅔ greater in its discharge capacity than Radford. That difference in reservoir capacity is not material, because, so far as the variable load or peak carrying load is concerned, all that is necessary is that there be sufficient water for a day or a few days pondage, and there is more than a few days in each.

2704 Another factor is the proximity of the Bull Falls development to Hinton and the possible trouble as regards down stream riparian owners or still further down navigation works. The Bull Falls development is within about 10 miles from the nearest power development of any other interest down stream, whereas, the Radford development is something like 90 miles away from it. Comparing distances from the head of navigation on the Kanawha River, Bull Falls development would be a distance of 81 miles and Radford twice that far, and then as regards this distance there is the further fact that the steepness of the slope from Hinton to the Kanawha River is substantially greater than is the slope from Radford to Hinton or the Bull Falls site, and that has a definite effect upon the travel of power tides,—power tides would flatten out more in the upstream stretch than in the down-stream stretch. Moreover, in 1930 wicket dams were in existence on the Kanawha River, and there was not an authorization of funds for construction of new navigation dams, and the wicket type dams, to the extent of eight on the Kanawha, were, therefore, very much in the forefront. With the Radford project, all have been displaced or will be by the time the project goes into operation. The statement that I made before the Public Service Commission of West Virginia took into account primarily the necessity as a business proposition, as I saw it—that there would be a change in the form of the development, and that was from a single dam, not at Bull Falls but at Hinton, which meant a proximity even greater to the interests generally down stream.

By Mr. **Thompson**:

Q. Are you through?

A. There is just one other point to be put into the picture and that is that the Bull Falls reservoir is located immediately adjacent to a re-regulating reservoir, and can be operated with-
2705 out consideration of any down stream rights whatsoever, because nothing intervenes. The water out of Bull Falls would empty into the head water at Hinton. In the case of Radford, there intervenes a great stretch of river, and there is within that stretch quite a difference from what there is below Bull Falls; there are various riparian considerations to be taken into account: One is Narrows stream plant of the Virginian Railway Company, of a capacity of 40,000 kilowatts, which depends for condensing water on the New River.

Another is the Glenlyn steam plant of the Appalachian Electric Power Company, that has about 80,000 kilowatts, that is likewise dependent on the flow of New River for condensing water.

To be sure, in the latter case, there is no diversity of ownership, but there is certainly an absolute need of keeping enough water in the stream to provide circulating water for a large steam station.

Q. Do you speak with the authority of the corporation which you represent, the defendant, when you say, if I understand you, that, if the Government does not build this project, and your company is successful in this litigation, that your company will build it?

A. I see you do not distinguish between myself and that company. I am not a general agent for that company.

Q. You said yesterday——

A. I have not finished.

Q. You said yesterday that, if the Government did not build it, you people would build it—this company?

A. I did not use any words, I think, that were equivalent to "we people"; but in my opinion, from the status of the project, the money spent on it, the recommendations that I have made,
2706 and the manner in which these recommendations have been received, the growth of the system load—all of these things tell me that the project will go on to construction—would have gone on with construction in 1930, had the license from the State of West Virginia been granted.

Q. Why has the Company been fooling with this project since 1912, and not gotten to the construction of it?

A. Well, it was not this company that did the fooling, if fooling was done. There were questions of State laws affecting that; the diversity of ownership and contentions that were not reconciled until the mergers in 1925 and 1926, in which the Appalachian Electric Power Company brought together the warring interests, so to speak. It takes a long time to put a large water power development into operation or being. This Radford project was laid out, not in its present form, but was conceived in 1914 or 1915, and is not yet in existence.

Q. You made application about 1924 for a license, did you not.

A. The West Virginia Power Company, prior to my connection with the Company, made application for a license to the Public Service Commission of the State of West Virginia.

2707 By Mr. Thompson:

Q. You said, on page 6299 of this record, in your testimony, as follows [reading:]

"Q. State if you know whether or not this Bluestone project of the West Virginia Power Company is still included in the plans of the defendant and its affiliates with the developing of power stations on New River?"

By Mr. Thompson. And your answer is "Yes."

By Mr. Jackson. That should be "for."

By Mr. Thompson:

Q. It is "with" here. Were you talking with authority or just talking then?

A. I was probably talking with knowledge.

Q. That was with knowledge of the plans of the company.

A. As they existed then.

Q. What I mean is, it was yesterday that you were talking?

A. I beg pardon; I thought you were quoting from the other transcript.

Q. This was yesterday.

A. I thought you were quoting from the transcript of the Public Service Commission. I do not understand it.

Q. I read the statement and your answer "Yes"; and I asked if you spoke with authority from the company or just talking as one, Mr. Scheidenhelm?

A. I was speaking with the knowledge which I have gained as a consulting engineer and in quite close contact in that capacity with that particular company and its affiliates.

2708 Q. Do you understand that they will, if they are victorious in this litigation—that they will go forward——

By Mr. Jackson. What litigation?

By Mr. Thompson. The litigation before Judge McClintic right now.

A. In the broad sense, they will go ahead and build. As to the fact of whether they will go on in a week or a month or a year after the situation is cleared, I am not prepared to say that. No one would know that under the present status, when the water is so troubled.

Q. On page 138, I read.

A. Which record?

Q. Of the West Virginia Commission record. [Reading:]

"Q. I still don't catch your idea, Colonel. Do you mean to say that if the water is not necessary to carry the peak load that you would let the water down through the dam during the dry period in order to keep the normal flow going."

By Mr. THOMPSON. And your answer. [Reading:]

"That might be the case, and the power company might be altruistic enough for that, but the fact is there is a need for the peak load and the operators of the power system would only be too glad if they had more water available. They are limited by the available water."

"Q. That would depend on the demand for power, wouldn't it?

"A. But that cannot be conceived, reasonably, even in times of business depression, not to require all the output possible."

2709 By Mr. THOMPSON:

Q. (Continuing.) Is that a statement of yours?

A. Yes, sir; essentially that.

Q. I am reading from page 140 of the same record. [Reading:]

"Q. So that coming back to your point, if there were enough water available the power system operators would gladly get more than 50,000 kilowatts capacity out of the Bull Falls development during the low water, so that the water that is turned out will not be turned out for any altruistic motive, it will be turned out to generate energy. The load would demand it; it would be economically advantageous to do it. Now, the result of this upstream storage will be to make more water available. The Radford project is to go to construction practically concurrently with the Hinton development, assuming this Commission grants the license. They are economically related, as is the Bull Falls Development. Have I made myself clear?"

By Mr. THOMPSON:

Q. (Continuing.) Did you make that statement?

A. I think I did in essentially that form.

2710 Redirect examination by Mr. JACKSON:

Q. Col. Scheidenhelm, on cross-examination the Government had you identify, and offered in evidence as Government Exhibit 256, a letter dated October 16, 1931, written by you to Major Herman, District Engineer, Huntington, West Virginia, inquiring whether there had been any difficulty in maintaining pool level on the Kanawha River in 1930, and asked you whether you received any reply. I now show you a letter dated October 20, 1931, addressed to F. W. Scheidenhelm, signed by

United States Engineer Department, by F. B. Davis, and already marked "Defendant's Exhibit 514 for identification," his signature having been identified by the Government witness Teeter, and I ask you whether that Exhibit 514 is the reply which you received to Government Exhibit 256?

A. It is the reply.

Mr. **Jackson.** We offer this Exhibit 514 in evidence. I will read it: "In reply to your letter dated October 16, 1931, regarding difficulties experienced in 1930 in maintaining pool levels above Dams Nos. 2, 3, and 4 on Kanawha River, you are hereby advised that difficulties were experienced in maintaining pool levels above Nos. 2, and 3. However, the deficiency in pool levels was not due to the low discharge in the river, but to missing timbers and stone filling at the tops of the fixed crib dams. After repairs were made, the pools were a little low at times, due to leakage through the old crib dams. No particular trouble was experienced in holding pools above movable dams below, though considerable caulking was required to prevent excessive leakage."

At this time I produce and ask to have marked for identification House Document No. 306, 74th Congress, First Session, entitled: "Ohio River. Letter from the Secretary of War transmitting, pursuant to Section 1 of the River and Harbor Act approved January 21, 1927, and Section 10 of the Flood Control Act approved May 15, 1928, a letter from the Chief of Engineers, United States Army, dated August 14, 1935, submitting a report, together with accompanying papers and illustrations, containing a general plan for the improvement of the Ohio River for the purposes of navigation and efficient development of its water power, the control of floods, and the needs of irrigation."

(**Note.**—This document is filed marked "Defendant's Exhibit No. 601 for identification.")

Mr. **Jackson.** I would like to withdraw Exhibit 514 and substitute a photostatic copy.

From page 146 of "Defendant's Exhibit 601 for identification" I offer in evidence paragraph 263 [reading:]

"263. Low water flow. The flow of the Ohio River was, in general, lower during the fall of 1930 than it has ever been since records of this nature have been kept. Table 45, appendix A, part 4, contains estimates of low water flow at all dams in the section of the river under consideration." A foot note shows Table 45, appendix A, "Not printed."

I now produce a photostat bearing the title at the top, "Table No. 45. Low water flow—Ohio River, regulated by reservoirs under Plan 1," and ask to have it marked "Defendant's Exhibit 602 for identification."

(**Note.**—The paper referred to was so marked.)

By Mr. **Jackson**:

Q. Col. Scheidenhelm, I show you Defendant's Exhibit No. 602 for identification, and ask you whether that is a photostatic copy of Table 45, Appendix A, referred to in paragraph 263 of Exhibit 601 for identification.

A. It was furnished to me by the office of the Chief of Engineers of the Army as such, and it bears all the earmarks, and I accepted it as such.

Q. Was that delivered to you by the Chief of Engineers in response to your request for that information?

A. It was.

Mr. **Jackson**. We offer in evidence this Exhibit 602.

Mr. **Thompson**. If the Court please, we have no objection, subject to examination, to this exhibit being marked for identification at this time.

We would like to look it over.

By Mr. **Jackson**:

Q. Col. Scheidenhelm, during your cross-examination you were asked whether, in particular, waves Nos. 1, 2, 3, and 4 of the 1930 wave tests were not rectangular in form with substantially perpendicular faces. Is that a fairly accurate description of those waves as they were initiated?

A. Quite so.

Q. State whether or not in your opinion there is any
2711 other form of wave with the same volume of water which
could produce any more severe effect in passing
downstream?

A. Speaking of form of wave at the point of propogation, waves which have form other than rectangular, and particularly triangular forms, tend to lose amplitude and volume more rapidly than do waves of the rectangular form. That is the most severe form.

By Mr. **Jackson**:

Q. What relation does the present answer you have just stated have relative to the persistency of the wave?

A. The wave which in its original form of propogation is of the rectangular or block form, tends to be more persistent in its travel down-stream as compared with the travel from the same point of initiation through the same course and with the same volume of a wave of a different form.

Q. Taking into account all of the means of wave propogation available to you at Byllesby and Buck for the purposes of these 1930 tests, could you have caused the propogation of any waves which, in their effect on the Kanawha River, would have been more severe than those which were actually propogated during those tests?

A. It was the intention to set up the most severe condition. As far as I knew then, and as far as I know now, the available facilities by way of power station, or reservoir, or pondage, and taking into account water supply, does not permit the doing of anything by way of wave propogation which would have had a more severe effect in the Kanawha River.

Q. How does the volume of wave 11, in the 1930 tests, compare with the discharge shown on Defendant's Exhibit 594?

A. By wave No. 11, I presume you mean the large wave centering on March 22 at Ivanhoe?

Q. That is what I understand.

A. At Ivanhoe, that wave had a volume almost equal to the total volume of discharge shown for the Radford power station
wave, exhibited as No. 594. That is, the latter has a volume
2712 of 3,000 second-feet days; the wave of the 1930 series had a
volume of 2,900 second-feet days; wave 11 had a volume substantially greater than the daytime portion of the Radford discharge on Exhibit 594. Actually, wave 11, as shown by Government Exhibit 227, was preceded in point of time by a small wave centering approximately on midnight of March 21–22, and that small wave approximates, to a substantial extent, the evening portion of the discharge shown on Exhibit 594.

At Ivanhoe, that small wave had a volume of approximately 500 second feet days. Thus that small wave, plus the succeeding wave 11, had a combined total of 3,400 second-feet days, which volume compares with the 3,000 second-feet day volume of the form of discharge for the Radford power station shown on Exhibit 594.

Q. Have you finished your comparison?

A. I have.

Q. On your cross-examination you testified that the average amplitude in stage of the 18 waves of 1930 tests, at Lock No. 2 on the Kanawha River, was approximately five inches. What was the average period of time which these waves required to rise the five inches in amplitude to which they attained at Lock No. 2?

A. I do not have the figures for the 18 waves because four of the 18 (13–A, 13B, 14–A, and 14–B) were practicalyy negligible at Lock No. 2. However, eliminating those four waves and treating the remaining fourteen, I find the average time of rising for the fourteen was about five and a half hours, and the average time for the fall was nineteen hours. That is the average duration of the fourteen waves was twenty-four and a half hours, approximately. Another reason for eliminating the four waves which, on Exhibit 227, are designated 13–A, 13–B, 14–A, and 14–B, is they were propogated near twelve hours apart, and in that respect differ substantially from the periods of propogation of the remainder of the number of waves.

By Mr. **Jackson**:

Q. How does the total average duration of the fourteen waves compare with the periods of release of possible power tides at Radford?

2713 A. In general, power tides which might be released at Radford would be twenty-four hours apart. That would obtain during all of the successive days when waves are released; or, to put it more accurately, when there is a variable flow discharge carrying some part of the system peak.

Q. Then would the comparison be between the 24½ hours and the 24 hours in that respect?

A. Yes; it would be on that basis. It just happens that the average interval between the release of waves at Buck and Byllesby for the fourteen I have mentioned is just a trifle over 24 hours.

Q. What was the average length of those fourteen waves of the 1930 power tests at Lock No. 2?

A. About 100 miles.

Q. Have you a chart which would graphically illustrate something of the actual form of these so-called power waves or tides at Lock No. 2?

A. We have a chart which depicts a wave on a full size vertical scale.

The **Court**. Are you not going back to the direct examination?

Mr. **Jackson**. I do not think so, but this is the last question I have on waves. It is only intended as illustrative, but if the Court thinks I am going too far, I will not press it.

Mr. **Thompson**. I object to any testimony with regard to the exhibit which it is proposed to introduce, as going beyond the limitations of redirect examination.

Mr. **Jackson**. All right. The defendant offers at this time, as a part of its re-direct and explanatory of the cross-examination as to the form of the so-called tides or waves, to prove graphically through this witness that such power tides or waves, when plotted in accordance with their actual size and form, will show a total rise at Lock No. 2 of possibly four or five inches, with a length of approximately 105 miles, so that the true picture of the wave will be a picture of a wave 105 miles long, rising over a period of many miles to a maximum height of four or five inches and receding over a distance of many miles to the original level.

Mr. **Thompson**. We object to counsel's description, as it is not based on the testimony in this case.

The COURT. That is what he is offering to prove.

Mr. JACKSON. I assume that offer is declined, and that we have our exception?

The COURT. Yes.

By Mr. JACKSON:

Q. On your cross-examination attention was directed to Government Exhibit 226, and particularly to the computed output from the Radford station for five week days as shown on that exhibit; will you please state what volume of water is included in the discharge of the Radford station, as shown on Government Exhibit 226, for each of the week days?

A. For Monday, October 24th, 3,620 second-feet days, approximately; Tuesday, 3,750 second-feet days; Wednesday, 3,900 second-feet days; Thursday 3,620 second-feet days; Friday, 3,400 second-feet days. Those are approximate figures.

Q. Col. Scheidenhelm, I show you Government Exhibit 229 and Government Exhibit 230, and ask you to state briefly whether there are any errors in those exhibits?

A. I find some discrepancies in them.

Q. State them briefly?

A. Some of the discrepancies I find have already been referred to in the testimony, and I shall not touch upon them unless 2714 counsel desire it. In addition, in the lower diagram on Exhibit 229, comparison of that exhibit with the original automatic gage chart, shows that the pool level at the upper end of pool No. 6 has been plotted uniformly at a level one-half foot below that actually shown by the chart.

In the case of Exhibit 230, I find apparent errors in the plotting of the elevation at Marmet dam (that is at the upper end of pool No. 6), for each of the respective times indicated. In one case, the error is of what I would style negligible extent; In the other cases they are not negligible. The maximum is about 1.3 feet.

Q. That is the nature of the errors? Are they in connection with the levels?

A. The elevations I find to be incorrectly plotted, a part of the error lying in the fact that chart 229 has been plotted one-half foot in error from the original gage chart, and the remaining errors I cannot account for.

Recross examination by Mr. THOMPSON:

Q. Colonel, on Government Exhibit 229, about which you have just testified, and on which you say there is an error, is that error of any consequence with relation to the purpose for which this exhibit was introduced?

A. As far as concerns the plotting of the upper end of Dam No. 6 pool on Exhibit 229, I would not consider that of consequence. I do consider it of consequence in that it forms basic data for the plotting on Exhibit 230.

Q. Do you regard what you assert to be an error, carried over from Government Exhibits 229 and 230 with respect to No. 6 pool, to be a serious one, or material, in view of the purpose of this exhibit in this case, namely, to show the profile of the water surface in Marmet pool?

A. Of course, it does not correctly portray the water surface in the Marmet pool, but I would surmise the purpose of Exhibit 230 is to show that fluctuations had occurred in Dam No. 6 pool 2715 due to the operation of the Marmet dam, and, in that respect, the errors are such as do not wipe out the fact that there are such fluctuations due to the Marmet dam, but it does change substantially the quantitative extent of those changes, as shown on Exhibit 230.

Q. The errors which you say appear on Government Exhibit 230 with respect to pool No. 6 do not affect the representation with respect to the Marmet pool, do they?

A. They do not, although in that particular representation there is the error pointed out at some time during the testimony as regards the so-called first oscillation at 4 P. M., which I did not mention this morning.

Q. And that error has been previously alluded to in testimony as two-tenths of a foot, has it not?

A. I believe that is true.

Q. You would not call that material, would you?

A. It is about one-third of the total amount previously shown.

Q. That would not be material, would it?

A. I do not think it is material upon the question that there are no fluctuations now caused in the navigation pools by the Marmet and London dams. It merely has to do with quantitative extent of these variations.

Q. You have reference to Government Exhibit 227. You have just testified, I believe, that wave No. 11 was comparable in volume with the wave on Defendant's Exhibit 594, if you include the preceding wave between 10 and 11; isn't that correct?

A. I believe I stated that the total volume of wave 11, without the small waves, is approximately equal to the total volume of the discharge shown on Exhibit 594. If the small wave be included, then the combined total, as per Exhibit 227, is somewhat greater than the total of the discharge from the Radford station, as indicated on Exhibit 594.

Q. On 11, how long is the time of discharge?

A. Wave 11, as measured at Ivanhoe in terms of ampli-
2716 tude in stage or feet, has a slightly complicating feature at
the bottom of the main wave. If one considers the duration of time just at the top of that small amount of preliminary discharge presumably caused by some discharge over the gates at Byllesby and Buck, the duration would be roughly 12½ hours. If one takes into account that preliminary leakage, one might call it, over the top of the gate, the duration would be about 16½ hours.

Q. And, if you do not take that into account, it is 11½?

A. I stated about 12½.

Q. Now then, on No. 594, it is about 16½?

A. It is about 16½ hours, as I recall it.

Q. Colonel, wouldn't the Radford project be carrying a variable load more than 90 percent of the time?

A. I never made any estimate of it. I doubt that.

Q. What would you say?

A. I say, I never made any estimate of it.

Q. You have thought about it, haven't you?

A. Not in those terms.

Q. What percentage of time does 9000 second feet obtain at the Radford dam site?

A. According to natural flow conditions on an approximate basis a flow of 9,000 second-feet, apparently would exist about five percent of the time.

Q. That would mean there would be a flow of less than 9,000 second-feet for 95% of the time?

By Mr. Jackson: I object to the question as not proper recross examination.

By the Court. He may answer.

By Mr. Jackson. Exception.

A. That is true if under natural conditions, not under operating conditions there, neither the periods of storage in the reservoir or the periods of low flow when there would be draft upon the reservoir—the latter would not affect the situation greatly but the former would. Certainly when a power station such as
Radford has a full reservoir and a flow of around 6,000
2717 second-feet and up, perhaps even 5,000 second-feet and up,
the variable flow set up by that would be comparatively little or nothing. I have not reasoned that thing through sufficiently to express it quantitatively.

Redirect examination by Mr. Jackson:

Q. Col. Scheidenhelm, in connection with the Grounding No. 1, testified to by the witness Elsey, Witness Elsey has furnished data to the effect that this grounding occurred December 28, 1935, at 8 a. m. The tow was four barges, the draft 6 feet, and under the heading "exact grounding" the statement is "ice gorge". Have you investigated the condition of the river and of the operations of the Marmet power station on that date?

A. I have.

Q. Will ~~you describe~~ the condition of the river and the operation of the Marmet power station at a date corresponding to this grounding?

A. Prior to the time of the stated grounding the water levels at the foot of the Marmet dam and locks had, for at least 24 hours, been at a level which, at a minimum, was about 1½ foot above the normal pool level at Pool #6. There was no variable load or peak carrying operation at the Marmet hydro station. The outflow from the Marmet power station was the only power outflow which could have had any conceivable bearing upon the question as to whether the grounding was caused or not caused by power station outflow. That is, the London Power Station outflow could have had no relation. The operations of the Marmet power station could not have been the cause of the grounding.

Q. In connection with grounding No. 5, testified to by the witness Elsey, the witness has produced a statement purporting to come from a record to the effect that this grounding occurred May 20, 1936, at 11:10 a. m., that there was a tow of eight barges, the draft of loading was 6½ feet, and the exact grounding was Lock 10. Have you investigated all the conditions of the river and the operations of the Marmet Power Station at that time?

A. I have.

By Mr. Jackson:

Q. Will you please describe the condition of the river and the operations of the Marmet power station at the time corresponding to the date given by the witness Elsey for grounding No. 5?

By Mr. Thompson. Your Honor. I further object on the ground that he isn't showing the source from which he gets this information.

By Mr. Jackson. At the time the witness Elsey was on the stand he undertook to testify to six alleged groundings of tows in the Kanawha River, which were designated by number for convenience, grounding #1 being testified to as having occurred about the middle of December, 1935, below lock #10, later corrected to lock #8. Grounding #2 was testified to as having occurred about seven or eight days later, below Lock #10. Grounding #3 was testified to as having occurred below lock #10 in January, 1936. Grounding #4 was testified to as having occurred below lock #11 in April, 1936. Grounding #5 was testified to as having occurred below lock #11 in May, 1936. Grounding #6 was claimed to have occurred around July 1, 1936, below lock #10. We asked the witness to produce or supply us with the exact dates of those six alleged groundings, the number of barges included in the tow, the draft to which they were loaded, and the exact location of the alleged groundings, and I now call upon Government counsel to supply that for those six alleged groundings or else move the testimony as regards those be stricken from the record.

By Mr. GATCHELL. Of course, your honor, in the direct testimony of Captain Elsey no request was made upon him for the furnishing of any record in substantiation of his statement he had six groundings on some dates within the past year. That request was made by counsel for the defendant, and on cross examination Captain Elsey supplied dates as nearly as he could recall. We attempted to secure through Captain Elsey the original log books from the company for which he worked, the Raymond City Coal and Transportation Company, and the Huntington District Engineer office as well, and we were unable to get the original log books. He has not supplied them and apparently cannot obtain them. They will not let those log books go out of the Raymond City Coal and Transportation boats——

By Mr. JACKSON. Boats?

By Mr. GATCHELL. I mean out of their office. We have received a letter from Captain Elsey dated August 18, 1936, addressed to Lt. Col. John F. Conklin, and if the defendant cares to have me do so I will read that, or else just offer it without reading it, supplying the dates as nearly corresponding as he could with the dates mentioned in his testimony. He gives a number of dates.

By Mr. JACKSON. Before you read them may I say——

By the COURT. Have you seen the letter?

By Mr. JACKSON. Yes, sir; and the situation is this. He purports to give one record of a grounding in December, 1935. While it is a good many days off from his grounding #1, I would raise no question about that, because a matter of approximation. He then shows no possible date for grounding that could possibly relate to his alleged groundings 2, 3 and 4, which occurred, according to him, at the very end of December, January, and one in April. The groundings he shows after the alleged grounding of April is one of May 20, 1936. His grounding #5 was alleged to have occurred in May, 1936, so if there is any data to support it, it must pre-empt that. He has a record for June 28, or at least he says he has, and sends the data he says was taken, that would roughly correspond to his July 1, 1936. Although he could produce nothing corresponding to 2, 3 and 4, he undertakes to list eight other additional groundings, which the Government wants to put in evidence without subjecting him to cross examination, and it is our position we are entitled to any data available for those six groundings, and if none, we are entitled to the statement there are none, so where there is any data we may show the condition of the river, and the Government has no right to inject into this record evidence of alleged groundings at other times without producing any witness and submitting him to cross examination, merely because they have failed to supply data that their witness was asked to supply and which he said he could supply in substantiation of his six alleged groundings.

By the COURT. The data in that letter is to be received as to so many of those incidents, these groundings as you refer to them, as can be identified with ones to which the witness testified on the stand. In other words, the situation will be he testified to a certain number of these incidents while he was a witness on the stand, and was asked to furnish more detailed information as to the dates, location, draft of the barges, which were grounded, and as to the nature and extent of the load, and he has furnished it as to three of those.

By Mr. JACKSON. Then as to grounding #1 the closest approximation to that, the data furnished by the witness Elsey, is as follows:

Date, December 28, 1935. Hour, 8:00 A. M. Number of barges, four. Draft six feet. Exact grounding, ice gorge.

As to grounding #5, the witness Elsey has furnished the following information:

Date, May 20, 1936. Hour, 11:10 A. M. Number of barges, eight. Draft, 6½ feet. Exact grounding, Lock #10.

As to grounding #6, the witness Elsey has furnished the following information:

Date, June 28, 1936. Hour 8:55 A. M. Number of barges, eight. Draft, 6.5 feet. Exact grounding, Lock #11, with notation "double trip."

By Mr. GATCHELL. And of course your Honor the note appearing at the bottom of this should also be in the record, although the whole letter is of course to be received by your Honor. That note reads as follows:

"NOTE. December 1935 not noted on Manifest.

"Seven days later not recorded.

"Stages below Marmet not noted on Manifest.

"Record can be had Marmet dam and Point Pleasant, West Virginia."

Now in that connection he said that he had recalled an instance in which there had been a rise in the stage on the Kanawha River of about three feet over night. We requested him to supply the date this occurred at the request of counsel for defendant. He has not done so, but we have been informed by the Huntington office on May 18th there was a rise on the lower gage at Marmet of 2.6 feet, between 7:00 P. M., and 10:00 A. M., on May 25, 1936, there was a rise in stage of 2.1 feet between 8:00 P. M., and 10:00 A. M. on the same gage, and on May 26, 1936, there was a rise in stage of 2.4 feet between 4:00 A. M. and 10:00 A. M.

By Mr. JACKSON. We object to that because there is nothing produced by the witness Elsey in support of his statement.

By the COURT. That information you have is from another source, has nothing to do with Elsey's testimony?

By Mr. GATCHELL. Capt. Elsey testified that he recalled the rise of three feet over night and counsel for defendent requested him to supply the data on which that occurred and, if he could not get it, to secure it from some source.

By Mr. JACKSON. I didn't request him to do that. I requested him to supply it.

By Mr. GATCHELL. Counsel for defendant requested him to supply it, and they have asked me to secure that data from Capt. Elsey if I could do so and if I couldn't do so to call the Huntington office, that it had been supplied by the Huntington office.

By Mr. JACKSON. What Huntington office are you referring to?

By Mr. GATCHELL. The District Engineer's office.

By Mr. JACKSON. I object to the acceptance of that statement.

By the COURT. Does it relate to this particular incident that the witness Elsey testified about?

By Mr. JACKSON. He testified about having observed a rise of three feet. I asked him to supply the date. He has not done so. Counsel comes in and reads three dates. I don't know whether he thought he would testify to three dates or not, and he says it is from information he has collected from the Huntington Engineer office. If the Huntington engineer office wants to produce testimony, we will be glad to have them here.

By Mr. GATCHELL. Here is the colloquy, Your Honor, page 3075 of the record:

"Q. And you made a statement that you saw three feet difference below the Marmet dam, didn't you?

"A. I didn't say that I saw it.

"Q. What did you say?

"A. I said I received the Government reports of the river being from three feet and then showing a gage of three inches to four inches at the mouth.

"Q. You mean you received a Government report that showed that the gage was three feet different from what?

"A. Three feet higher than it was the day before at the time that I had received my marks from the previous day.

"Q. And will you give the date of that?

"A. I haven't got the date of that; no, sir.

"Q. Will your records show it?

"A. Yes, sir; the United States Government records will show that.

"Q. Do you have the record?

"A. I don't have that record unless I can get the proper date.

"Q. Will you find it the same way you found it before and send us the date?

"A. Yes, sir; I will try to locate it."

By Mr. Jackson. He hasn't done so.

By the Court. Now you come in here with—what is it, Mr. Gatchell?

By Mr. Gatchell. I come in here with the record supplied by the Huntington office.

By the Court. There is nothing to indicate that it relates to the time or the incident of which that witness spoke?

By Mr. Gatchell. He didn't relate any time, Your Honor. That is the difficulty.

By Mr. Jackson. We ask him to do that.

By Mr. Gatchell. He said he would get it.

By Mr. Jackson. But he didn't.

By the Court. The objection to the introduction of that is sustained.

By Mr. Gatchell. Will Your Honor grant us an exception, please? Do I understand the letter from Capt. Elsey and the list attached is received by Your Honor?

By the Court. As to those particular incidents, as to which he testified.

By Mr. Gatchell. Will Your Honor grant us an exception to the receipt for that purpose?

By the Court. Yes.

2718. By the Court. I think perhaps he had better show the source.

By Mr. Jackson:

Q. Will you state the source of the information that you have about the condition of the river and the operations of the Marmet Power Station?

A. The primary sources as to the elevations of pool levels at the foot of the Marmet dam, that is, at the head of the No. 6 pool, are the lock readings for the downstream gages at the Marmet dam.

By Mr. Thompson:

Q. Have you those lock readings here?

A. The source of the information as to peak carrying operations is my interpretation of those downstream lock gage readings as representing variable operation, which interpretation on my part is based upon my knowledge of the operation of the Marmet plant and the fluctuations which result from it in its tail-water, that is, in the pool level at the head of the No. 6 pool. The Marmet power station, under present conditions, causes fluctuations which, assuming at the beginning a pool level in No. 6 at the normal elevation or nominal elevation of that pool, extend to approximately three feet above that pool level. That is a normal, a necessary, condition resulting from the natural conditions in the river and the discharge capacity of the Marmet power station.

By Mr. **Thompson**. At this time I move to strike all of that testimony as the witness has said he ha based it upon readings of certain gages, I presume, and we haven't those gagings before us.

By the **Court**. I don't know whether he has them or not.

By Mr. **Thompson**. I have asked him to produce them.

By Mr. **Thompson**:

Q. Are they here?

A. There are here records which were taken from the Lock Master's Office and which were taken in that form and 2719 relied upon by me, under the understanding between counsel, as I understood it, that records of that kind could be used without producing the originals and subject to the check of either party to this controversy from the original data.

By Mr. **Jackson**:

Q. Will you please describe the condition of the river and the operations of the Marmet power station for the date apparently given by the witness Elsey for grounding No. 5, that is, May 20, 1936, at 11:10 a. m.?

A. I have not investigated downstream gage readings beyond those at the head of the No. 6 pool. I have been concerned with what appeared to me to be the obviously pertinent matter, 2720 namely, the question as to whether No. 6 pool, at the head thereof, had an elevation above the normal pool elevation for a sufficiently long period in advance of the stated time of grounding, such that no inadequacy of water supply at Marmet could have been the cause of inadequate pool levels downstream. That involves the time of lag, that is the time of travel of water from the foot of the Marmet dam to the respective points of grounding. I do not know exactly the time of travel. It would require a refined investigation. In my judgment it is within eight to sixteen hours, with regard to locks 10 and 11, and less for locks closer to Marmet dam. I have taken into account the water elevations at the foot of the Marmet dam for a period of at least 24 hours, in each case, so as to cover sufficiently the total period.

A. The stated draft of the barges is six inches greater than the project depth. There had been some peak carrying operations at the Marmet power station prior——

A. (Continuing.) To the time of the grounding, but there had been no variable load of any material extent for more than 24 hours prior to the time of the grounding and within that period of 24 hours prior to the time of the grounding—my statement is incorrect, in part. I should like to re-state beginning with that portion of my statement concerning peak carrying operations at the Marmet plant. Within 24 hours prior to the time of the grounding there had been peak carrying operations at the Marmet station. Within that same 24 hours the minimum excess of water level at the downstream lock gauge at Marmet, that is, at the up-stream end of the No. 6 pool, over and above the nominal pool level, had not been less than about 9/10 of a foot.

By Mr. Jackson:

Q. The level of the No. 6 pool at the upper end was 9/10 of a foot above the normal level?

A. A minimum of about 9/10 of a foot above the normal level.

Q. What would be the relation between the maintenance of that level in pool No. 6, and the levels of the pools downstream?

2721 A. There could have, in my opinion, been no inadequate water level below the normal pool level, that is, below the project levels at any of the downstream pools, due to conditions at the foot of the Marmet dam, or due to the operation of the Marmet power station.

Q. Colonel, witness Elsey, in connection with an alleged grounding No. 6, has furnished information to the effect that this grounding occurred June 28th, 1936, at 8:55 a. m., with a tow of eight barges loaded to a draft of 6½ feet, and at Lock No. 11, with the notation "double trip." Have you studied the conditions of the river and the operations of the Marmet power station at the time given by the witness Elsey for the sixth grounding, that is, June 28, 1936, at 8:55 a. m.?

By Mr. Jackson:

Q. Is the source of your study the same as you stated in connection with Grounding No. 5?

A. The sources are the same as I have stated in respect of the two groundings concerning which I have given the results of my investigation.

Q. Please describe the condition of the river and the operations of the Marmet power station at the time given by the Witness Elsey for his alleged Grounding No. 6, that is June 28, 1936?

A. That grounding, am I to understand, is stated to have occurred at 8:55 in the morning?

Q. Yes.

A. In the case of the June 28th reported grounding at 8:55 a. m., he barges are reported to have been loaded in excess of the project lepth by six-inches. For more than 24 hours prior to that grounding there had been no peak carrying operation at the Marmet power station and the water level at the head of Pool No. 6, had not been below an elevation of approximately 8 inches bove the normal pool level.

Recross examination by Mr. **Thompson**:

Q. Upon what data did you base these statements that you nade?

A. The data which I have previously stated, namely, the downstream lock gage readings at the Marmet locks.

Q. Have you those downstream lock gage readings with you?

2722 A. Not in their original form. I have them charted.

Q. In what kind of form have you them?

A. I have them charted in a form taken from the originals.

Q. And did you make up that chart?

A. I did not.

Q. So that somebody else made it up for you, did they?

A. That is correct.

Q. And you assume that they made it correctly?

A. That is true.

Q. Have you got those charts which they made up?

A. I have.

Q. You have them?

A. I have them.

Q. How long have you had them?

A. I do not recall. I did not have them in my possession for this particular purpose.

Q. Have you had them a month?

A. I had the gage readings at these locks prepared as a routine matter and kept up to date since practically the plants have been in operation.

Q. Have you had them a month?

A. Not in their present form.

Q. In any form?

A. I probably have.

Q. And who got them up for you?

A. They were prepared by H. E. McCormick.

Q. And where is Mr. McCormick?

A. His headquarters are at Charleston, W. Va.

Q. Is he there now?

A. I do not know.

Q. Is he employed by the Appalachian Electric Power Company?

A. He is.

Q. Will you produce them now?

2723 A. Produce them or him?

Q. Produce these records which he got up for you?

A. Yes.

Q. All right, produce them.

By the COURT:

Q. Col. Scheidenhelm, have you any records of the stream flow at Kanawha Falls for these dates or for, we will say, 48 hours ahead of the dates that have been mentioned as the dates of these groundings?

A. I believe I have, sir. They may be approximate.

By Mr. THOMPSON:

Q. Did you use the gagings at Kanawha Falls in this consideration?

A. I am trying to answer the question of the Court, if you don't mind. I cannot lay my hands at the moment upon discharge estimates at Kanawha Falls.

By the COURT:

Q. For any other gaging station up-stream?

A. I have corresponding estimates of flow at Marmet, at the dam.

By Mr. JACKSON. It was our thought that if the flow through Marmet was adequate, any conditions down-stream would be regulated by that. It wouldn't matter what was above because that is the controlling flow.

By Mr. THOMPSON. I object to the argument of counsel and ask that it be stricken out.

By the COURT. That is probably correct, but I wanted to know the information from any of the gaging stations, both Marmet and London. I will go ahead and hear what Col. Scheidenhelm has to say.

A. I will furnish the other as soon as I can get it, but, in the meantime, at Marmet in connection with the grounding stated to have taken place December 28, 1935, the flow past Marmet was in the neighborhood of 4,200 second-feet.

By Mr. THOMPSON:

Q. Was that continuously?

A. In the case of the grounding stated to have taken place May 20, 1936, the flow past Marmet dam was in the neighborhood of 3,000 to 4,000 second-feet naturally, but the peaking operation there may have cut the flow by in the neighborhood of 2,000 second-feet. The fact that there was a water level above the #6 pool level shows that there was flow past the Marmet dam. In the case of the grounding stated to have occurred on the morning of June 28th, the flow at Marmet was in the neighborhood of 2,500 second-feet.

2724 A. I have available here the gage heights at Kanawha Falls but the conversion of those gage heights into stream flow on the basis of the rating tables of the United States Geological Survey for that station I do not have at hand and it is not a simple matter because of the fact that it is a recording gage and it reveals the fluctuations from hour to hour or even minute to minute of flow at that station.

(Exhibit 603, being cover page and page 267 of document entitled "The Ohio River,—charts, drawings and description of features affecting navigation, War Department rules and regulations for the river and its tributaries; navigable depths and tables of distances for tributaries. (Compiled under direction of the Chief of Engineers, United States Army, and the District Engineer, Cincinnati, Ohio)," was offered in evidence.)

(Exhibits 586, 588, 589 and 590, re-offered for purpose of showing the position and action taken by defendant and as evidence of the position and intent of the defendant.)

(Exhibit 507, being Gage Recorder Sheet of Kanawha River at Kanawha Falls, West Virginia, for the period July 6-13, 1936 was offered in evidence.)

(Exhibit 506, being "Seventh Annual Report of the Federal Power Commission" 1927 was offered in evidence.)

(Exhibit 557, being pages 140, 141 of Journal of the Virginia House of Delegates for 1817-1818 was offered in evidence.)

F. W. SCHEIDENHELM (recalled)

By the COURT. I want to know the low water time in the river.

By the WITNESS. On December 28th and for the preceding forty hours, at Kanawha Falls gage, the minimum flow was 3,900 second-feet; the maximum flow on December 28th, was approximately 4,600 second-feet. On May 20th, and for the preceding 40 hours, the minimum flow at Kanawha Falls was approximately 6,250 second-feet, and the maximum flow on May 20th was 12,000 second-feet approximately. On June 28th and for the preceding 40 hours, the minimum flow at Kanawha Falls was 2,360 second-feet, and the maximum flow on June 28th at Kanawha Falls was approximately 2,800 second-feet.

By Mr. JACKSON:

Q. Is that 40 hours preceding the grounding in each instance?

A. It was preceding the grounding.

JOHN E. CARPENTER

Direct examination by Mr. THOMPSON:

Q. Mr. Carpenter, where do you reside?

A. Point Pleasant, West Virginia.

Q. What is your occupation?

A. Associate Superintendent of locks and dams on the Kanawha River, part of the Ohio and Big Sandy River.

Q. You are a part of the force of the United States Government, are you?

A. That is right.

Q. To whom do you report?

A. I report to Mr. Castle, the Chief of Operations.

Q. Of what?

A. Of anything that happens.

By the COURT:

Q. Do you have any subordinates working under you?

A. Yes, sir.

By the COURT:

Q. When they are more than five feet away, how do you communicate with them; ever have occasion to shout at them, or make yourself heard?

A. Sometimes, yes, sir.

By the COURT:

Q. What is Mr. Castle's title?

A. Chief of Operations.

Q. Of what?

A. Of the locks and dams in the Huntington Engineer Office District.

Q. Is he a member of the force of the United States District Engineer office?

A. He is.

2726 Q. How long have you held your present position?

A. Since 1932.

Q. Prior to 1932, what did you do?

A. I was in charge part of the time of all of the operation, and part of the time on some construction work of locks and dams.

Q. These locks and dams you speak of, you are referring always to locks and dams of the United States, are you?

A. Yes, sir.

Q. How long have you been on the Kanawha River, how many years?

A. I was on the Kanawha River from 1905 to 1911, then later ack in 1932.

Q. Who have you been working for since 1905?

A. U. S. Government, Engineer Department.

Q. What are you specific duties?

A. Operation and care of the dams, that is, maintenance and epairs and to keep normal project depths.

Q. A witness here by the name of Putnam testified that the rate f increase in flow in the Marmet pool and the Winfield pool, vould have no effect upon navigation until a discharge reached point which he termed obstructive; also that the rate of decrease n flow in those pools was immaterial, so long as the pools were not rawn down below normal project elevation, allowing for lockage, eakage and evaporation. In that connection, have you investiated the causes of any navigation difficulties on the Kanawha iver?

A. Yes, sir.

Q. In what respect do you investigate these matters?

A. When boats go aground, any fluctuation whatsoever that vould cause navigation any trouble, such as boats being grounded n chutes, in their landings, or in any way that would cause rouble.

Q. How do you know these boats are aground?

A. By going to them.

Q. Who lets you know?

727 A. Either the lock masters or the companies themselves, the owners.

Q. How do they communicate with you?

A. By telephone.

Q. And what do you do after you get the communication by elephone?

A. Immediately go to the place of trouble.

Q. Have you had any complaints from pool #8?

A. Yes, sir.

By Mr. Jackson:

Q. When? What were the character of these complaints?

A. That in the landing of the——

Q. Won't you speak a little louder?

A. In the landing of the Raymond City Transportation Comany, I have had complaints from them, on account of the water eing down, that is, fluctuation of it.

Q. Is that in pool #8?

A. Yes, sir.

Q. Did you investigate that?

A. Yes, sir.

Q. What was the cause for your investigation?

A. The fluctuations of the pool.

Q. The fluctuations of the pool?

A. Yes, sir.

Q. How do you know that?

A. By being there at the time and knowing what the pools were doing.

Q. Was the Marmet power plant operating at that time?

A. Yes, sir.

Q. Did you or did you not determine the cause of that fluctuation you speak of?

A. That is what I thought it was, from the power plant.

Q. From the power plant?

A. Yes, sir.

Q. Did you go to the power plant?

A. I did not.

Q. Do you have any reports on their operations?

A. Yes; twice daily.

Q. Did you at that time?

A. Yes, sir.

Q. What did that report show, if anything?

A. That they were pulling their pools down and after a shut off of the turbines it made a cut in the river which continued on out.

Q. State, generally speaking, the number of complaints you have had from pool #8?

A. Well, I would say we would have as many as eight or ten a month from that one point.

Q. How about pool #7?

A. About the same.

Q. And when you got these complaints did you go to them, and what was your job when you got there?

A. If the boats were grounded, get water from some of the other pools, if no vessels moving in any of the other pools we would take water out of the pools above and bring it down into the pool where the boats were grounded and float the boats.

By Mr. **Thompson**:

Q. Can your Honor hear the witness?

By the **Court**:

A. By straining I can.

By Mr. **Thompson**:

Q. Can't you throw your voice a little stronger? Have you ever borrowed any water from #6 pool to help out on these other pools?

A. Yes, sir.

Q. And when you do that, what is necessary, if anything?

A. Notify all interests in #6 pool that we intend to take from
$\frac{3}{10}$ to $\frac{4}{10}$ feet of water out. If any traffic moving we do not do
that, but notify all landings and all boats moving that are
2729 in the pool that can tie up or not be stranded—we notify
everybody in the pool.

Q. Why do you notify them?

A. To keep them from grounding their boats in their landings or while under-way.

Q. If you take $\frac{3}{10}$ of a foot from the #6 pool and give it to #8, will that cause groundings?

A. Yes, sir.

Q. Is that when boats are tied up?

A. Yes, sir.

Q. As well as moving?

A. Yes, sir.

Q. Have you made any investigation in pool #6 because of complaints?

A. Yes, sir.

Q. Approximately, how many have you made there?

A. You mean altogether or any particular time?

Q. Altogether, since the Marmet was completed?

A. I would say fifty or more.

Q. And you were personally on the ground?

A. Yes, sir.

Q. And went to them?

A. Yes, sir.

Q. And you helped them to get off?

A. Yes, sir.

Q. How did you help them get off on #6?

A. Well, we would either get a little bit of water from the London pool or we would build up #6 pool to a danger point.

Q. When you found these groundings, did you consult your daily report for the Marmet and London stations?

A. I always knew it, knowing this would happen, what it would
be. Of course, I would know all the gages at the time,
2730 know the amount of water in the river, and what they were
doing above and below, everywhere from Hinton down. We
know how much water there is from Hinton to anywhere in the
river.

Q. How much do operators on the Kanawha River allow for tying up or sparing out?

A. They try for a foot.

Q. A foot of what?

A. Water, under their boats, quite a few places they can't get that.

Q. Do you know of any groundings in the Kanawha River in time of low water during the past year—in the Marmet pool?

A. Yes, sir.

Q. Have you attended investigations there?

A. Yes, sir.

Q. What have been the conditions?

A. Well, at the stage of normal pool at the dam, at a lot of their landings it is just what shows on the gage, that is, no more in their landing than what shows on the gage, at normal pool.

Q. I don't believe I understand that.

A. At the head of the pools—on the landings it is not a nine foot stage you understand. Well, any fluctuation, $\frac{3}{10}$ or $\frac{4}{10}$ gets them in trouble at some of their landings, not all, but the majority, they have barely enough to load their barges out.

Q. You said a reduction of $\frac{3}{10}$ or $\frac{4}{10}$ in the Marmet pool causes groundings at some of the landings?

A. Yes, sir.

Q. Was that $\frac{3}{10}$ or $\frac{4}{10}$ of a foot?

A. Yes, sir.

Q. Supposing there is a fog over the Marmet pool, what do the boats do, if you know?

A. Tie up immediately, if they can.

2731 Q. And where do they tie up?

A. Any place they can get to shore.

Q. And if there is a fall of the water of $\frac{5}{10}$ of a foot, what, if anything, happens?

A. A lot of places they go aground.

Q. Would they go aground if it was $\frac{3}{10}$ of a foot?

A. Some places; yes, sir. It all depends where they are caught in the fog.

Q. What is the condition of pool #6 with respect to groundings, that is, what drop in the normal elevation of that pool will cause groundings?

A. $\frac{5}{10}$ of a foot.

Q. Have you had groundings at $\frac{5}{10}$ of a foot?

A. Yes, sir.

Q. Where?

A. The harbor at Charleston and the harbor at Elk River and the coal companies.

Q. What do you mean by coal companies?

A. At their landings.

2732 Q. How many tipples of coal companies are there [interrupted].

By Mr. Jackson. I object to all this testimony and move to strike it out. I don't know what testimony they are rebutting.

By the Court. What do you say as to that Mr. Thompson?

By Mr. Thompson. Mr. Scheidenhelm has testified and I think Mr. Thomas or Mr. Putnam rather, that on a certain drop there would be no danger of interference with navigation in these various pools we are now discussing. I will read to your Honor from page 5274 the testimony of Rufus W. Putnam:

"Q. Major Putnam, in your opinion what, if any, adverse effect on navigation would result from an increase in stage at the head of the Marmet pool, at a rate not exceeding 1½ ft. per hour?"

"A. There would be no adverse effect upon navigation if the rate of increase in stage did not exceed 1½ ft. per hour up to a point where a critical discharge of 22,000 second-feet or more obtained, at which point it is possible current velocities would be such as to begin to interfere with navigation."

By the Court. That is on the increase.

By Mr. Thompson. Yes, sir. Now on page 5277: "Q. Major Putnam, in your opinion, what if any, effect upon navigation in the Marmet pool would result from a decrease in stage at the head of the Marmet pool for not more than two hours at a rate not exceeding 1½ ft. per hour, or from a decrease in discharge at the head of the Marmet pool for not more than two hours, at a rate not exceeding 6,000 second-feet per hour?"

"A. The rate of change in stage would have no effect on navigation, adverse or otherwise, except the necessary adjustments to lines and spars where boats are tied up at the terminals, so long as this rate did not continue to a point where the
2733 pool was no longer maintained at its project level."

He is testifying as to the effect in these pools with only a drawdown of ⁵⁄₁₀ of a foot, going away down below.

By the Court. Below the project level, I presume?

By Mr. Thompson. He has not said that.

By the Court. You don't expect me to believe this witness when he says no matter how deep the water is in the London pool and it goes down ½ foot it will ground boats when (interrupted).

By Mr. Thompson. We are not speaking about the London pool. We are speaking about the Marmet pool and #6.

By the Court. What is project level?

By the Witness. Eighteen feet at the dam.

Q. And what is it at the upper end of the pool?

A. Nine feet.

By the Court. If you keep it eighteen feet at the dam, no less than that, do you have any groundings?

By the Witness. Yes, sir, at their landings.

By the Court. It seems to me you have a situation that can't be helped, you have not got enough depth in your pool.

By Mr. THOMPSON. It is due to fluctuation.

2734 By Mr. JACKSON. The fact is landings and harbors are no part of a Government project. Private individuals make their own landings and sometimes they try to save too much money, but that hasn't anything to do with Federal navigation or this suit.

By the COURT. Do you mean to say it is the duty of the lock masters there to keep that water eighteen feet deep at the Marmet dam?

By the WITNESS. Yes, sir.

By the COURT. Even when he does that he has groundings at some of the landings?

By the WITNESS. In fluctuations at eighteen feet he wouldn't have.

By the COURT. You said he would have a minute ago.

By the WITNESS. If he had eighteen feet he would have a nine foot project in the channel—any fluctuation from that will decrease the channel depth. In the landing, you understand what that is, there isn't nine feet always, and consequently any fluctuation of ½ foot will cause trouble in the harbor.

By the COURT. You mean a decrease?

By the WITNESS. Yes, sir.

By the COURT. Now the witness you quoted, whom you say you are seeking to rebut, makes it a condition the water shall not be lowered below the project level, doesn't he?

By Mr. THOMPSON. He says the rate of decrease will not affect navigation.

2735 By the COURT. Provided the water does not fall below the project level?

By Mr. THOMPSON. "The rate of decrease in stage at the head of the Marmet pool for not more than two hours at a rate not exceeding 6,000 second-feet per hour." The answer was: "The rate of change in stage would have no effect on navigation, adverse or otherwise, except the necessary adjustments to lines and spars at the terminals so long as this rate did not continue to a point where the pool was no longer maintained at its project level."

Are people going to have to elevate and change their spars all because of this power operation?

By the COURT. That is not what you are asking. You were asking about grounding vessels. You say his testimony is in contradiction of the witness you quoted.

By Mr. THOMPSON. I certainly do.

By the COURT. I have not been able to see it.

2736 Q. Is it possible to have a rate of change of 1½ feet per hour in the Marmet pool without affecting navigation?

By Mr. Jackson. A rate of change of what?

By Mr. Thompson. A rate of change of 1½ feet per hour without affecting navigation.

By Mr. Jackson. I object to the competency of the witness to answer that.

By the Court. He may answer.

A. Yes, sir.

Q. What would happen?

A. Well, at that rate all kinds of boats would go aground.

By the Court. Just a minute—there is one condition—that you should not go below the project level.

Q. Can you keep from going below the project level if you have a flow of 1½ feet per hour of fluctuation?

By Mr. Jackson. I object to the question because not intelligible. You mean an increase or what?

By Mr. Thompson. An increase. I am asking the question you asked.

By Mr. Jackson. I should think you would keep them from grounding unless you were loading very rapidly.

Q. Does the rate of change have any effect on navigation in the pool?

A. Yes, sir.

Q. Does the rate of change in stage have any effect on navigation in the Marmet pool?

A. Yes, sir.

Q. In what way does it have?

A. You could not navigate with a river rising one foot an hour.

Q. What would be the effect say with the river dropping 1½ feet per hour?

By the Court. I would like to have the reason for that.

A. The current would be too strong in any river rising one foot an hour. The boat could not handle the tows.

By the Court:

Q. Do you mean even when the water wasn't going over the top of the dam?

A. A river rising one foot an hour, ~~the dam~~ would be lowered, that is, the wicket dams so far as that would go, and the roller type dams would be raised. A river rising one foot an hour is very, very dangerous to navigation, or to the structures, that is, the dam.

Q. Have you ever known the river to rise in normal times in the Marmet pool at the rate of one foot per hour?

A. You mean with low water or high water?

2737 Q. High Water.

A. Yes, sir.

Q. How about low water?

A. I don't remember of it being one foot an hour in low water.

Q. What do you have to do when it starts to rise at that rate?

A. Immediately raise rollers, and lower the chanoine dams, put them all down.

Q. How close to the elevation do you keep the water in the pool at the Marmet dam?

A. About $\frac{1}{10}$ of normal, that is, the dam at eighteen feet stage.

Q. $\frac{1}{10}$ of a foot?

A. Yes, sir.

Q. And supposing it gets more than $\frac{1}{10}$ of a foot below, what do you do?

A. We operate the dam to bring it to that point.

Q. Are you under orders to do that?

A. Yes, sir.

Q. And if it goes above $\frac{1}{10}$, what do you do?

A. We operate the dam to control it.

Q. At what rate does the river flow up where it comes into the London pool, what speed does it have, what velocity would you say, approximately?

A. Oh, in open river I would say it would be probably three to four miles an hour.

Q. Assume a wave five inches in elevation, flowing with a river that is going 3 miles an hour, would you, from the banks be able to observe that?

A. Yes, sir.

Q. If it rose five inches in three hours, would you be able to observe it?

A. Yes, sir.

2738 Q. How about it if you were on a boat, could you observe it?

A. You could observe it there quicker than if you were on the shore.

By Mr. Thompson:

Q. What effect, if any, would that wave coming into the London Pool at the upper end, on a flow of 3 miles per hour, and the wave $\frac{7}{10}$ of a foot high, have on navigation?

By Mr. Jackson. I object to the competency of the witness to answer that.

By the Court. Navigation where?

By Mr. Thompson. Within the London pool.

By the Court. I will let him answer it.

By Mr. Jackson. He has proven no qualifications, I submit, and I except.

A. It would cause a readjustment of landing places that were tied up in the landing and it would cause trouble to boats with tows operating either way, either up or down the river.

Q. And what would that be due to?

A. Current.

Q. What is the most serious problem with respect to stream flow that boats have up and down that river?

A. The fluctuation of it and current.

Q. And what do those fluctuations cause, if anything?

A. If they are serious enough, they cause boats to go ashore that are under way and those that are tied up—continual care must be taken of them.

Q. I ask you to assume this same wave passing on down from the London to the Marmet pool, what would be the situation in the Marmet pool with respect to being able to observe the wave from the shore?

By Mr. Jackson. I object to the competency of the witness to answer the question.

By the Court. He may answer it.

By Mr. Jackson. Exception.

A. It would be the same.

Q. Would you be able to see it?

A. Surely.

Q. Would you be able to see it if you were on the boat?

A. Certainly.

Q. And would a boatman on there realize that there was such a wave if he were going up against it?

A. Sure.

Q. If it passed on down from Marmet to No. 6, what would the condition be?

A. It would be the same thing.

2739 Q. Assume a wave such as I have described, passing on from the Marmet to No. 6, state whether or not that wave would pass on down beyond No. 6?

A. Yes, sir.

Q. And how far down would it go?

By Mr. Jackson. I object to the competency of this witness to testify to the behavior of waves. He hasn't shown the slightest qualification either in education or experience.

By the Court:

Q. How were you going to get these waves past the different dams?

A. Water goes on by them and you have to take care of it somewhere.

Q. Mr. Thompson asked you about a wave coming down $\frac{7}{10}$ of a foot high into the London pool and you told him what it would do and you say if that wave went on into the Marmet it would do the same thing and if it went on down below Marmet it would act the same way. How are you going to get it by these different dams?

A. You have got to pass that water. It don't make any difference where it goes to, and it creates the same thing, on and on.

Q. Suppose Marmet was drawn down, or London—which is the one of those dams that has a draw-down of 3 feet? Suppose that wave came into London dam when it was drawn down 3 feet. Would it go on through?

A. No, sir; not when it was down three feet.

By Mr. Thompson:

Q. But you are assuming the London dam is filled up?

A. I am talking about normal pool.

Q. And you are assuming it without a draw-down?

A. Yes, sir.

Q. How far down the river would that wave go?

By Mr. Jackson. I object again to the competency of the witness to answer the question.

By Mr. Thompson:

Q. Would it go to the Ohio?

By the Court. I will let him answer.

By Mr. Jackson. Let our exception be noted and I also suggest that while I haven't been objecting counsel ought not to make every question leading.

A. Water would go on out of the Kanawha River if everything is normal, that amount of water.

By Mr. Thompson:

Q. Assume the construction of the Winfield dam—have you studied the situation of that river from the Marmet to the Winfield dam?

A. Yes, sir.

2740 Q. What is the shape of the river?

A. Very tortuous.

Q. Is it wide or narrow?

A. It is about 500 feet wide over all.

Q. And, what is the channel width?

A. That will average about 100 feet. It is constricted at places to 60 or 80 feet.

By Mr. Thompson:

Q. State whether or not there are any waves coming from the Marmet dam that do affect navigation in Pool #6?

A. Yes, sir.

By Mr. Jackson. I object to that question. It is not a proper question, not proper rebuttal.

By the Court. I will let him answer it.

By Mr. Thompson:

Q. You say yes?

A. Yes, sir.

Q. What is the character of the channel from Marmet down to the Winfield dam site?

A. In quite a few places it is very narrow and the river is very crooked.

Q. Do you know a place called Elk Chute?

A. Yes, sir.

Q. Do you ever have any groundings on Elk Chute?

A. Yes, sir.

By Mr. Jackson. I object to the testimony about groundings as not proper rebuttal and move to strike it out.

By the Court. Objection overruled.

By Mr. Jackson. Many our exception be noted?

By Mr. Thompson:

Q. What were those groundings caused by?

By Mr. Jackson. If the Court is going to permit that, may I have a standing objection as to groundings as not proper rebuttal?

By the Court. Yes.

A. By the fluctuations of the pool.

By Mr. Thompson:

Q. From what fluctuations?

A. Most of them from the power dams—from the power waves.

Q. Will the depth of the pools that will be produced by the construction of the Winfield dam obviate those groundings that you speak of?

A. Quite a few of them; yes, sir.

By Mr. Thompson:

Q. What is it that causes the grounding of boats in the channel, generally speaking, if you know, in a narrow channel?

2741 A. By the fluctuation or the dropping of the water while
navigating them. When the water falls in these narrow
channels it restricts them. Even if you have the project depth
right in the channel, if boats handle these tows four or five hundred
feet long out in front of them, the boat itself uses the water
2742 on either side of the channel. Probably the boat will be
drawing 5 feet of water. It will get in position in this
shallower water to drive these tows through the channel.

Q. Why it is that the boat itself can't keep its tows in the channel?

A. When it is going around a bend they have got to flank.

Q. Got to what?

A. Flank.

Q. What do you mean by that?

A. Back their sterns into a position that the head of the tows will be in line with the channel, probably have to drive out of this point and flank to the opposite side while the tow boat itself wouldn't always be in the maintained channel. It will be on one or the other side of it.

Q. What compels it to do that, if you know?

A. Tortuous channel. The channel is crooked.

Q. Is the channel tortuous from Marmet down to Winfield?

A. Yes, sir.

Q. And will the current, or, if there is a discharge from the Marmet power plant after the Winfield project is finished, be eliminated from the waves from the Marmet?

By Mr. Jackson. I object to that question.

By the Court. He may answer it.

A. The current will not all be eliminated. It will be reduced, but not all of it.

By the Court:

Q. Mr. Carpenter, do you state that you undertake to keep the water in the pool at 18 feet at the dam?

A. Yes, sir.

Q. How far below the top of the dam is that?

A. That is right at the top of the dam, at the crest.

By Mr. Thompson:

Q. At the crest, you say?

A. Yes, 18 feet is the crest.

2743 Q. And do you try to keep it, as counsel here has described it so graphically, mathematically near that point?

A. Just under the top, so it won't roll over. We are not permitted to have water go over the roller type dam, over the top of it.

Q. And you have orders to that effect, do you not?

A. Yes, sir.

Q. State whether or not your orders are to hold it not less than one-tenth from the crest of the dam?

By Mr. Jackson:

Q. Are your orders in writing?

A. Yes, sir.

By Mr. Jackson. I object to the question as not the best evidence. If there are any orders in writing, the Government must have control of them.

By Mr. THOMPSON. A man can state, if he knows of his own knowledge. Certainly if he has orders, he doesn't have to bring a writing up here.

By the COURT. They may be in such language as to permit of some condition or exception or qualification. I will permit him to answer it, however.

By Mr. JACKSON. Exception noted.

By Mr. THOMPSON:

Q. What are your orders with respect to the height at which you shall keep this water in the reservoir at the Marmet pool?

Q. (The question was read as follows:) State whether or not your orders are to hold it not less than one-tenth from the crest of the dam?

A. Yes, sir.

Q. By that I mean one-tenth of a foot?

A. Yes.

Q. State whether or not that means that you are expected to hold it at one-tenth of a foot from the crest of the dam?

A. Yes, sir, we are.

Q. I think that you testified, did you not, that boats tried to allow for one foot when they are sparred out?

A. That is right.

Q. Are there any places along the channel, let us say in the Marmet pool, where there is less than one foot?

A. We have one.

Q. Where is that?

A. At Houston.

By Mr. JACKSON:

Q. You mean less than one-foot depth?

A. One-foot depth.

2744 By Mr. THOMPSON:

Q. What is the margin there, do you know?

A. Well, it is less than a foot. When that pool is down, when the storage is out of it, taken out of the pool, we have less than a foot—around a foot at the London pool.

Q. That is under the bottom of the boat?

A. Yes, when that pool is down.

Q. Were you informed at the time of these groundings that you speak of in the #6 pool as to the power plants operations occurring at the time of the groundings?

A. Yes, sir.

Q. How would that occur? Who, by the way, is the Lock Master at #6?

A. Mr. Bright.

Q. And if there is a grounding, does he call you?

A. Immediately.

By Mr. **Thompson**:

Q. What would be the effect on the wicket dams of a wave of 7/10 of a foot, passing on down the river?

By Mr. **Jackson**. I object to the competency of the witness to testify at all as to waves, and may our exception be allowed generally to that line of testimony.

By the **Court**. Yes.

A. The wickets would have to be operated to pass the flow of water on.

By Mr. **Thompson**:

Q. What do you mean, by raising the wickets or lowering them?

A. Lowering them down to give space for water to pass by, simply putting them down.

Q. Do you have any experience with waves going down that river where the wicket dams are?

A. Yes, sir.

Q. What experience have you had?

A. I have to be in charge of the operation of the dam, be out with them.

Q. Are you there when they raise and lower the wickets?

A. Not always.

Q. Frequently or infrequently.

2745 A. Well, I would say infrequently, unless something happens unusual. The Lock Master is competent to operate the wickets unless something unusual happens, and I don't have to go to them.

By Mr. **Thompson**:

Q. Based on your experience in operating locks and dams on the Kanawha and Ohio Rivers, what is your opinion as to whether or not power waves received into the London pool under the conditions under which the Marmet pool is now operated, would be transmitted through the Marmet, Winfield, and Gallipolis pools into the Ohio River?

By Mr. **Jackson**. I object to the competency of the witness to answer that.

By the **Court**. What power waves has he ever seen transmitted into the London pool?

By Mr. **Thompson**:

Q. Have you ever seen power waves coming from the London pool into the Marmet pool?

By the **Court**. I understood you to say coming into the London pool.

By Mr. Thompson:

Q. Based on your experience in operating locks and dams on the Kanawha and Ohio Rivers, what is your opinion as to whether or not power waves received into the Marmet pool under the condition under which the Marmet pool is now operated, would be transmitted through the Marmet, Winfield, and Gallipolis pools into the Ohio River?

By Mr. Jackson. I object to the competency of the witness to answer that question. It is a question that involves a higher degree of knowledge of hydraulics than this witness has.

By the Court. I think so, but if this witness thinks he has the knowledge, he can answer it. It is based on his experience and observation.

By Mr. Thompson. Here is a man that is doing nothing else but going up and down this river, called out practically day after day and many nights to test waves that are coming from the Marmet pool and yet counsel has the audacity to arise and object to his being an expert after they put on this gentleman that came from up near Pittsburgh.

By the Court. He may answer.

By Mr. Jackson. May our exception be noted?

A. My opinion is that the water would go on out into the Ohio River at about the same rate that it was received into the Marmet pool.

Q. Mr. Carpenter, assuming a total rise in stage in the Marmet pool of $^{8}/_{10}$ of a foot in five hours, with a similar decrease in stage, and this rise and fall occurring every 24 hours during the week, what would be the effect on navigation moving up-stream?

By Mr. Jackson. I object to the competency of the witness to answer that question.

By the Court. He may answer it.

A. At the peak of the rise, moving up-stream, it would be difficult for towboats to handle their tows.

By Mr. Thompson:

Q. What do you mean by "difficult"?

A. Currents driving them on shore from some of the chutes that they go through.

Q. And what would the situation be as to those moving downstream?

A. It would be practically the same thing.

Q. Assuming a total rise in stage below the Marmet pool of 1.2 feet in five hours with a similar decrease in stage, and this rise and fall occurring every 24 hours during the week, what would be the effect on navigation in pool #6 that was going up-stream?

A. It would be the same effect and besides it would have everybody crazy most of the time, keeping their stuff afloat, keeping their boats afloat in the landings.

2746 Q. Would that condition exist both going upstream and downstream?

A. And in the landing, yes.

Q. How often do these power waves go down the river, if you know, from the Marmet dam site?

A. Each time they operate their power plant.

Q. And what is the result among the shipping industry on the river?

By Mr. JACKSON. I object to that question as entirely too indefinite.

By Mr. THOMPSON:

Q. What is the effect, if you know?

By Mr. JACKSON. I object just the same as too indefinite.

By the COURT. He may answer.

By Mr. JACKSON. Exception noted.

A. It keeps them in a state of uncertainty as to the mooring of their vessels in the harbor and a navigator leaves one lock with the assumption that there will be no change in the river and he meets this and he is all bewildered. He simply doesn't know exactly what to do and it causes considerable trouble wherever he meets this wave.

2747 Cross examination by Mr. JACKSON:

Q. Mr. Carpenter, how old are you?

A. 58.

Q. You started working for the Government in 1905?

A. Yes, sir.

Q. And where did you work before that?

A. Before I started work for the Government?

A. Yes.

A. I worked in a timber camp at various places.

Q. As I understand it, up to the time you went with the Government you had been working in timber, lumbering, and things of that character?

A. And river work.

Q. Mr. Carpenter, will you define a wave for me.

A. As I see it, it is a sudden rise of water in pools that passes rapidly along the river.

Q. You say it is a sudden rise; is that right?

A. Yes.

Q. Will you tell me how great a rise and how sudden it is to constitute a wave in your definition?

A. Well, speaking on the river that I have had anything to do with, a wave from half a foot on up.

Q. You mean if you could see the face of water half a foot high or higher?

A. No, I don't mean that.

Q. What do you mean?

A. I mean a rise of that.

Q. And how sudden?

A. From one to five or six hours for half a foot.

2748 Q. That is, a rise of half a foot in one to five or six hours, is a wave, according to your definition?

A. Yes, sir; that is the way we look at it.

Q. Did you discuss waves with anyone before you came here to testify?

A. Before I ever knew there was a trial here, I did.

Q. With whom?

A. With employees and with my superiors.

Q. How long ago was that?

A. That was when we contemplated the operation of those—wondered what we would do, how the power plants would act at the Marmet and London pools.

Q. That was about the time that the power plant at the Government navigation dam was going to commence operation?

A. Before that.

Q. Just before that, and that was the first time you discussed waves with your superiors, wasn't it?

A. Yes.

Q. Did they tell you what the shape of a wave at that time was?

A. No; he had graphs he showed me.

Q. He showed you some graphs?

A. Yes.

Q. What graphs did they show you? Have you got them with you?

A. No; not any particular kind. We had them in the office and looked at them and they showed the effect.

Q. You have defined a wave in general. Tell me what would be the slope of the front of the wave that you have in mind?

A. I wouldn't know that.

Q. Have you any idea?

A. I would know where a certain body of water would start and know what to do with it from one dam to another.

Q. I am trying to find out how steep this wave is.

2749 A. I have no idea.

Q. Could you tell me whether it would be one degree or sixty degrees from the horizontal?

A. I couldn't tell you that.

Q. You don't know about that. Well, now, Mr. Carpenter, assuming that you were standing on the bank on the side of the London pool and there were a rise of five inches taking place gradually over a period of 5½ hours, is it your testimony that standing there on the bank you could observe the rising water?

A. Yes, sir.

Q. That is, you mean that as you stand there, you can look out and say, "I see the water rising"; is that right?

A. I would say "the river is rising."

Q. You could see that?

A. Yes.

Q. That would be a total rise of less than an inch in an hour, wouldn't it?

A. Five inches in five hours.

Q. Five inches in 5½ or 6 hours? It would be something less than an inch an hour?

A. That is right.

Q. And can you tell me how much of a rise that would be in one minute?

A. No; I wouldn't attempt to. I wouldn't know. I just would know that the river is rising.

Q. You can check me on the mathematics; I take it that if that water were rising at the rate of something less than an inch an hour, it would be rising at the rate of something less than 1/60 of an inch a minute, wouldn't it?

A. Well, assuming that it did.

Q. I just wanted to see how fine your eye is. It is your testimony that you can stand along the side of a river and you can observe with your naked eye a rise as small as something less than 1/60 of an inch a minute.

2750 A. Particularly when the river is rising.

Q. Answer my question directly. Can you observe a rise as small as that?

A. Yes, I can tell.

Q. You can tell?

A. I can tell.

Q. In the same way you can stand on the bank of a river and if the river is falling at a rate of less than 1/60 of an inch a minute, you can observe that, can you?

A. A falling river is harder to determine than a rising river.

Q. Now, let us see; do you think, standing on the bank of a river, you could observe with your naked eye a fall in the surface of the river at a rate of less than 1/60 of an inch a minute?

A. I could not on a falling river.

Q. Suppose instead of taking five or six hours to fall 5 inches, it took 18 or 20 hours, do you think that you could observe a falling in the river stage as you stood along the bank?

A. No, sir.

Q. Do you think that if you were on a boat you could observe the fall in the river stage declining at the rate of five inches over a period of 18 or 20 hours?

A. No, sir.

Q. You couldn't detect that in a row-boat, could you?

A. No, sir.

Q. I wanted to see whether you want to reconsider your testimony about a rise. In your opinion, would a rise in the stage of the river, proceeding at the rate of something less than 1/60 of an inch a minute, or less than one inch in an hour, have any effect on a boat?

2751 A. Sure, it would have an effect on the boat.

Q. Would it have a pretty substantial effect, in your opinion?

A. It all depends on where the boat was at the time.

Q. You are moving now on the surface of the stream?

A. That is right.

Q. Is it your testimony that a rise in stage at the rate of something less than 1/60 of an inch a minute or less than an inch in an hour, would have any substantial or appreciable effect upon the boat?

A. Yes, sir.

Q. That is your testimony?

A. Yes, sir.

Q. You are very clear about that?

A. Yes, sir.

Q. I want to show you a statement in defendant's exhibit 544 for identification, which is a document compiled in the Huntington Engineering Office, as to certain wave tests in 1930 which had an amplitude in excess of what I have stated to you, and I read to you from page 113 as follows: "The tests (referring to these waves)——"

By Mr. **Jackson**:

Q. Mr. Carpenter, I read to you from page 113 of this compilation of the Engineer Office at Huntington as follows: "The tests (referring to these 1930 wave tests) perhaps were important in demonstrating the absence of any marked changes in stream stages such as would affect transportation vessels as they were too slight to even affect a row boat," and ask you whether or not you agree with this conclusion that I have read to you from this document?

A. I can't agree to that.

Q. You didn't take any part in those wave tests in 1930, you?

A. No, sir.

Q. Did you know Major Herman?

A. Very well.

Q. Was he District Engineer in charge of the Hunting District in 1930 and some time thereafter?

A. I think so, yes.

Q. And if that conclusion that I have read to you were su scribed to by Major Herman, would that affect your judgmen

By Mr. Thompson. If the Court please, I object to that. isn't shown that this document ever was subscribed to by Maj Herman. This document is not in evidence. As I understa it, it was ruled out. He is asking him if it has been subscrib to and that it came from the Huntington office. I suggest th is misleading to the witness.

By the Court. I think the objection is well taken unless the is some showing that the opinions there expressed were tho of Major Herman.

By Mr. Jackson. I have nothing but the two letters of tran mittal.

By Mr. Jackson:

2752 Q. Mr. Carpenter, you have been testifying about cu rents in some of these future pools: What would be t velocity of current in the Gallipolis pool, when completed, with flow of 2,000 second feet?

A. Put that into "opening into the dam" and I could tell yo about that. I don't know anything about second feet to curren Put it into "opening into dam."

Q. Is current expressed in second feet?

A. Not in my language; I know it is, though.

Q. Well, you would not have any idea what velocity woul result from a flow of 2,000 or 3,000 or 4,000 second feet through th future Gallipolis pool?

A. No, sir; you would have to give me the opening in the dam- the way we get our currents. I don't go by miles or cubic feet o second feet.

Q. You testified about some waves passing down through Ma met, the future Winfield pool and the future Gallipolis pool an into the Ohio River. Let me ask you this question: Assumin a wave with a total amplitude or volume of 4,000 second feet enter ing the London pool and riding on a base flow of 2,000 second fee how much would that wave raise the Gallipolic pool by the tim it reached the Gallipolis dam?

A. We would not permit it to raise any.

Q. I did not ask you that.

A. I could not tell you that. However, we would not allow for our pools to raise above normal.

Q. I did not ask you that. I will ask that the question be read.

By Mr. THOMPSON. He is doing very nicely; let him answer your question. Let him proceed.

By Mr. JACKSON. Q. I will ask for the question to be read. [The question is read.]

By Mr. THOMPSON. I would like to suggest that this witness does not understand the term "amplitude." Counsel should state that in the English language.

By Mr. JACKSON. I told him what it was—volume; and he was offered as an expert. I did not think he was an expert, however.

By Mr. THOMPSON. He is an expert on the operation of the dam, but not on "amplitude."

By the COURT. That is the very line of examination that you conducted, Mr. Thompson. You asked him to define or as to the manner these waves passed from one dam into another. You may not have expressed it in second feet. You probably said waves of such a height in inches.

By Mr. THOMPSON. Yes, sir; in the simplest language. If you talk about "amplitude", you will have to throw the life-line out for him.

By the COURT. If he does not understand it, he may say so.

By Mr. JACKSON. The questions that you asked (addressing opposing counsel) were so general, I could answer them myself and would not have to cross-examine this witness. Please read the question. [The question is read.]

A. I could not tell you that.

Q. What is the area of the Gallipolis pool?

A. I don't know that either.

Q. How many acre-feet of water would it take to raise the Gallipolis pool one half inch?

2753 A. I don't know.

Q. What is the area of the Winfield pool?

A. I don't know.

Q. Can you tell me how much water it would take to raise the future Winfield pool—how many acre-feet or second feet—an inch?

A. No, sir.

Q. Assuming that the Marmet pool varied 0.3 of a foot, how much would it raise the surface of the future Winfield pool?

A. 0.3 of a foot?

Q. Yes, sir.

A. Probably 0.1 or 0.2.

Q. Why do you say that?

A. I never had experience with Winfield pool being in operation. It is not completed.

Q. Do you know how much volume of water would be involved for lowering the Marmet pool 0.3 of a foot?

A. In second feet, no, sir.

Q. Or in acre feet?

A. No, sir.

Q. Or in any other unit of measurement?

A. In tenths only; in tenths of a foot at a given point.

Q. How many tenths of a foot would it be?

A. Probably one or two.

Q. If you change it 0.3 of a foot at Marmet, would it be 0.1 or 0.2, say, in Winfield?

A. I could not say definitely.

Q. You do not have any idea how much volume of water it would take to effect a change of 0.1 or 0.2 or 0.3 of a foot in the Winfield pool?

A. It don't have any pool as yet.

Q. Or the future pool. You have testified about that, Mr. Carpenter?

2754 A. No, I could not tell you how much water 0.3 of a foot would make in Marmet pool or Winfield pool, for the simple reason that I have had no experience with Winfield.

Q. Can you tell me how much volume of water it would take to raise No. 6 pool, one inch?

A. Tell you how much it would take?

Q. Yes, sir, how much volume?

A. (No answer from witness.)

Q. You cannot tell how much volume of water it would take to raise any pool now in existence on the Kanawha River one inch, two inches, or three inches?

A. Expressed in second-feet?

Q. Acre-feet, gallons, or anything else?

A. No, not in acre-feet.

Q. I don't care whether it is acre-feet; it can be gallons or second-feet or any unit of measurement of volume that you know of. Can you?

A. No, sir; I cannot tell you.

Q. Can you tell me what velocity of flow would result in any pool on the Kanawha River, by reason of a flow of 1,000 or 2,000 second-feet?

A. You mean by current?

Q. Yes, sir.

A. Very little; it would be very little; I don't know exactly.

Q. And you do not know what change in velocity of flow would be produced by increasing the flow through the pools from a base flow of 2,000 second-feet to a base flow of 4,000 second-feet?

A. Not exactly.

Q. Can you tell me approximately how much it would increase it?

A. No, sir; I would not want to make that expression; no, sir.

Q. You said you never let water go over the dams, didn't you?

A. The roller type dam.

2755 Q. Would you do anything in case of a flood?

A. We take them out of the river.

Q. You let the water go over the crest of the dams at times, do you?

A. Not unless there is some accident.

Q. You are drawing the distinction between going over the roller gates and over the crest of the dam?

A. Yes, sir.

Q. And when there is a flood into the dam, it flows over the gate and not the crest of the dam?

A. No; the crest of the dam is the top of the gates—is the top of the roller.

Q. It is your testimony that when the roller gates are down, water never goes over the crest of the dam?

A. It should not; it seldom does; it might rush over.

Q. I am not talking about what it should do. Is it your testimony that it does or does not go over the roller gates?

A. It has gone over at times, but it is against all our regulations and orders to do that.

Q. Regardless of the regulations and orders, it is a fact that, from time to time, water does flow over the top of the roller gates?

A. Occasionally.

Q. To what depth?

A. I don't know what depth.

Q. Do you operate these dams or not?

A. Yes, sir.

Q. But you are not close enough in contact with them to know what depth the water flows over at times?

A. No, sir; it don't last but a few minutes, unless you are talking about the roller flap.

Q. No, sir. Tell me at what depth the water does at times flow over the roller gates, if you know, and if you don't know tell me so?

2756 A. We have one roller goes over five feet. It is a flap gate.

Q. I am not talking about that.

A. I don't know how deep it was the—over the top—the time the surge came over. We have had water over the roller a few times.

Q. And you don't know how many or how much?

A. No, sir; I could not tell you.

Q. How far down below the top of the gates has the Marmet pool been?

A. The roller has been out of the water, all of them.

Q. The rollers have been out?

A. The roller gates at the crest of the dam. It is a roller dam and in high water, or when you spill the water out, it is picked out of the water and the water goes under the gates.

By the COURT. He didn't ask that.

By Mr. JACKSON:

Q. When the roller gates are closed and the other gate is up, is it your testimony that the water at Marmet has never been below the crest of the gates?

A. Surely, it has been below, yes, sir.

Q. How much?

A. It is kept at 0.1 below nearly all the time, to keep from going over.

Q. What drop below the crest of the roller goes in the operation of Marmet?

A. About 0.1; we have a variation of about 0.1.

Q. Are you sure of that?

A. Yes, sir; quite sure.

Q. What would you do if it went over 0.1 below?

A. We would find out the cause of it, with the exception of making a test or something, or something like that.

By the COURT:

Q. Doesn't it vary more than that when there is lockage?

2757 A. No, sir; no, sir. We have a very close margin to operate on.

By Mr. JACKSON:

Q. Do you operate the London roller gates every time Marmet gets more than 0.1 below, or as much as 0.1 below the crest?

A. If necessary, we would, yes, sir.

Q. Do you—I asked you if you do?

A. Yes, sir.

Q. Whenever it is 0.1 below, you operate the roller gates?

A. Yes, sir.

Q. Of London?

A. Not always; we used the power company since they have been in there.

Q. Do you operate the roller gates at London whenever Marmet drops 0.1 below the crest?

A. No, sir.

Q. That is, in order to get water from London to Marmet?

A. No, sir; you don't operate the roller gates for that.

Q. Why not?

A. We asked the Power Company to change their volume on the turbines.

Q. Now, who is your superior officer in charge of the Huntington District?

A. Mr. Cassell is immediate, and Colonel Conklin is the District Engineer.

Q. Well, let me ask you. You have testified—a variation of 0.8 of a foot, was it?

By Mr. **Thompson**:

~~A.~~ It was 0.7.

By Mr. **Jackson**:

Q. In Marmet—in a period which would rise in Marmet at the rate of 0.8 of a foot in 5 hours—that it would cause trouble to navigation in the Marmet pool?

A. Yes, sir.

Q. Would it do that in any other pool, if the change in stage was at the same rate?

2758 A. It would in any pools below there.

Q. How about London?

A. It would below their draw down.

Q. Why wouldn't it above the draw down?

A. You mean—it would not affect the landing in the London pool. They always prepare to keep their plant out when these draw downs are made.

Q. Will you define what you mean by a "rate of change in stage"?

A. A falling or rising river.

Q. Yes, but what do you mean by a "rate of change in stage"?

A. The speed which it takes to flow.

Q. You mean how rapidly the changes occurred over an hour for instance?

A. For any length of time, yes, sir.

Q. Well, if a rate of change of stage of 0.7, did you say?

By Mr. **Thompson**:

A. It was 0.8.

By Mr. **Jackson**:

Q. (Continuing.)—of a foot an hour—no, five hours rather—strike that. That would be how much an hour—0.8 of a foot of change in five hours, would be how much in one hour?

A. It would be what?

Q. Strike that out. Assuming the rate of change to be 0.8 of a foot in five hours, how much would that be in one hour?

A. It would be .1, wouldn't it?

Q. 0.1 of a foot?

A. 1.3—I don't know.

Q. It would be 0.16 of a foot in one hour, would it not?

A. 0.5 in an hour.

Q. You testified that a rate of change of 0.8 of a foot in five hours, would be injurious to navigation. I am asking you to tell me what rate that would be in one hour. I get it 0.16 of a foot; is that right?

A. It would be 0.1 an hour—0.5 in 12 hours.

2759 Q. Eight you said?

A. In five.

Q. In five hours. I do not want to confuse you. Tell me what you compute the rate of change for one hour to be, on the assumption of a change of 0.8 of a foot in five hours?

A. (Witness is handed paper by counsel and figures.) It would be one and three-fifths, tenths.

Q. The same as 0.16, isn't it? Is that right? I am trying to agree on a figure, so that we may proceed.

A. I will agree with you.

Q. If, in your opinion, 0.16 of a foot an hour in the rate of change in stage in the Marmet pool, would have an adverse effect on navigation, what would you say as to the effect of a change of stage at the rate of one-half a foot an hour?

A. A half a foot an hour?

Q. Yes, sir.

A. The effect would be greater.

Q. That would be the same as a change of 2½ feet in five hours, wouldn't it?

A. Something like that.

Q. And you regard that as more dangerous?

A. Sure.

By Mr. Jackson. Here is a paper which I desire to have marked for identification as Defendant's Exhibit No. 608.

(The foregoing paper was marked as indicated.)

Q. Are you familiar with the signature of Colonel Conklin?

A. Yes, sir.

Q. Did you ever see his signature?

A. Yes, sir.

Q. I show you a signature on Exhibit No. 608, marked for Identification for the defendant, and ask you if that is Colonel Conklin's signature. [Exhibits to witness.]

A. Yes, sir.

Q. I read to you from Colonel Conklin's letter, dated June 26th, 1936, addressed to the Kanawha Valley Power Company, and signed by Colonel Conklin, the following passage on page two.

2760 Q. I invite your attention to this. It is entitled "Subject: Kanawha River pool fluctuations resulting from operations of the London and Marmet hydro plants.

"Following some discussion, it was agreed to proceed as follows, with the understanding that the procedure is subject to such modifications as developments may necessitate.

"(a) The rate of draw down in the London pool will not exceed ½ foot an hour."

Q. (Continuing.) And I ask you whether or not this rule of operation by Major Conklin affects your judgment as to what, if any, effect would be produced on navigation by the decrease in stage in the Kanawha River pools at the new dams at the rate not to exceed ½ of a foot an hour?

A. Is that the London pool?

Q. Yes, sir. Would that affect your judgment?

A. Not a bit in the world.

Q. You think that that decrease in stage at that rate, in the London pool, would not have any adverse effect on navigation?

A. Below?

Q. No, in the London pool?

A. They can draw from the pool to 3 feet.

Q. Do you think that change in rate in stage, at the rate of ½ of a foot an hour on the London Pool, would have any adverse effect on navigation in that pool?

A. Yes, sir; I do.

Q. You disagree with this rule of operation, that the rate of draw down for the London Pool was not to exceed ½ a foot an hour?

A. That is right.

Q. I direct your attention to the next paragraph from this letter. [Reading.]

2761 "(b) The level of the Marmet Pool will be kept within the range of plus 0.0 and minus 0.3 and pool oscillation on the lower gage at London due to turbine operations, will not exceed the rate of ½ foot per hour.

Q. (Continuing.) Do you understand that that would permit drops or dips in the Marmet Pool to the extent of 0.3 of a foot—a decrease in stage in Marmet Pool not exceeding, at the rate not to exceed ½ of a foot an hour?

A. You mean at Marmet, at the rate of 0.3 of a change?

Q. Yes, sir.

Q. (Continuing.) That provides for a draw down of 0.3 below normal pool level in Marmet?

A. We haven't such orders.

Q. Doesn't this letter say that?

A. Yes, sir.

By Mr. Jackson:

Q. Does the letter provide for a decrease of stage in the Marmet Pool at a rate not exceeding ½ of a foot an hour?

A. It certainly does. The letter says so.

Q. Do you agree with those methods of operation of the Marmet Pool outlined by Mr. Conklin in his letter, marked defendant's exhibit for identification No. 608, and which I have just read to you?

A. Do I agree with it?

Q. Yes, sir.

A. Not in toto, no, sir.

Q. To what extent do you agree with it?

A. I disagree with the London draw-down. He knows it himself—that I disagree with the draw down.

Q. A half a foot an hour?

A. Yes, sir; and my orders have never been changed.

Q. Does he know that you disagree with the minus 0.3?

A. I don't suppose so.

2762 Q. You had a disagreement with him about the half a foot an hour, did you?

A. I simply talked with him.

Q. Have you got the records of the actual operation of the gates of the Marmet Pool with you?

A. No, sir.

Q. Have any of your assistants in the Court Room those records with them?

A. I don't know whether they have or not.

Q. Will you find it, because, if so, I would like to see the records.

A. Just since February, he says. [Witness answers this question as result of information from a voice in Court Room.]

Q. Will you produce those since February?

A. They are at the hotel.

By Mr. Jackson:

Q. Mr. Carpenter, I think you said Colonel Conklin is your superior officer in charge of the operations of the Huntington District?

A. Yes, sir.

Q. And he is the officer who gives the final orders as to what is done by you and everyone else in the district, is he?

A. Yes, sir.

Q. And he has under his jurisdiction the operation of the navigations works of the Ohio River in that district?

A. Yes, sir.

Q. And he also has jurisdiction over the operations of the power plant on the Government navigation dams at London and Marmet?

A. Yes, sir; I presume so. I don't know.

Q. You——

By Mr. **Thompson**:

Q. What was the answer?

A. I presume so.

2763 By Mr. **Jackson**:

Q. You don't know that?

A. No, sir.

Q. You know, don't you, that these power stations on the navigation dams are operated under licenses from the Government, don't you?

A. Yes.

Q. And you know that the district engineer, Colonel Conklin, has supervision over that?

A. I am not so sure of that.

Q. You are not?

A. No, sir.

Q. You don't think that you have supervision instead of him, do you?

A. No, sir; I know I haven't.

Q. To the extent that any supervision that is exercised, you know that it is exercised by Col. Conklin, don't you?

A. If we get into trouble, we turn it over to the district office, and there our trouble ceases.

Q. You don't know anything about it from that time on?

A. I have nothing to do to correct it.

By Mr. **Thompson**:

Q. What?

A. From the time they get it from the office, we don't go into how they do.

By Mr. **Jackson**:

Q. From the time they get what, you don't go into it?

A. If we get a complaint from the lock-master that something is going wrong, we immediately notify the Huntington office—usually Mr. Cassell.

Q. And then you are through with your part?

A. I have done all I can do.

Q. You report any groundings you know about to the Huntington office, don't you?

A. If they are serious.

2764 Q. If they amount to anything, you do?

A. Yes, I report them to my superior officer.

Q. And you have reported to Col. Conklin's office every grounding that has come to your attention since the Marmet plant started that you regarded as serious?

A. Every one that I regarded as serious.

Q. Now, when were the groundings generally that you were talking about on direct examination?

A. Do you mean the dates?

Q. Yes.

A. I don't remember.

Q. You have no date?

A. I did not keep any date of them; they were too numerous.

Q. Did you say there was trouble at one place in the Marmet pool, at Houston?

A. At Houston.

Q. How do you spell it?

A. H-o-u-s-t-o-n.

Q. Is that the full name of the place?

A. Yes, sir.

Q. What is it—a landing?

A. Yes, sir.

Q. Of a coal company?

A. That is right.

Q. And where is that located?

A. The landing is probably a mile or such a matter below Houston.

Q. How far is it below the London dam?

A. Probably two miles, or something like that—two or three miles.

Q. What kind of trouble develops there?

A. Grounding of barges.

2765 Q. Where—in the channel?

A. No; in the landing.

Q. Is that the same as a harbor?

A. The same.

Q. What is there? Just a place to tie up?

A. A coal tipple.

Q. Is that the place where the most trouble is?

A. Not particularly there. Wherever they tie up or have a landing.

Q. I thought you said that was the place where they had the most trouble?

A. That is the shallowest place.

Q. The trouble is that it is a pretty shallow landing, isn't it?

A. That is right.

Q. How long has that landing been there?

A. I don't know.

Q. That has been there a good many years, hasn't it?

A. Yes, sir.

Q. Was that landing in the old No. 3 pool?

A. Yes, sir.

Q. What is the elevation of the new Marmet pool with reference to the old elevation of the old No. 3 pool?

A. I don't just remember. [Witness looks at memorandum.]

By the COURT:

Q. Where is the old No. 3 dam—between Marmet and London?

A. Yes, sir.

By Mr. JACKSON:

Q. About how many miles below London is the old No. 3 dam, Mr. Carpenter?

A. Three miles and a fraction.

Q. Will you tell me what the elevation of the present Marmet pool is compared with the elevation of the old pool No. 3?

2766 A. The old No. 3 is 591.57 elevation, and Marmet is 590.0.

Q. Then the elevation of old No. 3 pool was 1.57 feet above the elevation of the present Marmet pool?

A. Yes, sir.

Q. When the present Marmet pool was constructed and the old No. 3 destroyed, the landing was lowered 1.57 feet, wasn't it?

A. Yes, sir.

Q. And do you think that had anything to do with the landing at Houston?

A. The landing could have filled up.

Q. What is that?

A. The landing could have filled up.

Q. Do you think the lowering of the elevation, when they took out old No. 3, had anything to do with it—the lowering of the pool?

A. I don't think so.

Q. You do not think that had any effect, do you?

A. No.

Q. It did, however, decrease the water 1.57 feet, didn't it?

A. It raised the water 1.57 feet.

By Mr. **Thompson**:

Q. It did what? Raised it or lowered it?

A. (Witness looks at memorandum.) There is a difference 1.57.

By Mr. **Jackson**:

Q. Which way?

A. Raised.

Q. It raised it?

A. Yes, sir.

Q. Will you give me the elevation of Marmet pool?

A. 590.

Q. What is the elevation of pool 3?

A. 591.57.

Q. Is the elevation 591.57 lower than 590?

A. It is higher; 591 is higher than 590.

2767 Q. When you took out dam 3, did that lower the lev of the water above it, or not?

A. It lowered it.

Q. And it was lowered at one point 1.57 feet?

A. Yes.

Q. You do not think that had anything to do with the difficu ties at the landing at Houston?

A. It could have.

Q. You don't think it likely?

A. No.

Q. Then would you think the same thing would be true of an other landing, that the lowering of the water 1.57 feet woul not have any effect?

A. At any other landing?

Q. Yes.

A. Yes, surely.

Q. You think it would have an effect in another landing?

A. Yes.

Q. Now, Mr. Carpenter, the Government provides a throug channel down the Kanawha River, doesn't it?

A. It provides a channel.

Q. It dredges a channel down through the pool that is use by navigation going up and down the river?

A. That is right.

Q. The harbors or landings, as you call them, are provide by private interests that use them?

A. Yes, sir.

Q. And the depth of those harbors and landing depend o how deep the private interests choose to dredge the landing an the entrance to it?

A. It depends on the keeping of normal pools.

Q. Assuming that a pool is at normal level, does the depth of water at the landings and harbors depend upon the depth to which the private interests using those landings and harbors have dredged them?

2768 A. That is right.

Q. And that dredging is done by private interests at their own expense?

A. Most always.

Q. It is unless sometimes a city will provide, at its expense, a landing or harbor?

A. Yes.

Q. And the Federal Government has nothing to do with maintaining either one?

A. No.

Q. And do these landings, private and municipal, fill up with silt and coal dropping off barges?

A. Yes.

Q. And they tend to get shallower from time to time by reason of those phenomena, don't they?

A. That is right.

Q. And if the private interests and municipalities do not choose to dredge pretty soon, they will soon have trouble at these landings and harbors?

A. If they don't keep them cleaned out they will get shallower.

Q. And this does happen, doesn't it?

A. Yes, sir.

Q. Now, what causes groundings there at the power station operations?

A. Fog and current.

Q. Anything else?

A. Any fluctuation in the water, or any sudden drop of water, will cause it.

Q. Does it make any difference to what draft the vessel is loaded?

A. Oh, sure.

Q. If the vessel were loaded to nine feet, on an elevation of ten feet, and the water dropped anything less than a foot, there would not be a grounding, would there?

A. Yes.

2769 Q. If it dropped a half a foot, under those circumstances, there would be a grounding?

A. I thought you said a foot. As far as moving steamers, it is not enough.

Q. The fact is, of course, Mr. Carpenter, that questions of groundings are affected by the depth to which the barges are loaded?

A. Quite a bit.

Q. And when one is trying to flank around a channel, as you have been talking about, the operator sometimes does not maneuver perfectly and runs against the bank of the channel, doesn't he?

A. Occasionally that is the case.

Q. Now, as to any of these groundings that you testified about, do you know the draft to which these barges were loaded in any particular instance?

A. I do not recall them just right now.

Q. So you can't give me now any specific grounding, or the date, or the draft to which the barges were loaded?

A. I can't give the date.

Q. Is it any part of your business to find out about the drafts?

A. That is the lock-master's business to find out the drafts of the boats.

Q. When you investigated grounding did you investigate the draft to which the barges were loaded?

A. Sometimes. It is my business to get them out.

Q. Your principal job is to get the barge released and you don't pay much attention to what the draft might be?

A. I would pay attention to them sometimes.

Q. You simply report the circumstance of the grounding to your superior officer in the District Engineer office and from that time on you have nothing to do with it; is that right?

A. Not until they are afloat.

Q. After you have performed your duty in trying to get the tow
or barge afloat you simply report the circumstances to the
2770 District Engineer office and you have nothing further to
do with it?

A. After the barge is afloat.

Q. You make no further investigation of draft or other conditions that obtained at the time of the grounding?

A. I might, to know what the draft is at the time. I must know that.

By Mr. **Thompson**. What the draft is?

By the **Witness**. Yes, sir.

Q. You have testified about some of this grounding you thought was due to the operation of the Marmet plant. You didn't know that definitely, did you?

A. That was the cause of it. Yes, I knew that.

Q. You were very clear about that?

A. Yes, sir.

Q. You reported that to Col. Conklin?

A. I never report direct to him.

Q. Did you report to your immediate superior?

A. That is right.

Q. Told him that?

A. That is right.

Q. Did you ever find a case where a barge or tow rather had gotten out of the channel?

A. Yes, sir.

Q. That happens quite frequently, doesn't it?

A. Yes, sir; right often.

Q. And if you get out of a channel you are likely to ground a great many places?

A. Yes, sir; if you get out seriously.

Q. Does the river naturally at times vary more rapidly or less rapidly than a power station variation?

A. You mean from the cause of the power station?

Q. No; natural variations from rain and the like, are they more or less rapid than variations in discharge at the power stations?

A. Usually, we have had as much as a foot of rise an hour at Kanawha Falls.

2771 Q. From natural causes?

A. Yes, sir.

Q. And I think you said something about variations at the wicket dams or pools above those dams, do you maintain the levels in the pools above those wicket dams with mathematical precision?

A. Did I understand you to say above the roller dam?

Q. No, pools above the wicket dams?

A. As close as we can.

Q. You do have a good deal of variation, don't you?

A. Only at times.

Q. For instance, if you have the wickets up you won't put them down until there is a considerable depth of water flowing over the wickets?

A. We never, if possible, let it exceed over one foot.

Q. It may rise as much as one foot above then?

A. Only in some unusual case. For instance like we know water is coming behind it for instance like a wave from a power plant, you know it is going to subside, then we don't operate the wickets so often.

Q. Starting from pool level and assuming a rate of rise of one-half foot per hour for two hours would any interference with boats result?

A. Yes, sir.

Q. What would be the character of the interference?

A. At the dams while locking the foot of water in one hour will set up cross currents and make it hazardous to enter locks, and also increases the current in the chutes to such state it makes it bad to navigate.

Q. Are they dangerous after they have risen an hour?

A. 5/10 an hour?

Q. No, after they have risen for an hour, are they dangerous?

A. Surely, when entering a lock.

Q. Don't you often have conditions where the water is higher than that?

A. Yes, but we keep the pools down. If natural conditions we keep the pools at around normal, and if only going to be for a short period of time let more go over the crest of the dam than otherwise.

Q. In time of high flow, how can you prevent a rise of
2772 one foot or two feet in an hour?

A. You mean at the dam? We let the wickets down.

Q. How does that prevent rise in the upper end of the pool?

A. It doesn't on the wicket dam, we can't help anything, the dams must be taken out of the way; must be lowered. We keep it down to a certain stage at the dam.

Q. You can't keep it down when the water has risen?

A. Then we have an open river when the dam is lowered, nothing we can do about it.

Q. Is #6 pool dangerous when the water stands two feet above normal pool level at the upper end?

A. That doesn't happen very often, two foot——

Q. Will you answer the question.

A. It is dangerous.

Q. Starting from pool #4, or normal pool level in pool #6, if the power station at Marmet is in full operation, how much does the water rise at the head of #6 pool?

A. That will vary.

Q. If the pool is at normal pool level, and the power station is operating at full capacity, it won't vary, will it?

A. It certainly will cause us to operate our wickets at #6.

Q. Will that affect the rise at the upper end of the pool?

A. It will continue to be a certain wave, and will stay at that point.

Q. How much rise will there be?

A. I could not tell you. I would have to have the records to do that. It would fluctuate as we operate the dam.

Redirect examination by Mr. **Thompson**:

Q. How many complaints did you have on pool #6 before the Marmet dam was put in operation?

A. Very few.

Q. And how many have you had since?

By Mr. **Jackson**. That is not proper redirect.

By Mr. **Thompson**. You were asking about the effect on the #6 pool.

By Mr. JACKSON. Counsel put him on on rebuttal and questioned him about groundings, and now he wants to take in another field.

By the COURT. He may answer.

2773 A. We have each time the power plant is operated, after the close off, we will have probably four or five complaints each time in that pool.

By Mr. THOMPSON:

Q. Counsel asked you about the trouble at Houston landing. What caused the grounding at the Houston landing, if you know?

A. Because the first draw-down of the London pool [interrupted].

Q. The Marmet or London?

A. It was caused through the Marmet and London.

Q. Where?

A. Down by the Marmet pool, caused by that, but the reason of it was after the draw-down in the London pool, the water was closed off so suddenly it made a trough.

Q. You mean it made a trough in the Marmet pool?

A. That is right, Marmet did not shut their power plant down soon enough.

Q. Does the Government dredge at Charleston harbor, do you know?

A. Sometimes at the city landing only.

Q. Does the Government maintain the Charleston harbor otherwise?

A. No.

Q. Counsel asked you about boats getting out of the channel. They Don't get out of the channel on purpose, do they?

A. Certainly not.

Q. You were asked the first time you had considered or discussed waves with your superior. Was that the first time you had ever observed or considered waves?

A. No, sir.

Q. Did you ever see waves on the Ohio when you were on that river?

A. Yes, sir.

Q. And observe and study them?

A. I created them and followed them out.

Q. You mean down the river?

A. That is right.

2774 Q. You spoke about the water going over the top of the dam. I don't know I got clear your explanation. I had some difficulty hearing you. You mean by that it goes over the roller gates?

A. Only one of them, one has a flap on it, they call it the "flap roller" and it is permissible to spill water over that.

Q. It doesn't mean it goes up all the way over the top of the dam, does it?

By Mr. JACKSON. I object to the question as leading.

By the COURT. Let him answer.

By Mr. JACKSON. Exception.

A. No.

Recross-examination by Mr. JACKSON:

Q. You have just told counsel in response to his question the water doesn't go over these dams except through the flap; didn't you tell me at various times the water did go over the gates and that you didn't know how deep it went over?

A. Just in a swell or surge when it would run over.

Q. Never any other way?

A. None I know of.

Q. You don't really know?

A. Sure I know.

Q. How do you know?

A. They tell me they will permit it to go over a few minutes.

Q. Who told you?

A. The lock master.

Q. What did you mean when you told me you didn't know how deep the water at times flowed over these gates?

A. I don't know.

Q. And you don't know how long at times it flows over those gates?

A. Not very long.

Q. You don't know how long, do you?

A. Not very long.

By Mr. THOMPSON. Why don't you say how long if you know?

By the WITNESS. I don't know the exact time.

By Mr. JACKSON:

Q. What was the date you observed this trough at Houston?

A. I don't remember the date.

Q. Did you see it?

A. The trough?

2775 Q. Yes.

A. No; I was at the landing and didn't pay any attention.

Q. You didn't see it?

A. I did not.

Q. Will you get the date for me?

A. I don't know where I would get it. We don't keep dates of those.

Q. You don't make any record of the troubles you investigate?

A. No more than where I have it.

Q. I would be very interested in knowing the time of the trough you saw. You can't help me out on that.

A. I don't know or I would tell you.

Q. And it dropped the water so much below the pool level it grounded?

A. It grounded.

Q. It dropped the water so much below the pool level it grounded?

A. As it went by, yes, sir.

Q. What year was that?

A. That was last year.

Q. Sometime in 1935?

A. Yes, sir.

Q. Would you say in summer or fall?

A. I don't remember the time.

Q. Probably in the middle of the summer?

A. I don't recall the time.

Q. You do recall it was some time last year, don't you?

A. Yes, sir.

Q. You are definite about that?

A. Yes, sir.

Q. You didn't know the plant was not in operation last year?

A. Sir.

Redirect examination by Mr. Thompson:

Q. Was this grounding before or after the Marmet

2776 project started operating?

By the Court:

Trough or something.

A. It was one of their test runs.

Q. At the Marmet?

A. Marmet and London. I don't recall the time.

By the Court. Where do you live?

By the Witness. Point Pleasant, West Virginia.

By the Court. You work up and down from there?

By the Witness. Yes, sir.

2777 **Rowland P. Castle**

Direct examination by Mr. Gatchell:

Q. Please state your name and present occupation?

A. Rowland P. Castle; Chief of the Operation Division United States Engineers Office, Huntington, West Virginia.

Q. How long have you held this position?

A. Since June 4th of this year.

Q. What has been your experience during the past five or six years?

A. In 1929 I started work for the United States Engineers Office at Huntington and at Marietta, Ohio. I was there about a year and a half, and about March 1931, was placed in charge of the Engineers Office at Catlettsburg, Kentucky. That office was in existence until August 1932. I was then transferred to the Point Pleasant office, which was formed at the time the Catlettsburg office was disbanded, and was there about six months as Assistant to the Engineer in charge of that office.

I was transferred then back to the Huntington office, and for a period of about two months I was called Assistant to the District Engineer who, at that time, was Major Herman.

When Major Herman left the District, the Navigation Section was organized, and I was placed in charge of that Section.

Q. And what were your duties when you were placed in charge of the Navigation Section?

A. It was my duty to make regular trips over the river, at least two a month, by a launch, and then to ride tows navigating the river in the Huntington District from their origins.

By Mr. **Jackson**:

Q. When was that?

A. In August 1934, I was placed in charge of the Navigation Section.

2778 By Mr. **Gatchell**:

Q. During the time that you were in charge of the Navigation Section, did you talk to the navigators and pilots on the Ohio and Kanawha Rivers regarding operating conditions?

A. Yes, while I was on these tows I, of course, would spend most of the time in the pilot houses, and that was the reason for being there, to see what difficulties they encountered and what remedies we could put into effect to overcome those difficulties.

Q. What are your present duties?

A. Chief of the Operating Division, and, as such, I am charged with the responsibility of the operation of the dams and pools and project depths, dredging, and expenditure of all funds in connection with the operation of locks and dams.

Q. Does Mr. Carpenter serve under you?

A. He does.

Q. Do you serve under the District Engineer?

A. That is correct.

Q. And all reports on the operation of the Ohio and Kanawha River dams are sent to you?

A. Yes, I get routine reports twice daily, and any extraordinary operations that occur we get reports by telephone.

Q. Do you get reports of gage readings on the Kanawha and Ohio Rivers?

A. Yes, twice daily.

Q. Do you get reports at Marmet?

A. I get reports at the time the gage heights are taken. That is a routine.

Q. How many such reports do you get a day?

A. Two a day—one in the forenoon and one in the afternoon.

Q. Does Mr. Carpenter report all complaints of navigation difficulties to you?

A. No. He reports only major complaints.

2779 Q. He reports major complaints to you?

A. Yes.

Q. In addition to those, you have, yourself, talked to many of the navigators on the Kanawha River?

A. Yes, sir.

Q. How long have you been advised of complaints of navigation difficulties on the Kanawha River?

Mr. JACKSON. We object to this testimony as not in any way proper rebuttal. Apparently it is an attempt to go further into proof of alleged navigation difficulties or groundings in the Kanawha River. They offered proof of that through Capt. Elsey, and now, if they are to reopen their case on that subject, we would be compelled to inquire into it and also offer evidence in surrebuttal. It seems to me improper for them to go into that further.

The COURT. The trend of these preliminary questions seem to do that, but I can't tell yet.

Mr. JACKSON. I did not want the witness to tell of the alleged complaints, and I think that is what the question called for.

NOTE.—The question was read as follows:

"Q. How long have you been advised of complaints of navigation difficulties on the Kanawha River?"

Mr. JACKSON. I submit, that is improper. It cannot have any bearing except going into further proof.

The COURT. You may answer that question.

Mr. JACKSON. Exception.

A. Since I was placed in charge of the navigation section.

By Mr. GATCHELL:

Q. Had the Marmet dam been completed at that time?

A. It had.

Q. How long since?

A. This was about two or three months after the actual completion of the Marmet dam.

Q. When was the power plant at Marmet placed in operation?

A. It was sometime after that. I think about December, 1935.

Q. Mr. Putnam testified in this case for the defendant that the rate of increase in the flow in the Marmet and Winfield pools would have no effect upon navigation until the discharge reached a point which he terms destructive.

Mr. **Jackson**. I think it is where the current reached a point where it is obstructive.

Mr. **Gatchell**. I only have to go by what he said. I will read from page 5285: "The rate would have no effect until the discharge had reached 30,000 second feet. At that point, or in the vicinity of that discharge, the current velocities begin to become what I would term destructive."

Mr. **Jackson**. It is "obstructive."

The **Court**. Go ahead with the question.

By Mr. **Gatchell**:

Q. Would the rate of increase in flow in the Marmet pool have any effect upon the navigation prior to the time when it reached a high velocity?

A. Yes.

Q. How would it have any effect?

A. The rate of increase in flow—of course, a rise in the river will set up higher current velocity than was in effect before this rate of increase started, and that necessarily will slow down the operation of the tow in transit, and especially in the upper pool.

Q. When a tow is proceeding up-stream in the Marmet pool, does the velocity of the current have anything to do with the speed at which that tow can move?

A. Yes.

2780 Q. If that velocity is increased, what happens?

A. The speed of the tow is correspondingly decreased.

Q. Now, if the in-flow into the Marmet pool should be increased at a rate not exceeding 6,000 second-feet per hour, for not more than two hours, what would be the effect upon barges and tows operating in the Marmet pool?

A. During the time of the assumed increase in rate of flow, the velocities would be increased to some extent and the speed in transit would be decreased accordingly.

Q. What would be the effect upon tows and barges that are tied up along the banks?

A. The increased discharge would produce a fluctuation in the pool elevation and increase it, and after that discharge had receded, dropped down to normal again, there would be a corresponding drop. This would ground barges that were tied into the shore, loaded barges especially, with a clearance of three- or four-tenths under the barge.

Q. And is it necessary to tie up on the Kanawha River on account of fog?

A. Yes, very often.

Q. Do fogs occur very frequently?

A. During certain seasons of the year they do.

Q. Are any of those seasons during low water?

A. Yes.

Q. When a tow is tied up in a fog, does the navigator have an opportunity to pick the spot at which he will tie up?

A. No. The fact that he had to tie up on account of a fog does not allow him to pick the point that he will tie up. He has to tie up where the fog hits him.

Q. What is the method of tying up with spars?

A. That applies to floating plants, barges, and so forth, that might be moored in the harbors, and it might be the method 2781 to keep the fleet at a fixed distance from the shore line so it cannot be crowded in on the shore and grounded. It holds the tow in fixed relation to some definite object on the bank.

Q. How many barges are in tows operated on the Kanawha River?

A. The average tow would be about six barges.

Q. And how many spars would such a tow have to use in sparring out?

A. They would have to have at least two.

Q. How many tie lines would they have?

A. That depends on the judgment of the master of the boat. He should at least have one, if not two, head lines out on the head of his tow, and then a breast line, a spring line, and possibly two lines on the down-stream end of the tow.

Q. And how long does it take to get a tow sparred along the bank?

A. This sparring, of course, occurs in the harbors, and they are all equipped for that sort of work, and, even at that, it would take a period of from two or three hours, with five or six men, to spar it.

Q. If, while they are sparred out, there is a change in the stage of the river, up or down, in the Marmet pool, what effect does that have upon the sparring out?

A. Within certain limits the spars do not have to be changed, but when it goes beyond that limit it requires a resetting of the spars and practically starting from scratch.

Q. If they should have to change the spars, how long would that operation take?

A. If they are equipped with derrick boats, they can change rather rapidly, but, even at that, I do not think it could be done in less than two or three hours, and, if they have to do it by hand, it is a much longer operation.

2782 Q. Are you familiar, in a general way, with the plans for the Winfield dam?

A. Yes.

Q. Do you know the elevation of the pool behind that dam?

A. Yes.

Q. What is the elevation?

A. 556.

Q. And what is the elevation of the present No. 6 pool?

A. 563.15.

Q. So that the elevation of the No. 6 pool will be raised how much?

A. It will be raised 2.85 feet.

Q. Is the No. 6 pool dug for any particular depth of channel?

Mr. Jackson. I object to this as not proper rebuttal.

The Court. That question itself is not, but it may lead to something else.

Mr. Jackson. Exception.

Note.—The question was read.

A. Yes, at present, within the last two years, the control points in pool No. 6 have been dredged to sufficient depth to permit nine foot navigation in that particular section.

By Mr. Gatchell:

Q. Major Putnam testified that if there were an increase in stages at the head of Winfield Pool at a rate not exceeding two feet per hour, the rate would have no effect until the discharge had reached 30,000 second feet; will you tell us what you think of that statement?

A. With the rate of not exceeding two feet an hour, there will be considerable fluctuation in pool elevation; there will be an increased velocity, and, in my opinion, at a maximum of two feet an hour, it would be practically impossible for a tow of any size to actually get into the lower approach to the locks.

Q. Why could they not get into the lower approach to the locks?

A. The increased velocity would just about prohibit the movement of that tow.

Q. What is the effect upon the water around the lower approach to the lock?

2783 A. If this discharge was coming through the roller gates of the dam, it would be spread over about 500 feet of river. That would set up one set of current, which would be bad, and especially bad on the tow at the time it had to cross from the left side of the channel over to the right side of the channel in order to enter the lock, because the effect of that current would be pretty much broadside on the tow.

By the COURT:

Broad on which side?

A. The left side of the river. The lock is close to the left side.

By Mr. GATCHELL:

Q. Do they have to cross over the river immediately below the Marmet lock?

A. Yes, there is a rather short crossing there.

Q. What effect would it have upon boats moving up or down in the area now occupied by No. 6 pool, if there was this rate of increase in the Winfield pool?

A. The effect of the velocity will, of course, vary at different points in that pool, but down as far as lock 6 you have a sharp constriction of the channel at Biain's Island, and immediately above is Elk Chute, and there is a very narrow channel there, and at Donnally's Bar, immediately above Elk Chute, and a few miles above that there is a stretch of river known as the Levy Crossing, where there is a dredged channel of at least two miles, and it extends from below the Marmet dam to the entrance to the locks. Through these various constrictions, the velocity will be increased. Down bound, those in approaching these particular areas will necessarily have to slow down, because they will not be able to go through with safety at the same speed of water. They will actually be backing up in going through.

Q. What would be the effect upon a tow in the Marmet pool under a raise at the rate of a foot and a half and hour—not exceeding two hours?

2784 A. In the upper limits of the Marmet pool, from just below Paint Creek on up to the London lock, which is a distance of about three miles, you would have increased velocities and a considerable variation in the direction of the action of the current.

By the COURT:

Have you seen these conditions you are speaking of actually happen on the river, or are you speaking theoretically?

A. I have seen tows which could not get through the chutes because of the velocity of the water through the chutes.

By the COURT:

I am speaking of what you say as to the locks: Have you seen those conditions on the river which you narrated?

A. Yes.

By Mr. **Gatchell**:

Q. You have been actually on the river when there has been a variation of flow below the Marmet pool?

A. Below the Marmet lock. Yes, I have been through there when tows were having considerable difficulty in getting through.

Q. Have you been on the Marmet pool when tows were having difficulty in getting up that pool?

A. Not in the Marmet pool, no.

Q. How long does it take a barge tow, proceeding up-stream, to pass through the length of the Marmet pool in normal low water?

Mr. **Jackson**. I object to that as not proper rebuttal.

The **Court**. It may be preliminary to something else.

Mr. **Jackson**. Exception.

A. The average tow moves at a speed of between two and a half to three miles an hour under normal conditions. Under low water, it would take five or six hours.

By Mr. **Gatchell**:

Q. How long would it take the same tow to pass up-stream through this pool if, at the time it entered the Marmet pool, the discharge in the head of the pool had increased at the rate of 6000 second-feet per hour, and, thereafter, progressively increased 6000 second-feet per hour for three additional hours?

2785 A. The tow would be slowed down by the same amount and the same velocity that the natural flow was increased, due to this increase of flow of 6000 feet.

Q. Would there be any difficulty in keeping in the channel in the Marmet pool?

A. In the upper limits of the pool, above old lock 3, I would say yes.

Q. And what effect, if any, would such an increase of flow at the head of the Marmet pool have upon an average two proceeding down-stream from the upper end of Marmet pool?

Mr. **Jackson**. I object to the competency of the witness to answer this question. It is purely theoretical.

The **Court**. I will let him answer it.

Mr. **Jackson**. Exception.

A. It would increase the hazards that would naturally accompany the tow in navigating that section of the river which has not been extensively improved below the old low water channel.

By Mr. **Gatchell**:

Q. Professor Thomas testified that some storage and re-regulation of power waves reaching Kanawha Falls could be secured on the Marmet pool. Under present conditions, do you permit fluctuations in the level of the Marmet pool?

Mr. Jackson. I will ask a qualifying question. Mr. Castle, are e regulations or orders to the lock-master in writing?

Witness. I have never seen them.

Mr. Jackson. Mr. Carpenter testified yesterday that they are in riting.

Witness. They may be, but I have not seen them.

Mr. Jackson. You don't know anything about them?

Witness. No, sir.

Mr. Jackson. Mr. Carpenter testified yesterday that they are in riting, and I object to any testimony without producing the ecord.

Mr. Gatchell. This witness has qualified himself as being in harge.

The Court. I understand that. This witness said that he doesn't now of any written orders about it.

Mr. Jackson. Their own witness has testified that they are in riting.

The Court. I do not recall what Mr. Carpenter said, but, preuming he said that, there is a difference of opinion or a different tatement between him and the chief.

Mr. Jackson. Exception.

By Mr. Gatchell:

Q. Under present conditions, do you permit a variation in the levation of the Marmet pool?

A. The lock-master at Marmet is instructed to maintain his ool elevation at one-tenth of a foot below the crest of the dam, which is equivalent to a stage of 17.9 feet on the upper gage. The peration of the power plant in connection with that dam allows he use of an additional two-tenths of a foot on the gage right at he lock, which means that the fluctuation can be from 18.0 to 17.7 n that gage.

By Mr. Gatchell:

Q. At what elevation do you keep your working pool level?

2786 A. At 17.9.

Q. Which is 1/10 foot below the crest of the roller gates?

A. Yes, sir.

Q. As I understand you, you permit them to draw down 1/10 of a oot below your working pool elevation?

A. Yes, sir.

Q. I show you paper marked for identification Govern-
2787 ment Exhibit #263, purporting to be a letter signed by John F. Conklin, Lt. Col., Corps of Engineers, District Engineer, addressed to the Kanawha Valley Power Company, Charleston, West Virginia, under date of June 26, 1936, subject,

"Kanawha River pool fluctuations resulting from operation of the Marmet and London hydro-plants", and ask you if you recognize that paper?

A. Yes, sir.

Q. What is it?

A. It is a copy of a letter that was written in the Huntington, West Virginia office, as a result of a conference between Mr. McCormack and Mr. Ellis of the Kanawha Valley Power Company, at which conference a method of operation was proposed and tentatively accepted, which would result in the [interrupted].

Q. Were you present at the conference?

A. Yes, sir.

Q. And was any agreement reached in that conference?

Q. What was that agreement respecting?

A. The operation of the power plant.

Q. Was that agreement reduced to writing?

A. The agreement was reduced to writing in a letter to the Kanawha Valley Power Company.

Q. Is this the letter?

A. It is a copy of the letter.

(Said letter, Exhibit 263, being identical with Exhibit 608 marked for identification, was offered in evidence.)

(Exhibit 609, being Letter dated July 10, 1936, to U. S. District Engineer Office, Huntington, West Virginia on "Kanawha River Pool Fluctuations Resulting From Operation of the Marmet and London Hydro Plants"—from Kanawha Valley Power Company, was offered in evidence.)

Q. You are in charge of the operation and maintenance of these pools in the Kanawha River?

A. Yes, sir.

Q. Are dredging operations carried on in the pools?

A. Yes, sir.

Q. Where do you have the most difficulty on the Kanawha River?

By Mr. **Jackson**. I object to that as not proper rebuttal.

By the **Court**. It may be preliminary to something else.

A. At the lower approaches of the locks.

By Mr. **Gatchell**:

2788 Q. What do you mean by lower approaches?

A. That portion of the pool within from right up to the lock gates downstream in some cases as far as two miles.

Q. Is that in the deepest part of the pool?

A. No, sir.

Q. Is it in the shallowest part?

A. Yes, sir.

Q. Mr. Castle, when you were telling about sparring out boats, I didn't quite follow you. Can you tell the Court how much of a rise would affect the sparring?

A. That would depend entirely on the length of the spars. I could not make a general statement about that.

Q. What is the principal complaints you receive of navigation difficulties in the Kanawha River?

By Mr. Jackson. I object to that as not proper rebuttal.

By the Court. Objection overruled.

By Mr. Jackson: Exception.

A. Fluctuating pools, changes in flow.

Cross examination by Mr. Jackson:

Q. Mr. Castle, how old are you?

A. Thirty-six years old.

Q. What did you do before you went to work for the Government in 1929?

A. I was in the contracting business.

Q. Where?

A. In Huntington, West Virginia.

Q. And how long had you been in that business before 1929?

A. Since 1923.

Q. That is, you have been in that business ever since you were old enough to do anything, until you went into the employ of the Government; is that right?

A. No, sir; I had worked before that, and had been to school before that.

2789 Q. Did you go to any professional school?

A. I am a graduate of the United States Military Academy, at West Point.

Q. When did you graduate?

A. 1923.

Q. And have you ever been an officer in the Corps of Engineers?

A. No, sir.

Q. You graduated in 1923?

A. Yes, sir.

Q. Then did you go into the contracting business?

A. Yes, sir.

Q. When?

A. About two months after graduation.

Q. And you continued in that until 1929?

A. Yes, sir.

Q. And then accepted this employment in the Engineer Office as a civilian engineer, at Huntington?

A. I was employed at Huntington and sent to Marietta.

Q. Now what kind of construction work were you doing before you went with the Government?

A. General construction, buildings entirely.

Q. You were not engaged in navigation operations before you went with the Government?

A. No, sir, not in the contracting business.

Q. And any experience you have had in having anything to do with navigation has been since you went with the Government?

A. Yes, sir.

Q. You have not personally ever navigated boats?

A. No, sir, I am not a pilot.

Q. And you have never been in the navigation business yours'lf?

A. No, sir.

2790 Q. Now, assuming Mr. Castle that the flow in the future Winfield pool, at a given time, is 8,000 second feet, will the current be any different whether that flow was attained in the course of two hours or in the course of ten hours?

A. Yes, sir, if the current or flow is attained in two hours the current will be in excess of that during that time than if you attained it in ten hours.

Q. The fact is, is it not, with a flow of 8,000 second feet in the Winfield pool, the current will be the same regardless of how rapidly the river rose, prior to that time?

A. If I understand the question, it is after the flow of 8,000 second feet is reached it will be the same?

Q. Be the same at that time?

A. Same as what? I don't understand.

Q. I want you to tell me whether, in your opinion, when a flow of 8,000 second feet exists at the future Winfield pool, the velocity which will prevail at that time will depend upon the rate of rise in the river prior thereto?

A. A flow of 8,000 second feet will produce a certain current, and that current will be maintained regardless of the rate of rise prior to that.

Q. That is, with a given flow, a certain current will result which may or may not be obstructive to boats, depending upon the velocity of current, isn't that about right?

A. Any flow is obstructive to a boat in transit.

Q. That is your opinion is that every boat going up a river is obstructed because there is some current in the river?

A. Yes, sir, it retards its progress.

Q. Your testimony is based on the theory there is always some obstruction to navigation unless you have completely slack water, with no movement in it?

791 A. Any velocity, natural or otherwise is an obstruction.

Q. That is the sense about which you have been testifying bout obstructions here this morning, isn't it?

A. In my testimony this morning I have based my increases in elocity due to these increases in stage or discharge on an assumed ow in the river, and assumed velocity therefrom.

Q. What is the hydraulic capacity of the Marmet power station, pproximately?

A. I have been told about 10,000 second-feet.

Q. Isn't it about 9,000 second-feet?

A. I don't know the capacity, at the present—the turbines at resent—are operating under a higher head than they will be when e dam is completed.

Q. What is the average flow of the Kanawha River at the Marmet am?

A. In what season?

Q. The average flow?

A. I don't know.

Q. Isn't it in excess of 13,500 second-feet?

A. I don't know.

Q. From your familiarity with the river and river conditions, ouldn't you say that is about right?

A. I wouldn't say it is right. I would say it is probably in excess f that throughout the year.

Q. Doesn't the average flow of the Kanawha River at Marmet xceed 10,000 second-feet more than fifty percent of the time—I on't mean the average, but the flow at Marmet, doesn't it exceed 0,000 second-feet more than fifty percent of the time?

A. I don't know.

Q. Would you say that is not right?

A. I don't know.

92 Q. You testified I think that in your opinion an increase at the rate of 6,000 second-feet per hour in any of these avigation pools existing in the future would create an obructive current in those pools. Assuming, Mr. Castle, a flow of 000 second-feet in the future Gallipolis pool, and assuming that ow was increased by 6,000 second-feet, what would be the resulting locity of current? [Interrupted.]

A. I don't know.

Q. What would be the velocity of current in the Winfield pool sulting from a flow of 6,000 second-feet?

A. I don't know what the velocity of the current would be.

Q. You never have made any study of the current velocities that ould result on any of these pools from various flows, have you?

A. No, sir.

Q. And you don't know, of course, what current velocities would exist in these various pools from a given flow or would result from a particular increase in flow in those pools, do you?

A. I don't know about the velocity, no, sir.

Q. Have you observed, Mr. Castle, whether navigation ceases on the Kanawha River, when the flood flows get as high as 30,000 second-feet?

A. I have seen boats unable to get through certain points on the Kanawha when the flow was less than 30,000.

Q. I am asking if navigation ceases on the Kanawha at 30,000 second-feet?

A. No, sir.

Q. Does it continue, Mr. Castle, when the river is over-flowed?

A. Yes, navigation continues.

Q. Do you know what the current in the river is when it has risen to a stage where it is flowing and inundating the lands where houses are built along the river?

2793 A. No, sir; I don't know.

Q. Be pretty high, wouldn't it?

A. No, sir; be lower.

Q. That is your opinion, the higher the flow the lower the current?

A. At a certain point in the stage of the water.

Q. You testified, as I understood you, if a boat were operating on the London or Marmet pool, and there were a decrease in flow into that pool of, for instance, 6,000 second feet in an hour, it would result in grounding of the tow or the boat; is that about right?

A. No, sir, I don't think I mentioned grounding the boat.

Q. You don't think it would ground, do you, as a result of there being a decrease in flow at the London or Marmet pool of 6,000 second feet?

A. It might or might not, depending on where it was caught at the time.

Q. You know if the boat were not loaded beyond the project depth and the pool did not drop below the project depth, there would be no grounding as a result of the decrease in flow of 6,000 second feet, do you not?

A. If he were in the channel there would be no grounding.

Q. If you get out of the channel you are always in more or less hazard of having a grounding?

A. Surely.

Q. Now, Mr. Castle, you said that when boats were sparred out, that if there is any drop in water level, or at least under some conditions, drops in water level, that it would result in the grounding of the barges. You personally, of course, have not sparred out boats, that has not been any part of your business?

A. I have supervised the sparring out of our own fleets, yes, sir.

2794 Q. The sparring out of the boat is to allow for rise and fall of the water level, isn't it?

A. In part.

Q. And it is the common and usual practice in river navigation to spar out boats for that reason unless you have in some places a dock or wharf constructed, which is not likely to be often?

A. Sparring out is common practice.

Q. And it of course follows when you spar out your barges that so long as there is not a recession of the water that is greater than the amount of clearance you have allowed under your barges, there will be no grounding, is that true?

A. That is right.

Q. And the matter of having these fluctuations and dealing with certain fluctuations within those limits is a part of practical river navigation, isn't it?

A. Surely.

Q. And when there is a recession, there is no effect unless it may be in some instances the necessity of adjusting the hawser, is that what you use to bind the boats, or how is that, a rope as I understand it?

A. It requires considerable more adjustment than a rope. As the river recedes it will be necessary to remove your spars.

Q. That would only be true if you had a recession greater than the amount of clearance provided by your original sparring out?

A. Yes, sir.

Q. And as long as you do not have a recession that does not exceed that, you would not have any such need?

A. That is right.

Q. And isn't it true every time you spar out, you have two or three feet of water under your barges?

A. No, sir.

2795 Q. Isn't that generally true?

A. Not always; no, sir.

Q. But isn't it generally true?

A. I don't think it is.

Q. You would not be willing to say it isn't?

A. In the majority of harbors on the Kanawha River it isn't the case.

Q. You wouldn't say it isn't generally two feet, would you?

A. I don't know of any with two feet clearance.

Q. It all depends on how far they are sparred out and the slope of the bed, doesn't it?

A. Not always, it depends on the depth of the harbor. You can't spar a fleet out sixty or seventy feet, lots of places if you did that the fleet would be in the middle of the river.

Q. In places where there are a perfectly flat, shallow landing, you have a situation where there has never been provided a landing or harbor?

A. These boats are sparred out in what they have provided.

Q. And what they have provided is merely a question of the amount of dredging and work they care to do in providing a landing, by private interests, isn't it?

A. It is up to private interests to provide their harbors.

Q. On these wicket dams, Mr. Castle, navigation proceeds when the wickets and then the passes are down, and the other wickets up?

A. No, sir; that condition never prevails.

Q. The wier goes down first?

A. Surely.

Q. And does navigation then continue?

A. Yes, sir.

Q. And what is the flow in the river under those conditions?

A. With the entire wier down?

2796 Q. Yes.

A. At lock #6 or where?

Q. You can give me different locks.

A. At Lock #6 all the wier will be down at a stage of about four feet on the Falls gage, at about that.

Q. Will the pass still be up?

A. Yes.

Q. So that they will be using the lock?

A. Yes.

Q. And what will be the flow at that point in the river under those conditions?

A. I would have to have a rating chart to see what that discharge is. If I remember right, it would be around 13,000 or 14,000 second-feet, or something like that.

Q. So this navigation continues with a flow of around 14,000 second-feet through the locks?

A. Flow through the locks?

Q. No; the flow in the river is 14,000 second-feet?

A. That is correct.

Q. You testified about your view of the effect of increases or decreases in flow of 6,000 second-feet per hour. The decrease would, of course, decrease the current, wouldn't it?

A. That is correct; yes, sir.

Q. And would that have a compensating beneficial effect on navigation?

A. Of course, the decrease in flow is going to benefit it just as much as the increase in flow hurts the other tow, but as far as navigating any one boat is concerned, I don't think the change is——

Q. The only point I am getting at is, Mr. Castle, if you assume an equal variation up and down, below a certain established flow, the increase will tend to increase the current and the de-
2797 crease will tend to beneficially decrease the current that would otherwise exist; isn't that true?

A. Yes, it makes it easier. A decreasing river makes it easier.

Q. You stated, I think, that if there were an increase of 6,000 second-feet per hour for two hours that that would create current so that the tows or barges couldn't go upstream?

A. At certain locations that rate of rise would stop traffic.

Q. Mr. Castls, assuming a previous base flow of 1,000 second-feet, will you tell me what current would result from an increase of 6,000 second-feet in one hour at the Marmet or Winfield pools?

A. No, sir; I can't tell you the velocity.

Q. That is at the end of the hour?

A. I can't tell you.

Q. Will you tell me what current would result at the end of two hours?

A. I couldn't say that.

Q. Of course, if the original flow were 1,000 second-feet and it increased even in two hours at the rate of 6,000 second-feet, it would still be less than the flow at which you maintain the use of the lock in the wicket dams under present conditions rather than putting them down and using the navigable pass, wouldn't it? That is, you said a while ago that when the flow in the river at the wicket dams would be around 14,000 second-feet and the weir down, navigation would still be using the lock; is that right?

A. Yes, sir.

Q. So that under the conditions I have assumed, it is a mere matter of mathematics.

A. You mean a flow of 7,000 second-feet in the river?

Q. At the end of the two hours there would be a flow of 13,000 second-feet in the river under the conditions I assume?

A. Yes. The locks would still be in operation.

2798 Q. And that would also be less than the average flow of the Kanawha River at Marmet, wouldn't it?

A. I don't know about that.

Q. You spoke something about the current below the locks at London and Marmet. Is it not a fact that the nature of those currents was determined by model tests made by Professor Thomas of Carnegie Institute of Technology?

A. I don't know.

By Mr. **Jackson**:

Q. Mr. Castle, what is the capacity in kilowatts of the installation at Marmet—about 15,000 kilowatts?

A. I have been told that, yes.

Q. I think you said your understanding is that the hydraulic capacity of the installation is 9,000 or 10,000 second-feet?

A. That is my understanding, yes.

Q. You testified about Exhibit 263, the letter of Col. Conklin to the Kanawha Valley Power Company, and I want to direct your attention to paragraph "C" with a subparagraph 1, at the bottom of page 2, reading as follows: "Pending completion of the central control system, current rules for manual operation will be modified at once with the view to minimizing fluctuations as follows:

"1. Power increment, both positive and negative, will be applied at the rate of 5,000 kw., applied gradually over a period of 60 minutes, instead of 30 minutes, as at present."

I ask you whether I am right in understanding that to mean that the rate at which the power load is to be added to the Marmet power plant, or taken off of the Marmet power plant, shall be 5,000 kw. per hour?

A. The paragraph you referred to states that it will be applied in increments, or taken off in increments.

By Mr. **Jackson**:

Q. I want to see if I am right in understanding that the load will be added or taken off at a rate which will be 5,000 kw.
2799 per hour, or not exceeding that?

A. Gradually applied.

Q. That is one-third of the capacity of the plant, isn't it—15,000 kw.?

A. That is my understanding, yes.

Q. And that would also be equivalent, speaking in terms of hydraulic capacity, to 3,000 second-feet per hour, would it not?

A. Assuming 9,000 second-feet.

Q. If you assume 10,000, it will be 3,300?

A. Yes.

Q. So under this rule of operation the flow of discharge of the Marmet power station may be increased 3,000 second-feet in an hour or decreased 3,000 second-feet in an hour; is that right?

A. That is correct.

Q. I also direct your attention to subparagraph 2 of Paragraph "C" at the end of Government Exhibit 263, reading: "Within the limits of +0.0 to −0.3 at the Marmet upper pool, the operation of Marmet plant will be started in advance of the London plant and closed in conjunction with the London Plant to equalize, as much as possible, the level of the lower pool at Marmet. Compensation of the heavier peak for shorter duration with incidental fluctuations will be carried primarily at London but in this operation due care will be exercised at both plants to avoid drawing the lower pool at London below normal." The lower pool at London is the Marmet pool?

A. That is the upper end of the Marmet pool.

Q. And by this reference to peak is meant a variable operation of the plant, isn't it?

A. Peak, as I understand it, is the maximum—either discharge in water or generation of power.

Q. It says "heavier peak for shorter duration." That means you would have a larger flow for part of the time; is that right?

2800 A. During the length of the peak, yes.

By Mr. Jackson:

Q. And this exhibit 263, you have identified, as I understand it, as the regulations that were promulgated by Col. Conklin and that now obtain; is that right?

A. Tentatively; yes, sir.

Redirect examination by Mr. Gatchell:

Q. Counsel asked you if you knew what velocities would result from the discharge at a certain number of cubic feet. You said you didn't know. Do you know that the Kanawha River would have different velocities at different stages?

A. At certain points, yes.

Q. Counsel asked you about sparring out of boats and may I ask you this: Do navigators wait until boats have gone aground before changing their spars when the river is falling?

A. No; when they know the river is falling they will watch pretty closely and they will try to get the boats moved out just ahead of the time they ground.

Q. So that the river might stop falling after they had sparred out; and they still would have gone through the operation?

A. That is correct, yes, sir.

Q. You said that private interests maintained the landings and harbors along the Kanawha River. Who maintains the water level?

A. The Engineer Department of the United States.

Q. Do private interests maintain landing places all up and down Kanawha River where they can tie up in fog?

A. Not to my knowledge.

Q. This agreement that counsel referred to as Exhibit #263, the letter signed by Col. Conklin, under date of June 26, 1936—is that a final agreement?

By Mr. JACKSON. I object to the competency of the witness to answer that question.

By the COURT. He has said two or three times it was a tentative agreement.

2801 By Mr. GATCHELL:

Q. By that do you mean it can be changed at any time?

A. Yes, sir.

Recross-examination by Mr. JACKSON:

Q. Mr. Castle, after the four new dams are completed and in operation and the three power stations, the two at London and Marmet and the one at Winfield, will the navigation interests be better off than under the old conditions with the ten low dams in the Kanawha River before any of these improvements were made?

By Mr. GATCHELL: That is certainly not a proper question. There are many considerations that might enter into it.

By the COURT. Objection sustained.

By the COURT:

Q. Mr. Castle, supposing the gates of the Marmet dam are raised as high as possible, in an effort to discharge water from the pool, what is the discharge that will occur when the pool is full? I realize that if the pool level drops, of course the discharge will be less but on a full pool if you raise the gates as high as possible, how much water will run out, do you know?

A. You mean the roller gates in the dam?

Q. Yes; the roller gates in the dam?

A. Well, I have no way of being able to answer that, sir.

2802 HARRY R. BRIGHT

Direct examination by Mr. GATCHELL:

Q. Will you state your full name and present occupation?

A. Harry R. Bright. Lock Master at Lock and Dam #6, Kanawha River.

Q. How long have you been Lock Master at Lock and Dam #6?

A. Nearly 7 years.

Q. How long have you lived on the Kanawha River?

A. All my life.

Q. Is the dam at Lock #6 a fixed crest dam?

A. It is a movable dam, Chanoine Wickets.

Q. And what is the normal pool elevation at Dam #6?

A. 563.15.

Q. What is the gage height?

A. 15.25.

Q. Are you in control of the pool level?

A. Yes, sir.

Q. And at what elevation are you instructed to keep that pool?

A. Got to keep it above normal pool, not to be under normal pool.

Q. At what stage of the river do you raise your wickets?

A. When our dam is down we start raising our wickets at about 11 feet on the lower gage.

Q. And what would be the reading on the Kanawha Falls gage at that time?

A. Between 4½ and 5 feet.

Q. At what stage on your lower miter-sill gage do you have your entire dam up?

A. Near about 7 feet, that is at low water.

Q. Would it be needled?

A. It would be needled.

2803 Q. In times of low water during the years prior to completion of the London and Marmet power plants, how frequently did you ordinarily operate or maneuver the wickets on Dam #6?

A. Near about 200 times during low water season.

By Mr. GATCHELL:

Q. Is that since the completion?

A. Since the completion of the Marmet dam.

Q. How about prior to completion of those dams?

A. It would be very few—six, maybe eight—times a year on an average at low water.

Q. How many times do you operate the wickets on your dams a day?

A. Average about four times a day.

Q. Are you informed as to the discharge past the Marmet dam?

A. By telephone.

Q. Who informs you?

A. The Lock Master or some of his crew who is in charge at the time. The Lock Master may not be there at all times.

By Mr. **Jackson**:

Q. The Lock Master where?

A. At Marmet.

By Mr. **Gatchell**:

Q. Do they notify you whenever there is a change in the discharge?

A. Yes; the same thing.

Q. How many men does it take to operate the wickets in ordinary low water under present circumstances?

A. Three.

Q. A three-man crew?

A. A three-man crew, yes.

Q. About how long does it take?

A. It takes about an hour or a little better than an hour for each operation.

Q. And what is the effect upon the normal current below the dam and near the lock entrance when you lower some of your wickets?

A. It sets up a back-slash, we call it, and the boats has difficulty getting in the lock. They have to put out a line to take them into the lock. It is an out-set current.

By Mr. **Jackson**. May it be understood that all of this testimony is subject to our objection as not proper rebuttal?

By the **Court**. Yes.

By Mr. **Jackson**. And exception.

2804 By Mr. **Gatchell**:

Q. Are complaints made to you when navigators have difficulty near Dam #6?

A. Yes, sir.

Q. Do you make investigation of such complaints?

A. Yes; I try to remedy that by our pool level.

By Mr. **Jackson**. I think another question should be asked if he is going to pursue this further.

By Mr. **Gatchell**:

Q. What do you do?

By Mr. **Jackson**. I object to their going into this question further. It seems to me it is new.

By the **Court**. I think so, too. I allowed these other questions to be asked on the theory that they were preliminary, getting to something probably in rebuttal of the evidence introduced by the defense, but these questions certainly are not in rebuttal.

By Mr. **Gatchell**. Your Honor, all that we are attempting to do by this witness, whose testimony on direct will be very short, is to see if Major Putnam was correct when he said that the rate of ge, increase or decrease in the flow of the river past the Marlam, would have no effect upon navigation, adverse or other-

the Court. Let us get to that then.

Mr. Gatchell. These questions that I have been asking are minary to that because we want to show that this man has ledge of what happens and how it happens and what naviga- interests have to say about it.

Mr. Jackson. That would be an effort to bring in further mony on the line of Capt. Elsey and would be improper.

Mr. Gatchell. May I proceed?

the Court. You may go ahead.

By Mr. Gatchell:

Did you answer the question as to what you did when they plained to you about navigation difficulties?

I investigate it.

Mr. Jackson. May our exception be noted?

the Court. He investigates and that is all.

By Mr. Gatchell:

Go ahead.

the Court. No; that is enough. He investigates it.

By Mr. Gatchell:

Do you operate your pool in any way?

Yes; if our pools are down we immediately caulk and try aise the pool and if we haven't got the water sufficient we call Mr. Marshall and ask for water if he has it to spare.

By the Court:

Mr. Marshall is the Lock Master at Marmet, isn't he?

That is right; yes, sir.

By Mr. Gatchell:

Does he give you the water?

At times.

If he does not what do you do?

I call Mr. Carpenter.

And what does he do, if you know?

He investigates it, as far as I know. That is as far as I vith it.

Have your navigation difficulties increased since the comple- and the operation of the London and Marmet plants?

By Mr. Jackson. I object to that as not proper rebuttal.

By the Court. He may answer it.

By Mr. Jackson. May our exception be noted?

Yes.

By Mr. **Gatchell**:

Q. If your dam has all of the wickets down and you receive word from the Marmet dam that the power plant has been shut down, what operation of your dam is necessary?

A. Well, if it down just below 11 feet, we have to put the dam up to the project depth above.

2805 By Mr. **Jackson**. Will you read the answer.

(The answer was read as above.)

By Mr. **Jackson**:

Q. Is that what you said?

A. Put the dam up to raise the pool so that navigators can go up and down the river.

By Mr. **Gatchell**:

Q. Do the changes in stage at the upper end of your pool cause any difficulty in the operation of your dam?

A. Changes in the pool? Yes; it does.

Q. Does it cause you to operate your wickets more frequently?

A. Yes, sir.

Q. Does the rate of increase in flow at the upper end of your pool cause you to operate your dam more frequently.

A. Yes, sir.

By Mr. **Jackson**. I object to that question as he hasn't shown any competency to consider rates of increase.

By the **Court**. The answer may stand.

By Mr. **Gatchell**:

Q. And would the same thing be true of the rate of decrease?

A. It would.

Q. You say you have lived on Kanawha River all your life?

A. Yes, sir.

Q. Can you stand on the bank of Kanawha River and observe a rise in that river of as little as 5/10 of a foot in five hours?

A. Well, yes.

Q. Do you have any difficulty in observing the rise in stage of the Kanawha River?

A. I do.

Q. Where were you living in 1930?

A. Lock #6.

Q. And where was your home?

A. Lock #6.

Q. Where is that located?

A. Four miles below Charleston.

Q. Where was the water supply of the City of Charleston obtained during that year, if you know?

A. Elk River.

2806 Q. Do you know if they experienced any difficulty with the water supply during that year?

By Mr. JACKSON. I object to that as irrelevant and immaterial.

By the COURT. What is that in rebuttal of?

By Mr. GATCHELL. This just goes to the testimony of Dr. Mead with respect to the City water supply of the City of Charleston and this witness was there during the year 1930.

By Mr. JACKSON. What is it going to rebut?

By the COURT. What statement did he make that you wish to deny?

By Mr. GATCHELL. It is in rebuttal of this specific point that was brought out by the witnesses for the defendant, namely: Dr. Mead, and I forget the other witness, that the water supply for the City of Charleston did not come from the Kanawha River, and, if this witness knows, I would like to ask him three questions on it.

By the COURT. He just said it came from the Elk River.

By Mr. GATCHELL:

Q. Is that true during the entire year?

By Mr. JACKSON: I object to that as not proper rebuttal.

By the COURT. I will let him answer.

A. They had trouble with water. They had to lay an extra line through the City of Charleston to the river to supply the water.

By Mr. GATCHELL:

Q. To what river?

A. Kanawha River.

Q. Do you know at what time they got the water supply from the Kanawha River?

A. No, sir.

Cross-examination by Mr. JACKSON:

Q. What do you mean by a rate of decrease in stage?

A. That is when the river is falling.

Q. You don't mean by rate——

A. (Interrupting.) We don't get it by rate—we get it by tenths.

Q. You don't know what a rate of decrease of increase means, do you?

A. Decrease is falling and an increase is rising.

Q. Any answer that you made that involved the questions of rate were made without any understanding on your part as to what that means, weren't they?

A. I don't know what rating is.

Q. Am I right in understanding you, Mr. Bright, that you can stand along the Kanawha River and, if that river is falling at the rate of 1/60 of an inch a minute, that you can stand there and observe that fall?

By the WITNESS. (Interrupting.) No, sir; I cannot.

By Mr. JACKSON:

Q. Mr. Bright, assuming that you are standing on the bank of the Kanawha River, I will ask you if you can observe an increase in the stage of the Kanawha River at the rate of 1/60 of an inch or less, in a minute?

A. Yes, sir; I can tell when the river is rising.

Q. You can actually see it rising?

2807 A. No, sir; but I can tell that it is rising by the different currents the same as if a man poured water there and made a current.

Q. If there is a change in stage upward, as little as 1/60 of an inch in a minute, you can observe the changes in the river, as you look at it. Is that right?

A. I can tell when the river is rising; that is all.

Q. You can tell when the river is rising with that small change?

A. You can tell when the river is rising.

Q. Suppose that you were standing on the bank of the Kanawha River and look at it and went away and came back in five minutes, and it had risen 1/16 of an inch, could you tell it from looking at the river?

A. We can tell when the river is rising, but I don't know how much.

Q. If you were standing there and then went away and came back in five minutes, it is your testimony that, in that interim, the river had—if the river had increased or risen—the stage had risen 1/16 of an inch, that you could recognize that with your eye?

A. I could not recognize it as 1/16, but I could recognize that it is rising.

Q. It is your testimony that, if you were standing on the bank of the Kanawha River and looked at it and went away and came back in five minutes, and there had been a rise in stage of as little as 1/16 of an inch, you could look at the river and say, "I can tell by the currents on the river that the river has risen since I was here."

A. I can tell that it is rising, but not that it was 1/16 of an inch.

Q. I just wanted to know how finely drawn your judgment was. You stated that you have operated the wickets at Number 6 Dam from time to time?

A. Yes, sir.

2808 Q. And you said that you now operate them perhaps 200 times a year?

A. Yes; approximately 200 times a year.

Q. You don't mean to imply that you operate all of them, do you?

A. No, sir; just to take care of the waves from the Marmet turbines.

Q. What you mean is that you adjust a few wickets during this time?

A. If we kept the dam up and the waves come when we have too much water over the top to swing the wickets, it would probably do damage to the dam.

Q. The point is, what you do under these circumstances is to adjust a few wickets. You don't put the wickets all down?

A. No, sir; we don't put them all down.

Q. It is perhaps only a few that you moved?

A. Yes, sir.

Q. And it is part of your duties, as lock-master, with your crew, to move the wickets, as may be required?

A. Yes, sir.

Q. You are directed to do that by Colonel Conklin, or through him?

A. Yes, sir; through him.

Q. Has your pay been increased since you have been moving or adjusting the wickets oftener?

A. No, sir.

Q. You get the same pay that you got for a number of years back, don't you?

A. Yes, sir.

Q. Have you any more men working for you now than you had?

A. The same men.

Q. The same men exactly?

A. Yes, sir.

2809 Q. You understand that your dam is to be taken out as soon as Winfield is completed?

A. Yes, sir.

Q. And there will not be any wicket dams then, I take it?

A. Not at Lock No. 6.

Q. Do you know how much volume of water must flow past your dam before currents, that are troublesome or an obstruction to navigation, arise?

A. No, sir.

Q. You have not made a study of that kind?

A. No, sir.

Q. And you would not have any idea that a flow of 2,000 second-feet or 6,000 second-feet, or 8,000 second-feet, or 10,000 second-feet would create these currents?

A. I don't know a thing about it.

Q. Nor any other measure of volume of water, such as acre feet or gallons or any thing of that character?

A. No, sir.

2810 Direct examination by Mr. GATCHELL:

Q. Will you state your full name and present occupation?

A. W. H. Marshall; I am lock-master at Marmet.

Q. And what are your duties as lock-master?

A. To control the upper pools at Marmet Dam.

Q. What is the elevation of upper Marmet pool at its working elevation?

A. The elevation is 589.9,—0.1 below the crest of the dam.

Q. Do the rollers constitute the crest of that dam?

A. Yes, sir.

Q. When the water falls below the working pool elevation, how much of a drop do you permit before you take any steps to remedy that?

A. If it goes below that one-tenth, which is below the crest, we try to rectify it and bring it back up.

Q. If it goes below 589.9?

A. If it goes one-tenth below 589.9, we try to bring it back.

Q. What do you do?

A. We call the operator that operates the power turbines and ask them if they won't restore it.

Q. And how can they restore it?

A. They could restore it by decreasing the opening through the turbines.

Q. They can restore it by decreasing the opening through the turbines?

A. Yes, sir.

By the COURT:

Q. You call the operator at Marmet, do you?

A. Yes, sir.

Q. And this pool will be brought back to the proper level by the inflow from London?

A. Yes, sir; by decreasing the discharge through the turbine.

2811 Q. By decreasing the discharge through the turbines at Marmet?

A. Yes, sir.

Q. And then that inflow from both will build it up?

A. Yes, sir.

2812 By Mr. Gatchell:

Q. Does the working pool elevation vary more than .3 of a foot?

A. It does; yes, sir.

Q. What are your instructions in regard to any variation?

A. We are instructed not to let the water go over the dam, if, by ordinary manipulation, the dam will prevent it.

Q. The manipulation of the power plant?

A. The manipulation of the power plant or Marmet Dam.

Q. Does the power company always respond to your request to change the discharge through their turbines?

A. Usually they do; however, once or twice, they would not do it.

Q. What happened the times they would not do it?

A. The operator told me that he had instructions from the Cabin Creek Station that he could not change it.

Q. What did you do?

A. In one case, I called the Cabin Creek Station and they told me—I asked them if they would not decrease their discharge through the turbines, so as to build the pool up, and he told me it was not any of my business, so I called up Mr. McCormack, but he was out of town, and that is as far as it went.

By Mr. Gatchell:

Q. Major Putnam said that there would be no adverse effect on navigation, if the rate of increase of the stage of Marmet pool did not exceed 1½ feet per hour up to the point where the critical discharge of 22,000 second feet obtained. When there is an increase in the stage of Marmet pool of 1½ feet per hour, what do you do?

A. Why, we get prepared to operate the roller dam and operate it as that water gets to it.

Q. And do you know if a rise of water at any such stage as that has interfered with navigation operating on the Marmet pool?

2813 A. The upper three miles of our pool—Marmet pool, is worse—it is the worst part, and navigators have complained to me that they had considerable trouble.

By the Court:

Q. What is the cause of it?

A. The increase or excess currents.

Q. At various times, under certain conditions?

A. Well, low water when we have just project depth, they have some treacherous chutes through there—narrow channels, and the additional discharge down there—they complained that it was objectionable.

By Mr. GATCHELL:

Q. Major Putnam said that a decrease in the stage at the head of Marmet pool for not more than two hours at a rate not to exceed 1½ feet an hour would not have any effect on navigation, adverse or otherwise, as long as the project level was maintained. Can you tell us what effect you have observed upon navigation in the Marmet pool, where the elevation—in decrease—where the elevation of the project pool was not—where the normal pool elevation was not reached?

By Mr. JACKSON. That is not an accurate quotation of Major Putnam's statement. The answer was this: (Referring to record and reading:)

"A. The rate of change in stage would have no effect on navigation, adverse or otherwise, except the necessary adjustments to lines and spars where boats are tied up at the terminals, so long as this rate did not continue to a point where the pool was no longer maintained at its project elevation."

By Mr. GATCHELL:

Q. What would you say about that?

A. The lock-master at London lock has received complaint that I have heard about.

2814 Q. Did you have any such yourself?

A. No, sir; I did not observe the conditions.

Q. Do you report all complaints to Mr. Carpenter?

A. All that I do not have authority to correct.

Q. Do you keep a record of complaints?

A. No, sir.

Q. Have you received any complaints regarding boats tied up at tipples?

A. Yes, sir.

Q. What is the nature of those?

A. Below Marmet Dam or Lock 6 pool, about four miles below Marmet, there is a coal tipple that has made several complaints of the lowering of the pool.

A. Boats going aground due to a falling river or lowering the stage at that point.

Q. Do you know if any such groundings were caused by fluctuations from Marmet and London power plant operations?

A. The Marmet——

By Mr. JACKSON (interrupting.) From his own observation?

By Mr. GATCHELL. I asked him if he knew.

A. I know that the lower pool at Marmet Dam fluctuated due to the operation of the hydro plant and, since this point is about four miles below, it is evidently the cause of their grounding.

Q. Did you receive many complaints or do you?

A. Yes; I did only recently. ..I might add that, since then, we ported to the men that complained that we have no jurisdiction er the control of this pool, and rather than report to me, they to my superiors.

By Mr. JACKSON:

Q. You say "we"; where?

A. At Marmet.

Q. You refer to pool No. 6?

A. Yes, sir.

By Mr. GATCHELL. You may cross examine him.

By Mr. JACKSON. I move to strike the evidence of this itness before the cross examination on the ground that it is not oper rebuttal evidence.

By the COURT. I will strike it all except the latter part—that knows that fluctuations were caused in pool No. 6 by discharges om the Marmet power plant and caused one grounding.

By Mr. JACKSON. That is pool No. 6?

By the COURT. Yes, sir.

Cross-examination by Mr. JACKSON:

Q. How old are you?

A. I am 34 years old.

Q. How long have you been working for the Government?

A. Since 1929.

Q. You have been working there as lock-master for that period?

A. For the last two years.

Q. Before that, what was the nature of your work?

A. I was inspector of construction at the lock and dam.

Q. Before you went with the Government, where did you work?

A. I worked on surveys.

Q. Surveys on the river?

A. Yes, sir.

Q. For whom?

A. For the Government.

Q. You worked for the Government before 1929, did you?

A. No, sir; that was since then.

Q. What did you do before 1929?

A. I worked for the Commissioners of Sewerage at Louisville, Kentucky—a survey man.

Q. Do you have any written instructions from your superiors s to the operation of Marmet lock?

A. Yes, sir.

Q. Do you have them here with you?

A. No, sir.

Q. Do you have them here in the city?

A. No, sir.

Q. Can you have them sent here tomorrow?

A. I could write for them.

Q. Where would you have to send?

A. To Marmet Dam, at Marmet, West Virginia.

Q. Now, does the water ever flow over the roller gates at Marmet?

A. Yes, sir.

Q. It does that from time to time, does it?

A. Yes, sir.

Q. And at times it flows over the gates to a total of several tenths of a foot?

A. It has gone 0.2, I know.

Q. Hasn't it run higher than that at times?

A. I don't recall.

2816 Q. You have a gage there, haven't you?

A. Yes, sir.

Q. Is that an ordinary recording gage?

A. No, sir; it is a staff gage.

Q. You read it every hour?

A. Yes, sir; every hour.

Q. There is also an automatic recording gage, isn't there?

A. There is not on our property.

Q. But there is at the dam, isn't there?

A. The hydro plant, I understand, has one working.

Q. And that records the fluctuations in stage more accurately than a staff gage, read once an hour?

A. Yes, sir; it should if it is working properly.

Q. It does away with both the fact that the reading is intermittent of the staff gage and also does away with any possible errors in reading?

A. Yes, sir.

Q. The occasional overtopping of the gates is not merely a splash or spill, but it is an actual overflowing?

A. Yes, sir.

Q. Is there some question involved of flowage rights, if the water gets much over the top of the gates?

A. When the water goes over the top of the gates, it is due to mismanagement or fluctuations, but we attempt to keep it below and operate in normal times to keep the water below the top or at the top.

Q. But every once in a while, it does get over?

A. Due to mismanagement, I suppose.

Q. Would you say that it had been over the gates as often as 32 times in the month of July, by not less than 0.1 of a foot?

A. Well, it might have done that; it might have done that.

2817 Q. You testified about a complaint at a landing in pool No. 6; is that right?

A. Yes, sir.

Q. What landing was that?

A. That was the Hatfield-Campbell Creek Coal Company.

Q. Do you know what depth of water prevails in the landing r the harbor of the Hatfield-Campbell Creek Coal Company.

A. No, sir.

Q. Do you know to what depth the barges were loaded at the ime of the alleged grounding, if any?

A. No, sir.

Q. You know it to be a fact that Pool No. 6 was above the normal ool level at the time of the alleged grounding?

A. Yes, sir; it was.

Q. Isn't it a fact that, since Marmet Power Station has been in operation, the elevation of pool No. 6 below your dam has never een below the project elevation?

A. That is true.

Q. Mr. Castle testified here that, in accordance with a certain etter offered in evidence by the Government, in Exhibit 263, written by Colonel Conklin, there was permitted an increase in discharge of the Marmet Power Station at the rate of 3,000 second feet in an hour. Can you tell me how much an increase in discharge of 3,000 second feet in an hour would raise the elevation of the water at the tail race below Marmet Dam or at the upper end of Pool 6?

A. I have no knowledge of the discharge in second feet through Marmet Dam. We always tell in vertical heights.

Q. At Marmet Power Station?

A. Marmet Station.

Q. Don't you know that the full discharge or capacity discharge of the Marmet Power Station, that is, 9,000 or 10,000 second
2818 feet would increase the water elevation in the tail race below Marmet Dam and at the head of Pool No. 6 by about three feet?

A. Possibly, I don't know.

Q. Haven't you observed that?

A. That is, with the power company's turbines running wide open?

By Mr. **Jackson**:

Q. Yes, sir, and nothing through the dam?

A. Possibly three feet.

Q. And wouldn't it be true that an increase in discharge of 3,000 second feet an hour would raise it approximately one foot per hour?

A. Something near that.

Q. Now, you said that an increase in stage of 1½ feet an hour that you would prepare to operate the roller gates?

A. Yes, sir; we would be prepared.

Q. The roller gates are operated by electricity, are they?

A. Yes, sir.

Q. And to operate them, you press a button and they raise?

A. Yes, sir.

Q. And the reason you would prepare to open them, would be so that you would let the water go over the crest of the dam, rather than spilling over the roller gates?

A. It would go out under the dam instead of over the crest.

Q. I thought it would go under the roller gates, but over the crest of the dam?

A. No, sir; it does not go over the crest of the dam, because we raise the rollers so the water will go under the rollers.

Q. The dam is a masonry dam, with the roller gates on top?

A. Yes, sir.

Q. And the roller gates simply increase the height of the dam or the masonry part of the dam?

A. Of the masonry part; yes, sir.

Q. And when you raise the roller gates, the water passes under them and over the masonry part of the dam?

2819 A. It passes over the sill of the dam, the sill; yes, sir.

By the **Court**:

Q. What about the sill—how high is the sill referred to from the bottom of the gate, or the bottom of the river?

A. The elevation of the sill is 564 and the elevation of the apron below the dam is 550; it would be about 14 feet.

By **Mr. Jackson**:

Q. If there is more water needed in pool No. 6, and the power station were not operating, you would have to raise the roller gates?

A. If we had the water, we would.

Q. Isn't it a fact that you didn't operate the roller gates but once in August?

A. In August, I believe that is right; it would not be over two times, I don't think.

Q. Isn't it a fact that you only operated it once on August 15th, for 13 minutes and you raised it about 3 inches?

A. I think that is right and I saw that—I was looking at it.

Q. Wasn't that operation because the water was over-topping the gates?

A. Yes, sir; that is right.

Q. Did you operate the gates more than two or three times in July?

A. I don't recall the number of times.

Q. You testified that at one time you asked some operater to djust the discharge and he refused?

A. Yes, sir.

Q. State when that was.

A. I don't recall the date; however, the operator, or the man ext to him, in responsibility, would know, because I talked to all of them about it.

820 Q. Who wes it you asked?

A. I tried to find out about that, but I could not find out bout it. He is stationed at Cabin Creek.

Q. I thought you asked the operator at Marmet to change?

A. I did.

Q. Who was that?

A. The operator, was named, I believe, Smith.

Q. Do you know when that was?

A. I don't recall the date.

Q. Was there any other occasion when you asked the operator o change the discharge?

A. One other time I asked him and he said he could not do it.

Q. When was it?

A. In the last two months. I don't know the date.

Q. Who was it you asked?

A. The operator on duty at the time. That was one of the easons we raised the roller sufficiently.

Q. What was the date?

A. I don't recall the date.

Q. How long ago was that?

A. It has been about two months, I will say.

Q. Isn't it a fact that you did not raise the rollers on any lates, except within the last three months—except July 6th, July 8th, and July 13th, and August 15th?

A. I don't know the dates. I will have to look at the records.

Q. Can you fix a date when you claim these conversations occurred?

A. No, sir.

Q. Do you live at Marmet Lock and Dam?

A. Yes, sir.

Q. Does the operator at the station—the power station work there?

A. He works at the Marmet Hydro plant.

2821 Q. And you don't know who they were?

A. I know Smith and I know one or two of them.

Q. Do you know who you were talking to on the second occasion?

A. No, sir.

Q. Can you refer to your records and tell us who it was?

A. No, sir; I don't have any record of that.

Q. Can you tell the date by looking at your records?

A. No, sir; I could probably guess when it was. It was one of three days that we operated the dam; it was one of those days.

Q. And you could only guess as to one of those days?

A. Yes, sir; Mr. McCormack was out of town at the time and you might trace it through that.

Q. Because he was out of town?

A. Yes, sir. I discussed it with him some time later.

Q. Why did you want the discharge changed?

A. I have instructions to do all I can to keep the water from going over the dam.

Q. And you wanted to increase it?

A. I wanted to increase it to draw it down.

Q. The pool was too high and you wanted more discharge?

A. Yes, sir.

Q. Was that the same situation on the other occasions?

A. The pool being high?

Q. Yes?

A. Yes.

Q. You could remedy that by pressing the button, couldn't you and raising the roller gates, or one of them?

A. Yes, sir.

Q. Why didn't you want to do that?

A. Instead of calling the hydro plant?

Q. Yes?

A. Because we wanted them to have as much water as they could get.

2822 Q. Then you were not offended that they didn't take it. It made no difference to you, did it?

A. No, sir; but they were supposed to do it. They were operating on a schedule and the operator at Marmet hydro plant said he could not change it without orders, and Cabin Creek Station told him to let it go as it was.

Q. So you then operated the roller gates?

A. Yes, sir.

Q. How many?

A. One.

Q. For how long?

A. For a very short time, 15 minutes, probably.

Q. Your trouble was remedied by opening the roller gates for 15 minutes?

A. For the time; yes, sir.

Q. How high did you open the gates?

A. I think about 6 inches, or 3 inches.

Q. What is the full opening of that gate?

A. About 50 feet.

Q. Is it that h'ight?

A. Yes, sir.

Q. Someone said it was 26.

A. The full opening of the gate?

Q. Yes?

A. You can raise the roller up 50 feet above the sill.

By the COURT. What is the diameter of the roller?

A. The diameter of the cylinder is 19 feet and 4 inches and it has a lip sticking down to take up the difference.

By Mr. JACKSON:

Q. You gave some testimony as to what would be the effect upon navigation in Marmet Pool which would result from
2823 a decrease in stage at the head of Marmet pool for not more than two hours at a rate not exceeding 1½ feet per hour. Now, assuming that the pool never fell below project level, what would be the effect on navigation in that pool, if any.

A. The lowering of the stage would affect it to a certain extent.

Q. If it was never lowered below project elevation, would it make any difference?

A. Yes, sir; if boats were not in the channel, it would make some difference.

Q. Your answer was based on the assumption that, if the boats were out of the channel, in the shallow part of the pool, the lowering might affect it?

A. No, sir; not affect them in the channel.

Q. How would it affect a boat in the channel at Marmet pool, if the stage never fell below project depth?

A. As I understand navigation—I am not a navigator, they will swing their tow boat around in order to keep a loaded tow in the channel, and by them having the tow boat out of the channel and the tow in the channel, they could easily have water drop in and they could hit an obstruction.

Q. Is it your testimony that the Government channel is not wide enough for navigation of a tow boat and the tow?

A. No, sir.

Q. (Continuing.) When it is full?

A. No, sir; I am not a navigator, but they complained.

Q. You hear lots of people complain about lots of things, don't you?

A. They do on that river.

Q. You had nothing to do with the design of the navigation channel, did you?

A. No, sir.

2824 Q. You don't mean to tell the Court that the navigation channel was so designed that that project, at normal elevation, is not suitable for navigation of a tow boat and tow, do you?

A. It is no doubt suitable; however, the operators are taking advantage of some of the conditions on the river and they may be mislead by the river falling—it may be dangerous.

Q. You are assuming in your answer that there is going to be a shortage of water because the boats are out of the channel.

A. Because the river is falling.

Q. If they are in the channel, you don't claim there is a shortage of water with project depth, do you?

A. No, sir; not in the channel.

Q. So you are answering upon the assumption that the boats are out of the channel?

A. They could be.

Q. That is the basis of your answer?

A. If part of them is out; yes, sir.

Q. Do you think a decrease of a foot and a half in stage would reduce the currents in Marmet pool or not?

A. It would do that to a certain extent, I believe; however, it is the falling water they have trouble with.

Q. Do you think the decrease of currents would be beneficial or otherwise?

A. The decrease in currents will usually be beneficial.

Q. I think you said that most of these troubles, so far as you heard about them, were at the upper end of the pool?

A. In the Marmet pool?

Q. Yes; I am talking about the Marmet pool, and that is where the old pool No. 3 was?

A. New No. 3?

2825 Q. No; old pool No. 3.

A. That is three miles below new Number 3.

Q. You mean that new No. 3 is London?

A. Yes, sir.

Q. Do you know that the elevation of old Pool No. 3 was 1.57 feet above the elevation of Marmet?

A. Yes, sir; approximately that; I don't remember the figures.

Q. And that old Dam No. 3 was taken out after the construction of Marmet pool, which dropped the water level up in that area by 1.57 feet?

A. Approximately; yes, sir.

Q. That drop was felt all through the shallow parts of the pool outside the channel and by landings that had been built, or were being maintained under the old conditions, wasn't it?

A. Yes, sir.

By Mr. **Jackson**. That is all.

By Mr. **Gatchell**. I may be laboring under a misapprehension. May I ask if Your Honor's ruling struck out the direct testimony.

By the **Court**. My ruling did not apply to all of the evidence of this witness, but that portion that you asked about the grounding and pool No. 6. I said it was all stricken except so far as the witness says it was of his own knowledge—that he knew of one grounding, and that they were from fluctuations caused by the discharge from power operations at Marmet.

By Mr. **Gatchell**:

Q. Where is the upper staff gage located at Marmet Dam?

A. It is located about 60 feet above the upper gate or the intermediate wall.

Q. Where is it located with respect to the power house—on the same bank?

A. It is on the opposite side of the river.

2826 Q. Where is the lower gage?

A. It is about 40 feet below the lower gates or intermediate wall.

Q. On which side of the river with respect to the power plant?

A. On the opposite side.

By the **Court**:

Q. Since you have been there at Marmet, has the river gotten so high that the flow could not be taken care of through the gates?

A. Yes, sir.

Q. Has it ever gone over the top of the dam?

A. We raise the dam out of the way. It has gone over the top wall, which is five-foot higher than the elevation of the crest of the dam.

Q. You raise your gates when the flow gets high?

A. Yes, sir.

Q. Has the flow in the river gotten so high, since you have been there, that it could not be taken care of through the raised gate?

A. Yes, sir; we would have no control over it; the rollers would be all out of the water.

By Mr. **Gatchell**. Q. Would it go over the roller gates when they were raised?

By the **Court**:

He raised the gates—he raised the rollers and the discharge comes from the opening made by the raised rollers.

A. Yes, sir.

Q. Has the water gotten so high, since you have been there, that the discharge could not be taken care of in that way alone, and went over the whole thing?

A. Possibly it did during the ice last winter when it broke up and came down so fast it might have gone over just a little bit. That was in the break of the gorge, and I think 2827 we had a raise in the lower pool of five feet an hour.

Q. These gates are in between sort of pillars in sections?

A. Yes, sir.

Q. And it is a permanent structure that goes clear to the top?

A. Yes, sir.

2828 **Thomas H. Graham**

Direct examination by Mr. Thompson:

Q. Mr. Graham, will you please state your name and residence?

A. My name is Thomas H. Graham.

Q. What is your occupation?

A. I am employed by United States Engineers at Huntington, West Virginia, as Assistant to the Chief of the Repair Section.

Q. Where is Wicket Dam No. 6 on the Kanawha located?

A. About five miles below Charleston, and it is the next wicket dam below the City of Charleston.

Q. Do you know where Elk River discharges into the Kanawha?

A. I do.

Q. Where?

A. In the City of Charleston.

Q. What is the normal elevation of the pool above Wicket Dam No. 6?

A. Elevation 563.15.

Q. How far up Elk River does pool No. 6 back the water?

A. About three and a half miles.

Q. State whether or not Wicket Dam No. 6 will be eliminated by the construction of the Winfield dam?

A. It will.

Q. What will be the normal elevation of the pool created by the Winfield dam?

A. Elevation 566 above mean sea level.

Q. How far, if you know, will the Winfield pool back the water up Elk Creek?

A. About eight miles.

Q. Have you made any investigation to ascertain the source, or sources, from which the City of Charleston obtains its water supply?

Mr. Jackson. I object as irrelevant and immaterial.

The Court. He may answer.

Mr. Jackson:

Exception.

A. I have.

2829 By Mr. Thompson:

Q. When?

A. Last month—August 31, 1936.

Q. Where does the City of Charleston obtain its water supply?

A. One plant is located on the west bank of the Elk River about one mile above the mouth of the river; the intake is in Elk River. Another plant is located on the left bank of the Kanawha River about 200 feet above the south side highway bridge; its intake is in the Kanawha River, and it is connected to the main plant by a water main running under the bed of the river. Another plant——

Mr. Jackson: (Interposing.) Did you say "plant?"

A. Pumping station. A pumping station is located on the right bank of the Elk River about four and a half miles above the mouth of the river. This station is connected to the main plant by a water main.

By Mr. Thompson:

Q. Now, you have named three or four there?

A. Three.

Q. Are there any others?

A. There are two more.

Q. Where are they?

A. One above the City of Charleston, at Belle, West Virginia, and another at Nitro, below Charleston. Both are on the right bank of the Kanawha River, and have their intakes in the Kanawha River. These two plants are connected by water main running through the City of Charleston, which connect with the City Water Works, so Charleston may obtain water from either of these plants.

Q. State, if you know, when the river is low (that is Elk River) where does the City of Charleston get its water from?

A. During very dry seasons, all, or practically all, of the water for the City of Charleston comes from the Kanawha River.

2830 By Mr. Thompson:

Q. How low does the Elk River get, if you know, in flow?

A. It has been down to one second-feet.

Q. Do you recall what year that was?

A. 1930.

Q. State whether or not these pumping stations have a connecting system?

A. They do.

2831 At this point the following Government Exhibits were introduced by Huston Thompson, Attorney for the Plaintiffs

Government's Exhibit No. 264–A—Aerial photographs of New River from Hinton, W. Va., to Narrows, Va.

Government's Exhibit No. 264–B—Aerial photographs of New River from Hinton, W. Va., to Narrows, Va.

Government's Exhibit No. 264–C—Aerial photographs of New River from Hinton, W. Va., to Narrows, Va.

The following stipulation was entered into by the Counsel regarding the above Exhibits:

By Mr. **Jackson**:

The waiver of objection to the admission of these Mosaic photographs produced is conditioned upon:

(1) Stipulation they were taken from a height of 10,000 feet or more;

(2) That all of the ink markings will be removed from the photographs, and

(3) That it is stipulated that the flow of the river at the time the pictures were taken ranged from 2,800 second-feet for a few of them, to 11,500 second-feet.

Is that agreed to?

By Mr. **Thompson**:

Yes, except I think the stipulation should be an average of 7,500 second-feet.

By Mr. **Jackson**:

All right.

By Mr. **Thompson**. May we put these in as they are, and we will secure similar pictures, identical pictures, and substitute in place of these?

By the **Court**. I think so.

By Mr. **Thompson**. Then we offer these in evidence as Government Exhibit Nos. 264–a–b–c. (Pictures were so marked by the reporter.)

By Mr. **Jackson**. Subject to the stipulation and understanding the lettering on these exhibits now actually in Court are not received, and the exhibits present will be replaced by identical photographs, without such lettering.

By Mr. **Thompson**. Yes, sir.

2832 **Roger B. McWhorter**, a witness hereto introduced by the United States, was recalled and testified as follows, on direct examination.

By Mr. **Thompson**. Q. Mr. McWhorter, on page 5261 of the record, Major Putnam states that in his opinion New River was not susceptible of navigation in its natural state; please state your opinion on this subject?

By Mr. Jackson. Objection to that as not proper rebuttal.

(Discussion by counsel.)

By Mr. Jackson. It seems to me the most they could ask would be they be permitted to ask the single question that was submitted to Major Putnam and Colonel Watkins, and for the witness to answer yes or no.

By Mr. Thompson. I will ask the question and give it exactly as it is here.

Q. Will you state whether or not, in your opinion, New River was susceptible of navigation in its natural state?

By Mr. Jackson. We want our exception noted because not proper rebuttal and not competent. The answer I understand is to be yes or no.

By Mr. Thompson. Your witness expressed a view that took one quarter of a page.

By Mr. Jackson. I asked the reasons. You could have done so on direct.

A. It is, for the reason (interrupted).

By Mr. Jackson. I object to him going any farther than giving his statement.

By the Court:

That is all. He has given his reasons before.

Q. Mr. McWhorter, your attention is called to page 5290 and
5291 of the record, whereon Major Putnam says, in substance, a
change in stage of five feet up or down at the rate of two feet
2833 per hour would not affect the mooring, loading and unloading of barges, the question reads:

"Q. What, if any, practical effect would an increase in stage, at a rate not to exceed two feet per hour, with a total rise in stage, not exceeding five feet, have upon the mooring, loading and unloading of barges or other vessels in harbors or at terminals along the Kanawha River.

"A. I understand there is a total limitation or another limit placed on the total amount of change and that is placed at five feet. That being the case, the only effect on navigation under those conditions would be that the barge men would have to keep their eyes open more actively so that on a decreasing stage their lines would not part, and on a rising stage they could take in their lines, and whichever direction the stage was going they could properly adjust any spars they used for keeping their barges off the banks.

"Q. You referred to rising and falling stages. I think I only asked about rising stages. Is your answer applicable to either rising or falling stages at the rate of two feet per hour with a maximum change of five feet?

"A. Yes, it is."

What do you have to say to that?

By Mr. Jackson. I object to the form of the question and also to the competency of the witness to answer. He has never shown any experience in navigating boats.

By the Court. I think he may answer it.

By Mr. Jackson. Exception noted.

A. It is my opinion that any such great change as that in the stages of the river would very seriously and adversely affect the interests of navigation. In fact, I think under no condition could navigation thrive under such conditions.

By Mr. Jackson. I move to strike that out. The conclusion that it would affect the interests of navigation is purely a conclusion of the witness.

By the Court. Is that all you want on that?

By Mr. Thompson. Yes, Your Honor. He made a statement and I want him to explain why.

By Mr. Jackson. Is our motion to strike rule on?

By the Court. I will let it stay. He may ask him.

By Mr. Jackson. May our exception be noted?

A. I was referring to those sudden and large changes in stage in a short period of time. The reason why that would affect navigation adversely is that boats could not be moored and sparred out and tied up and left for even as much as an hour or so without running the risk of having those boats break away from their moorings by the water being dropped from under them.

By Mr. Thompson:

Q. Mr. McWhorter, I have reference to page 5209 of Mr. Putnam's testimony. On that page Major Putnam states, in substance, that slack water navigation pools vary from 6 inches above and
below the predetermined stage at which the pool is supposed
2834 to be maintained. What is your opinion as to whether such
pools fluctuate in that manner?

A. They do not to my knowledge.

By Mr. Jackson. I object to the competency of the witness to answer.

A. (Continuing.) They do not, to my knowledge, and there is no reason for it to fluctuate to those wide limits. In fact, these navigation pools can be and are held very close to the project levels.

By Mr. Thompson:

Q. I hand you, marked for identification, Defendant's Exhibit No. 525, consisting of fourteen pages and on the heading "War

Department, Office of the Division Engineer, Upper Mississippi
Valley Division, Corps of Engineers, United States Army,"
2835 and dated St. Louis, Missouri, February 24, 1932, subject—
Report on Application for License, Federal Power Project
No. 1175, West Virginia, to the Chief of Engineers, U. S. Army, Washington, D. C., and ask you if you know what that is?

A. Yes, this is the report of the Division Engineer of the War Department at St. Louis, Missouri, who was the Commission's accredited field representative as to this project. This report was made pursuant to a request of the Federal Power Commission. It was made to the Chief of Engineers, and, pursuant thereto, the Chief of Engineers submitted his report to the Commission and this report of the Division Engineer I took from the Commission's files.

By Mr. **Thompson**:

Q. I call your attention to page 7 of that report, and ask you to read the 7th paragraph, entitled "Power Capacities."

A. "Power Capacities.—The average discharges of the Great Kanawha River for 90 percent of the time at Marmet and London were computed in office of the District Engineer, Huntington, West Virginia, from flow duration data based on 40 years of stream flow records at Lock #2, with proportional increases in flow due to increased drainage areas. To determine the net amount of water in second-feet available for power a deduction was made for water required for navigation lockages and for leakage through the lock, and crest gates. The resultant or residual flow remaining for power use for 90 percent of the time was found to be 2,660 second-feet at Marmet and 2,560 second-feet at London. This applies under present conditions of no storage in the basin. Using the formula for power capacity of h. p. = .08 q. h., where *q* is the 90 percent power flow and *h* is the average static head, the following table gives the flow values and power capacities to apply under the initial developments at Marmet and London.

"Stream flow 90 percent of time, second-feet, Marmet 2910, London 2800.

"Estimated available for power use, second-feet, Marmet, 2660, London 2560."

2836 Q. At that point will you subtract 2,660 from 2,910
under Marmet?

By Mr. **Jackson**. We will concede that 250 is the difference, but we object to the testimony. It isn't rebutting anything and he is reading from an exhibit in evidence.

By the **Court**. He is trying to show what the representative of the Chief of Engineers, or the engineer in the field, allowed for lockage.

By Mr. **Thompson.** Yes, sir.

By the **Court.** What is that in rebuttal of?

By Mr. **Thompson.** And to show that is the basis on which they figured the charges so far as operating those plants was concerned, and that that lockage of 250 second-feet is one which these people, the defendants, recognized, when they made their contract and it seems to me that rebuts any testimony that has been introduced here of some very minor low flow that is necessary for lockage.

By Mr. **Jackson.** Will that affect the quantity of water actually used for lockages?

By the **Court.** It only rebuts the answer of another engineer who says it is his opinion if I recollect correctly, from 150 to 200 second-feet, is sufficient for lockage.

By Mr. **Jackson.** That is right. He made an engineering estimate. At the same time, he said it was true when they were trying to arrive at some trade or deal for this power that they discussed 250 second-feet as the outside limit that might some time or other, over this long term contract, be required for lockage, leakage and evaporation, and this doesn't rebut anything that is in the record.

By Mr. **Thompson.** I call Your Honor's attention to page 6446 of Mr. Scheidenhelm's cross-examination:

"Q. Wasn't an allowance made there of 250 second-feet for lockage upon which you computed your figures for the rental?

(Mr. Jackson objected.)

"The **Court.** He may answer it.

"Mr. **Jackson.** I don't think there is anything in the license about it at all.

"Mr. **Thompson.** I understood the Court to say 'any dispute.'

"The **Court.** He can answer it unless there is some dispute about it and then we want the best evidence."

By the **Court.** Did he answer it?

By Mr. **Thompson.** "Mr. Jackson. It is not in the license, and I understand it is not a fact.

"By Mr. **Thompson.** Our contention is when they figured the basis of the license, in all of the figures there was an allowance of 250 second-feet for lockage. That is what I am asking this witness, if that isn't true?

"By the **Court.** You may answer.

"By Mr. **Jackson.** May our exception be noted."

By Mr. **Jackson.** Read the answer.

By Mr. **Thompson.** All right, I will read his answer, but you know how long his answers are: "There is, of course, no contractual arrangement in that respect at all. The fact is that when the economics of the problem were figured at the various offices of the War Department, particularly at the District Office, there was an allowance for leakage and lockage made in the total of 200 or 250 second-feet, I do not recall which, an allowance in the sense that their estimate of total flow, volume of flow or rate of flow at any given time were reduced by 200 or 250 second-feet so as to reach a figure which they felt surely would represent"——

By the COURT. You are rebutting that testimony by bringing in a paper to show what the witness said is correct?

By Mr. THOMPSON. No, I am bringing this in to show here is an actual basis of 250 second-feet. They don't admit it. He said "200 or 250". I am bringing this evidence in as the best evidence to show that fact and that they recognized it.

By the COURT. I permitted it to be answered by the witness and he answered it and I don't think there is anything in this that is a denial of it at all.

By Mr. THOMPSON. The thing isn't settled by the answer of Mr. Scheidenhelm. It is in his usual language where he leaves a thing up in the air. Will Your Honor permit him to answer it?

By the COURT. I will permit him to say 250 feet, that it shows in the engineer's report that it was figured on the basis of 250 feet.

A. Your Honor, it shows more than that.

By Mr. JACKSON. I object to the witness—he doesn't want to wait for a question to start the argument.

By the COURT:

Q. What do you mean—it shows more than that?

A. It shows that Col. Scheidenhelm said that was the correct figure.

Q. The engineers' report doesn't show what Col. Scheidenhelm said?

A. No, but Col. Scheidenhelm submitted a memorandum commenting on that report in which he did make that statement.

By Mr. JACKSON. I object to the last statement and move to strike it out.

By Mr. THOMPSON. May I ask Counsel have you introduced a report from Mr. Scheidenhelm or Col. Scheidenhelm on the Kanawha Valley Power Company. I don't want to mark this for indentification if you have.

By Mr. JACKSON. No, I am sure we haven't introduced anything as irrelevant as that.

By Mr. THOMPSON:

Q. I hand you, marked for identification, Government Exhibit #266, being dated March 12, 1932, and in type form with the name of F. W. Scheidenhelm at the end, and being an informal comment upon the report of the United States Division Engineer at St. Louis, February 24, 1932, on an application of the Kanawha Valley Power Company for license, Federal Power Project No. 1175, West Virginia, by F. W. Scheidenhelm, Consulting Engineer for Applicant, and ask you if you know what that is?

A. I do.

Q. Where did that come from?

A. From the files of the Federal Power Commission.

Q. Were you in the Federal Power Commission at the time that was received?

A. I was.

Q. Do you remember it being received there?

A. I do.

By Mr. Thompson. I offer this document in evidence.

By Mr. Jackson. We object to it as not proper rebuttal and irrelevant and immaterial.

By the Court. It may be a paper over Col. Scheidenhelm's signature that is contradictory of something he said.

By Mr. Jackson. They can't do that without submitting it to him on the stand. I don't think one can lay in the bushes.

By the Court. I was not thinking of that feature of it. Let me see what it is.

By Mr. Thompson. Your Honor will understand we have just introduced this document before which set up the figures of the Chief of Engineers and here is a comment by Mr. Scheidenhelm: "Par. 7. Power Capacity. In view of the estimates of flow and of the requirements for lockages and leakage as estimated by the Division Engineer, the derived figures in horse power appear to be correct."

By the Court. I don't think that is contradictory of anything.

By Mr. Thompson. I think it is supporting. I want to make definite now what Mr. Scheidenhelm, as I say, has left up in the air, that is, this 250 second-feet.

By Mr. Jackson. I object to the exhibit as not proper rebuttal.

By the Court. Let it stay in.

By Mr. Jackson. Exception noted.

2837 By Mr. Thompson. Q. On page 5770: "Q. Now assuming that for some reason the three-foot draw down between elevations 611 and 614 in the case of the London Pondage would not be available for reregulating any Radford power tides which might pass Kanawha Falls, and that no reregulation of these tides had been accomplished in any pond or reservoir upstream from the head of the London Pool, and assuming the Winfield and Gallipolis dams to have been completed and placed in operation. What, in your opinion, or rather what is your opinion as to whether any Radford Power tide passing Kanawha Falls, would be transmitted unchanged through the Kanawha navigation pools into the Ohio River, downstream from the Gallipolis dam? A. I think it is improbable that these waves would be transmitted down those navigation dams. The surface area is very large, so large that variation in water level of about two inches in those pools would be sufficient to reregulate the power waves from the Radford plant." I will stop long enough to ask the witness if he agrees with that statement?

By Mr. Jackson. I object to that as not a proper method of rebuttal. We go through a record and read every question and answer and ask the witness if he agrees with it.

By Mr. Thompson. We are not reading one in a hundred. We are reading inconsistent statements.

By the Court. It is expected that the witness will testify to the contrary?

By Mr. Thompson. He will testify to the contrary of that, absolutely. Then we will turn back, as soon as he gets through with that, to the next one and read the two that Your Honor has ruled out, and show there is an absolute inconsistency on the part of this witness.

By Mr. Jackson. Won't that appear in the record?

By the Court. I will let him answer this question. I don't think the proper way to ask the witness a question is to ask him if he agrees with it. The question ought to be more specific.

By Mr. Thompson:

Q. What do you have to say about it?

By Mr. Jackson. I object to that as worse.

By the Court. It is right difficult to frame a specific question and embody those conditions. I will let him answer it.

A. If the London pool were held at its maximum level of 614, the power waves reaching that pool from the Radford project would be transmitted practically unchanged through that pool, the Marmet pool, the Winfield pool and the Gallipolis pool, into the Ohio River, below the Gallipolis pool, and, in fact, they might reach the Ohio River below the Gallipolis dam as larger waves than they were when they reached the London pool for the reason that those pools are just as likely to be above the project level as they are below, and if they are above, these Radford waves would entrain that extra water and carry it on down to the Ohio River below the Gallipolis dam and thus cause larger waves than the Radford waves were at the London pool. Likewise, if the several pools on the Kanawha River, and the Gallipolis pool on the Ohio River should be below the project level, that would aggravate the condition of the long troughs that would be formed over the week ends, or for longer periods, that the Radford project might be closed down.

2838 By Mr. Thompson:

Q. I hand you, for identification, Government Exhibit No. 267, being a letter from John J. Kingman, Lt. Col. Corps of Engineers, and Chairman of the Federal Power Commission, Interior Department Building, Washington, D. C., dated September 17, 1932, and ask you if you know what that is?

A. That is a letter from Lt. Col. John J. Kingman, for the Chief of Engineers, dated September 17, 1932, in response to a telephone request from the office of the Federal Power Commission.

By Mr. Thompson. Q. Mr. McWhorter, I call your attention to the testimony of page 6283 on direct of Col. Scheidenhelm, wherein it says, in substance, that the fluctuations in flow caused by the London and Marmet power plants are so much greater than the power waves that would be caused by the Radford plant, that the Radford waves would not be recognizable below the London dam. State whether or not, in your opinion, that is a true statement?

By Mr. Jackson. I object to that as not proper rebuttal. He is reading an answer to the witness and asking him if it is a true statement.

By the Court. I think he may answer that. I don't know whether that was gone into in chief or not.

A. That is not a correct statement, if the London pool is held at its maximum elevation of 614. I think it is true if that 3 feet of pondage is used for power subject to the paramount right of navigation.

By Mr. Thompson:

Q. Did you say it was a true statement if the three feet were used for pondage?

A. It is not a true statement. Yes, I said it was a true statement if the three feet of draw-down is being used for pondage for power purposes, subject to the paramount right of navigation.

Q. If it isn't being used for draw-down, what then?

A. I have testified it is not a true statement.

Q. Why?

A. Because the London pool would then be fixed at elevation 614 and these power waves would pass through it unchanged, or substantially unchanged, as they would pass through all the other pools down to, and including, the Gallipolis pool.

By Mr. Thompson:

Q. On page 6295 of the record, Colonel Scheidenhelm
2839 testified, in substance, that the operation of the Radford project would substantially increase the low water flows in the Kanawha River. Do you agree with that statement?

By Mr. JACKSON. We object to the form of the question.

By the COURT. I do not recall that that was the subject matter of inquiry before. He can only answer on that supposition.

A. I agree it would increase the average low water flows, but would greatly reduce—unless the plant were properly operated—the minimum low water flows, which is a critical view from the viewpoint of navigation. For instance, in these dry years like 1925 and 1930, the operation of the Radford project would increase the natural low water flow at Radford—at the Radford Dam site—from about 600 second feet to about 1200 second feet, but it would reduce the minimum low water flow from the natural flow of about 600 second feet to down to zero flow.

By Mr. THOMPSON:

Q. At page 6303 of the record, Colonel Scheidenhelm says, in substance: That the Radford project would control floods in such a manner as to increase the head at the Marmet, London and Winfield power plants on the Kanawha River. In your opinion, is that a true statement?

By Mr. JACKSON. We object to that.

A. I don't think that there is any substance in that statement—no appreciable substance to it.

By Mr. THOMPSON:

Q. What do you mean by that?

A. It might very slightly increase the flood heights or slightly decrease the flood heights, but in either case, it would be difficult to ascertain the magnitude of such changes. What Colonel Scheidenhelm meant by increasing the head at London, was that the tail water would be reduced in elevation, by the fact that the flood waters would be held back at Radford. It is highly problematical whether the flood waters so held back would exceed the natural valley storage preempted by the reservoir, and if it did not exceed it, certainly the flood heights would not be reduced on the Kanawha River.

2840 Cross examination by Mr. JACKSON:

Q. Mr. McWhorter, how large a volume, in cubic second feet, would be represented by one inch on the reservoir of the London, Marmet, Winfield and Gallipolis pools?

A. I have not computed that, but it would be the same—substantially the same—for above the project as below.

By Mr. JACKSON:

Q. I do not care about that. I want you to tell me, if you can, what would be the volume, in second feet—or second feet days—required to raise the level of the London, Marmet, Winfield and Gallipolis pools one inch above normal pool levels?

2841 A. I don't know; at least, if I ever knew, I do not have the figures now.

By Mr. Jackson:

Q. Do you know the area of the Gallipolis pool at project elevation?

A. I do not.

By Mr. Jackson:

Q. Mr. McWhorter, the area of the London pool elevation at 614 is 910 acres. Take that down.

A. (The witness makes notes on paper.)

Q. The area of the Marmet pool at elevation 590 is 1,420 acres. The area of the Winfield pool at 566 elevation will be 3,700 acres. The area of the Gallipolis pool at elevation 538 will be 9,760 acres. Now, as an Engineer, tell me what volume of water, in the second foot day, will be required to raise the surface of those four pools one inch?

By Mr. Thompson:

Q. Do you understand that this means raising all pools simultaneously?

A. That is my understanding of his question.

By the Witness. What is it you are after?

By Mr. Jackson:

Q. How much volume of water in second foot days it would take to raise the surface of all those four pools one inch?

A. It would take 660 second feet.

By Mr. Jackson:

Q. What is that?

A. It is 660 second feet.

Q. It would be 660 second feet days, you mean?

A. Second feet for 24 hours. Right there—just a minute—get it straight as we go along. You assume——

Q. All I am asking you is that. I did not ask you to assume anything. Compute the volume of water it would take to raise those four pools one inch, when the elevations are at project level?

A. And you assume——

Q. I did not ask you——

By the Witness. You assume that one inch would be uni-
2842 form over the surface of all the pools, which is not true.

By Mr. Jackson:

Q. I did not ask you that, Mr. McWhorter, did I?

A. I want your assumption.

Q. All that I asked you to do is to compute how much water—the volume of water that would be required to raise those four pools one inch above the project level of those four pools?

A. I made the computation, showing 660 second feet.

Q. Second feet day?

A. Right.

Q. And would it be right to say that two inches would be approximately twice that volume, on each of these pools?

A. Yes.

Q. And three would be three times?

A. Yes, approximately.

Q. Does water, when it enters a pool, tend to seek its level?

A. Yes, sir.

Q. I produce here a letter, dated July 28th, 1936, on the letterhead of the War Department, United States Engineers Office, Huntington, West Virginia, office, addressed to Colonel F. W. Scheidenhelm, and signed John F. Conklin, Lieutenant Colonel, Corps of Engineers, District Engineer, and ask to have it marked as an Exhibit for the Defendant.

(Said letter, exhibit 610, offered in evidence.)

By Mr. Thompson:

Q. When you said it would take 660 cubic feet days to raise the surface of the Marmet, London and Winfield pools——

A. Second feet days.

Q. Second feet days, to raise the surface of the London, Marmet and Winfield dams, one inch above the normal project elevation, did you mean by that to raise the three reservoirs simultaneously?

A. There are four of them, and I answered the question as a hypothetical question as a correct answer to the question Mr. Jackson asked. Of course, I assumed all four would be raised uniformly one inch over the entire aggregate area of the four reservoirs.

2843 By Mr. Thompson:

Q. I hand you, marked for identification, "United States Exhibit 271," and ask you to look at it, and say if you know what it is?

A. I do.

Q. What is it?

A. It is a copy of the protest of the Appalachian Electric Power Company against the application of the Town of Galax, Virginia, for a grant and loan from the Federal Government for the construction of a municipal electric hydro and Diesel engine power plant and distribution system.

Q. Have you ever seen this document before?

A. I have.

Q. When?

A. The Town of Galax made this application for a loan from the P. W. A. to the State organization of the P. W. A., at Charlottesville. That application was forwarded on to the Public Works Administration, at Washington, together with this protest of the Appalachian Electric Power Company.

The Public Works Administration referred the application, together with this protest, to the Federal Power Commission for examination and report.

At that time I had occasion to examine this protest.

Q. Whose name is printed at the end of page eight of this protest, "Brief of Appalachian Electric Power Company?"

2844 Who is it signed by?

A. It is signed "Appalachian Electric Power Company, by counsel, John S. Draper, Attorney."

(Exhibit 271 was offered in evidence over defendant's objection that the same was not proper rebuttal and was inadmissible.)

By Mr. Thompson:

Q. Where is the Town of Galax?

Witness. A. It is in the upper part of New River Valley. On the right band of the river, and some little distance from the river.

Q. How far above the Radford dam would you say it is?

A. I would say probably 65 miles. I am just making a rough estimate.

Q. How far would you say it is from the North Carolina boundary?

A. Perhaps ten miles or less—less than ten miles.

2845 **L. H. Watkins**

Direct examination by Mr. Thompson:

Q. Colonel, referring to page 5702, the tests made by Professor Thomas on August 14 to 15, to determine the effect of power operation on the normal Marmet pool, the witness testified as follows: "I found that there were no seiches that could be attributed to the wave that we ran." Is that a true statement, in your opinion?

Mr. Jackson. I object to the form of the question. I do not know that he is prepared to state whether it is a true statement.

The Court. Go ahead.

Mr. Jackson. Exception.

A. No. I think he may have overlooked certain factors in there and he did not properly interpret it.

By Mr. Thompson:

Q. Upon what do you base that statement?

A. I have here the chart that was furnished by Mr. Thomas to the engineer of the Power Commission, upon the request of the Assistant Attorney General, towards the close of his examination.

This chart shows the Kanawha Falls curve of hydrograph of the Kanawha Falls gage, the upper London gage, the lower London gage, the upper Marmet gage, and the lower Marmet gage, during these operations.

Now, these operations were made under very adverse conditions. In the first place, they were made during a period of low flow, very low flow, when any fluctuations which you could get were necessarily small.

The volume of the wave used in the test was small. It did not amount to a full draw-down from the London pool. It was less, therefore, than 2,600 acre feet.

Just before the test was begun, a sharp wave was sent by, and it was bound to affect the test.

During the test, blocks of power were not put in uniformly up and down, as you would expect the wave to run, and were horizontally taken in and out. These were bound to affect the tests.

Furthermore, during the operation, the crest of the pool at the Marmet dam was allowed to rise two-tenths of a foot. That was it was bound to affect the test.

Now, referring to——

Mr. Jackson (interposing). None of this, so far, answers the question.

Witness. I will show it. Just wait a minute.

I have here Government Exhibit 117-A, which shows a rating curve for the upper end of the pool below the London dam.

2846 Examining this curve and considering the variations which would occur by the 3,200 cubic feet per second discharge for a discharge of 4,100 cubic feet per second, which he claimed that he used during this test, we find that we would expect a rise in the upper end of the pool of about three-tenths of a foot.

Examining the hydrograph for the upper end of London pool, we find it did rise to three-tenths of a foot, and it fell about three-tenths of a foot, but, during the operation, they permitted the crest of the dam at Marmet to rise two-tenths of a foot, and that rise took place during the falling stage of the Marmet dam.

Had the Marmet stage been kept level, it would unquestionably have fallen two-tenths of a foot further, or a total of five-tenths of a foot, so it does indicate, without doubt that this did obey the fundamental law of tipping the upper end of the pool up, and then to have it fall not only to the point of rest, but about an equal distance beyond.

Unfortunately, the fluctuations at Marmet were very small, and it is difficult to show conclusive results. However, in this test made by Mr. Thomas, we have the rating curve for the lower, Marmet gage, which is the upper end of Dam No. 6.

This does furnish very interesting and very conclusive information.

Mr. **Jackson**. I suggest that he answer the question.

Witness. Wait a minute, and I will be glad for you to question me all you want when I get through, and I hope you do.

Now, taking Government Exhibit 117–B—that is another one of these famous rating curves that called so much attention in this Court—take that for a discharge of 3,200 cubic feet per second, plus 4,100 cubic feet per second, we see that we should expect a rise of about 1.2 feet, and, according to my theory, it should fall not only to the point of rest but to a point about that distance beyond.

Now, let us examine the curve: During the operation we find that the upper end of the pool or dam of No. 6 raises about 1.2 feet and that it fell about 1.75 feet. But during the operation, the crest of the dam, the water, rose almost a foot, and it fell again to about the point of rest. 2847

Now, during the downward stage (that is from about 7 P. M. until 3 P. M. on August 15, a total period of twenty hours), we find that the force of gravity and the impulse of the wave entering the pool forced the upper surface of the pool down, not only to less than that indicated by the crest of the dam, but even below the indicated point of rest for 3200 cubic feet per second, and, at the end of the old stage, it was only about eight-tenths above the final point of rest.

Now, during this downward stage, the surface of the pool in Dam No. 6 became more and more horizontal during the last stages of the test, until finally it was only seventeen hundredths of a foot above the water at the crest of the dam.

Now, had the dam not risen, it would no doubt have fallen below the horizontal—it would unquestionably have fallen below the horizontal.

So then, during the whole of the 20 hour period, we find that the force of gravity and momentum of this wave entering the pool was forcing the water down and down and over the dam.

So, at the end, it was impossible for the lockkeepers of Dam No. 6 to get the wickets up in time to maintain the crest that they desired.

Now, throughout their argument, the defendant had used small waves. This one, for example, is less than 2600 acres. Had they used larger, such as those that occurred during average annual flow, they would secure greater results. Furthermore, they neglected the Saturday and Sunday Troughs from Radford, which caused by far the greater fluctuation in pools of this nature.

Mr. **Jackson**. I move to strike out the testimony so far. The witness has not touched the simple question that was asked.

Mr. **Thompson**. He has, but you have not recognized it.

Mr. Jackson. He has repeated his testimony.

Mr. Thompson. He has described a situation which went past you, just like this wave.

Mr. Jackson. He was asked whether or not there were any seiches shown in the pool.

The Court. What is the actual statement?

Mr. Thompson. The statement of the witness, Mr. Thomas, was: "I found that there were no seiches in that pool that could be attributed to the wave that we ran." I asked him if that is a true and correct statement.

The Court. As I understand what the witness is saying, it is in effect not as to the truthfulness and accuracy of the test, but whether, under a wave of larger amplitude, that would not be true.

Mr. Jackson. That is what he said.

Witness. No; I said that he misinterpreted these things.

By Mr. **Thompson**:

Q. Isn't it a fact that there was a seiche there, and he didn't know it?

A. Yes, that is exactly what did happen.

Mr. Jackson. That is the first time that he has commented on the question.

Mr. Thompson. The number of pages that your witness took to answer, it takes some time to cover.

The Court. I think the witness should confine the statement to a smaller compass if he is going to state there was a seiche there which Mr. Thomas did not recognize.

2848 Q. What is your conclusion as to that statement of Prof. Thomas, that there were no seiches in that pool that could be attributed to the wave they ran?

A. He misinterpreted the results.

Q. And there was a seiche?

A. There was. No question about there being seiches in the upper end of the pool, in dam #6, as big and broad as day from night.

By the **Court**:

You mean shown on the chart?

A. Yes, Sir.

By the **Court**:

Or conditions which must have made them?

A. Shown on the chart when properly interpreted.

Q. Referring to page 5744, in discussing the shape and decrease of power wave, the witness concludes; "In my opinion it would be impossible for waves released from a point as far upstream as

Radford to cause any perceptible seiche in these navigation pools". Colonel Watkins, is it possible to release waves from a point as far upstream as Radford and not cause any perceptible seiche in the navigation pools on the Kanawha?

A. The point is,—[interrupted].

By Mr. **Jackson**:

I object to the question as not proper rebuttal. Certainly if anyone expressed his opinion fully in the opening of the Government's case as to what he thought about waves, Colonel Watkins did.

A. Prof. Thomas on proof shows it.

By Mr. **Jackson**. He is doing nothing but asking him to restate his evidence and opinion about it, merely because we offered testimony on the subject as to which they gave testimony in the main part of their case.

By the **Court**:

What do you say to that, Mr. Thompson?

A. The Professor on tests proves the decrease in the waves—[interrupted].

By Mr. **Jackson**:

I move to strike that out. Colonel Watkins you know Court procedure better than to be volunteering statements.

2849 A. The point at issue is the fact Prof. Thomas attempted to prove the decrease in the back end of the wave would be so long it would not affect these pools. Well his own test which he made just to show that purpose, shows it would greatly affect it. The reason for that is very simple. As I have explained a number of times in my examination and cross examination, that the fact which caused the fluctuation in these pools is when the wave enters it, causes it to tip up, then the force of gravity, plus the impulse, momentum of the large volume of wave entering the pool, causes it not only to sink to the point of rest, but about an equal distance beyond. He attempted to show if you prolonged the wave long enough it would cause no effect, whereas, as a matter of fact, the rate of decrease or increase, so long as it occurs in a single day, and so long as the volume and amplitude are the same, makes no appreciable difference in the effect. In the results he made, at dam #6, the wave fell about the same, although he intentionally prolonged it about twenty hours it made no difference whatever, he just simply made a fundamental error.

By Mr. **Jackson**. I move to strike out the answer because the witness states what he previously stated and reiterated on direct.

By the **Court**. The answer may remain in.

By Mr. **Jackson**. Exception.

2850 By Mr. **Thompson**:

Q. Colonel, Professor Thomas stated on his direct examination that he studied by analytical methods and also by constructing what he called an integrating model of the Bluestone reservoir, with different vertical and longitudinal scales, and it was sensitive enough to detect seiches of about five one-hundredths of a foot or five-eighths of an inch, and he continued by saying, "I could not detect any perceptible seiche in the reservoir on this model, which checked my computation, which would show the height in Bluestone reservoir would be less than five hundredths of a foot." Colonel, why, in your opinion, couldn't he detect a seiche in the Bluestone that would be less than five hundredths of an inch on this model that he described?

A. I do not know why.

Q. You do not know why?

A. No.

Q. I do not understand the answer.

A. I don't know why because I have had a great deal of experience in supervising hydroelectric interests and navigation interests in navigable waterways in which this very factor was involved, and I found out in the experiments that when the wave enters the stream it did cause the upper end to tip up and to force the gravity and the momentum and a large volume of power or force over the surface of the pool, not only down through the point of rest but to an equal distance beyond. I was so sure of that I got up and testified in court that this would happen in the pools on the Kanawha River, knowing full well that the defendant, or its subsidiary, was operating power plants on the river above.

Q. You have read the testimony of Professor Thomas with respect to his integrating model, and how he operated it, and the results that he obtained, have you not?

A. Yes.

Q. What is wrong with his integrating model so far as the information or data upon which he constructed and operated it are concerned?

2851 A. I think he made—I know that he made two fundamental errors in adjusting his model.

Q. What were they?

A. One of those was the fact that he adjusted it to conform to the waves of the 1930 tests, and he adjusted it to conform to the amplitude rather than the volume. Now, looking at those waves, you can very readily realize that they are not going to maintain their persistency in altitude.

Q. Why not?

A. For the simple reason that the amplitude at which they were discharged from the Buck project was far too great for the volume. You could not expect such waves to persist like that.

Furthermore, he did not adjust it to the most persistent wave which anyone would readily understand would be more or less typical type of wave for the river.

In the third place, in another place in his testimony, he stated that he did not adjust his model to conform to the volume—he did not use the volume in testing it. I have had a great deal of experience in tracing waves of different forms, and especially downstream, by simply using the rating curve in the stream and constructing a flood channel, as inflow and outflow curve, and I have constructed waves of various forms actually thousands and thousands of miles. I do know if he adjusted his model without using volume for adjusting it, it will not give accurate results.

Q. And you say he did adjust it without using volume?

A. He stated it in his testimony.

Mr. Jackson. Will you give me the reference to the page?

A. Will you give him that, Mr. Thompson? It is in the notes. One on the point is on page 5836. He uses these words: "I then ran tides down the model corresponding to the 1930 tides and checked the change in the profiles at those tides, and then adjusted the baffles between gaging stations so the model would reproduce the profile or hydrographs of the 1930 tides."

Then, again, on page 5855 of the manuscript, during his cross-examination, he answered about the 1930 tests, "I did not figure volume." Then the question, "Didn't you figure volume at all?" and he answered "I figured volume at various times in the study, but not for the purpose of adjusting the model."

By Mr. Thompson:

Q. Now, it is your contention that you cannot adjust a model of that kind unless you do figure volume?

A. Let us take a very simple thing: Anyone, even a layman, knows that the more the rain the higher the flood. The same thing applies to power waves coming downstream. And, furthermore, if you do not consider volume in adjusting, you have no absolute way of checking your results below.

2852 The volume I found in tracing waves downstream, if you use volume you can check your results all the way down the stream.

Q. You said there were two fundamental errors; you spoke of volume and then you spoke of using the data of the 1930 wave?

A. Yes.

Q. Wherein did the error lie in using the data of the 1930

A. As I have already explained, those waves were not of a shape and they were not discharged in a manner to possess any amplitude, and, in the second place, those waves had nothing to represent the Saturday and Sunday trough coming from Radford.

After all these successive waves, we know they are going to overlap and not persist permanently. On the other hand, the gap between the Friday wave and the Monday wave is so great that there will be no overlap, so that we may expect such a trough as that to go hundreds and hundreds of miles downstream and lose their amplitude between the crest of the week day wave and the trough of the Saturday wave.

By Mr. THOMPSON:

Q. Could the witness' conclusion be correct from the data and tests that he made, as testified to, that perceptible seiches could not be observed in the Bluestone reservoir from waves coming from the Radford project?

Mr. JACKSON. I object to the form of that question.

The COURT. I will let him answer it.

Mr. JACKSON. Exception.

A. May I have just a moment to think about it? These are technical engineering questions and asked in entirely different form, and I would like to think about it a second so I do not make a mistake. The methods of adjusting his model indicate that the results would not be wholly reliable. My own experience indicates that when a wave does enter the upper end of a pool it tips it up and falls about the same distance below. Mr. Thomas' own tests down on the Kanawha confirm that fact very conclusively.

The COURT (interposing). He just testified a moment ago with respect to these waves about which Mr. Thomas testified, while he did not say whether or not they would create seiches he said his tests were based on inaccurate data of the volume of the wave—that no such wave as that would in effect occur. I did not understand him, however, to deny presuming the waves used by Mr. Thomas in his tests were those which would actually take place; that statement of Mr. Thomas, or the conclusions of Mr. Thomas were inaccurate. He said his tests were based on inaccurate data, as I understand. Is that correct?

WITNESS. Yes, sir; and not consistent with what I have found out by experience.

By Mr. THOMPSON:

Q. Does that go to all types of waves?

A. To all types.

Q. I believe you have testified that it is not possible to properly adjust a model to determine persistency of waves without considering volume; is that right?

Mr. JACKSON. I object to the question as leading.

The COURT. He may answer it.

Mr. JACKSON. Exception.

A. I do not think you can get reliable results. You
2853 may by accident hit the adjustment, but I do not think
that they will be reliable.

By Mr. THOMPSON:

Q. I call your attention to the testimony of Professor Thomas on page 5908:

"Q. Will you explain to the Court the principle of the integrating model?

"A. Such a model is a model of some hydraulic structure which does not resumble the structure closely physically, but satisfies the same mathematical equasion. I think I can best explain the principle by using the chart."

Then there is a great deal of testimony with respect to the chart. Now, I want to ask you this question: Would this model, as described by the witness and as operated by him, give correct results so that he could apply an algebraic formula to it, if based upon the data which he says that he got from the 1930 wave tests?

A. His results, of course, would be in error if he makes mistakes in the adjustment.

Q. State whether or not there is any value of a mathematical formula or an algebraic formula, if that is what it was, applied to a model where the data upon which the model is adjusted does not include the various items which it should include to properly adjust it?

A. Oh, well, no doubt he included the items he should have included, but he used an improper basis for adjustment. I would like to state that in the formula itself that he shows is a very long and complicated thing. In an integrating model you can get wonderful results for current around dams and other flumes, and also current in river channels like the lower Mississippi, but when you come to measuring just the way a river will discharge a volume of water downstream, you have a very complex problem. If your model is not carefully constructed and not properly adjusted, you can't get reliable results. There are no two ways about it.

On the other hand, if it is carefully constructed to show close correspondence to the river and for each section downstream, and it has these baffles placed in it with points corresponding to the very shoals and restricted to parts of the channel adjusted to conform to the actual obstruction and stream flow, and if 2854 it has in it every important thing, the channel storage corresponding to the channel storage downstream, and you adjust that model to discharge volumes downstream in a manner typical of the river, then you can undoubtedly get very good results.

Q. Did he have this model adjusted according to his statement as you understand it to these various items you have described?

A. I have stated he had two fundamental errors in there. There in his testimony he stated he did not attempt to locate the baffles at corresponding points of obstruction in the channel itself.

Q. So would or would there not be any virtue in applying a mathematical formula to an adjustment of that kind?

A. As I said it is very complex. The waves themselves are very complex, and if you make an error you will not get reliable results.

Q. You mean by error such error as you have described?

A. Yes, sir.

Q. On page 5925 and 5926, the witness stated: "In determining the percentage of reduction of waves, it is important to take into consideration a great many things, among them whether the wave occurs on a rising or falling stage of stream; whether the wave is a series or group of similar waves, or whether the adjacent waves are larger or smaller, whether there are minor wave summits between the main wave summit, all of those things enter into the question of what the reduction in amplitude and volume will be, and in the case of the 1930 wave series, we noted there was an enormous variation in the percentage of reduction and volume in the individual waves and those percentages depending on a variety of conditions which were present in that series." Please state whether or not Prof. Thomas could have obtained a reasonable estimate of the percentage of reduction of waves by considering the things he has here stated?

By Mr. **Jackson**. I object to that question as not proper rebuttal.

By Mr. **Thompson**. He has stated the conditions——

By the **Court**. He may answer.

A. It would be practical to make a reasonable estimate.

Q. Would that be practical without considering the question of volume?

A. No; you would have to consider volume. As an estimate for use in this problem I suggest we adopt the waves at

2855 Kanawha Falls, a volume of about 80% of that for the wave discharged at Radford. Now for each section of the river there is a more or less constant relation between the volume and the amplitude of the waves. If for the purpose of this problem we adopt [interrupted].

By Mr. JACKSON. I object to the answer. He has already answered the question.

By the COURT. He may complete his answer, but I don't want a long dissertation.

By Mr. THOMPSON. I have given the series of matters the witness thought important in determining the percentage of reduction of waves, and I asked if that could be done satisfactorily without considering volume.

By Mr. JACKSON. He has answered that.

By the COURT. I understood him to say no.

A. I have answered that.

Q. Referring to record, page 5356, the testimony of Mr. Putnam:

"Q. How did you arrive at this expenditure of $200,000,000; in other words, how many reservoirs did you figure on constructing?

"A. I figured an average lift of twenty feet at each dam, making roughly about 1,800 feet of fall, approximately 1,800 feet between the head of London pool and the mouth of Wilson. I mean to overcome that fall some 90 locks and dams would be required, with an average lift of twenty feet.

"Q. Why did you only make it twenty feet?

"A. Because, there were two reasons for that, in the first place I felt if I exceeded twenty feet in some locations we would get into difficulties with the railroads along the bank; in the second place there is from the point of view of improving a stream for navigation an economical limit, beyond which it is not wise to go on the question of lift, in other words, in attempting to save the number of dams."

Q. Please state whether or not, in your opinion, that is a feasible or reasonable way of developing navigation on New River.

By Mr. JACKSON. I object to the form of the question. I don't understand this procedure of reading a page from the transcript and then asking the witness a question.

By the COURT. Of course that is unusual, but this record is so large it is difficult to remember or keep track of what witnesses said ~~exactly~~, and I am admitting it for that reason, and in an effort to expedite matters.

A. No; it is not a reasonable method.

Q. Why?

A. In the first place these low dams, only twenty feet, will be well below flood height along the river. They will be unable to assist at all in flood control of the river, and if gates are installed and operated with fixed crest at the dam, like those on the lower river, this long series of dams would materially increase flood heights below, and in the second place the dams are so low that you could not economically develop power at these sites, and what you could develop would be flooded out during all floods.

Q. Would that be the best or even the practicable way of improving that river for navigation?

A. No.

Q. Why not?

2856 A. In the first place too many dams, no excuse for that many dams. It would simply be so low navigation would be absolutely flooded out during periods of flood. You have high floods on this river. And in the third place, you can't build dams in the river without affecting other interests, it is impossible to put them in without affecting other interests.

By the Court. Isn't that exactly what the Government has down so far in its navigation dams, built them about twenty feet, about twenty-four at London and Winfield; isn't that exactly what the Government is doing, building a series of comparatively low dams to aid navigation on that river; do you criticise that?

By the Witness. There is a reason for that, that section of the river is built up with manufacturing plants and all sorts of things are along the river, so you can't get them higher than they are. I have asked the engineers why and they say you can't do it without flooding out all these interests.

By the Court. Isn't that what Mr. Putnam said ~~they~~ ought to be, around twenty feet, what they are?

A. Up on the New River.

By the Court. I didn't understand him to say extending all the way up the course of New River.

A. All the way to Wilson Creek on New River. I have made a study of the lay-out of possible projects all the way from the mouth, right to Wilson Creek, and I have taken into consideration the railroads and flood heights and all those factors, and I know you can lay-out a god system of projects without materially interfering with the railroad, except in places, and without flooding out any point in local centers, ranging in height from about forty feet to seventy-five feet. With higher dams such as Bluestone, Radford, etc., you can lay-out a good system of projects all the way up that will assist greatly in flood control, development of power, and all those things.

2857 Q. State if there isn't a difference in the gradient of the Kanawha River down where the Government dams are put and the gradient of the New River from the Kanawha Falls, or from the Gauley River up to Wilson Creek?

By Mr. JACKSON. We concede that.

A. Yes; the slope in the lower river is much flatter.

By the COURT:

Q. Col. Watkins, have you made an estimate of the cost of developing that river for navigation?

A. Yes, sir.

Q. What is your estimate of the cost for a 9-foot channel?

A. I don't recall now what it is. I can say that the combined development of the river for navigation, flood control, and power was a very attractive price. I don't recall the figures. It was some time ago. I haven't them with me.

By Mr. THOMPSON:

Q. Can you give an approximation of it?

A. I made a very detailed study of the river for all of the facts involved in it and I don't recall what the figures are now.

Q. Was it more or less than $200,000,000, if you can remember?

A. Well, it was a combined development. I didn't consider these low dams because, frankly, they are absurd when you talk about using them for the development of the river, and I don't recall what they combined but I do know that the economy of the development was unquestionably for power and you had excellent flood control and you could certainly expect in the future to economically develop through waterways or anything of that nature you wanted.

2858 Cross-examination by Mr. JACKSON:

Q. Col. Watkins, will you define an integrating model?

A. Mr. Thomas gave a very detailed description of it.

Q. You tell me. You define it briefly now so we will get through.

A. Well, an integrating model is a model that, in order to bring the proportion of the section of the river or other factor considered, within reasonable ranges, you foreshorten the total length and thereby you increase the slope, you modify the cross section of the volume and you do a great many things that are certainly not in the river itself, so in order to use that you have got to use a complex formula just like Mr. Thomas described. That, in my opinion, is a very good description of an integrating model. I don't say you can't get good results for certain things, but it is complex.

Q. Is it the application of analytical and mathematical methods to models?

A. Oh, yes; you can apply all sorts of formulas, empirical, or other formulas.

Q. You said it was a matter of adjusting. You mean it is a matter of scale?

A. No; I mean adjusting it so you get the right results, in measuring the persistency of waves. That is what he was trying to do.

Q. You spoke about foreshortening—what was it—the length?

A. You mean this integrating model?

Q. Yes.

A. Yes.

Q. In your understanding is that merely a matter of scale?

A. Well, if you foreshorten the length you are going to increase your slope and if you reduce the width you are
2859 going to affect the manner in which that remaining channel
is going to discharge water and all sorts of factors. They can be corrected by formulas but they are empirical formulas.

Q. What I am getting at, do you mean that the matter of an integrating model is a mere matter of adjustment of scale?

A. Oh, no; you have got to do a whole lot more than that. You have got to make the slopes conform somewhat to those of various sections of the stream. You have got to put in baffles at the right point to go around and represent obstructions to the stream; you have got to go ahead and put in channel storage corresponding somewhat to the channel storage of the stream—I mean if you are going to measure the effect on waves.

Q. Your idea is that in an integrating model you just have the original on a reduced scale?

A. No; you have it on a distorted scale.

Q. But it is a mere matter of adjusting scales as related to the original, in your opinion?

A. No; it is not a mere matter of that. It is a mere matter of getting all the factors which affect the shapes and forms of waves as they go downstream. It is a complex problem.

Q. Do you understand that there is placed in the integrating model something to represent particular falls, for instance?

A. Yes; undoubtedly you can put them in there but Mr. Thomas said he didn't have anything in there that represents Sandstone.

Q. In your judgment, in an integrating model, should you have in the model something in the form of a baffle, or otherwise, that represents each particular falls or obstruction in the river?

A. I say there should be something to do that because if you group those baffles near a rating station it is going to cause successive waves that come along to run together at that point and help to dampen out their persistence. In other words, you don't
keep them separated. If you group those baffles in place
2860 and don't locate them along the stream like they should be,
you are going to make them run together and loose the persistency just as you would if you stick a whole lot of storage between those rating curves and, although it may measure one

rating curve all right, if you turn loose a series of successive waves down through there, that storage is just going to wipe them all out.

Q. Col. Watkins, we are trying to get through with it. If you don't mind answering my question and avoiding any long dissertation after it, it would help out a good deal.

By Mr. Thompson. I insist that the witness be permitted to answer.

By Mr. Jackson:

Q. Did you understand that Prof. Thomas grouped his baffles in the way you have described?

A. He stated he located them along the rating curve, in his testimony. He stated he did not locate them along where the obstacles of the stream were.

Q. Is it your understanding that Prof. Thomas grouped his baffles near the gaging stations?

A. I don't care where he located them. I described where he located them. He spoke of setting them in there and he did say he didn't take any trouble to locate them.

Q. You don't know where they were located, do you?

A. No; I don't.

Q. Why do you say they were grouped below the gaging stations?

A. Because if he didn't locate them where the obstacles of the stream were he is not going to get correct results.

Q. Is it your idea in an integrating model, you have a baffle located just where each obstruction is in the original?

A. Yes; for the simple reason that if you don't you are going to ruin your waves. You are going to run the successive waves together.

Q. You don't have to argue with me if you will answer the question.

A. I want to make this emphatic. You are asking me these things——

By Mr. Jackson:

Q. Col. Watkins, did you ever construct an integrating model?

A. No; I haven't—yes; I have too, but not exactly perfect—simply to get the effect of dams, other shapes of dams and currents that result therefrom. May I continue my answer? 2861

I may say for determining the manner in which waves have gone downstream, I have gone to the stream itself, which is much better than using a model, and I have used simple rating curves and simple flood storage curves and used those as a yardstick and traced them right downstream with the very factors of the stream.

It is much better than simply using a model. That is why I haven't used them for tracing them downstream.

By Mr. JACKSON. I move to strike out the answer as not responsive.

By the COURT. Let it stay in.

Q. (The question was read as follows): Col. Watkins, did you ever construct an integrating model?

By Mr. JACKSON:

Q. Did you?

A. I have answered that.

Q. Say yes or no.

A. I said I have used models to help me and I went ahead and told you why I didn't use them more.

Q. Have you ever constructed an integrating model?

A. No; not according to the system of Mr. Thomas.

Q. To be perfectly frank, you have not; isn't that true?

A. In a small way it was, not according to his formula. I didn't have to go into all the detailed formulas for those kind of things.

Q. You never constructed an integrating model of the kind that Prof. Thomas was using, did you?

A. Not of the long detailed kind that he did, but simple models for determining stream flows about dams and those things.

Q. I am asking you about integrating models?

A. No; I didn't do it and I told you why I haven't, because I can get much better results as to these waves downstream in going to the stream itself.

By Mr. JACKSON. I move to strike out the last part of the answer as not responsive.

By the COURT. I will let it stand.

By Mr. JACKSON:

Q. The models that you used looked like the original except they were smaller, didn't they, or at least, intended to look like the originals?

A. Somewhat like it. In some cases it was simply sections of the stream instead of the whole stream to determine just 2862 the way the velocity of the current would run over a dam or something like that—very simple.

Q. And the more your models looked like the original, except in scale, and were like the original, the better they were, were they not?

A. Yes; the better they were, the more like the original they were, the better they were.

Q. In other words, you simply had a scale model of the original that you were studying, didn't you?

A. Approximately so.

Q. And not an integrating model; is that right?

A. I think that is more the case. There was some of the scale somewhat distorted, but not much.

Q. As you understand it, is distortion of scale the sole characteristic of an integrating model?

A. Oh, no; Mr. Thomas, I think, has explained in detail his model, and I don't think you need to go into it farther.

Q. The fact is you never knew what an integrating model was like until you read Mr. Thomas' description of it, did you?

A. I knew there were such models. I have never had any necessity to use them. I could always go to the stream itself and get my data which is much more reliable, so that I have not gone into it.

Q. You do know that the United States Engineering Office uses integrating models and has tests made in the laboratory of the Carnegie Institute of Technology, don't you?

A. Yes; I know that, certainly.

Q. They do that right along, don't they?

A. Yes; but those currents measured there are not waves coming downstream. I just said these waves are complex. These currents are simple.

2863 Q. Don't you know that the United States Engineering Office now is having built an integrating model in the laboratory of the Carnegie Institute of Technology, for studying flood waves passing downstream?

A. No; I didn't know that.

Q. You didn't?

A. No.

Q. You haven't kept up on the matter of integrating models in the study of stream flow, have you?

A. But I do know that New River has plenty of gaging stations all the way up and downstream, and at its tributaries for you to go to the stream itself and measure the effect and the form and the shape in which waves will come downstream, with an accuracy depending solely upon your own computations and it will take in every physical characteristic of the stream all the way down from top to bottom.

Q. And did you, Col. Watkins, ever release a wave at Radford of the size and form that you are talking about and actually measure it at the gaging stations downstream on New River?

A. No; I didn't need to, not for the purposes of this problem, because my knowledge was good enough to let me get within a reasonable estimate of what would be the results just as those famous rating curves I constructed on the lower river do give the results down there. I can give you just about the same results with these waves on this river so far as the factors of this problem are concerned.

Q. In other words, you were not able, were you, to turn out a full-size wave of the kind you were studying at Radford and actually measure its action passing down the river?

A. No; but my experience is that it wasn't necessary, not necessary with the experience I have had on this river. It was not necessary for me to go up there and make an estimate, which was good enough for all purposes of this problem, for the simple reason that the effects are so great that we don't have to get down to very close details, very fortunately.

Q. Whether you had to or not, you didn't do it?

2864 A. No; I didn't do it and I explained why I didn't do it.

Q. It wouldn't be possible to do it, would it, at the present time and under present conditions?

A. I may add, of course, Radford isn't there and I don't have to have it there to make an estimate.

Q. I understand you don't need any estimate, but I am trying to get at the facts you did have, if any. Col. Watkins, I want you to state briefly the precise error that you found in the adjustment of the integrating model by Prof. Thomas?

A. As I have already explained, one of them was due to the fact that, according to his statement, he adjusted the model to conform to the wave discharge by the 1930 tests. Now, those waves, on account of the form in which they were discharged, had a great loss in amplitude and, to a certain extent, in volume, and they had no Saturday trough, which, after all, is the most vital factor in this problem, and, in the second place, they were not adjusted according to the witness' statement, according to volume. He didn't consider volume. I have had enough experience to know well enough that you cannot get accurate results with any model if you do not make a discharge of volume downstream and the manner in which a typical wave of the stream goes down.

Q. I am only trying to get your errors and unless you are under compulsion, you don't need to argue each one as you state it. At the present time I understand you claim one error in adjustment; that is, that Prof. Thomas, in adjusting his integrating model, did not take into consideration the volume of the waves, of a 1930 wave; is that right?

A. He said he didn't consider volume in adjusting his machine.

Q. And you claim he did not consider volume in adjusting the integrating model?

A. I claim that he stated he didn't.

Q. That is one error you claim in adjustment; is that right?

2865 A. That is one of them.

Q. Do you claim any other error in adjustment of that integrating model, if so, what is it?

A. I claim he stated he adjusted it to conform to the 1930 waves of the 1930 test.

Q. Do you claim he didn't do it?

A. No; I don't, he said he did, and I say that was an error.

Q. You claim that data was not proper, but I am trying to find out what errors you claim Prof. Thomas made in the adjustment of his integrating model?

A. I think I have made that clear.

Q. Is there any other error you claim he made than your assertion that he did not take into consideration the volume of the waves in the 1930 wave tests?

A. His evidence indicated that he did not locate his baffles according to the position of the various obstacles that flow downstream.

Q. The second error that you claim is that the integrating model did not have a baffle corresponding to Sandstone falls and every other falls in the river or obstruction in the river; is that right?

A. If you are going to get perfect measurements of the persistency of a wave going downstream, you cannot neglect to put obstacles proportionately along which conform to those in real life, for the simple reason that if you don't locate them right and exhibit them, you are going to run the waves together and you are going to lose them.

Q. Are you talking now about an integrating model or a scale model?

A. Yes; I am talking about any kind of a model.

Q. Any kind of a model?

A. Yes, sir; any kind of a model.

Q. You make no distinction between an integrating model and a scale model in this respect?

2866 A. No.

Q. You still haven't answered my question. I am asking you for the second error that you claim in adjustment?

A. I have already told you two, and I have told you three. Look at the record.

Q. Wait a minute.

A. Don't try to confuse the issue. I have told you two positively and I told you this other baffled.

By Mr. **Jackson**: I move to strike out the statement.

By Mr. **Jackson**:

Q. You have told me that you allege one error in adjustment in failing to take into consideration the volume of the 1930 wave and for the failure of the model to discharge volumes, failure to adjust the model to discharge volumes.

A. Failure to adjust the model to discharge volumes?

Q. Discharge volumes of what?

A. Water. He said he didn't take into consideration the volumes in adjusting his machine, he made an error.

Q. We will agree that you claim that is one error. Can we let that alone. The second error that you claim is that he didn't put baffles in the model at the sites of the various obstructions in the river; is that right?

A. Let me review the errors.

Q. No.

A. No; it isn't right, for the simple reason that I have already given you three errors in his adjustment. Let me recite them over again.

Q. Just a moment.

By the **Court**. Gentlemene, I think I will have to take charge of proceedings.

By the **Court**:

Q. Col. Watkins, you answer the questions as they are asked you. You have got a right to explain your answer to a reasonable extent, but I am somewhat in the same position as Mr. 2867 Jackson. You keep referring to three errors, and I can't remember where you have pointed out any except two, one relating to the volume of the water and the one to what you say is a mislocation of the baffles on the model. Let us expedite this thing by a little order.

By Mr. **Jackson**. All I want him to do is list them and I got two, as I understand it. Now I want to find out is there another one.

A. May I repeat what I have already said as to the errors?

By Mr. **Jackson**:

Q. Please don't.

By the **Court**. Let him answer it in his own way.

By Mr. **Jackson**. The trouble is I will be no further ahead when he gets through and will have to start over again.

A. The first error is the fact that he adjusted his model to conform to the waves of the 1930 tests. That is error No. 1.

By Mr. **Jackson**:

Q. Just a moment.

By Mr. **Thompson**. Let him finish.

By the **Court**. Go ahead, Mr. Jackson.

By Mr. **Jackson**:

Q. Is it your contention that the integrating model ought not to have been adjusted to conform to the results of the 1930 wave tests?

A. You can utilize them for adjusting them to the 1930 wave tests but you can't just go and pick out any wave you like as apparently the witness did, from the results he obtained.

Now, may I answer and show you just why you can't follow those unless you are careful about just what you get from those tests?

By Mr. **Jackson**. If Your Honor please, all I want to do is to get a list of the alleged errors.

By the **Court**. Yes, that is all I want and if this witness will start the statements over——

A. I will be glad to give each one without an interruption, if I may. 2868

By the **Court**. The trouble is, Col. Watkins, that after you have given each one you want to enter into a long explanation of it which is not being asked for. Now, enumerate the errors, as briefly as possible.

A. Error No. 1: The model was adjusted to conform to the 1930 wave test, which, on account of the way the test was made, had great reduction in amplitude and reduction in volume in the admitted Saturday and Sunday trough. That is error No. 1.

Error Number 2: The witness states that he did not consider volume in adjusting his model. That is error Number 2.

The third, as I stated, he did not locate his baffles to conform to the location of the various obstructions of stream flow. Those are the three errors I have listed.

Q. Are there any others in the adjustment of the model?

A. He did not go into detail about flood storage or channel storage. That is an important factor in this problem.

Q. Do you claim any other errors in the adjustment of this model?

A. No, sir; but he did not give details on those things which are important factors.

Q. Do you contend that, with a properly constructed integrating model, Professor Thomas should not have been able to reproduce the essential results of the 1930 wave tests?

A. No; I don't claim he could not. He no doubt could.

Q. Don't you think that a properly constructed integrating model should be able to reproduce them?

A. He probably did reproduce them very accurately apparently—the 1930 wave test—it probably is.

Q. Aren't you sufficiently familiar——

A. (Interrupting.) The trouble was, the results that he claimed indicate to me very conclusively that he adopted ~~in~~ the 1930 wave tests, waves that had too small a persistency, and that is the fact in the case.

Q. In other words, the results do not accord with your opinion and you think they are wrong?

A. They do not conform with what I know would be about right.

2869 Q. Don't you know enough about an integrating model to know that the volume is automatically reflected in the operation of the model?

A. We are talking about waves going down stream in forms and shapes.

Q. Will you answer my question?

A. I will say, if he did not consider volume in adjusting the integrating model—I don't care what his formula was, you will not get correct results.

Q. I am asking you if you know enough about an integrating model to know that it automatically reflects the volume?

A. Sure; maybe in stream flow and that kind of thing.

Q. Don't you know enough about integrating models to know that baffles are never located in the models to correspond with the location of the obstructions of nature, but merely to reproduce the conditions of stream flow to correspond with the hydraulic lines that control at the control points?

A. I know that is fine for determining currents and those things, but I know that the factors controlling the waves are so complex that you will not get good results if you group them together in one place or another and don't distribute them in the stream. I know that. I know that.

Q. You know the results of an integrating model, although you never constructed one?

A. Yes, sir.

Q. Do they test the same as a scale model?

A. Yes, sir. I can say they could, because I have had so much experience following waves down stream, and I know what will happen to a wave all the way down and how it will behave. I have traced them so many thousand miles downstream, I know the factors involved.

Q. Colonel Watkins, what is the natural period of oscillation in pool No. 6, on Kanawha River?

2870 A. I don't know. I think I saw some peaks in the curves of Mr. Thomas' testimony that indicated about two hours, and I think that is correct.

Q. Do you think 2.4 might be correct?

A. That is about right, I guess.

Q. Yesterday, you testified about some tests made by Professor Thomas at Marmet pool?

A. Yes, sir.

Q. And you referred to a flow of 3,200 cubic feet per second. What did that flow represent?

A. I took that from the average height of the gage at Kanawha Falls, indicated on the chart [witness indicates paper in his hand].

Q. Did you intend that flow to represent the base flow that existed at the time of the tests?

A. That is what I understood it was.

Q. And you got that, you say, from the Kanawha Falls gage?

A. Here it is shown on your chart; yes, sir [indicating].

Q. Can you answer the question?

A. Yes, sir. This one on the chart.

Q. I will ask that the question be read. (The question is read). That is, your 3,200 second-feet figures was based on that?

A. Yes, sir; as shown as on this chart [indicating].

Q. Did that represent the flow out of the power station at Marmet prior to the tests?

A. It represented the flow at Kanawha Falls. It was approximately the same so far as the factors in this problem are concerned, for measuring the stages in the gage heights which would occur.

Q. That would depend on whether or not the flow through the power station was any different at London and Marmet, wouldn't it?

A. No, sir; for the reason that all the discharges is to give you just the approximate place on this rating curve in the stream so that you may measure the changes that took place with a discharge of so much, and if you make an error of ten per- 2871 cent in it, it will not materially change the results, so that any error I made in assuming 3,200 cubic feet per second was not the base flow of the stream, will not greatly affect the results.

Q. Regardless of your feeling about that, the fact is that the flow down in the Marmet pool, any flow, and the Number 6 pool, whatever it is, depends on the amount of flow through the power station and not on the flow at Kanawha Falls?

A. The wave tests——.

Q. (Interrupting.) The tests were taken when?

A. The 14th and 15th.

By Mr. Jackson:

Q. Is that right?

A. Oh, yes.

Q. What time was the test wave taken at Marmet Power station?

A. According to the chart, it was started—your load at two P. M., on the 14th.

Q. What was the power out of Marmet power station just before the wave commenced at that time, two o'clock on August 14th?

A. I don't know exactly what it was, but I assume, for the purpose of this problem, that the flow, 3,200 C. F. S., as indicated by the Kanawha Falls gage, was base flow. Any error that I made would not materially affect the problem.

Q. You undertook to criticize these results yesterday on the assumption that the base flow was that shown by the Kanawha Falls gage?

A. Yes, sir.

Q. And you took that to be 3,200 second-feet?

A. Yes, sir.

Q. If that base flow at Marmet power station at the time of the wave was 1,800 second-feet, that would be a great deal more than ten percent error in the assumption, wouldn't it?

A. If it were 1,800 second-feet.

Q. It would be a forty-five percent error, wouldn't it?

A. It would be about that, but may I state that it would
2872 not materially affect the results, except it would make the wave go down much lower below the horizontal.

Q. Now, what was the power output at Marmet just before the wave was initiated?

A. At Marmet?

Q. Yes.

A. The London power house.

Q. Marmet?

A. It is on your chart here [indicating].

Q. You said London? I just wanted to correct you.

A. It is on the chart here [indicating]; you show it to be one o'clock it is 3,000 k.w.

Q. What was the flow corresponding to that 3,000 k.w. out of Marmet power station?

A. I don't know exactly what it was at that time. I took your figure of a change in flow of 4,100 cubic feet per second, which Mr. Thomas said he used.

Q. You are talking about the increase. I am talking about the base flow. Don't you know the 3,000 k.w. at Marmet would correspond to a flow of about 1,800 second feet?

A. No; I did not go into the details of checking exactly the flows here. What I was interested in was the change. It is the change that matters. As I said, you would not greatly change results. The results that you get, if the flow happened to be 1,800 feet per second and not 3,200; it would not greatly affect the results, except, as I said, it would go lower—the lower part of the wave would go down below horizontal further.

Q. Laying that to one side, you under took to criticize Professor Thomas' results without even attempting to determine what was the actual base flow out of the Marmet power station
2873 before the wave was initiated?

A. I had no intention of criticizing the results. All I did was analyze them.

Q. You undertook to——

A. (Interrupting.) I undertook to analyze, not criticize the results, and I did take into consideration those factors necessary for a correct analysis of the problem.

Q. According to your idea, the correct analysis of the problem did not require a determination of that—what was the wave at the Marmet power station?

A. It requires you to determine what portion of the rating curve to use in determining the change. If that were only 1,800 second feet, it would make a slight difference only, but not enough to materially affect the situation.

Q. Let me know if 1,800 second feet is not right, later on in the day.

A. I will state that 1,800 is correct, if you say so. I will accept that, if it is correct, because it will not materially affect the results. It will make them smaller, but not materially affect it, because you have written the curve right where it was at the beginning and you have it where it was at the end. I measured that rating curve change and I know it gave approximately the right results. If I took 1,800 instead of 3,200, it will not greatly change it. You can take it and look at it.

Q. You mean it will not change your opinion?

A. It will not change the results. It is known. That is, it is so. It is measured here in black and white—written.

Q. What was the gage reading at Marmet lower gate power station during the base flow discharge immediately preceding the formation of the wave?

A. The Marmet lower gage?

Q. Yes, sir.

2874 A. It was at 564 and about .2.

Q. Is .17 about right—564.17?

A. According to this curve, it is nearer 18.

Q. In your testimony yesterday, you referred to Government's Exhibit 117-b. Will you please refer to that Exhibit now and give the appropriate back water curve on the Exhibit and state what it shows as to the flow corresponding to elevation 564.2?

A. (Witness refers to papers.) You will have to express the flow, 564.2, in discharge per cubic feet per second to get the elevation on this curve. I used 3,200 cubic feet.

Q. What does your chart show to be the discharge at elevation 564.2, on your Exhibit 117-b?

A. Oh, yes, I see—564.2—[witness examines papers] it shows a discharge of 4,200 I believe.

Q. 4,200 second-feet?

A. I believe that is it.

Q. What is the matter with your back water curve?

A. What is that?

Q. What is the matter with your back water curve?

A. Nothing, so far as natural slope is concerned. Maybe it is not high enough or low enough in particular places.

Q. You have agreed that the discharge at that time was 1,800 second-feet, and would you think the back water curve, which gives you 4,200 second-feet, when the actual discharge was 1,800 second-feet, was in error or not?

A. We will look at this; an answer to your question requires consideration of questions that have gone before and must have an explanation. That is all there is to it, and that explanation is that, when you look on the days, you see that on the immediately preceding days, there was a very sharp power wave, which unquestionably did affect the gage height, and it would measure the discharges at this particular time. That is the answer there.

By Mr. JACKSON. I will ask that the question be read. [The question is read.]

2875 A. I think my answer is excellent to that, because I explained the factors which were existing at the very time the measurements were made, which I said did affect the gage height, therefore that would affect the gage reading.

Q. Will you say whether or not you think that result would indicate the back water curve to be in error or not?

A. No, sir, it does not, because you take those factors and it will not be due to the gage height.

Q. I just want your views.

A. I used the average flow to go on.

Q. Did you take the flow at Kanawha Falls?

A. I took the actual flows existing at the time the tests were made.

Q. And the 1,800 was actually existing at the time of the test?

A. Yes, sir, but was it the average daily flow. The Kanawha Falls gage indicated it was 3,100. I don't give a dern what it was when the test was taken, but I am talking about the average daily flow. That is the one to use. That is correct, you betcha.

Q. Starting, Colonel Watkins, with the known flow and a known gage height at the foot of Marmet Dam and power station, will an increase of discharge from the power station cause a change in the water level?

A. You mean of the crest of the dam?

Q. I mean tail water increase.

A. The crest of the dam.

Q. No, the tail water?

A. Will an increase in flow cause that? You would expect it to, unless some other factors entered.

Q. For an increase of 4,100 second-feet flow through Marmet Station being the amount which you say Professor Thomas gradually increased the flow during the afternoon——

A. [Interrupting.] He said that.

2876 Q. Do you challenge it?

A. No, sir.

Q. (Continuing.) What increase in water level would that produce below Marmet Dam?

A. I believe I measured it yesterday and it was about——

Q. (Interrupting.) Look at Exhibit 117-b and tell me the results.

A. (Witness examines papers.) With an average daily flow of 3,200——

Q. (Interrupting.) I didn't ask you that.

A. That is what I have to look at to get the correct measurement for this problem. You want me to measure it and I will measure it. I have to do that to get the correct measurement.

Q. Give me your answer.

A. Well, let me give you my answer. It is a change in discharge of approximately 1.2 feet.

Q. What elevation would that result in?

A. A final elevation of approximately 564, or approximately 565.

Q. Wouldn't it be better than that?

A. Just a slight shade above it.

Q. You start with 564.2 and add 1.2 to that, according to your estimate; is that right?

A. No, sir, I would look at the curve because of the other factors. You have a little sharp wave just above it—before it, and it is bound to have an effect on what the gage height is at the time this was taken. Measure it from where it was shown on the curve.

Q. Tell me what elevation Marmet gage actually attained after the flow had been increased 4,100 second-feet.

A. According to the chart, it rose to 565.35.

Q. That would be very close to the sum of the first elevation, 564.2, that you gave me, plus 1.2 rise you found for the

2877 increased flow of 4,100 second feet; that is, the total would be 565.4?

A. It is approximately that, a little bit less.

Q. Tell me what was the minimum power load at Marmet power station at the end of the test period.

A. At Marmet power station?

Q. Yes.

A. Your curve indicates that it actually fell to about 2,000 k.w., but all the way down, you are putting your load in and out and popping it up and down and immediately after that you are popping it back to three and then you pop it back to two again.

Q. It shows two k.w.'s as a minimum?

A. Yes, sir.

Q. Is that that load less by 1,000 k.w. than the load corresponding to that base flow at noon, August 14th.

A. Yes, sir.

By Mr. JACKSON:

Q. And what do you find to be the discharge from the Marmet power station corresponding to the load of 2,000 k.w.?

A. Measured on what?

Q. In any way that you know, if you know.

A. You have to reduce that to discharge.

Q. Do you know how?

A. Yes, I know how they do it. What do you say it was? I will accept it; it does not enter into this problem exactly.

Q. Do you think 1,200 second feet is about right?

A. You can draw it if you want. It does not affect it materially.

Q. Are you willing to accept 1,200 second-feet as about right?

A. Something like that.

Q. According to your Exhibit 117-B, what pool elevation in No. 6, at No. 6 dam, would you expect for a discharge 2878 of 1,200 second-feet?

A. No. 6 pool, at No. 6 dam?

Q. Yes.

A. What elevation would I expect there?

Q. Yes; look at your exhibit 117-B.

A. Yes; I see, but, before I could measure this Exhibit 117-B right, I have to know what factors are affecting the heights at that particular time. You popped a little load up just before, and I can't accurately measure on here unless I put in an analytical study of it like I have on this; but, if it were actually that, and no other factor, if you take 1,800 feet——

Q. (Interposing.) 1,200 feet?

A. It would be at an elevation of about 563.2, or something like that.

A. I would like to have defendant's counsel correct his statement that these are not justified by facts. Furthermore, I did not make a lot of general categorical statements. I simply read what was written on the curve.

By Mr. Jackson:

Q. Now, taking into consideration the base flow of 1,800 and the increase of 4,100, the maximum discharge at Marmet was 5,900 second-feet; what was the flow at the peak of the wave—5,900 under those conditions?

A. I would like to repeat, the Kanawha Falls gage indicates 3,200 second-feet per day; that should be taken at a base flow for the problem instead of what otherwise happened to be measured at that time, and then add 4,100 cubic feet per second and you have 7,300 cubic feet per second.

Q. All right; I take the 7,300 second-feet: Now, cutting down the 1,200 second-feet, which we agreed was the discharge corresponding to the power production at the end of the tests; what elevation would you have at the same gage?

A. Where am I going to measure it from?

2879 Q. At the same gage?

A. You can't use the rating curve for measuring the height you are going to have for a certain discharge at the end of the measurement. This thing very clearly shows that you had the force of gravity and the force of momentum or volume forcing it down for 20 hours, and it actually dropped below in the average during the falling stage 1.1 below the point of rest, and, of course, you can't measure the discharge at that particular time; but, if you will look on the hydrograph, you will see what it is.

Q. All right. Is there any time at the end of the test when you found the upper end of pool No. 6 lower than the lower end of that pool?

A. No; according to the data from the Engineers Office and that the lock-master has given to me, it was about 17 hundredths of a foot above the water at the crest of No. 6 dam.

Q. Well, it is obvious, isn't it, Col. Watkins, that if at a given time you had a flow at a given point, for instance below the Marmet power station, of 5,000 second-feet, and at a later time you had a flow of 3,000 second-feet, you would expect a lower water elevation with the lower flow, wouldn't you, at the same point?

A. You would expect a low elevation for the same flow if there were not other factors which came in and kept it from being that.

Q. In general, a reduction of flow at a given point will mean a reduction in elevation?

A. It reduces the expected point of rest.

Q. A reduction in flow at a given point will mean a reduced elevation of water at that point, will it not?

A. It means just as I said, the effective point of rest will be——

Q. (Interposing.) I am not asking about a point of 2880 rest, but I asked you whether or not, if you reduced the flow at a given point, if you do not expect the elevation of water will be reduced?

A. Yes.

Q. And if you increase the flow at a given point, you will expect the elevation to rise, will you not?

A. Yes.

Q. That is all.

A. May I add that before you can actually determine where it will be, you have got to look at the other factors, because this problem shows it just as clearly as night from day.

2881 H. G. Gerdes, recalled, testified in rebuttal as follows:

By Mr. Gatchell:

Q. Mr. Gerdes, Mr. Yarbro testified that each one of the pictures in Exhibit 592 fairly and accurately portrayed the situation described in the legend at the bottom of the picture; will you briefly tell the Court if that statement is correct?

A. That statement is not correct.

Q. Will you please explain very briefly what you mean by that?

Mr. Jackson. I move to strike out the first general statement.

The Court. I will let it stay in.

Mr. Jackson. Exception.

Q. Will you examine the photographs at Wylie's Falls?

A. I have examined those.

Q. Will you tell the Court if those pictures, or first, how many pictures show Wylie's Falls?

A. Three.

Q. What are the numbers?

A. Nos. 106, 107 and 108.

Q. Do those three pictures fairly portray the shoals at Wylie's Falls?

By Mr. Jackson. I object to that. The pictures show, #106 "View of Wylie's Falls from left bank, June 1, 1936"; #107 "View of Wylie's Falls from right bank, June 29, 1936"; #108 "View of Wylie's Falls from right bank, June 29, 1936," overlaps Picture #107. I think all the witness may be asked is whether or not he is prepared to testify those pictures do not accurately represent the scene that met the eye at the place indicated in the photographs on the dates indicated.

By the Court. He may answer.

By Mr. Jackson. Exception.

A. These three pictures while taken from both banks, looking at Wylie's Falls, are nevertheless so taken that a significant part of Wylie's Falls is omitted from all three views. It should be possible, in my opinion, in three pictures to cover the Falls and show all of them. The navigation channel dug by the U. S. Engineers is not shown in any of the three pictures, although it is situated at the Falls, at the right bank of the river.

Q. Is it discernible from the place at which these pictures were taken?

A. To one who has been at Wylie's Falls and knows where the navigation channel is it may be identified on photograph #106 and #108, although to one who has not spent sometime on the ground at Wylie's Falls it would certainly be impossible to recognize it.

By Mr. Jackson. I move to strike out all the witness' testimony. He first testified it doesn't represent the scene [illegible] show the channel, and now he undertakes to point out the navigation chute is shown by two other pictures.

By the Court. The answer may stand.

By Mr. Jackson. Exception.

By Mr. Gatchell:

2882 Q. I show you Defendant's Exhibit #555, photographs taken by T. A. Patton. Mr. Patton testified that these photographs fairly portray the situation at the time and place mentioned, at the bottom of each picture. Have you examined those?

A. I have.

Q. Are his statements correct?

By Mr. Jackson. I would like to ask a qualifying question. Mr. Gerdes, were you present at the time and place indicated by these photographs, when the photographs were taken?

A. I have been present at the places but not at the times mentioned.

By Mr. Jackson. I object to the question. Obviously he doesn't know anything about the scene that met the eye when the pictures were taken.

A. That is not correct.

Q. Will you explain to the Court what you mean?

A. Referring to photographs 114 and 115, which are again two view of Wylie's Falls, neither photograph shows the navigation channel at the right bank at the end of the Falls in such a way that it can be recognized or identified by one not otherwise familiar with the site. The remainder of the photographs, some of them [interrupted]. Some of them fairly represent the river——

By Mr. Jackson. What is the question pending, may I ask?

By Mr. Gatchell. Whether Mr. Patton's statement these photographs fairly portray the situation is correct.

By Mr. Jackson. His testimony is this, that these photographs fairly show the scene that met the eye when the photographs were taken. If this witness is prepared to rebut that, all right.

A. Some of the photographs represent fairly the scene which they purport to show.

By Mr. Gatchell:

Q. On page 5182 of the record, the witness Patton testified that
these photographs contained in Exhibit 555 which I have
2883 handed you were taken on September 29, 1930, and can you
inform the Court as to the condition of the river, the discharge in the river at that time?

By Mr. Jackson. I object to that as not in rebuttal of anything.

By the Court. I think he may answer that.

By Mr. Gatchell:

Q. Will you give us the stream flow?

A. The river flow at the time these photographs were taken was extremely low, the discharge being somewhere between one-half and two-thirds of ordinary low water. At Wylie's Falls the interpolated discharge was 1,200 cubic feet per second and at Bull Falls 1,260 cubic feet per second and at the location of Photograph No. 126, which is the lowermost one of the group, one thousand three hundred cubic feet per second.

Q. I show you defendant's exhibit 554. Have you examined those pictures?

A. I have.

Q. The witness Slocum, who introduced these pictures testified that they were taken in November 1931. Can you give the stream flow at the time those pictures were taken?

A. I can.

Q. Will you give it, please?

A. The stream flow during the time these photographs were taken was also very low, being between a half and two-thirds of low water.

By Mr. Jackson. I object to the characterization. He is asked to give what it was, and I think that is what he should do.

A. The interpolated discharge at Foster Falls, that is, interpolated between the U. S. G. S. Gaging points along the river—the interpolated discharge at Foster Falls was either 700 or 760 cubic feet per second, depending upon whether the date was the 4th or the 26th, it not being stated by Mr. Slocum on which of the two dates the individual photographs were taken. At Allisonia, at

Photograph No. 18, the discharge as interpolated would be 1,030 second feet, that being for the date of the fifth of November, and at Photograph No. 46, at Radford, 920 second feet if taken on the 6th or 1,050 if taken on the 24th, these being very close together, and at the last photograph of the group, one mile above Eggleston, 1,140 cubic feet per second.

By Mr. **Jackson**:

Q. What date was that?

2884 A. November 6th.

By Mr. **Gatchell**:

Q. Is that the normal flow of New River at that time?

By Mr. **Jackson**. I object to that as not proper rebuttal, going into the question of the normal flow.

By the **Court**. He can answer it.

A. No, that is a little more than half of the ordinary summer low water at New River.

2885 **H. G. Gerdes**

Rebuttal—Direct examination by Mr. **Gatchell**:

Q. Prof. Thomas testified that the pool fluctuations shown on Government Exhibit 229 were caused by variations of the load at Marmet and other stations. When you introduced the exhibit, did you testify as to the causes of these oscillations shown on Government Exhibit 229?

A. I did not.

Q. I show you Government Exhibit 229 and ask you what that shows as to the causes of the fluctuations regarding which you did testify?

By Mr. **Jackson**. I object to that. He is asking him now to repeat his testimony.

By the **Court**. He may answer.

A. I have reference particularly to the oscillations in the Marmet pool following the reduction in load on the London Power Plant, which started at about 4 p. m. on June 16, 1936, and continued through five successive alternate risings and fallings of the water at the two ends of the Marmet pool with a gradually dimishing amplitude, the pool finally coming to a steady state at about 8 p. m. on that evening. The power plant records showed that at that time both London and Marmet plants were operating with relatively little fluctuation in load, which, together with the observed facts of these rhythmic and opposite fluctuations at the two ends of the Marmet pool, make the fact that it must have been caused by the oscillation of the pool as it settled down to a steady state after having taken a part of the load off of the power plant; that is, the water surface, on a slope oscillated back and forth five times, before it finally settled down to a new smaller slope.

By Mr. GATCHELL:

Q. Prof. Thomas compared the hydrograph of the 1930 wave tests in exhibit 141 to show that the typical wave illustrated on his Exhibit No. 594 would be reduced in amplitude from 9,000 c. f. s. to 3,500 c. f. s. betewen Radford and Kanawha Falls. Have you studied the comparison which he made in this connection and found any errors in it?

2886 A. I have studied it and I have found that it is incorrect.

Q. Will you explain that statement?

A. I studied the comparison made by Prof. Thomas which rested upon the 1930 wave tests, as shown on Exhibit 141, and the other hydrographs of that test, and came to the conclusion that his interpretation or his findings were in error and I have embodied my study in a diagram on which I have platted the persistence in amplitude from Radford to Lock #2 of all of the 1930 wave tests against the amplitude of those waves at Radford.

By Mr. JACKSON. Has it been offered in evidence yet?

By Mr. GATCHELL. I offer this in evidence, Your Honor.

By Mr. JACKSON. I object, because it appears from a mere inspection that it is nothing more than an attempt to interpret again the 1930 wave tests as to which the Government has gone into exhaustive detail on direct, and it is a mere attempt, in a subterfuge, in rebuttal, to re-state their case. Certainly they have described at great length by Mr. Kramer, Col. Watkins, Mr. McWhorter and Mr. Gerdes, what they thought about these wave tests on their main case and now they want to interpret them again.

By Mr. GATCHELL. Your Honor this is, on its face, simply an analysis of the persistence in amplitude of all waves in the March, 1930 wave tests upon which Prof. Thomas based his comparison as to the persistence in amplitude of his typical wave that he illustrated on his Exhibit 594. Now, all that we are attempting to do is to see if his comparison was based upon a sound premise. If it was, then, of course, his testimony is entitled to some weight. If it was not, then we think we are entitled to show that.

By the COURT. I don't think that is what you are doing. If the witness is able to point out certain conditions or assumptions made by Prof. Thomas, which, in his opinion, were erroneous, he may be permitted to do that. I don't understand that is what you are undertaking to do. So far the witness has contented himself by saying that Prof. Thomas' calculations and conclusions are erroneous and then undertaking by a chart to reiterate testimony that he himself has previously given in chief and other witnesses have given in substance also.

By Mr. JACKSON. An attempt to reinterpret these 1930 wave tests which they have done repeatedly on their direct testimony.

By Mr. GATCHELL. On examination in chief this witness testified regarding two waves, Nos. 4 and 10, and Prof. Thomas said those waves were not typical and he took other waves. We are simply saying instead of having all this discussion as to whether certain waves are typical and other waves are typical, let us examine the whole 1930 wave tests, a test which was carried out under the entire control of the defendant. Their engineer was in charge of it and had control of the whole thing. All that we are saying is that Prof. Thomas based his comparison upon an inaccurate premise.

By the COURT. Ask him what that was. I let Col. Watkins be examined on the same line where he undertook to point out what he said were erroneous premises, on which some other witness based conclusions.

By Mr. JACKSON. May I make this observation: It is a subterfuge to have this witness put in a new interpretation of these 1930 wave tests that they have interpreted three or four times on direct, and if their interpretation is right, and Prof. Thomas' is different, then obviously there is something wrong with his premise, but I don't think that they can come in and go over their testimony again on the 1930 wave tests.

By the COURT. I understand that. If, for instance, we have a conflicting interpretation regarding these wave tests and this witness can say "I will show you why there is a conflict, because the witness Thomas took certain erroneous conclusions or made erroneous assumptions, which I can point out to you to show wherein he was in error." I think that would be proper rebuttal, and that is what I am confining them to.

By Mr. GATCHELL:

Q. Will you tell the Court what this chart represents?

By Mr. JACKSON. I object to that.

A. This chart represents, to the best of my ability, the relation between the 1930 wave tests upon which Prof. Thomas based his estimates, and the estimates of Prof. Thomas which he said are based upon those tests. There is shown here, platted on the height scale the persistence in amplitude from Radford to Lock #2 of each wave of the 1930 tests, that is, the ratio of how high the wave was at the end of the run as a percentage of its height at the beginning. On the horizontal scale there is shown the amplitude at Radford, that is, the height of each wave at the beginning, and each point thus represents the relative strength of the wave at the end of the run at Lock #2, platted against its height at the beginning. I have taken it to be a common sense proposition that the bigger a wave is—that in any given channel, the bigger a wave is at the start, the bigger it will be at some given distance down that channel, and I have sought in this diagram to show how the waves of the 1930 tests conform to that common sense, simple idea, and, in so doing, point out that the estimates that Prof. Thomas has made, based upon the same data and arrived at by more complicated means, appear to me to be in error.

By the COURT:

Q. Mr. Gerdes, isn't all of this computation about the 2887 results of these wave tests exactly what the Government introduced at great length in chief, or they had abundant opportunity to introduce?

A. No, sir; I do not believe that it is.

By the COURT. I have said two or three times if he can pick out premises or conditions which the other witness used in this calculation and point out where they are erroneous, he may do so, but that isn't what you are trying to do. You are trying to utilize that to open up this whole subject of wave tests and evidence that would reiterate what he has previously testified to, and any number of other witnesses have testified to in chief, or which they have certainly had an abundant opportunity to testify to.

By Mr. GATCHELL. Your Honor, we certainly don't want to open up the 1930 wave tests again, and at the time Prof. Thomas was on, he discussed two or three of these waves. Obviously, Your Honor, the entire series of tests should be a more accurate representation than a few waves picked out at random. All that we are asking this witness is if he can show us wherein the premise of Prof. Thomas was erroneous.

By the COURT. All right, wherein was the premise of Prof. Thomas erroneous?

My Mr. GATCHELL:

Q. Can you answer that question?

A. I can. Prof. Thomas used the 1930 wave tests to build and calibrate his model, from which he drew his conclusions, that is, the waves themselves, and, among other things, principally their amplitude, were the premise. I have here platted——

By the COURT:

Q. Where was he wrong in doing that? What was erroneous in using the 1930 wave tests as a basis for his calculations?

A. There was nothing wrong in that.

Q. Where else did he err?

A. The error came in in the way in which he used them.

Q. How did he err in the way in which he used them?

A. By using them in a model which gave erroneous results, which error I have here demonstrated. There are a number of possible deficiencies in the model which might have led to this erroneous result. I did not think it proper to endeavor to follow Prof. Thomas through all of the operations of his model.

By Mr. **Jackson**. I move to strike out the testimony so far. It is obviously nothing more than an attempt to reiterate what was covered before.

By the **Court**. It looks like it to me.

A. The point of the diagram is——

By Mr. **Jackson**. One moment.

By the **Court**. Go ahead.

A. The whole point of this diagram is that these waves indicate a general trend, that is, they follow in general—although there are many minor complications which have been brought up—a simple rule. That rule points to a definite amplitude for the wave of the size which will be emitted by the Radford power plant.

By the **Court**. I think you have gone far enough.

No, gentlemen, I can't admit that.

By Mr. **Gatchell**. Your Honor, may we have an exception to your exclusion of this testimony and say, were this witness permitted to testify, he would show that from the 1930 wave tests used by Prof. Thomas as the basis upon which he compared the persistence in amplitude of his typical wave shown in Defendant's Exhibit 594, that this witness would say that the 1930 waves show that the larger the wave passing Radford, the greater is the percentage of persistence of the amplitude of that wave at the time it reaches Kanawha Falls.

By the **Court**. Mr. Gatchell, in your avowal, and in some of your questions, you injected something about the tests made by Mr. Thomas, carrying the implication that you were in position to point out where his tests were erroneous. This very avowal would carry that implication because you make some reference to Prof. Thomas' results obtained and that carries the implication that you can point out some erroneous basis for his conclusion. I have invited you a half dozen times and asked the witness to point out anything of that sort, if he can, and the witness hasn't done that and wishes to go off into a general discussion of the wave tests, giving his conclusions about it, pointing out no error in Prof. Thomas' method of computation except to say that he has another method by which he reached a different conclusion. Any time you can point out, as I allowed Col. Watkins to point out, any supposed errors, fallacious conditions, upon which conclusions were reached by defendant's witnesses, you may do so, but I will not let this witness say that witness Thomas expressed certain views and reached certain conclusions and we now want to point out those as being erroneous by showing we reached a different conclusion in a different way. That was something you undertook to do in chief and certainly had abundant opportunity to do.

A. I believe the error in Prof. Thomas' methods and apparatus to be the way in which he calibrated his so-called integrating model, which is another way of saying approximating model. He calibrated that from the 1930 wave tests in such a manner that if it were calibrated in a certain manner on this distorted scale it would give distorted results. I believe that would be one factor. Another one, I believe to be the microscopic scale of his model which renders it highly unlikely that accurate results could be obtained.

By Mr. Gatchell:

Q. Can you tell the Court then the distortion in the integrating model?

By Mr. Jackson. Are you going to offer evidence now that the scale of the integrating model was different than Prof. Thomas gave?

By Mr. Gatchell. To simply show the distortion in Prof. Thomas' integrating model.

By Mr. Jackson. Prof. Thomas gave the scale of his model and exactly what it is in every way and unless this witness is prepared now to say that he knows that is false or untrue——

By the Court. But if the witness can point out where a model, made to the scale described, would produce certain inaccurate results, I think he is entitled to do that.

A. Well, this integrating model is an approximate device which consists of a condensed representation of a short piece of river which is set up and adjusted repeatedly so as to give at the four or five places for which there are data which are selected so that when a wave, possessing the characteristics of one which it is desired to repeat, say one of the 1930 waves, is passed through the model and makes the right shape at the first station on the model, then the succeeding stations on the model are adjusted so that it gives an answer at those stations corresponding to the shape of the 1930 wave. That is a matter of successive adjustment and balance and the chances for error in the model due to the non-representation of the river between these stations and the small scale of the model, are such as to render it unlikely that when a wave, possessing some different characteristics and being considerably larger than the waves which were used to calibrate the model, is run through it, an accurate result would be obtained, and as I have tried to show by this diagram here, apparently an accurate result has not been obtained.

By Mr. **Gatchell**:

Q. Do these 1930 wave tests show that the small waves have as high a percentage of persistence as the larger waves passing Radford?

A. They do not.

By Mr. **Jackson**. I move to strike out the answer and I object because that is clearly going into their case in chief again.

By Mr. **Gatchell**:

Q. Professor Thomas testified that his typical Radford wave, shown on Exhibit 594, would decrease in amplitude from 2889 9,000 second feet at Radford, to 3500 second feet at Kanawha Falls. Have you found any errors in the premises upon which this conclusion is based?

A. Professor Thomas said that in the determination of the persistency of the waves from Radford to Kanawha Falls, he used an integrating model and that he checked the accuracy of the results obtained from the model by his study of the 1930 waves. In making a check of the 1930 waves, to determine if the premises of Professor Thomas was sound, I found that the facts as to the 1930 waves did not support his conclusion, and these facts are:

That the 1930 wave tests show that the larger the wave passed Radford, the greater the persistence in amplitude at Lock 2.

By Mr. **Jackson**. That is simply a method by counsel to circumvent the ruling of the Court this morning. He is undertaking to testify that the waves show certain results as to amplitude. What the decrease was was given by Mr. McWhorter and Mr. Watkins and another witness, and I think by this witness also, but I am not certain whether or not this witness did, but certainly they had an opportunity to testify as to what happened to every wave, and now he is seeking to restate it.

By the **Court**:

Q. What are the erroneous premises he adopted?

A. The erroneous premises that he adopted with the 1930 wave tests, was that larger waves have smaller percentage of persistencies.

By Mr. **Jackson**. Will you point to the transcript of the evidence here where that testimony occurs, Mr. Gatchell.

By Mr. **Gatchell**. On page 5732, Your Honor, Professor Thomas was asked [reading.]

"Q. Professor Thomas, in your opinion, what would be the amplitude of a power tide emitted from the Radford station in the form and volume shown on Exhibit 594, when it reached Kanawha Falls?"

By Mr. **Gatchell**. And his answer was as follows: [Reading.]

"A. In my opinion, the amplitude of such a tide would be approximately 3,500 second-feet."

By Mr. GATCHELL (continuing). You will have to go through the whole testimony of Professor Thomas to get the other facts upon which he based this conclusion and the premises he used.

By the COURT. The objection will be SUSTAINED.

By Mr. GATCHELL. Will your Honor grant us an exception to the ruling of the Court on that?

By the COURT. Yes, sir.

By Mr. GATCHELL:

Q. Mr. Gerdes, Professor Thomas said that the power waves would be observed by routine variation in pool levels on the Kanawha River. Is this opinion borne out by the evidence—I mean by the facts?

A. No, it is not.

By Mr. JACKSON. We object to the form of the question—"is this opinion borne out by the facts". That is a conclusion that the Court will draw.

By the COURT. Let it stand.

By Mr. GATCHELL:

Q. What are the facts?

A. The observed fact on the Kanawha River is that the power wave shown on Government Exhibit No. 229, created at the London power plant June 16th, 1936, traveled down the Kanawha River practically undiminished over five dams to the Ohio River.

By the COURT. What wave is it?

By Mr. GATCHELL. Any waves. I beg your pardon. I asked if the conclusion was borne out by the facts, and here is actual evidence that the power wave moved from the London tail race through Lock 11."

By the COURT. Mr. Thomas spoke of waves originating at Radford, and expressed the opinion that they would be ironed out going through the various pools. If you had some man to come in and testify that he is a lock-master near the mouth of the Kanawha River, and that these waves originated up the river and were apparently perceptible there, I might let him testify to that. You are trying to re-open the whole question of the waves by going out and getting some records from some lock masters. If we reopened this, we would not have these men here with the data, subject to cross-examination, and could not check the accuracy of the data or the conditions of the river at that time. I will not start that at this stage of this case.

By Mr. GATCHELL. Exhibit No. 229 was introduced before and certain errors testified to or were brought out on cross-examination. Please mark this Government Exhibit No. 229–a. [Indicating.]

The foregoing exhibit was so marked.

By Mr. Gatchell:

Q. Mr. Gerdes, I show you Government Exhibit No. 229–a, entitled "Automatic gage record, London and Marmet, June 15th to 19th, 1936, and ask you if this is similar to the original Government Exhibit No. 229?

A. Yes, sir.

2890 Q. Does it show corrections made on Government Exhibit No. 229–a?

A. Yes, sir.

Q. What corrections are shown [handing paper to the witness].

A. Following the testimony of Colonel Scheidenholm to the effect that there were errors noted in Government Exhibit No. 229, I rechecked the Exhibit and found it to be correct, with the exception of the lower graph, which is the reading at the upper end of Dam No. 6 pool. On rechecking it, it was found that the lower horizontal lines, forming part of these records, represented a place where the gage had evidently become fastened, and had not recorded the entire fluctuation in the water surface at Marmet on those days—the fluctuation actually being about 3½ feet.

By Mr. Jackson:

Q. What are you doing—correcting it?

A. About 2.6 feet, instead of 1.8 feet, as previously shown. This correct line has been plotted from the lock master's report on the Marmet dam.

By Mr. Gatchell. We will ask to have this Exhibit marked as Government Exhibit No. 230–a.

I offer this corrected Government Exhibit No. 229–a.

(Said exhibit is marked as indicated.)

By Mr. Gatchell;

Q. Mr. Gerdes, I show you a paper, marked Exhibit for the Government, No. 230–a, Profile of Water Surface, June 16th, 1936, and ask you if that is similar to the original Government Exhibit No. 230?

A. Yes, sir.

Q. Does it have any differences, and if so, what are they?

A. Following similar testimony regarding this chart—the errors in it—in this graph—it was rechecked and found to be entirely correct, with the exception of five entirely minor and inconsequential errors that I show here corrected to indicate their magnitude.

By Mr. GATCHELL. I offer Government Exhibit No. 230-A, in evidence.

(Said exhibit is filed and marked as indicated.)

By Mr. GATCHELL:

Q. Now, Mr. Gerdes, can you tell us if the Bluestone project is under construction?

2891 A. It is not; I was there last on July 21st, and there was no construction; no construction work in progress there.

Cross examination by Mr. JACKSON:

Q. In Exhibit 229-A, where you undertook to correct your errors in the original Exhibit 229, did you shift from that gage to any other in the bottom of the graph?

A. The corrected line is shown plotted from the lockmaster's report, which refers to lower gage which is on the other side of the river from the upper gage, a distance of approximately 500 feet.

Q. Did you use a different gage?

A. Yes; but the two are situated at the same point on the river, and should give, within close limits, the same reading.

Q. The old line on Exhibit 229 is still not plotted according to the gage, is it?

A. I believe it is.

Q. Did you change it from the way it was on the other?

A. No.

Q. Will you refer to the gage chart and see if the statement is true?

A. Will it be satisfactory if I refer to copy of the original Exhibit 229?

Q. For the purpose of showing errors.

A. I will refer to the gage chart. I do not fully understand your question.

Q. Mr. Gerdes, you stated that you had found some error in calibrating the integrating model used by Professor Thomas; briefly, what was that error?

A. I stated I found an error in the premises taken by Professor Thomas.

2892 Q. Do you claim to have found any error in calibrating the integrating model by Professor Thomas?

A. I found his results to be inaccurate in his work.

Q. Is that since his results from the integrating model do not agree with the opinion you previously expressed, you concluded that there was an error in calibrating?

A. Since his testimony indicated that his results were partially predicated on the use of the integrating model, I found it did not lead to the conclusion that might be assumed that it is likely the error might be in the model.

Q. That is all the basis you had for making the positive statement that you discovered an error in calibrating his model?

A. I said the error I found might very likely occur, or would very logically have been in either the calibrating or microscopic scale.

Q. As a matter of fact, you do not know anything about the precise calibration of Professor Thomas' model, do you?

A. Yes; I think I do.

Q. You never saw it?

A. No. I have used similar models, and I am familiar with that sort of work.

Q. It is your testimony that you have made integrating models of the kind that Professor Thomas used?

A. Yes.

Q. Where did you make one?

A. At the University of California.

Q. When.

A. In 1930.

Q. Were you employed there at that time?

A. No; I was employed by the United States Engineering Department.

2893. Q. And you were working there?

A. Yes.

Q. Who was in charge of that?

A. Professor Morrough O'Brien.

Q. That was in 1930?

A. That is right.

Q. Did you say the Bluestone project was under way?

A. I said the Bluestone project was not under construction on July 21, 1936.

2894 By Mr. THOMPSON. Now I would like to offer in evidence a document submitted to the Circuit Court of Appeals, in the case of the Appalachian Electric Power Company v. George Otis Smith, et al., and also before Mr. Justice Way, when we argued the case before him, which is a photostatic copy of a letter signed by George Otis Smith, addressed to me, and dated April 8, 1932. I would like to read that letter into the record.

By the COURT. What is it about?

By Mr. THOMPSON. That letter has to do with the question of having searched the records of the Federal Power Commission to find out whether there was any authority of the Commission for the signing and sending of the letter by the Secretary of War to the Attorney General. I called your Honor's attention at the time, when the letter was admitted, to the fact I would bring this letter before your Honor.

By Mr. Jackson. I object to his as an incompetent method of proof and something gotten up by counsel for the purpose of this litigation.

By Mr. Thompson. Not this litigation.

By Mr. Jackson. And not received in any Court. When counsel says received in Court he means he merely brought it there and it never became a part of any record.

By Mr. Thompson. I must contradict everything being said by counsel. [Letter handed to the Court to read.] Your Honor will remember that the minutes of the meeting of the Commission said that twice there was an attempt to have this matter referred to the Attorney General, and the Commission voted it down both times, then the letter was sent by Secretary Hurley, who was Acting Chairman, and this letter shows the searching by George Otis Smith (then the Chairman of the Commission), of the record to find whether there was any authority, and the letter speaks for itself.

By the Court. In other words, Smith looked through the records to see if he could find any place where the Commission had formally adopted a resolution inviting the opinion of the Attorney General, and didn't find any.

2895 By Mr. Thompson. It wasn't in the form of a resolution, but he searched the records to find if any authority by the Commission—resolution is probably the better word.

By Mr. Jackson. I don't think Mr. Smith if produced as a witness would undertake to say anything like that, but if any proof is to be made, he should be produced.

By the Court. You may put it in.

By Mr. Jackson. May our exception be noted, because wholly incompetent and not in rebuttal.

By the Court. Yes, sir.

By Mr. Thompson. This letter then goes in evidence as Government Exhibit #272. (Letter marked and filed Government Exhibit #272.)

Your Honor we want permission to file after the close of the case three licenses. They are recited in the appendix we had in the other case. We sent for them and had certified copies sent down here, but we have lost them, at least I cannot locate them now. They have to do with a license to construct a highway bridge July 28, 1928 at Cotton Hill Station, West Virginia, five miles above the mouth of New River; and another one October 16, 1926, a highway bridge at Stone Cliff, West Virginia, 28 miles above the mouth of New River, and August 29, 1927 a highway toll bridge at Hinton, West Virginia, sixty-six miles above the mouth of New River.

By Mr. **Jackson**. We object to them as not in rebuttal of anything.

By Mr. **Thompson**. We asked at the time when we closed our case for permission in the event we could not find some of these exhibits, for permission to put them in and I understood you gave us that permission.

By Mr. **Jackson**. We object to them further on the ground they are immaterial and irrelevant.

By the **Court**. Objection overruled.

By Mr. **Jackson**. Exception.

By Mr. **Gatchell**. Your Honor, you will recall that we had an understanding about the aerial photographs which had been taken at the direction of the Federal Power Commission. It seems upon consulting with counsel for defendant there is some misunderstanding with respect to the actual book we desire to introduce as an exhibit, and they have asked us to introduce instead of the actual book we had, a smaller copy.

By Mr. **Jackson**. We asked you to introduce the actual book you had, and the actual book you gave to us, instead of a new one we didn't know anything about until last night.

By Mr. **Gatchell**. I said there was some misunderstanding as to what was offered.

By Mr. **Jackson**. No misunderstanding as to the actual book.

By Mr. **Gatchell**. Therefore we ask permission to introduce these aerial photographs with the understanding we will withdraw them to substitute legends more acceptable to counsel for the defendant, and as they seem to think we have improper legends, we will submit the legends to them to see if they agree with what we think is proper, and also some matter appearing in the beginning of the volume which will be omitted, if that is satisfactory.

By Mr. **Jackson**. That is agreeable. The one attempted to be offered in the Court of Appeals had a lot of testimony on it and that was to be changed.

(Note.—Book of aerial photographs marked as Government Exhibit No. 273.)

2896 By Mr. **Aiken**. For the purpose of clarifying the record in regard to the status of certain Government exhibits, offered in connection with the testimony of Col. Edgerton, I desire to re-offer for all purposes at this time the following Government exhibits. I will make this in the form of a blanket offer in as much as counsel for defendant intimated there was no objection to the re-offering for all purposes of the following Government exhibits:

#88, being the Declaration of Intention.

#89—Assignment of the Declaration of Intention.

#102—The letter transmitting the Assignment of Declaration of Intention.

#90—The application for license.

#90-a—Maps accompanying application for license.

#92—The First Taylor report, dated August 20, 1925.

#93—The underlying reports of the Divison and District Engineers to Exhibit #92.

#96—Letter from General Deakyne dated July 23, 1926.

#98—Report of General Deakyne dated April 12, 1927.

By Mr. Jackson. We have no objection to the exhibits being received so far as they have been read by Mr. Aiken with this understanding, which I understand to be supported by the record, for instance, I think the report of General Taylor of August 20, 1925, is open to consideration for whatever it might be worth. It is an official report and entitled to be considered for whatever it is worth, but I make that concession upon the understanding the same treatment is accorded to the report of General Taylor of December 25, 1929. I merely want to make that clear, our position being where there is an official report that is germane and made in the regular duties of the officer, it is open to the consideration of the Court for whatever it might be worth, although some parts may not be accepted as evidentiary.

2897 By Mr. Aiken. I understand that is the status of these various official reports in the record, such as the Taylor report of December 29, 1925, offered by the Defendant.

We desire in addition thereto to reoffer for all purposes Government Exhibit #94, being the report to Col. Edgerton, Chief of Engineers of the Federal Power Commission, by Major Trippe, dated October 14, 1925. I understand that counsel for the defendant objects to this report on the theory or for the reason this report made by Major Trippe to Col. Edgerton is not an official report, in that it did not pass through regular channels into the office of the Chief of Engineers, War Department. Now the record discloses that Col. Edgerton testified that Major Trippe was acting as field representative for the Federal Power Commission and this report was made to him direct upon his request and we feel it should be received as your Honor has received various exhibits on the part of the defendant, these various reports, made by subordinates. For instance the report of Col. Spaulding. We feel in view of the testimony of Col. Edgerton that this report was by Major Trippe directly to him as the field representative of the Federal Power Commission, and has as much dignity as if it had gone through the office of the Division Engineer and into the office of the Chief of Engineers and thence to the Federal Power Commission.

By Mr. JACKSON. The report was simply a letter written by Major Trippe to Col. Edgerton saying he was down there and didn't have time to talk with him, and for him to write him. It was purely an informal matter. I think governmental matters were not handled in that way.

By the COURT. For what purpose is it in?

By Mr. JACKSON. For showing what was before the Federal Power Commission.

By Mr. AIKEN. I do not know whether your Honor recalls
2898 just what the import of this report was. It was a report
as to the effect, or what the anticipated effect of the Radford project on navigation on the Kanawha River would be, and expressed the opinion of Major Trippe it would adversely affect navigation.

By the COURT. Was Major Trippe here?

By Mr. AIKEN. Yes, sir.

By the COURT. I will exclude that except for the purpose for which it has already been admitted.

By Mr. AIKEN. Exception.

There are four additional Government exhibits I wish to reoffer for all purposes which fall in the same category, and for that reason I shall offer them all at once.

Exhibit #95, being report of Mr. Kramer on his studies of waves on the Pit River.

#103, 104 and 105, which are similar reports of wave studies on the Pit and Klamath river. Your Honor excluded evidence of the same nature when Mr. Kramer was on the stand, on the ground that he would not be permitted to testify about any conditions on rivers other than New River. We felt at the time Mr. Kramer's comparison of the two rivers and his knowledge of the Pit and Klamath was such as to permit this evidence to be received, and we now desire to make this offer.

By Mr. JACKSON. We renew our objection. They are only in to show what was before the Commission.

By the COURT. I will confine them to the purpose for which they are in.

By Mr. AIKEN. Exception.

By Mr. JONES. (Counsel for Plaintiff.) I desire to have the record incorporate three acts of the State of Virginia.

By the COURT. Make a reference in the record to them.
2899 By Mr. JONES. An Act approved May 6, 1887, (this will
be Exhibit No. 274) incorporating the New River Steamboat Company and authorizing them to operate a steamboat on New River.

The next is an Act of February 3, 1888, of the General Assembly of Virginia, to authorize the Radford Land & Improvement Company to erect a dam across New River (marked Government

Exhibit No. 275) the concluding paragraph being pertinent: "And in the erection and maintenance of said dam, when required by the said New River Steamboat Company, after the said New River Steamboat Company has provided a steamboat for its purposes, ready for operation, then the said Radford Land & Improvement Company shall provide and maintain a suitable lock which will allow the passage of a boat of the capacity of 60 feet long by 15 feet wide. This is an Act of the General Assembly of Virginia, Section 1887–8.

By Mr. Jackson. I understand these are being received as Exhibits and I ask that our exception be noted.

By Mr. Jones. This is an Act that relates to Montgomery and Pulaski Counties. I desire to call the Court's attention to this Act, approved March 24, 1926, of the Acts of 1926: "Be it enacted by the General Assembly of Virginia that the owners of land in Montgomery and Pulaski Counties, Virginia, below the mouth of Little River, abutting on and adjacent on New River, and the owners of the coal and other minerals in and under such land, be, and they are hereby given the right and privilege of mining and removing, and of having mined and removed the coal and other minerals under New River, lying opposite their respective lands to the center of the stream, but nothing in this Act shall be construed to affect the vested rights of any citizen or citizens of Virginia, natural or artificial." This is from the Acts of Assembly 1926, page 659, being Chapter 366.

By Mr. Jackson. May our exception be noted to the receipt of this?

By Mr. Jackson. In exhibit 271 that was just offered I think it is sufficiently clear from what was read that the relator said the
attention of the Board of Public Works is especially called
2900 to the fact that in expending Federal Funds for this project,
approval of both the Federal Power Commission and the
State Corporation Commission will no doubt have to be obtained.

By the Court. That is Mr. Draper's letter.

By Mr. Jackson. In that connection, I offer in evidence from the supplemental appendix to Plaintiff's Brief in this case, Executive Order No. 6251, appearing on Pages 290 and 291 in which the President designates the Federal Power Commission as the agency to examine projects for which money is being loaned under the National Industrial Recovery Act for the Development and Utilization of electric power, regardless of where it is, and without reading it,——

By Mr. Thompson. As usual, he doesn't read it all. He left out the statement about submitting it to the Chief of Engineers.

By Mr. Jackson. Let it be copied into the record without reading it, and it may be marked Defendant's Exhibit No. 611.

Defendant's exhibit No. 611

"Executive Order No. 6251. Designating the Federal Power Commission as an agency to aid the Federal Emergency Administrator of Public Works.

Pursuant to authority vested in me by Title II of the National Industrial Recovery Act, approved June 16, 1933, I hereby designate the Federal Power Commission as an agency to aid the Federal Emergency Administration of Public Works in the preparation of that part of the comprehensive program of public works provided for in Section 202 of the Act which pertains to the development of water power and the transmission of electrical energy. As such agency, the Commission shall make a survey of the water resources, of the United States as they relate to the conservation, development, control and utilization of water power; of the relation of water power to other industries and to interstate and foreign commerce; and of the transmission of electrical energy in the United States, and its distribution to consumers, and on the basis of this survey, shall formulate a program of public works.

2900-A "2. I further authorize and direct the Commission to investigate, upon the request of the Federal Emergency Administrator of Public Works, application for loans to be made under Title II of the National Industrial Recovery Act for the construction of the public works projects which involve the development and utilization of electric power and to make recommendations with respect thereto to the Administrator.

"3. The Commission shall authority to appoint, without regard to the civil service laws, such officers, experts, and employees as it may find necessary to carry out its functions under this order, to prescribe their authorities, duties, responsibilities and tenure, and, without regard to the classification Act 1923, as amended, to fix their compensation. The Commission shall have authority also to make all necessary expenditures (including expenditures for personal services and rent at the seat of government or elsewhere, for law books and books of reference and for paper, printing, and binding).

"4. The total expenditures by the Commission in connection with its functions and duties under this order shall not exceed the sum of four hundred thousand dollars ($400,000.00).

"FRANKLIN D. ROOSEVELT.

"THE WHITE HOUSE, *August 19, 1933*."

By Mr. JACKSON. I have about five or ten minutes of rebuttal testimony.

By the COURT. From whom?

By Mr. JACKSON. Dr. Thomas.

By the COURT. I think you feel, having had him here all the time, you want to put him on the stand, and yet I don't see that there is anything he has to rebut.

By Mr. JACKSON. I am going to have him rebut the statement that he had left out something from his model, or something like that.

By Mr. THOMPSON. I object.

By Mr. JACKSON. I understood from Your Honor that we ought no to take the time of the Court.

By the COURT. I don't think so.

2901 *Government exhibit No. 1*

Map of New River (Original Exhibit)

2903 *Government exhibits Nos. 2 to 13, inc.*

Photographs of bateaux and other types of boats on New River. (Original Exhibits.)

Exhibits Nos. 12 and 13 were not offered in evidence, but, with the consent of the defendant, are treated as though they had been admitted over the objection of the defendant, as being immaterial, irrelevant and incompetent.

Government exhibits Nos. 16 to 26, inc.

Physician's certificates pertaining to certain witnesses for plaintiff. (Omitted.)

Government exhibits Nos. 27 to 29, inc.

Day books and Ledger of Lilly Lumber Company. (Omitted.)

Government exhibit No. 30

Photostat copy "Index to Reports, Chief of Engineers, U. S. Army, 1866–1912." (Original Exhibit.)

2904 *Government exhibit 31*

43d Congress, 1st Session. House of Representatives. Ex. Doc. 1, Part 2.

(pp. 52–64)

REPORT OF THE SECRETARY OF WAR

Being part of the message and documents communicated to the two Houses of Congress at the beginning of the first session of the Forty-Third Congress. Volume II. Washington: Government Printing Office. 1873.

2905. From Ex. Doc No. 25, 42d Cong., 3d Sess.

16

EXAMINATION AND SURVEY OF NEW RIVER FROM THE MOUTH OF GREENBRIAR, WEST VIRGINIA, TO THE LEAD MINES IN WHITE COUNTY, VIRGINIA.

UNITED STATES ENGINEER OFFICE,
BALTIMORE, MD., *December 20, 1872.*

GENERAL: The appropriation bill of June 10, 1872, for rivers and harbors, required that an examination or survey be made of New River from the mouth of the Greenbrier, in West Virginia, to the lead mines in Wythe County, Virginia.

The field work was executed in August 1872, by Mr. N. H. Hutton, assistant engineer. His preliminary report is inclosed herewith, as well as a report from Mr. C. R. Boyd, a civil engineer attached to Mr. Hutton's party, to both of which attention is recommended.

The country through which New River flows is represented as being very beautiful, fertile, and salubrious. Its mineral resources are extraordinary, its water-power admirable, and its excellence for farming and grazing purposes is admitted by all who have seen it. Such a country deserves development, and it appears that attention was very early directed to it.

A survey of 54 miles of the river between Sinking Creek and Greenbrier River was made by Moore and Briggs in 1819, under the auspices of the board of public works of the State of Virginia, with a view of connecting the waters of the James and Kanawha Rivers by that route.

Their report is interesting and instructive. They say:

"This is truly a noble river. Notwithstanding it was represented to us as being remarkably low, yet it afforded (July 1819) a superabundance of water for every purpose of internal navigation. The fall in this part of the river, considering the mountainous country it passes through, is comparatively moderate. The principal falls are the Bull Falls, McDaniel's, Anderson's, Wiley's, Neilley's, and Peter's Mountain Falls—none of which have been improved in the least degree, yet we ascended them all with our boat, though in two or three instances with considerable difficulty, after taking out our baggage, stores, &c."

It is probable the difficulty of passing their boat was due more to the rapidity of the current than to want of water. They had previously stated the draught of their boat to be 9 inches. They give an estimate of the cost of good sluice navigation of 2 feet at all times for this portion of the river, $10,400. It must be 906 remembered that this estimate was made more than fifty years ago, and should now be increased to $30,000, to acomplish the same result on the part of the river (54 miles) between Sinking Creek and Greenbrier; and to $100,000, including the portion from the lead mines to the Greenbrier, 128 miles, with the understanding that the improvement at Foster's Falls be restricted o a sluice-way and tracking-path.

But little has been done in the way of improving the river since he time of Moore and Briggs, though an effort is said to have been made in that direction by the confederate government during the ate war. Mr. Hutton states that the keelboats now used draw about 12 inches when two-thirds loaded. By the construction of slight deflectors or dams of rock and brush, both of which materials abound, the volume of the water may be concentrated and the depth over the shoals increased from the present average of about 12 inches to about 2 feet, without too much increase of velocity of current. Some of the falls, which are almost always vertical and of an average height of about 4 feet, could be greatly improved by blasting sluices through them, about 30 feet in width, and of an average length of 50 feet. It is to be observed that the falls have in many cases natural chutes or sluices through them, susceptible, also, of such improvement as that just indicated.

What has been said above refers to a keel-boat navigation, but the pressure for the improvement of this river is increased by the development of the railroads which intersect it and afford the means of rapid transport east and west for the commodities to be procured along and near the stream. There is a demand for the steam navigation.

Mr. Hutton estimates that to give depth of water of 3 feet at all seasons, would suffice for present needs, and would cost $750,000, with only so much reduction of grade at the falls and rapids as would permit small stern-wheel steamers to ascend, each with one or two barges in tow, and probably requiring at a few places that the ascent be made by hauling on ropes attached to fixed points above and to the drum of the steam-engine of the boat. The improvement contemplated in the above estimate is of the 2907 same general character as that referred to above for the 2 feet navigation, except at Foster's Falls, where a lateral canal, if steam is used, seems to be required, at least over the first fall of 18 feet in one-half mile. This canal at a single point would consume in its construction about one-third of the sum mentioned above, $750,000. It is probable that further study of the river and revision of the estimates may enable them to be reduced, at the same time demonstrating the propriety of concentrating the first efforts to improve on certain parts of the river contiguous to existing lateral outlets. Should Congress not think proper to appropriate a large sum for New River at this time, it is to be observed that the judicious use of any small sum, even a few thousand dollars, would decidedly and at once ameliorate the navigation, while the work done would be available for any further improvement to be subsequently undertaken. It is desired to revise the estimates and to make some additional studies from the maps. A supplemental report will be shortly made, with which the maps and revised estimates will be submitted.

Very respectfully, your obedient servant,

Wm. P. Craighill,
Major of Engineers.

Brigadier-General A. A. Humphreys,
Chief of Engineers, U. S. A., Washington, D. C.

Baltimore, *December, 17, 1872.*

Sir: I have the honor to submit the following preliminary report of the survey of New River, Virginia, made under your direction during last summer.

The portion of the river embraced within the limits of the survey extended from the lead mines in Wythe County to the mouth of the Greenbrier River, a distance, by the course of the river, of 128 miles.

Of this section no previous examination was known to have been made, except of the lower 54 miles, from the Greenbrier to Sinking Creek, which was surveyed and leveled by Messrs. Moore and Briggs in 1819.

2908 The party was organized and equipped at Wytheville, the county-seat of Wythe County, and about 15 miles from our starting point on New River. Operations were commenced on the 25th of July, at the dam of the Wythe Union Lead Company, and terminated on the 21st of August at the mouth of the Greenbrier River.

From the lead mines to the eighty-third mile, level and compass lines were run, determining the meanderings of the river, the slope of the water-surface, and the form and extent of the obstructions. Cross-sections of the river were also taken at frequent intervals, and an accurate topographical sketch of the valley.

At the eighty-third mile, owing to a sudden rise in the river of considerable extent (between 4 and 6 feet) which rendered the further immediate prosecution of the levels impracticable, the major portion of the party was disbanded, and the examination of the river thence to the Greenbrier was confined to a personal examination of the rapids and shoals, with topographical sketches of the country.

This course was rendered more evidently the proper one, under the circumstances, from the fact that, as before stated, this portion of the river had already been surveyed and leveled; and for the 14 miles that this survey overlapped the survey of Moore and Briggs, an almost perfect coincidence was observed to exist.

New River which forms the main body of that stream which, after the junction of the New and Gauley Rivers, is known as the Kanawha, rises in the northwestern corner of North Carolina, near the Tennessee line, and flows northeasterly through and between spurs and branches of the Blue Ridge until it reaches the initial point of this survey, at the lead mines. From this point it flows in the same general northeasterly direction, between and parallel to the main divides of the Blue Ridge and the Alleghanies, cutting alternately through spurs, from the one or the other until, in the fifty-fifth mile of the survey, at what is known as the Horseshoe, it turns abruptly to the northwest and breaks through the five ranges into which the Alleghanies are here divided, keeping the same direction to the Greenbrier, 73 miles beyond.

2909 Throughout this whole distance the valley almost always presents some level bottom-land, though nowhere except in the Horseshoe could it be considered at all extensive. The foot-hills, however, that border the river are fertile to their summits, and good timber abounds.

Commencing at the lead mines with a width of 350 feet and an average depth of 5 feet, the river gradually expands to a width of 900 feet and an average depth of 6 feet, just above the Greenbrier, subject, of course, to the occasional expansions and contractions found in all natural water courses.

On its course, between the mines and the Greenbrier, New River receives several tributaries of no inconsiderable size. Among them, in the east, are Big Reed Island and Big Stony Creeks and Little and Indian Rivers; on the west, Cripple Reed, Walker's, and Wolf Creeks and East and Blue Stone Rivers. All of these are mountain streams, furnishing from 50 to 200 cubic feet per second of water at ordinary stages.

The drainage area of the river, within the limits of the survey, amounts to 2,400 square miles.

During the time of this survey the river was in rather an unusually low condition, according to the opinion of all the residents along its borders; yet the results of slope measurements and cross-sections at various points indicated a discharge of 2,000 cubic feet per second at the lead mines, and 3,000 cubic feet above Lipford's Falls, in the sixty-second mile.

From this it will be perceived that this stream affords at all seasons an abundance of water for any scheme of navigation improvement that may be adopted.

The river in its present condition presents the usual features of mountain streams: reaches of comparatively still and deep water separated by rapids and shoals.

In the upper portion of the river, for 35 or 40 miles, the pools are generally very short, whole miles being composed of ledges of slate or limestone, 200 or 300 feet apart, with small pools between. In the lower portion, though the rapids are more concentrated, yet even there the pools will hardly average more than one mile in length.

2910 The total fall of the river from the lead mines to Greenbrier is 531 feet, or about 4¼ feet per mile—a grade that, if equally distributed throughout, would offer no impediment to such navigation as the country along the river has need of.

The obstructions to navigation are of three kinds:

Ledges over which the water falls;

Ledges that simply cut across the axis of river, without effecting any change of slope of water-surface; and

Ledges formed by bowlders and gravel brought down by freshets.

The ledges encountered along the upper half of this section of the river are almost entirely of slate, while those found for 40 miles below are of limestone, and the remainder, toward the lower end, of sandstone.

All of these deposits are distorted and upheaved to such an extent that in most of the ledges the strata are nearly vertical, and, with one or two exceptions, where trapdikes appear, will be comparatively easy of removal by blasting.

The following statement of the obstructions encountered in each mile will probably assist in forming a correct view of the difficulties to be overcome, as well as the best method of doing so. It will be understood that in each mile, except to the extent named, the river affords a good navigation and an average depth of 5 feet at low-water stages.

Commencing at the lead mines:

1st mile: Good navigation; fall, 5 feet.

2d mile: Good navigation; fall, 4 feet.

3d mile: One shoal over slate ledges 500 feet long; fall 2½ feet.

4th mile: One shoal 600 feet long; fall, 2 feet 7 inches; and one 400 feet long, fall 1 foot 11 inches; and one sharp-edged ledge, no fall, 100 feet below last shoal.

5th mile: Good navigation.

6th mile: Foster's Falls; about 18 feet fall over slate and limestone ledges, in 2,300 feet, with a short pool and a succession of ledges.

2911 7th mile: Small pools, falling 8 feet in 32 feet.

8th mile: One or two small ledges to be removed; fall, 4 feet.

9th mile: Commerce with a fall of 3 feet in 400 over slate ledges.

10th mile: One rapid 600 feet long; fall, 7 feet.

11th mile: Good water.

12th mile: One small ledge 50 feet wide.

13th mile: Good water.

14th and 15th miles: Consist of shoal rapids for 9,000 feet, falling over sixteen ledges of shale and limestone, about 12 feet vertical.

16th mile: Good water.

17th mile: A succession of nine ledges, 2,000 feet over all; fall, 5 feet.

18th mile: One small ledge, fall, 5/10 foot.

19th mile: Fall of 1½ feet over ledges of shale for 300 feet.

20th mile: One ledge 200 feet wide, and one 20 feet wide; fall, 3 feet over both.

21st mile: Four ledges, each 50 feet wide; 6 feet fall over all.

22d mile: Five ledges; fall over all, 8 feet.

23d mile: Wide and shoal; river falls over six ledges; will require some work the whole distance; fall, 9 feet.

24th mile: River narrowing, but still falling over ledges of limestone and shale; about six ledges crossed; 7½ feet fall.

25th mile: Allison's Falls occur at the beginning of this mile, where the river falls 3 feet in 300 feet over a ledge of red shale.

26th mile: Good water, except some slight clearing away of bowlders; fall, 1 foot.

27th mile: River wide and filled with islands, among which the river falls 13 feet over four ledges; will require excavation for 2,500 feet.

28th mile: Good water; fall, 3 feet.

29th mile: River falls 8 feet over a succession of nine ledges of shale.

30th mile: One ledge 800 feet wide, one 300 feet; fall over all, 3 feet.

2912 31st mile: Wysor's Falls, where river falls 7 feet over two sets of ledges, both about 800 feet wide.

32d mile: Four ledges, each about 100 feet wide; fall, 10 feet.

33d mile: Commences with fall of 5 feet over five ledges, about 50 feet wide each.

34th mile: Good water; fall, .2 foot.

35th mile: Good water; fall, 2 feet.

36th mile: One ledge, 250 feet wide; fall, 2 feet.

37th mile: Two ledges, each about 200 feet wide; fall, 3½ feet.

38th mile: Commences with continuous ledges for 1,600 feet; fall, 3 feet.

39th mile: Good water.

40th mile: Good water; fall, 1 foot.

41st mile: Ledge of gray shale at lower end, falling 3 feet in 800 feet.

42d mile: Continuation of same shoal rapids for 1,500 feet; fall, 4 feet.

43d mile: Rapid shoals over bowlders and gravel for 1,000 feet, and then one narrow ledge with 4/10 foot fall.

44th mile: Two riffles over bowlders and gravel, about 100 feet in both; fall, 2 feet.

45th mile: Seven ledges; fall, 7 feet in 1,000 feet.

46th mile: Good water; fall, .5 foot.

47th mile: Two ledges, about 500 feet over both; fall, 4 feet.

48th mile: Shoal of bowlders and gravel, 500 feet long; fall, 1 foot.

49th mile: Rapids and shoals (mostly over bowlders) 2,000 feet long; fall, 4 feet.

50th mile: Good water; fall, 3 feet.

51st mile: Rapid, over bowlders and gravel, 1,500 feet long; fall, 8½ feet.

52d mile: Three narrow submerged ledges, 30 feet in all; fall, 1 foot.

2913 53d mile: At lower end Barnitz Falls, over five ledges of limestone 450 feet; over all fall, 6 feet.

54th mile: Shoal and rapid over boulders and gravel 800 feet long; fall, 4 feet. In this mile a portion of the river is said to sink and pass underground across the "Horseshoe Bend," reappearing in the 59th mile in the form of powerful springs, discharging water of about same temperature as that of the river.

55th mile: Good water; a few bowlders to remove; fall, .5 foot.

56th mile: Two ledges very narrow; fall, .5 foot.

57th mile: Good water; fall, .5 foot.

58th mile: Good water; fall, .5 foot.

59th mile: Shoals over bowlders, &c., 800 feet long; fall, 2 feet.

60th mile: Good water; fall, .5 foot.

61st mile: Good water; fall, .4 foot.

62d mile: Good water; fall, .4 foot.

63d mile: Good water; fall, .4 foot.

64th mile: At lower end commences Sifford's Shoals, with fall of 2 feet over slate ledges 500 feet wide.

65th mile: Continuation of Sifford's Shoals; river very wide and shallow; fall, 10 feet, over slate ledges about 200 feet apart, with 3 feet water between them.

66th mile: The same; fall, 9 feet.

67th mile: Shoals continue for 1,600 feet; then a short pool and Walker's Mount Falls, where the river falls 5 feet in 500 feet, over two ledges of shale and metamorphic limestone.

68th mile: Continuous ledges for 4,000 feet; fall, 8 feet. In this mile a subterranean stream discharges into the river from under left bank. The sound of a waterfall could be heard from under the rocks over which the line of survey passed.

69th mile: Good water; fall, 3 feet.

70th mile: Four ledges, extending over 1,000 feet, with a fall of 6 feet.

2914 71st mile: Good water; river very narrow and deep.

72d mile: One shoal over bowlders and gravel, 1,000 feet long; fall, 2 feet.

73d mile: One shoal, 1,500 feet long, over bowlders and gravel.

74th mile: Snidow's Falls, 2,000 feet in length, over bowlders and gravel; fall, 5 feet.

75th mile: One ledge of limestone, 300 feet long; fall, 3 feet.

76th mile: Four submerged reefs, about 50 feet in all; fall, .75 foot.

77th mile: One riffle over bowlders and gravel, 1,000 feet long.

78th mile: Rapids, 500 feet long, over bowlders and gravel; fall, 2 feet.

79th mile: Rapid over two ledges, 500 feet long; fall, 7 feet; swift water whole mile. In this mile a subterranean stream discharges into the river from under the right bank.

80th mile: Five ledges, 50 feet over all; swift water whole mile; fall, 7 feet.

81st mile: One rapid, 300 feet long, over bowlders and gravel; fall, 3 feet.

82d mile: One rapid over large rocks, apparently loose, bowlders and gravel, 500 feet long; fall, 3 feet.

83d mile: Rapid over four or five ledges, 200 feet over all, and lower down another 1,000 feet long, over rocks and pebbles; fall, 5 feet.

84th mile: Swift water; fall, 7 feet.

85th mile: Good water.

86th mile: At French's mill-dam is fall of 5 feet, over four limestone ledges, extending 1,200 feet.

87th mile: One small ledge; fall, 8 feet.

88th mile: One ledge, 100 feet wide, but can be avoided by going behind island and removal of 300 to 400 feet of gravel bar; fall, 3⅓ feet.

89th mile: Shoal over bowlders and gravel, 500 feet long; fall, — feet.

2915 90th mile: Shoal over loose rocks, 100 feet long; fall 3 feet.

91st mile: Good water.

92d mile. Peter's Mountain Falls, where river falls 4½ feet in 1,300 feet, over a succession of limestone ledges, terminating in an abrupt fall of 5 feet.

93d mile: Two ledges, ten feet wide each; fall, 3 feet.

94th mile: One shoal over bowlders and gravel, 500 feet long; fall, 3 feet.

95th mile: One shoal of bowlders and gravel, 1,500 feet long, containing three ledges of rock; fall, 5 feet.

96th mile: Good water; fall, 1 foot.

97th mile: Good water; fall, 4 feet.

98th mile: One long shoal of bowlders and gravel for 1,500 feet, traversed by one ledge of rock with 2½ feet fall over it; whole fall, 6½ feet.

99th mile: Good water; fall, 1 foot.

100th mile: Neilley's Falls and rapids; whole fall, 11 feet, 6 of it nearly vertical. A sluice 500 feet long, along left bank, will pass them, with 50 feet of rock excavation and 450 feet of bowlders and gravel.

101st mile: Commences with shoal, 600 feet long, over bowlders and gravel; fall, — feet.

102d mile: One riffle over bowlders, 100 feet long; fall, 2 feet.

103d mile: One riffle, 500 feet long, over bowlders and gravel; fall, 3.8 feet.

104th mile: Commences with shallow riffle, 600 feet long, over bowlders and gravel, and following this occurs Wiley's Falls, where the river falls 4 feet in 10 feet, over a limestone ledge about 50 feet wide.

105th mile: Riffle and shoal, 1,600 feet long, over bowlders and gravel, with four ledges of rock, which can be turned, however, by passing along right bank, through loose rock and gravel; fall, 5 feet.

2916 106th mile: One narrow ledge; fall, 2½ feet.

107th mile: A few loose rocks only; fall 3¾ feet.

108th mile: Riffles over pebbles for 200 feet; fall, 4¾ feet.

109th mile: Swift water and riffles over bowlders for three-fourths of a mile, terminating with a fall of 3 feet over a limestone ledge 200 feet wide; several large detached rocks below falls.

110th mile: Two falls over limestone ledges, each 2 feet in 250 feet; fall, 4¾ feet.

111th mile: Three ledges, 500 feet over all; fall, 2.4 feet.

112th mile: McDaniel's falls, ledge 300 feet long; fall, 4 feet.

113th mile: Good water; fall, .4 foot.

114th mile: Rapids and shoals over continuous ledges for 1,000 feet; about 300 feet of rock excavation; fall, 3 feet.

115th mile: Good water; fall, 1.4 feet.

116th mile: Good water; fall, 1 foot.

117th mile: Two small ledges, 35 feet in both, and 150 feet of shoals over pebbles and bowlders; fall, 2.3 feet.

118th mile: One rapid and shoal 1,000 feet long, over continuous ledges; fall, 8½ feet.

119th mile: Bull Falls, ledge 3 feet high; blasting for 100 feet, and rapids 300 feet long below, over pebble and bowlders.

120th mile: Four ledges 250 feet long over all, ending fall of 3 feet over a ledge 20 feet thick.

121st mile: Three ledges, and rapids for 500 feet over loose rock and gravel; fall, 1 foot.

122d mile: Shoal over gravel, 1,000 feet long; fall, 3 feet.

123d mile: Good water; fall, .22 foot.

124th mile: Shoals and rapids, crossed by seven or eight ledges, extending 1,000 feet; fall, 6¾ feet.

125th mile: About 3,000 feet in length of shallow rapids over bowlders and gravel.

126th mile: One rapid 500 feet long, crossed by two ledges of rock; fall, 2.25 feet.

2917 127th mile: Good water.

128th mile: Ends with three-fourths of a mile of rapids; shoals over ledges of sandstone. To connect with Greenbrier would be necessary to canalize behind islands; fall, 7 feet.

The results of the survey are not yet sufficiently arranged and developed to enable me to present an exhaustive review of the subject of the improvement of this river, but it may be said generally that the object of the improvement, as expressed by the promoters of the scheme, is to connect the iron, lead, and zinc deposits of Wythe County and the copper of Carroll with the coal of the Kanawha fields.

The region traversed by New River, through the counties of Wythe, Pulaski, Montgomery, Giles, Mercer, and Monroe, is one of the most fertile in Virginia, notwithstanding its general mountainous character.

Carroll and Wythe Counties abound in rich deposits of copper, iron, lead, zinc, and manganese, which are yet hardly developed, owing to the want of economic means of transport, though there are now in operation, within a length of 20 miles along the river, nine iron furnaces, and the Wythe Union Lead Mines, which have been worked for more than a century, and still yield abundantly of lead and zinc ores of great purity.

These counties, as well as those before named, farther down the river, possess fertile soils and abundance of good timber. The whole region is remarkably well adapted to sheep-raising; and it can hardly be doubted that the immense water-powers existing all along this river and its tributaries would be utilized for woolen and other manufacturing operations, if an outlet were offered to a market.

The improvement, if effected, would, in about 40 miles below the lead mines, intersect the Virginia and Tennessee Railroad and the Chesapeake and Ohio at the mouth of the Greenbrier, thus opening to both eastern and western markets a large area of productive country, now practically shut up.

The present wants of this region would be met by any system of improvement which would afford 3 feet depth of water
2918 during the lower stages of the river. With only so much reduction of grade at the falls and rapids as would permit a small stern-wheel steamer to ascend with two barges in tow, even if at a few points, the ascent required to be made by hauling up by ropes attached to fixed points above and to the drum of the steamboat engine.

This extent of improvement can be accomplished, except at Foster's Falls, by clearing out sluiceways through the shoals and rapids, at nearly their natural grades, and by opening through the vertical falls and ledges sluices with a slope not exceeding 1 to 10; and all work done upon this place would be available toward the completion of a more thorough and complete system.

At Foster's Falls a lateral canal, at least over the first fall of 18 feet, would seem to be essential.

An approximate estimate of cost for this work would be—

60,000 yards rock excavation, at $2.50	150,000
350,000 yards removal of loose rock and bowlders, at $1	350,000
50,000 yards rock in wing-dams, at $1	50,000
Canal around Foster's with two locks, 9-foot lift	200,000
Total	750,000

The present system of transportation on this portion of the river is by keelboats which carry from two to three tons, and are rowed or floated down the river and poled up. An expenditure of $100,000 would greatly ameliorate the condition of the river for this trade, and enable the trips to be made with so much more certainty as to induce a considerable increase of trade.

In conclusion I would say that, owing to occupation in other duties during the working season just closed, I have been unable to give this subject the attention it requires, and that, on a subsequent and more complete review of the results of the survey, some of the views and figures here presented may be considerably modified.

With this I would also submit the report of Mr. C. R. Boyd, civil engineer of Wytheville, Virginia, on the extent and 2919 character of the resources of the country traversed by the New River, and dependent, to a greater or less extent, for their full development on the improvement of its navigation.

Mr. Boyd has given much of his time to a study of the mineralogy of this region, and is peculiarly well fitted to write upon the subject intrusted to him.

I am also indebted to Mr. Boyd for his valuable professional assistance in the execution of the survey; and my acknowledgments are due Mr. F. Dielman, topographer, and Mr. Charles Humphreys, surveyor, for the very efficient performance of their respective duties.

Respectfully submitted.

N. H. Hutton, *Assistant.*

Colonel W. P. Craighill,
Corps of Engineers, United States Army.

2919A Wytheville, Virginia, *December 17, 1872.*

Sir: In compliance with instructions to collect and forward data bearing upon the value of the improvement of New River to the adjacent country, I have the honor to submit the following report, together with a map illustrative of the country treated of. At the same time I would ask indulgence for the omission of much important information, which the time and means at command would not permit me to procure.

Assuming that the mineral interests of the country tributary to New River are, or will be, of paramount importance, I have devoted the body of this report to that subject.

That section of country contiguous to and likely to supply tonnage at once to a New River improvement, beginning at its southwestern limit, is the following: A part of the counties of Ashe, Alleghany, and Surry, in North Carolina; parts of the counties of Carroll, Grayson, Wythe, Pulaski, Montgomery, Bland, Tazewell, and Giles, in Virginia; and the counties of Mercer, Monroe, and Summers, in West Virginia; comprising an area filled with apparently inexhaustible deposits of iron-ore of high grade, coal, lead, zinc, copper, baryta, salt, alumina, sandstone, (millstone and grindstone grit,) limestone, (both ordinary and magnesian,) and sometimes strong indications of beds of gypsum, some of which leads of ore are exhibited nearly in their actual position upon the accompanying map.

About the counties of Ashe, Surrey, and Alleghany, in North Carolina, I know but little, except that greater facilities than they have yet enjoyed for transportation will greatly stimulate the raising of copper ores from mines now idle (so distant are the smelting establishments,) as well as the production of cereals, dried fruits, cranberries, tobacco, &c., for which they are noted.

The counties of Grayson and Carroll in Virginia, lying between diverging ridges of the Blue Ridge and Alleghany Mountains, and essentially mountainous in physical structure, are watered by New River and tributaries, having a good native soil, and often showing their highest ridges in cultivation to their summits.

Their large deposits of copper and iron have long since induced enterprising men, of their own and neighboring counties, to devote capital and time to the raising of ores to find themselves prohibited from realizing a safe return by the imperfect means of transportation.

The copper and accompanying arsenate of iron, showing conspicuously three miles southwest from Hillville, the county site of Carroll County, have been traced southwardly to Duck Town, in Monroe County, Tennessee.

The kinds of copper ore given by Dr. Dickeson, geologist, of Philadelphia, are the red oxide, 63.04 per cent.; black oxide, 54.02 per cent.; smut, 25.12 per cent., from good ores in the Dalton mines; giving an average from good and bad of 32 per cent. of metallic copper.

The vein seems to have a trend S. 28° E., (no doubt variable on the lead;) dip tending to vertical, with a width seldom diminishing below 8 feet. The water-power of these, like that of all the other counties treated of in this report, would be decided, upon close inspection in the driest weather they experience, as very good, inasmuch as but few of the whole number of streams become dry in any season. Their agriculture is improving, and would, under more favorable circumstances, send large supplies of grain to market.

The trade in horses, cattle, hogs, sheep, wool, leather, tobacco, cranberries, fine apples, dried fruits, &c., is now a matter of much local interest.

The counties of Wythe, Pulaski, and Montgomery, lying pretty much between parallel ridges of the Alleghanies, are chiefly drained by New River and its tributaries. Their physical structure is that of a plane of broken surface, declining toward the New River basin, presenting in many localities broad areas of gently-rolling lands, covered with either a luxuriant sod of grass, and supporting large herds of beautiful cattle, or with cereal crops, which the fine limestone substratum enables them to produce abundantly.

From the head of Cripple Creek, in Wythe County, extending north by east along the creek, crossing New River, and extending through the southern portion of Pulaski and Montgomery Coun-

ties, is a great lead of iron ore, as represented on the map,
2419B varying in breadth, as shown by its furnaces and forges, from half a mile to two miles, sending off now and then arms but little less extensive than the main lead, giving the capital and labor invested along it remunerative returns, although the imperfect means of transportation for metal and supplies would appear to be prohibitory. This lead, as developed at Radford iron-works on Mack's Creek, Pulaski County, trending N. 86° E. for seven miles, dip 30° southwestwardly, shows two immense veins of stratified iron ore, between a roof and floor of slate, whose least thicknesses are respectively six and nine feet. No doubt the loose ores worked to the southwest, in Wythe County, are decrepitated from these veins lying hidden under the débris of the mountains southwestwardly from the furnaces and forges of Messrs. Graham, McGavock, Howard, and Saunders, Painter, Pearce, Chatwell, Huddle, Gallup, Crockett & Sanders, and Sayers & Oglesy. This lead has given from its lease valuable ores an assay of 50 per cent. of metallic iron. It may be as well to call attention to the fact that branches of this lead are to be found lapping around both sides of Lick Mountain, Draper's, and the Roaring Falls Mountains in Wythe County, as well as that part of the Draper's Mountain in Pulaski, where an assay of the iron ore has given 87 per cent. of metal. The same, as to branching leads, may be said of many mountain spurs and ridges on the south side of Montgomery County.

The furnaces and forges above enumerated are now shipping 12,000 tons of metal annually, with a supply of charcoal timber so greatly diminished as to cause many of the proprietors to look abroad rather anxiously for supplies of stone-coal or coke.

The lead and zinc ores of these counties accompany each other throughout a great part of the distance traversed by either, having a course nearly parallel with the iron.

The Union lead mines, in Wythe County, have been worked for more than a century, giving a great part of the metal that was used by the colonists in the Revolutionary war, and supplying nine-tenths of the lead consumed by the confederates in the late war. The ores are chiefly carbonates and sulphurets, overlaid by heavy masses of zinz ore, which are mined and shipped north in the crude state. In fact, it seems to be one of the distinctive features of the lead at this point that zinc ore is always superposed upon it. The recent discovery by the company of a vein 50 feet in thickness, renders it an inexhaustible mine. To the southwest tracings of this lead have been found as far as Tennessee. It is distinctly marked twelve miles north by east, and farther than that is either displaced by the zinc ore or lies at a greater depth.

It is highly probable that the lead which shows in remarkably pure masses at Childress's Store, in Montgomery County, bends abruptly to the left along a spur, and outcrops again at Eskridge's at Repper's Ferry, where at one time it was mined and reduced to metal.

The zinc ore to the southwest of and near the mouth of Reed Island Creek, appears near the surface in masses, giving upon assay a percentage which has induced purchases by experienced miners, and it would be extensively worked were a more certain means of transportation provided.

The coal lying toward the northern boundaries of the counties of Montgomery, Pulaski, and Wythe, in the southern slope of a mountain which is most generally known as Cloyd's or Little Walker's Mountain, crossing the river near Lifford's, is variable in the thickness of its measures, showing veins occasionally seven and a half feet in thickness, changing from a nearly pure anthracite to a coal containing nearly 20 percent of bitumen. It has been estimated by experts that ten miles' length on two veins in Montgomery County, above water-level, will yield 850,000 tons; but there are certainly five veins in this lead developed in Wythe County, varying in thickness from an 8-inch seam to a 7½-foot vein, with a strong probability of the existence of three more, which, if they should continue through that portion contiguous to New River, would suggest the idea of a very great quantity both above and below water-level, as it has been found to outcrop at elevations varying from 1 to 600 feet above water-level. Accompanying these measures, both above and below, are veins of valuable iron ore, thinning out and thickening along their extent, in some places well-defined specimens of the hydrated peroxide of iron having been taken from a vein overlying the coal at a short distance, while the veins beneath are more or less hematitic in character, sometimes fossilliferous, as at Tyler's, in Pulaski. The coal has an average trend about north 70 degrees east, average dip southwestwardly 30 degrees, until it reaches that part of Montgomery broken by anticlinal ridges. The most conspicuous openings upon these measures are located near Blacksburgh, in Montgomery County, Tyler's and others, in Pulaski County, and at Stony Fork, in Wythe County, at neither point a greater distance than twenty-five miles from the river. They are now engaging the attention of a continually extending trade. While prosecuting the survey of New River through the gaps made in the mountains by the passage of the river, I saw great masses of white siliceous conglomerate, perhaps 500 feet beneath the coal-veins, and, within that space, good grindstone grit, which has been mined, particularly in Wythe County, for a great many years, not far from which, in the cove of Wythe County, are extensive beds of marble.

Bartya in these counties seems to accompany the leads
2919-c of lead and zinc, pure in some veins, in others discolored by
manganese and iron ore, requiring the use of sulphuric
acid to force it from its impurities.

Bodies of white-oak timber and pine of various kinds are likely to engage the attention of the shipping interests on the sea-board when transportation shall be more convenient.

The county of Giles, lying on both sides of New River, between great parallel ranges of the Alleghanies, is essentially limestone in geological structure, except in the greater mountains, which are made up of quartzose and siliceous rocks, slates, shales, &c. The soil is superior, being based in the main upon limestone, and is noted for excellent natural grasses, fine herds of cattle, good crops of the cereals, tobacco, &c. Sheep-raising in this, as well as in most southwestern counties, forms a very important item in domestic economy, yielding large quantities of wool for shipment. The iron ore of Giles County is extensive and of excellent quality. Experts have regarded the body of ore upon the Little Flat Top Mountain, lying westwardly from the river, in the Kimberling country, as the largest of good quality known to exist in Virginia. These ores are a fine, dark hematite, of high percentage of metal, located about as represented on the map. The ore showing on slopes of Saltpond Mountain, near Newport, is in large quantity, and turns out, at the works of Mr. Williams, a tough and easily-worked metal. The coal situated toward the western boundary of the county, near the large deposists of iron, needs further investigation to prove its quantity and quality.

The same measures, extending the length of Bland County, have been opened in some places, showing thick veins near Sharon Alum Springs, and a fair quality of coal, which will, no doubt, improve as the mining proceeds. Strong hopes are entertained on Walker's Creek, and in Burk's Garden, that the coal showing in those localities will prove to be in large quantity. This county includes a part of the Little Flat Top Mountain deposit of iron. With that and the iron ore on the northern boundary, it presents masses of metalliferous deposits of great value. The fine bodies of white-oak, pine, walnut, cherry, beech, maple, &c., abounding in this county, will, no doubt, be sought after by ship builders and furniture makers, while nearly equal facilities exist with the other counties for the raising of fine cattle, sheep, and hogs.

Toward the northern boundary of the county of Giles, near the narrows, (Peter's Mountain Falls,) exist ores of either plumbago or dark oxides of some of the finer metals, which need a thorough assay to name them.

Mercer County, West Virginia, between the East River Mountain and the Great Flat Top Mountain, as to its available lands between East River and Bluestone River, is a plateau elevated 700 or 800 feet above the level of the river, drained in great part by the East River, Bluestone, Lick, and Island Creeks; and as to minerals, is chiefly remarkable for extensive measures of bituminous coal on the southeasterly slope of the Great Flat Top Mountains, extending through the whole of the northwestern side of the county, requiring further development to show number and width of the veins. They, however, outcrop for a distance, directly across their trend, of nearly ten miles; the greatest measure yet developed being an 11-foot vein.

The northern slope of East River Mountain shows considerable deposits of iron ore, ledges of variegated marble, very pure baryta, and fine millstone grit extending along Peter's Mountain into Monroe County. Iron ore does not exist in such masses as in Giles County, but upon Bluestone, above the mouth of Brushy Creek, presents fine bodies of ore, which have yielded, upon assay, from 48 to 80 percent of metal, chiefly lying upon the spurs of the Black Oak Mountains, as well as in ridges and spurs of the Flat Top, upon the opposite side of the Bluestone River. This county is particularly noted, also, for containing large forests of white-oak timber, while its soil is thinner, being generally a sand rock beneath, from which, in places, a fine grindstone grit has been taken. It is sometimes crossed by ledges of limestone, probably magnesia, from which good lime has been made.

Monroe is almost entirely limestone in its substratum, has a deeper soil, but, as to minerals, too little is known to venture upon any positive location of the several bodies of fine ore which she is known to possess, except the lead of iron upon Little Mountain, lying next Peter's Mountain, on south boundary, from which metal has been manufactured of good quality.

This county, unlike Mercer County, presents an alternation of ~~ridge and~~ valley, and is one of the best timbered counties in the State.

That part of the county of Summers within reach of a New River improvement is chiefly noted for a fine body of white-pine timber on Bluestone River, beginning near its mouth and extending into Mercer; for evidences of coal measures near Crump's, together with a part of the Great Flat Top measures, and for the salt-wells upon the left bank of New River.

To sum up, a sufficient transportation will throw open to the world great metalliferous deposits, with the extent of which I was scarcely even in part acquainted, until that cursory examination of which this is the report.

The kinds of valuable timber in all these counties are white, red, Spanish, black, post, and pine oaks, black and white walnut, 2919–D poplar, beech, birch, white, yellow, and black pines, cherry, hickory, sugar-maples, lynn, buckeye, chestnut, and cedar, all of which exist in extensive bodies in various localities within the scope of this report.

A line drawn from Princeton, in Mercer County, east by south, toward the southern boundary of Pulaski, will pass over but little country whose rocks do not dip almost regularly at an average angle of 30 degrees southwestwardly.

The points which would suggest an idea of important geological divisions are, first, in the line of the East River and Peter's Mountains; again, near the coal measures in the gaps of mountains crossing the river just below Lifford's; and, lastly that I have noticed, in the contortions along New River, near to and below Foster's Falls, where appear those red shales and slates, forming for many miles the bed of the river, (easily worked,) classed by some persons as the new red sandstone, while Foster's Falls (just opposite the Roaring Falls Mountain) are composed of quartzose silicates, of earlier formations.

Respectfully submitted.

C. R. Boyd,
Assistant Engineer.

Colonel William P. Craighill,
Corps of Engineers, U. S. A., Baltimore, Maryland.

United States Engineer Office,
Baltimore, Maryland, January 9, 1873.

General: I have the honor to transmit herewith, as supplementary to my report on the survey of New River, Virginia, forwarded on the 20th December, 1872, the following drawings, viz:

Eleven sheets of map of New River, scale 1 inch to 800 feet.

One tracing of map of New River, scale 1 inch to 6,600 feet.

One tracing of profile of New River.

One tracing, showing the location of coal and mineral deposits of region of country drained by New River.

The first-named maps exhibit the meanderings of the stream, its width, and generally its depth, as well as the positions of ledges, shoals, and falls, and the topography of the valley;

The second, which is from a survey made in 1820, by Mr. H. P. Taylor, shows the general outlines of the river on a smaller and more convenient scale;

The third indicates the slope of the water-surface from the lead mines to the Greenbrier; and

2920 The last named shows, in black, the lines of coal deposits, and in brown the location of deposits of iron, zinc, and lead.

On the large-scale maps the proposed dams and locks are shown in red. All shoals, &c., not otherwise marked, are indicated to have sluiceways cut through them.

The general character and extent of the obstructions to navigation in this river were so set forth in the previous report as to render a repetition unnecessary, but in order to clearness now, it may be well to refer to some of the points in that report.

It was there stated that to give a keelboat navigation of 2 feet depth, which would require tracking or towing paths, where the ascent was too steep to permit the use of poles, would cost $100,000. This estimate is not changed by subsequent and more careful study of the maps and profiles.

It was also said that the expenditure of $750,000 would afford a 3-feet navigation for small steamers, provided that at several places they were drawn up the steeper ascent by ropes attached to fixed point above, and that a lateral canal were constructed at Foster's Falls.

More mature reflection, with a study of the results of the survey, induces the conclusion that a steamboat navigation, impeded by the necessity of hauling up the boats over the steeper places, would be unprofitable and unsatisfactory, and that for steam navigation to be efficient such drawbacks must be done away with.

More careful estimates also indicate that by using a less expensive and a nearly equally serviceable method of construction of locks and dams than was contemplated in the former report, the canal around Foster's Falls can be constructed for about $60,000.

It was expected that the river might, with advantage to its discussion and treatment, be divided into several separate sections relating to their respective facilities for improvement and their connections with transverse means of transportation by rail or otherwise. This expectation has not been realized, except
2921 to the extent that that portion of the river lying between the lead mines and the crossing of the Virginia and Tennessee Railroad (a distance of forty-four miles) would seem to be that which deserves the more immediate attention, as being the only outlet for the large mineral productions of the adjacent counties, as well as of those lying along the river beyond and in North Carolina. The lower counties are principally agricultural; the extent and kind of improvement required for the betterment of the river is about the same throughout.

The two plans which, after mature delay, are recommended for consideration are as follows:

A 2-feet keelboat navigation, as explained in the former report, costing $100,000; or a 3-feet steamboat navigation, as set forth below, which would cost $1,000,000.

To expect a navigation for steamboats of light draught, it is assumed that they can for short distances ascend a grade of 1 in 400, with a current of five miles per hour. It is therefore proposed to excavate a sluiceway 90 feet wide and 3 feet deep through all shoals having a grade not exceeding 1 in 400. Where the grade exceeds this, low regulating dams are proposed, with sluices with a fall not exceeding 1 foot at each. In several cases, as stated below, and indicated on the large map, dams should be introduced containing locks; and in two other places, lateral canals.

The dams and locks may be of crib-work filled with stone, for which an abundance of material is found all along the river. It was not possible with the means at command to determine the exact position and height of dams required, or the precise amount of excavation, but the estimates are believed to be sufficient both as to quantities and prices.

The dams are estimated at an average height of 6 feet, with a width at base of 12 feet. The locks are estimated at 25 feet wide and 90 feet in length, with a depth of 4 feet on the miter-sills, in order to allow for any probable future extension of the depth required by the boats navigating the river.

2922 The estimate for a 3-feet steamboat navigation will be, as explained above:

100,000 yards rock excavation, at $1.50	$150,000
500,000 yards gravel and bowlder excavation, at 50 cents	250,000
60,000 linear feet of dams, at $5 per foot	300,000
Two locks, 10-feet lift, at Foster's	40,000
One lock, 9-feet lift, at Gadby's Ferry	20,000
One lock, 7-feet lift at English's Ferry	18,000
One lock, 6-feet lift, at Barnett's Falls	17,000
Four locks, 7-feet lift, at Lifford's Falls	72,000
One lock, 10-feet lift, at Peter's Falls	20,000
One lock, 5-feet lift, at Neilly's Falls	15,000
One lock, 5-feet lift, at Weilley's Falls	15,000
	217,000
40,000 yards canal prism at Foster's Falls, at 50 cents	20,000
160,000 yards canal prism at Lifford's Falls, at 50 cents	80,000
Total	1,017,000

The portion of river included between the lead mines and the Virginia and Tennessee Railroad will cost to improve, according to this plan, about $350,000, and it would appear, as stated above, that it is the part at present most needing improvement for the development of a valuable interest already existing.

The pools are now capable of navigation by vessels drawing 5½ feet. To give a lock and dam navigation of 5½ feet from the lead mines to the mouth of the Greenbrier would cost about $2,500,000, overcoming a fall of 550 feet in one hundred and twenty-eight miles.

The statement was made in the former report that a comparatively small sum could be expended on this stream with great and immediate benefit to its navigation, which would be useful in the more extended improvement under any plan likely to be adopted in the future. That opinion is still entertained. 2923

Very respectfully, your obedient servant,

WM. P. CRAIGHILL,
Major of Engineers.

Brigadier-General A. A. HUMPHREYS,
Chief of Engineers, Washington, D. C.

2924 *Government exhibit 32*

(pp. 3–32; 62–65; 113–114)

Report of Moore and Briggs. Fourth and Fifth Annual Reports of the Board of Public Works to the General Assembly of Virginia (1819). Report of the Principal Engineer of the Board of Public Works.

2924–A

REPORT

To the Board of Public Works for the State of Virginia:

Having, in the early part of the year, contracted with a manufacturer in Baltimore, for several important instruments, they arrived in Richmond on the 20th of the 3d Mo. last. Asa Moore was appointed as an Assistant on the 24th, and on the 26th, we commenced laying out the Manchester canal, agreeably to the instructions of the Board, of the 12th of the same month. Isaac Briggs having been applied to, by direction of the ex-officio members, to supply the place of additional Engineer, arrived on the 27th, and immediately joined us in the work.

After completing the survey, levelling, and taking notes for estimating the cost of this canal, whilst our boat was fitting up, and other preparations making for our western tour, we were employed in the same kind of operations on the northern side of the James River, between the lower arch and Sabbat Island.

On the 27th of the 4th Month, having completed our preparations, we commenced our journey westward; and, (for reasons which will hereafter appear) as we went up the river, continued our survey for an independent canal, from opposite the lower point of Sabbat Island, to the upper end of Pleasants' Island. We arrived at Lynchburg on the 10th of the 5th Month.

Previous to our leaving Richmond, we were so fortunate as unexpectedly to meet with two more excellent levelling instruments for sale, both of which we secured; one on our own account, and the other on account of the Board of Works, by direction of the ex-officio members. At Lynchburg, by appointment, we were met by Thomas Mifflin Ladd, another assistant, who brought with him a small theodolite, a very useful and convenient instrument for the necessary field operations in laying out roads. This made our stock of instruments very ample and complete.

At Lynchburg, agreeably to arrangements previously made, another boat was purchased, and delivered to Asa Moore, in order
to be fitted up for the purpose of attending him on a sur-
2924–B vey for an independent Canal from that place to the head
of Pleasants' Island, and afterwards on other sections higher up the river. This part of the work was confided to him, in consequence of his having had more experience in using the levelling instrument than either of our other assistants. A set of hands was therefore organised as his assistants, and the necessary instructions given him for the execution of the work; which it was our intention to examine on our return from the westward, and to take notes on the ground for the purpose of enabling us to form estimates of the different items of expense incident to the formation of such a canal.

It would seem that some time might have been saved, by commencing the survey for this canal at Dunlap's Creek, (the highest point,) and continuing the same regularly, to its lower termination, instead of first laying out a lower section, and then passing again up the river to a higher; but there were circumstances which rendered the plan adopted the most eligible. One was the difficulty of conducting levelling operations through fields corn, when grown to the height of six feet and upwards. This made it very desirable to have that part of the business which lies in the great corn country between Lynchburg and Richmond, executed as early in the season as possible. Another was, that this part of the line lay entirely on one side of the river, and presented less difficulty than those parts higher up the river, where a greater exercise of judgment would be necessary to determine on the places of crossing, and the choice of grounds for the canal; supposing it possible that either my colleague or myself might be able to return from the mountains in time to conduct at least a part of the survey over these more difficult grounds. A third was, that, as we were apprehensive that the whole of the survey might not be completed in the season, we deemed it expedient to make sure of the lower sections.

After remaining at Lynchburg a few days, for the purpose of making the before-mentioned arrangements, procuring supplies, &c., we continued to ascend the river to the mouth of Craig's creek; Andrew Alexander having joined us by appointment

on our way to this point. In conformity to our instructions on the 24th of the 5th Mo. we commenced the levelling and surveying of that stream, continuing the same up to the mouth of John's Creek, 49 miles, to which place we ascended with our boat. Whilst Isaac Briggs was conducting the early part of this survey, I passed up the valley in which this stream is situated, by way of the road; and from the mouth of John's Creek, across the Alleghany ridge, to the waters of Sinking Creek, thence down the same to New River, with a view to obtain a general knowledge of the country, and to determine
2924–C on the route for the survey, after leaving Craig's Creek.

On this tour, I was very agreeably accompanied by General J. Breckenridge, Major Andrew Hamilton, Major ——— Burwell and Carey Breckenridge.

On my return, I joined my colleague and company, and we continued together as far as the boat ascended the creek, where we found a separation would very much conduce to the despatch of business. And accordingly, Isaac Briggs continued the levelling and survey across the mountain, and down to the mouth of Sinking Creek, on New River; whilst I returned with the boat to James River, and thence up to the same and Jackson's River to the mouth of Dunlap's Creek, where waggons were (with some difficulty) procured to convey the boat, our baggage and stores, across the Alleghany mountain to Greenbrier River, at the mouth of Howard's Creek. Isaac Briggs and company having completed their survey, crossed the country, to the mouth of Dunlap's Creek, from whence a similar survey and levelling was made, to the mouth of Howard's Creek; where the boat had previously arrived, been overhauled, refitted, and launched into Greenbrier River, and waiting their arrival.

On the 21st of the 6th Mo., Isaac Briggs and company commenced the survey and levelling of Greenbrier River. At the same time, Hugh P. Taylor, a young man of our party, possessing talents and industry, and who had previously proved himself qualified for the task, was detached as surveyor of roads, and lines of experiment, incidental to laying out a new road. His first business was to survey the present travelling road or post road, from Greenbrier to the Falls of Kanawha, and the route known by the name of the Gauley route, to the same place, preparatory to their being delineated on a map. Whilst this was going on, I was employed about a week, in company with Josias Shankling, surveyor of Greenbrier county, in examining these two routes, and obtaining a general knowledge of the adjacent country, in order to lay out work for the surveyor in my absence. This being accomplished, and his instructions made out, I returned, and joined the party on the river, on the 29th, near the end of the 37th mile.

The navigation of the Greenbrier river, from the mouth of Howard's Creek to New River, and of the latter, from the mouth of Greenbrier up to Sinking Creek, thence down to Bowyer's Ferry, thence to the Kanawha, and of the Kanawha to its junction with the Ohio, are subjects of interesting consideration; and the proper selection of the modes of improvement, best adapted to the impediments to be overcome, with estimates of the expense, constitute a very important part of our duty. We therefore
2924–D continued together from the 37th mile, on the Greenbrier
river, to the mouth of the Kanawha; a tedious, and, in places, extremely perilous journey.

As horsemen can travel from the mouth of the Kanawha to the Falls, in less than half the time that it would require for our boat to ascend the stream, in order to make the best use of time, and to give Isaac Briggs an opportunity of seeing some part of the grounds between the Falls and Greenbrier River, previous arrangements had been made for horses, to meet us at Point Pleasant. The boat returned, with our baggage and men, to the Falls, where it was met by a waggon from Greenbrier county, which had been before engaged to carry our baggage to Jackson's River. Isaac Briggs and myself arrived several days before the boat, and occupied the intermediate time in viewing grounds for the contemplated road. On our way up, we made sale of the boat, to be delivered at the Falls.

Hugh P. Taylor having executed the work laid out for him, met us, by appointment, near the Falls. From an inspection of his maps, and from the want of satisfactory information relative to a large extent of unsettled country, over which a direct line between distant points of the contemplated route would pass, it was deemed advisable to run a direct line between certain points, about 23 miles asunder, through this country, to serve as a guide line in exploring, in case it should appear probable that the route would be improved by making use of grounds near that direction. This was executed whilst the waggon was travelling across the mountains, and Isaac Briggs and myself engaged in viewing other grounds.

On our arrival at Jackson's river, Isaac Briggs commenced the survey for an independent canal, from the mouth of Dunlap's creek downwards; and Hugh P. Taylor returned to his home, in Rockbridge county, for a short time.

Asa Moore having executed his survey below Lynchburg, about the middle of the 7th Month, he had been directed by letter to move up to Wood's Island, about 30 miles above Pattonsburg, and to execute the same kind of survey between those points that he had made below; this part of the line presenting less difficulty than any other of equal length above Lynchburg. He had now nearly finished the survey of this section, and his boat was wanted to accommodate Isaac Briggs and his party. I therefore rode down, and found him near Pattonsburg, examined a part of his work on the way, and returned with him and his boat to Jackson's River, where he united with Isaac Briggs, in forwarding the survey of the canal.

Hugh P. Taylor returned and met me, by appointment, at
Callaghan's, 6 miles west of the mouth of Dunlap's Creek,
2924-E on the 9th of the 9th Mo.; and, on the 10th, commenced
the survey of the road, from the mouth of Ogley's creek, by the way of Sweet Springs, Union, Indian Creek, and Pack's Ferry, to the Falls of Kanawha. Whilst this was going on, I spent two days in viewing this route, as far as Indian Creek; then went across to Lewisburg, and explored the grounds, for the purpose of improvement, to the top of Meadow mountain, near the present road; thence near the direct line recently run, so as to be able to direct the survey for the location of the road, on our return.

The survey of the road, by way of Indian Creek, &c. was completed on the 21st; and, on the 22d, we commenced the final location of the new road, and finished on the 13th of the 10th Mo. Hugh P. Taylor then returned home, and I rode down and joined Isaac Briggs on the canal survey, 12 miles above Lynchburg. This survey was completed on the 26th. On the 28th, left Lynchburg, and proceeded to examine Asa Moore's survey to Pleasants' Island, taking notes for estimating the expense of making the canal. We arrived at Richmond on the 10th day of the 11th Mo. 1819.

Having given this rapid historical sketch of the whole of our operations during the late season, I will now proceed to describe the rivers, creeks and land surveys, distinctly, in the order in which these examinations and surveys were made, including estimates of the expense of improving the water courses and making the road, with observations on the individual and relative importance of each; beginning with

CRAIG'S CREEK

This stream, as will be seen by the map annexed to this report, is remarkably crooked in its course; the valley through which it flows, is considerably sinuous, and may be stated to be from one quarter to two miles in breadth. The stream frequently traversing the valley from side to side, gives a much greater length than a line passing through the middle or on either side of the valley. It measures, from its confluence with James river to the mouth of John's Creek, 49 miles. Its average width for this distance, may be about 55 yards; the whole fall 345 feet, or a small fraction over feet per mile. The greatest fall in any single mile is 13.33 feet, and but one mill less than three feet.

Very little has ever been done to improve the navigation of this creek. In the year 1818, a small sum was expended in removing a few of the most material obstructions. This sum, I have been told, did not exceed $400; yet even this has rendered it an useful navigation several months in the year.

2924-F I am of the opinion, that a moderate sum, (say) 5 to 6,000 dollars, judiciously expended, would give 18 inches of water, in all places below John's Creek, six months of the year, in usual seasons, and 12 to 15 inches two or three additional months.

We left John's Creek on the 3d of the 6th Month, the water was then said to be unusually low for the season; but if properly collected in sluices, would certainly have given more than 12 inches. The quantity is doubtless at all times amply sufficient for the purpose of supplying a canal. But, by reference to the notes of survey, it will be seen that the very frequent occurrence of high, precipitous, rocky banks, on both sides, precludes the idea of constructing a continued canal on either shore; and the great inconvenience and expense attending the numerous crossings of the creek, added to 345 feet of lockage, forbids the adoption of any plan for making one entirely through the flat ground in the valley, unless some very important benefit was to result from it.

The importance of the navigation of this stream depends very much on the description of improvement which may be adopted on James River. If a good sluice navigation is effectuated in the bed of this river, Craig's Creek will become the channel through which the surplus produce of the valley in which it lies, must find its way to market. Some inducement will also be given to bring some of the adjacent hill sides and smaller vallies into cultivation; so as greatly to increase the quantity of products now raised on its waters. And, if a good road should be made across the Alleghany ridge into the Sinking Creek valley, a part of the products of that district of country would also be invited to pass over to an eastern market.

But, if such a navigation was made down the ravine of the James River, as would reduce the expense of transportation to one-half, or less than half of the price by a sluice navigation, the difference being probably equal to the cost of transportation on a good road from New River, at the mouth of Sinking Creek, to the mouth of John's Creek, the inducements would be great, not only to the inhabitants of Sinking Creek valley, and its immediate vicinity, but also to many, further up New River, to transport their most valuable products to the head of the navigation on Craig's Creek, to be thence forwarded to market.

Craig's Creek, above its junction with John's Creek, is too small to admit of improving it for navigable purposes, containing not more than about one-third the water that passes below. And John's Creek, though about double the size, is 2934-G so excessively rapid, that there is as little prospect of improving it for those purposes, in any stage of the water.

The dividing ridge between the waters of Craig's Creek and those of Sinking Creek, is much more elevated than we had been led to suppose. The lowest spot in the ridge is 1,279 feet, above the water, at the mouth of John's Creek. The highest spring, tributary to Craig's Creek, 1,225 feet; and the highest water of Sinking Creek, crossed by the survey, 1,237 feet. This stream was then a small spring branch; its extreme source probably about the same elevation as the lowest part of the dividing ridge. The survey (as will appear by the notes) was conducted partly by the road, and partly in the ravine of the Rocky Run branch of Craig's Creek.

SINKING CREEK

The head spring of this creek has already been described. After being joined by several other small streams within a short distance, it passes through a fertile valley, about 34 miles, (by the survey, but something more by its meanders.) to New River, and falls, in this distance, nearly 966 feet. Twenty-six miles from its mouth, it was believed, when the survey was made, there was water sufficient for an independent canal; but, from that point downwards, a lockage of 630 feet would have to be provided for. It is in every part too small to use advantageously in the bed of the stream without dams. If dams were to be erected, there is reason to suppose so much of the water would be wasted through the porous matter of which the banks in many places are composed, that enough would not be left to supply the locks, which would be equal in number to those in an independent canal. About 7 or 8 miles from its mouth, the quantity of water begins to diminish, by wasting through the porous limestone rocks, which form the bed of the stream; and several miles from the mouth, it entirely disappears, except when considerably raised by rains or melting snows; it then discharges a part of its waters into New River, by the natural opening. I think the valley through which it passes, is nearly equal in extent and fertility to that of Craig's Creek.

The great elevation of the dividing ridge, the absence of anything like a tolerable supply of water, for several miles, on each side of the summit, and the very unfavorable and expensive kind of ground for a canal, for 5 or 6 miles, at the lower end of Sinking Creek valley, renders it ineligible, in my opinion, to 2924–H think of any water communication on this route, except a sluice navigation on Craig's Creek to the mouth of John's Creek, as before-mentioned.

Having early foreseen that it was not probable we should be able to accomplish the whole of the extensive surveys and examinations of water-courses, required by our instructions, and also to locate and estimate the expense of the three roads, mentioned therein, during the season; we believed our time would be most economized by giving our attention principally to the water-courses, until the further progress of our work should develope which of these routes would be most likely to be adopted as the connecting link between the navigation of the eastern and western waters; and then to bestow such attention to that route as time would admit, or circumstances might require. We therefore omitted making any survey, for the special purpose of a road between the "highest point of navigable water, on Craig's Creek, and New River, at the mouth of Sinking Creek;" but nevertheless took care to obtain such information on the subject as leaves no doubt on our minds, that a road may be made between those points every where within a limit of 5° of aclivity or declivity, without incurring any unusual expense incident to a mountainous country. This, we believe may be effected, either by taking the valley of John's Creek, for some distance and then crossing John's Creek Mountain, being a continuation of the Allegheny ridge, at a low price, into the valley of Sinking Creek; or by a route near the line of survey. The latter would accommodate the greatest number of inhabitants.

DUNLAP'S CREEK

Our levelling and survey, commencing at the mouth of this Creek, and terminating at the mouth of Howard's Creek, on Greenbrier River, was conducted along the present travelling road, passing up the valley of this Creek, 5 miles 116 perches, to the mouth of Ogley's Creek. In this distance, the road crosses the stream nine times. The valley is not wide, but affords several good farms. It is traversed from side to side by the creek, very frequently; and, being bounded by mountains on each side, the bank of the creek is very high and steep, where it impinges against those formidable boundaries, making it extremely difficult and expensive to carry either a road or canal on either side of the valley. The stream is too small to admit of a profitable sluice navigation, but is sufficient for the supply of a canal at all seasons.

The fall in the distance mentioned is 126 feet, or nearly 24 feet per mile. If it should be improved for the purpose of navigation, I think the most eligible plan would be to canal and lock
2924-I on the flat ground between the mountains, and cross the creek wherever it traversed the valley, by means of a dam. But as there will be 126 feet of lockage to provide for on any practicable plan, it will become a subject for consideration, whether the trade that may be calculated on, will justify so large an expenditure on so short a distance.

OGLEY'S CREEK

Our surveys passed through the ravine of this creek, from its mouth to its source. In dry seasons, it affords in no part a sufficiency of water for the purpose of a navigable canal; and therefore cannot be considered of any importance in relation to commercial transportation.

HOWARD'S CREEK

This creek, about six miles from its mouth, becomes large enough to supply a navigable canal, but too small for a sluice nagivation. The fall, in this distance, is 144 feet, averaging 24 feet per mile. There would be fewer crossings of the stream by a canal down this creek, than of Dunlap's Creek. But probably there would be some difficulty to encounter, on account of the porous limestone land through which it would pass. The fall per mile being nearly the same as Dunlap's Creek, and the trade it would accommodate probably about equal, the same question arises with regard to the propriety of improving it on any plan for the purpose of navigation.

There are on this stream, and its branches, some large tracts of very excellent land.

The distance between the mouth of Dunlap's Creek, on Jackson's River, and the mouth of Howard's Creek, on Greenbrier River, is, by the present road, twenty-eight miles sixty-eight perches.

The elevation of the lowest part of the dividing ridge, above the water of Jackson's River, at Dunlap's Creek, is 1240 feet; and, above the water of Greenbrier River, at the mouth of Howard's Creek, 402 feet.

The grounds between these creeks, and the facilities they present for improvement, &c. will be more particularly noticed in describing the road which has been located on this route.

GREENBRIER RIVER

This river measures, between the mouth of Howard's Creek and its junction with New River, 49 miles 273 perches.
2924–J Its average breadth is about 100 yards, and the fall in that distance 309 feet; averaging nearly 6 feet 3 inches per mile. It partakes largely of a characteristic common to rivers which derive their principal sources from the Alleghany ridges: that is, the very great inequality in the quantity of water discharged at the different seasons of the year. From the best information we could obtain, it appeared, that, for 6 or 7 months of the year, it was usually from 2 to 3 feet deep, on the gravel shoals, where it flows with a rapid current; and that it was subject to very great swells, from the melting of snows, or heavy rains, was visible by the signs left on the banks. In the latter part of summer and autumn, it becomes comparatively very low. We descended it in the latter part of the 6th, and beginning of the 7th Months; the season being remarkably dry, it was said to be lower than it had been before seen, at that time in the year; and that it was seldom lower at any season. Our boat drew about 9 inches water, and we were frequently under the necessity of opening long sluices through the gravel and loose stones, to obtain that depth. When I saw it, three months after, it was still considerably lower. It was then said to be lower than it had been since the settlement of the country. At the time of our passing down, if the water had been properly confined to narrow sluices, in the shallow places, it would have afforded every where, at least 15 inches in depth; and, when I examined it afterwards, about one foot.

Having, as before stated, been necessarily absent, whilst the upper part of the survey of this river was going on, I have only had a very partial view of the first 36 miles; and must, therefore, principally rely on Isaac Briggs' notes, and verbal statements, (obtained about the time of my joining the party,) for particular information relative to the bed of the river. From the knowledge derived from these sources, I think it probable that $400 per mile will make a complete sluice navigation, to the end of the 35th mile. At the great falls in the 36th mile, two locks will be necessary, of 7 feet lift each; and one of the same lift, at the little falls, in the 37th mile.

The 38th, 39th and 40th miles, have considerable descent; the water passing shallow over many ledges, and between loose rocks; the expense of improvement may be estimated at $600 per mile.

The 41st mile much better, and may be improved for $200.

?

From thence to the mouth of the river, nearly 9 miles, there are many places where little improvement will be necessary; and others, where the clearing of the bed for sluicing, will be expensive: the whole will probably average about $600 per mile.

2924–K The account will then stand thus:

For improving 35 miles at $400 per mile	$14,000
" 12 do. $600	7,200
" 1 do	200
3 locks, of 7 feet lift, 21 feet, at $625 per foot	13,125
	$34,525

I feel quite satisfied that this estimate will be fully adequate to the purpose for which it is made; that is, to making the most perfect kind of sluice navigation the whole distance, including the three locks in the 36th and 37th miles.

The bottom lands on this river are not very extensive; but there are generally more or less on one side or the other, and frequently on both.

The value and importance of this navigation will be best considered in conjunction with the upper section of

2924–L

NEW RIVER

The examination, levelling, and survey of which, from the mouth of Greenbrier, up to the mouth of Sinking Creek, was commenced on the 5th of the 7th Mo. 1819.

This is truly a noble river. Notwithstanding it was represented to us as being remarkably low, yet it afforded a superabundance of water for every purpose of internal navigation. The fall in this part of the river, considering the mountainous country it passes through, is comparatively moderate. The principal falls are, the Bull-falls, McDaniel's, Anderson's, Wiley's, Neilley's and Peter's mountain falls: none of which has ever been improved in the least degree; yet we ascended them all with our boat; though, in two or three instances, with considerable difficulty, after taking out our baggage, stores, &c. The breadth of the river from 2 to 300 yards, and the length of this section 55 miles 58 perches.

The fall and description of each mile, and the estimates of expense for effectuating a good sluice navigation of 2 feet, at all times, are as follows:

1st mile—Hard to ascend in places, but may be easily improved by 2 or 3 sluices, estimated at Fall 7. 11 f.	$400

2d mile—Requires no improvement worth noting. Fall 1. 61 f.
3d mile—Same as the last. Fall 2. 25 f.

4th mile—Wide and shallow, will require some improvement, estimated at ---------- $300
Fall 5. 07 f.
2925 5th mile—Nearly the same ---------- 300
Fall 6. 70 f.
6th mile—Excellent navigation. Fall 0, 22 f.
7th mile—Requires a little improvement estimated at ---------- 150
Fall 3. 11 f.
8th mile—Good navigation. Fall 1. 07 f.
9th mile—A small improvement necessary, estimated at ---------- 150
Fall 4. 04 f.
10th mile—The Bull falls are situated in this mile, in which there are about 3 feet fall in 60 yards, a good sluice and tracking path may be made on the eastern side for about ---------- 300
Fall 5. 83 f.
11th mile—This mile will be more expensive to improve than any of the preceding, the bed is generally composed of smooth rock and very wide; it will require some long sluices but not of the most expensive kind; they may be estimated at ---------- 800
Fall 8. 62 f.
12th mile—No improvement necessary worth noting. Fall 2. 31 f.
13th mile—Very good. Fall 0. 93 f.
14th mile—The same. Fall 1. 40 f.
15th mile—A long sluice will be necessary to overcome the difficulty in passing several continuous ledges, the expense may be about ---------- 500
Fall 6. 84 f.
16th mile—Very good. Fall 0. 42 f.
17th mile—In this mile occurs McDaniel's falls of nearly 4 feet in about 100 yards, a good sluice may be easily made on the west side and will probably cost about ---------- 500
Fall 4. 90 f.
18th mile—Very little improvement necessary. Fall 2. 41 f.
2926 19th mile—Anderson's falls are in this mile, rather more than 2 feet in 80 yards, also another of nearly the same, each of which will require a sluice, and may cost together ---------- 600
Fall 4. 78 f.
20th mile—A small fall succeeded by a long rapid shoal, which will require a long sluice, but not very expensive; it may cost about ---------- 500
Fall 7. 67 f.
21st mile—A part of the rapid continued, and a few other ripples, will require small improvements: (say) in the whole ---------- 200
Fall 4. 73 f.
22d mile—This mile requires a little improvement in places and may cost ---------- 100
Fall 3. 68 f.
23d mile—Requires no improvement worth noting. Fall 2. 40 f.
24th mile—Several ripples and shoals in this mile will require a little improvement by sluices very easy made, the cost of which may be about ---------- 200
Fall 5. 05 f.
25th mile—In this mile are Wiley's falls, composed of a ledge of rocks extending all across the river, the fall is nearly 4 feet and very abrupt. The sluice round the end which must be on the west side of the river, will be expensive; it will probably cost ---------- 500
Fall 4. 51 f.
26th mile—No improvement necessary in this mile worth noting. Fall 3. 79 f.
27th mile—The same. Fall 2. 15 f.
28th mile—Several ledges and some shoals which will require some sluicing, estimated at ---------- 300

2927 29th mile—¾ of this mile very good, but in the last ¼ occurs Neilley's falls, the greatest we have yet seen in the river. The whole fall is about 11 feet; six of which is nearly perpendicular, except a very thin sheet near one shore, which is more gradual, and over which (after unloading) with some difficulty, we ascended with our boat. A good sluice and tracking patch can be conveniently made along shore, and may cost about---------- $700

Fall in the mile 11.21 f.

30th mile—Excellent water. Fall 0.93 f.

31st mile—Commences with a very long rapid shoal; after which good water to the end. An easy sluice may be made on the west side and will probably cost---------- 400

32d mile—Good navigation. Fall 1.37 f.

33d mile—The same. Fall 1.06 f.

34th mile—A long shoal, but so regular that very little improvement is necessary. Fall 8.06 f.

35th mile—Generally good water, the few ripples that occur require but little if any improvement. Fall 3.93 f.

36th mile—Good water. Fall 2.96 f.

37th mile—Early in this mile occurs Peter's mountain falls. In the present state excessively hard to ascend, but by unloading our boat and very hard labour we succeeded in getting up. The abrupt fall at the lower end is about 5 feet; this is succeeded by several ledges above; making in the whole 9.56 f. This fall will cost more to improve than any we have past. The sluice must be on the west side and ought to be about ¼ long. To complete it in the best style, it will probably cost---------- 1,000

38th mile—Good navigation. Fall 1.41 f.

39th mile—More rapid than the last, but requires very little improvement. Fall 3.17 f.

2928 40th mile—In this mile, occurs a long rapid shoal, which ought to be improved by a regular graduated sluice, and may be estimated at---------- 400

Fall 8.45 f.

41st mile—No improvement necessary, worthy of note. Fall 3.36 f.

42d mile—The same. Fall 3.06 f.

43d mile—There is in this mile a fall composed of four limestone ledges, over which the water flows very rapidly, but not with an abrupt fall. It descends 5 feet in about 400 yards. An improvement by a graduated sluice, will be necessary, and may cost about---------- 400

Fall 6.66 f.

44th mile—A long shoal in this mile, which will require some sluicing, estimated at---------- 300

45th mile—In this mile there is a long rapid shoal, which ought to be improved by sluicing, and will probably cost---------- 400

Fall 9.13 f.

46th mile—Begins with a continuance of the last-mentioned rapid for a short distance, then good water to near the end, where there is a fall of about two feet: the improvements for this mile may be stated at---------- 200

Fall 5.38 f.

47th mile—No improvement necessary. Fall 3.53 f.

48th mile—The same. Fall 3.09 f.

49th mile—The most of this mile is swift water, but does not require sluicing. Fall 6.84 f.

50th mile—A continuation of swift water, and, in places more rapid than the last mile: some sluicing will be necessary and may be estimated at---------- 300

Fall 11.23 f.

2929 51st mile—Begins with a continuation of the shoal for a short distance; then good to near the end, where it is excessively rapid. An easy sluice may be made round a small island, and might cost about	$200
Fall 4.43 f.	
52d mile—Begins with a part of the rapid water just mentioned, and to which the last mentioned sum is applicable; the remainder of the mile smooth water. Fall 3.43 f.	
53d mile—Good navigation. Fall 1.32 f.	
54th mile—A long rapid in this mile, which ought to be sluiced in places, and may probably cost	300
Fall 9.64 f.	
55th mile—Smooth deep water. Fall 0.70 f.	
56th mile—At 58 perches in this mile, arrived at the mouth of Sinking Creek, where we terminated our survey. No improvement necessary. Fall 2.40 f.	
Total expense	$10,400

The whole fall in this section, f. 251.47, averaging f. 4.52 per mile.

The valley through which this part of the river passes, is very unequal in width. There is more or less of bottom land in almost every part; but, in several places, it widens out to a great exent, and affords several large tracts of first rate land. The second bottoms, and many of the hill sides, are also very rich.

Whilst engaged on this survey, great pains was taken to collect information relative to the character of the river, and the adjacent country, between the mouth of Sinking Creek and the Carolina line. This infirmation has been corroborated by all we have since received on the subject; and goes to establish the fact, in my mind, that the section alluded to, above the termination of our survey, (which measures about 130 miles by water,) is more
2930 susceptible of improvement than the section between Sinking Creek and Greenbrier; the falls being fewer in number, in proportion to the distance, and none of them so difficult to improve, as some we have described.

The counties of Montgomery and Wythe, through which this river and its branches extend, are known to be remarkably fertile; abounding also in iron ore, and manufactories of that article. Grayson also affords some good land, plenty of iron ore and one iron manufactory. Adjoining the two latter, to the west, is the rich county of Washington, on the waters of the Holstein, abounding with vegetable and mineral products. Gypsum or Plaister of Paris, of the best quality, is found here in great abundance, and salt cheaply manufactured to any requisite amount.

The quantum of utility resulting from the navigation of this river, will much depend on the degree of perfection to which the navigation in the James River valley, may be brought. If the best description should be effectuated, so as to reduce the price of transportation from Covington, at the mouth of Dunlap's Creek, to Richmond, to a comparatively small sum, in proportion to the value of the article transported; large quantities of bulky articles, such as tobacco, flour, hemp, cordage, pork and beef in barrels, bacon, and perhaps bar iron, and iron castings, would find their way down the New River, up Greenbrier, and across the portage to Covington, and thence to Richmond market; or, perhaps, at some seasons, down to Sinking Creek; then across the portage to Craig's Creek, and thence down to the main line on James River.

If a good sluice navigation only should be made on James river, we still might calculate on some of the most valuable of these articles with the addition of butter, ginseng and saltpetre, taking one of these directions to market; and in either event, goods of every description would pass from Richmond into these counties by this route. In addition to this, great benefits would result to the inhabitants of the neighbouring counties by the facilities such a navigation would afford to the mutual interchange of products and commodities, the growth and manufacture of their own country.

2931 The consideration of this branch of the subject will again be necessarily taken up in the general remarks towards the conclusion of this report.

On the 13th of the 7th month, we left Sinking creek, arrived at the mouth of Greenbrier river and commenced our examination, levelling and survey down the New river from that point on the 16th. The description, fall and estimate of expenses are as follows:

1st mile—Requires sluicing in several places and will probably cost Fall 6.42 f.	$300
2d mile—Very wide and shallow, but will admit of a very handsome sluice on the left, estimated at Fall 8.25 f.	400
3d mile—Nearly the same as the last, expense of sluicing estimated at	400
4th mile—About ¼ of this mile nearly the same as the two last, then for about 120 perches the descent becomes much more rapid, and in the present state of the water is dangerous to descend, and in all states must be excessively hard to ascend; the bottom is composed chiefly of flat rock. The remainder of the mile smooth water. A safe graduated sluice may be easily made through the rapid part of this mile, and will probably cost Fall 14.35 f.	600
5th mile—Good navigation. Fall 2.07 f.	
6th mile—In this mile are Brooke's falls, where the water falls 9 feet 8 inches in about 120 perches; the lower end very abrupt over broken rocks, which renders it very difficult and dangerous to pass in the present state of the water; a sluice and tracking path may be made on either side at an expense of about	1,000
It would however be a rapid one, and of course laborious to ascend; a lock would be a more eligible improvement at this place; for the construction of which the shores afford tolerable facilities. Fall in the mile 9.88 f.	

2932 7th mile—Begins with very deep smooth water, but a rapid with a fall at the lower end over a ledge soon occurs, succeeded by two or three small falls; then good water to the end. A tolerably easy sluice may be made for about---------------- $500
Fall 6.66 f.

8th mile—No improvement necessary worth noting. Fall 2.89 f.

9th mile—Nearly the same. Fall 3.11 f.

10th mile—This mile includes the great falls of New river, the whole fall in the mile is f. 32.27, about 2 feet of which occurs in a shoal above the principal fall which is over a ledge about 22 to 24 feet high, in the middle of the river; the balance consists of broken rapids for a short distance below. Notwithstanding the ground on the left side is very favorable for the purpose, yet the very great fall in so short a distance renders the sluicing plan entirely ineligible, 30 feet of the fall being in about ¼ of a mile. It is therefore my opinion that this great fall ought to be overcome by locks. The site is excellent for the purpose; 3 of 9 feet lift each may be made to answer the purpose by allowing some fall in a sluice above the first, and also some below the third; the whole expense of this mill will probably be-- 25,000

11th mile—Good water. Fall 1.17 f.

12th mile—In this mile there is a very swift rapid, but may be very easily improved by a sluice on the right side at a very small expense, (say)-- 200
Above and below this rapid the water is good. Fall 10.90 f.

13th mile—Very little improvement necessary. Fall 4.03 f.

14th mile—A brisk current in a part of this mile, a little of which may require some improvement, estimated at---------------- 100
Fall 5.31 f.

2933 15th mile—This mile ought to be improved by short sluices in two or three places, which will probably cost---------------- 150
Fall 6.33 f.

16th mile—In this mile, there is a long rocky fall, which will require considerable improvement. I think the expense may be estimated at-- 600
Fall 14.46 f.

17th mile—Begins with a small fall; several others also occur, which ought to be improved by short sluices. The expense of the whole may be estimated at-- 400
Fall 7.61 f.

The river appears to be changing its character. Above the great falls, the surface is remarkably free from rocks, except at a few falls. The bed is now more contracted, and a great number of rocks rise above the surface of the water.

18th mile—Several small falls, which will require short sluices, and may cost-- 200
Fall 4.41 f.

19th mile—Nearly the same as the last, except one fall, which is greater, and more abrupt. Expense of sluicing---------------- 350
Fall 7.47 f.

20th mile—Good navigation. Fall 0.65 f.

21st mile—Nearly the whole of this mile is good navigation; but, near the end, the water becomes very much contracted, and an excessively rapid current commences, called the winding falls. The mile terminates about 20 perches below the beginning of the fall, in which distance there is a descent of nearly four feet. The whole fall in the mile, 6.64 f.

22d mile—Begins in the last mentioned fall, which continues about 40 perches further; in which distance there is a fall of f. 6.52; making in the whole f. 10.46, in this rapid. In one place, the water, in its present low state, is confined to about 30

2934 yards; the current through the whole is excessively rapid; but a sluice and tracking way may be very conveniently made on the left short, which will make the passage of boats tolerably easy. Expense estimated at ---- $500
Fall in the mile, 11.30 f.

23d mile—Several rapid shoals in this mile, will require improvement, and may cost ---- 400
Fall 9.11 f.

24th mile—Nearly the same as the last, except that the expense of improvement may be greater (say) ---- 500
Fall 9.82 f.

25th mile—A very rapid and dangerous shoal, called Gid's defeat, occurs in this mile. A tracking path and long graduated sluice, on the left, is the most eligible mode of improvement, and may cost ---- 600

The remainder of the mile tolerably good. Fall f. 15.31, about f. 13 of which is in the rapid above mentioned: the distance about 40 perches.

26th mile—Requires some improvement; estimated at ---- 250
Fall 6.44 f.

27th mile—Good navigation. Fall 0.20 f.

28th mile—In this mile, occur three distinct falls; one of them dangerous to descend. They will all require sluicing, and will probably cost ---- 700
Fall 16.09 f.

29th mile—No improvement necessary, worth noting. Fall 5.80 f.

30th mile—In this mile are several rapids, which will require improvement; estimated at ---- 600
Fall 13.43 f.

31st mile—Early in this mile, occurs a long rapid, terminated
2935 by a fall over rocks at the lower end. It may be improved by a sluice taken through a small point of rocks, on the right shore. The water is then very deep and smooth, to near the lower end, where there is another considerable rapid. The expense of improving the two, may amount to ---- 700
Fall 15.12 f.

32d mile—Begins with a short, but excessively swift broken rapid. The fall is about 5.50 f. in little more than 100 yards. It must be improved by a sluice and tracking path, which may probably cost ---- 400
Fall f. 8.

33d mile—Several rapids and two small falls, over ledges, in this mile, all of which may be made tolerably easy by sluicing. The expense will probably be ---- 500
Fall 10.46 f.

34th mile—All good water, except one gravel shoal. The expense of improvement estimated at ---- 100
Fall 4.83 f.

35th mile—Good navigation. Fall 1.20 f.

36th mile—In this mile occurs the Buffalo Falls, consisting of a long gravel shoal, with some broken water by rocks at the lower end. The navigation may be made tolerable by a sluice, that will probably cost ---- 450
Fall 14.60 f.

37th mile—Begins with a short rapid, which will require a little improvement; also a small fall just below; the two may amount to ---- 150
Fall 6.12 f.

38th mile—In this mile there are several sheets of smooth water, but there are two rapids and a rocky fall to improve; these may be estimated at ---- 500
Fall 13.05 f.

2936 39th mile—Several small rapids in this mile but none that require improvement; a very small fall near the ned may cost about ---------- $50

Fall 6.95 f.

40th mile—Most of this mile is good water; but a pretty long rapid occurs near the lower end which will require a sluice, and may cost ---------- 200

Fall 5.85 f.

41st mile—In this mile are several rapids which require improvement; the expense may be estimated at ---------- 450

Fall 10.25 f.

42d mile—Some rapids with falls over rocks at their lower ends occur in this mile; they may all be made tolerably good by sluices, which will probably cost ---------- 500

Fall 10.03 f.

43d mile—Begins with very deep smooth water; at about 1/4 commences a rapid, shallow and difficult to pass (at this state of the water) near the lower end: it can be easily improved by a sluice on the right side, estimated at ---------- 250

Then good water to the end. Fall 7.81 f.

44th mile—Mostly tolerable water, except a fall near the lower end that may be conveniently sluiced for about ---------- 150

Fall 7.83 f.

45th mile—Commences with a rapid that is succeeded by several others; to overcome which sluices will be necessary; particularly for one near the lower end that is terminated by a rocky fall, where the river is contracted to about 30 yards in width, and will be expensive to improve on the right, where the sluice would be most likely to keep open; the immense rocks and apparent violence of the freshets forbid the attempt on the left; there will be some liability to its filling with gravel, otherwise the site
2937 on the right would be good. I do not think however that this effect would often take place, and then but partially: It would be nearly straight and very long, and of course expensive; though there would be no blasting of rocks. On the whole this mile will cost more to improve than any we have past, except where a lock or locks are recommended. To render the navigation tolerably good, the expense of the mile ought probably to be estimated at ---------- 1,200

Fall 19.75 f.

46th mile—Mostly good water, except one fall consisting of three ledges, which will require a sluice and tracking path, that will probably cost ---------- 500

Fall 8.90 f.

47th mile—At 130 poles in this mile is Bowyer's ferry, above which there is only 6 inches fall and consequently requires no improvement ----------

Total cost of improving the section from the mouth of Greenbrier to Bowyer's ferry ---------- $39,850

Total fall in this section 402.76 f.

The remainder of the 47th mile continues good to the end, except one fall, the improvement of which may cost ---------- 200

Fall 5.08 f.

48th mile—Several rocky falls in the upper part of this mile. The very confined limits of the bed, and the immense masses of rock on the shore in places forbid the idea of sluicing. Two modes of improving present; the one is by a canal nearly ½ mile long on the left shore with two locks at the lower end, the other is by removing a few of the worst projecting rocks near the shore and filling some of the chasms between the rocks on the shore so as to form a tolerable footway or tracking path for hauling by a rope, fastening in the rocks at particular places ring bolts, 2938 or iron pins for security. Under all circumstances perhaps the latter ought to be adopted. This will probably cost $500

A canal may be built and locks secured from injury by freshets, but the canal would be very expensive, as it would require one great wall the whole distance, and in some places two. Fall in the mile 16.95 f.

49th mile—A considerable part of this mile is good water; then a fall round which a sluice may be conveniently made on the left shore; after this another rocky fall occurs that cannot be easily sluiced; the tracking plan must therefore be adopted. The expense for this mile is estimated at 700

Fall 17.11 f.

50th mile—In this mile are several tremendous falls, or rather different parts of the same fall; immense rocks have fallen in on both sides, so as to contract the water to a very narrow space, in one place estimated to be not more than 40 feet, and at this low state of the water a rock appears about the middle even of this narrow channel; but the water being of course very deep between the rocks at this place it is not so dangerous to pass as at several others where it is wider, and the water completely broken into white foam, from shore to shore by the dashing and friction occasioned by the rocks below; something may be done to render the passage downward safe at these places, and also those before mentioned; but towing only can be relied on as the means of ascending. The expense of improving this excessively rugged mile may be estimated at 1,200

Fall 26.16 f.

51st mile—Of the same character as the last, but the falls in one or two instances more rocky and dangerous to descend than any we have passed. In descending one of these of 13 feet, the boat was driven with great violence on a ledge and stuck fast
2939 in a very perilous situation, the water being very deep and excessively rapid on both sides, we could find no means of relieving her but by getting a part of the baggage on shore by means of ropes, which had to be again transported a considerable distance over, between and under huge rocks, forming as rough a mass as the mind can well conceive such materials can possibly exhibit. The fall in this mile is also great, and must be improved in the same way as several of the last; (that is,) by putting one of the shores in such a state that a towing rope may be every where carried by men, and by removing some prominent rocks, and in places making short sluices where circumstances will permit, for the passage of the boats. The expense is estimated at 1,600

52d mile—Near the beginning of this mile a great and dangerous fall occurs, and a considerable one near the lower end; the remainder tolerable water; expense of improvement may be estimated at 1,000

Fall 19.75 f.

53d mile—Nearly ¼ good water, then a great and rough fall of 15 feet in about 200 yards; the water then tolerable to the end; expense of improving not so great in proportion to the fall as some of the former miles, in consequence of the shores in places being less rugged (say) 600

Fall 17.16 f.

54th mile—Early in this mile is a rocky fall of 10 feet; the whole of which except a few inches is in the distance of about 100 yards; then some good water; after which, another fall; then, good to the end; expense of improvement 1,000

Fall 18.66 f.

2940 55th mile—Begins with good water, then three abrupt falls in close succession, or rather different parts of the same fall; then good water to near the end, where there is a very rough and abrupt fall; expense of improvement estimated at $1,200

Fall 20.33 f.

56th mile—A fine sheet of water for about ¾; then a long fall to the end; but not so abrupt nor dangerous as many others; expense of improvement 800

(these falls are called Claypole's shoals)

Fall 15.39 f.

57th mile—Begins with a part of the fall last mentioned, after which are two or three other small falls that may require some improvement; expense for the mile may be stated at 600

Fall 11.69 f.

58th mile—Begins with good water; and continues to near the end, where there is a fall of 9½ feet in about 150 yards; this may be improved in part by sluicing, and in part by a tracking way; the expense is estimated at 400

Fall in the mile 10.78 f.

59th mile—Good water except one fall over ledges of rock; which may be improved by removing some rock, a little sluicing and making a tracking path; which will probably cost 500

Fall in the mile, 9.28 f.

60th mile—In this mile are several falls over ledges, which will require the same kind of improvements as those mentioned for the last mile, they may be estimated at 600

Fall 13.42 f.

61st and 62d miles—Begin with a considerable fall over a ledge, then after a short distance of smooth water another occurs of about the same perpendicular fall, (viz. 6½ feet,) but rather more gradual; then another small sheet of good water, after which commences a very long and great fall of a character rather

2941 different from any that we have past. Some of those were principally composed of ledges of rocks across the bed of the river forming abrupt and sometimes perpendicular falls of different heights. Others were formed of large pebble, making the descent more regular but often producing excessively rapid water; (the latter description has generally been denominated rapids in the preceding notes;) both of these were however frequently interspersed with rocks rising above the surface of the water. But the fall that commences in this mile, appears to be mostly formed by a loose jumble of detached rocks of various sizes, that have either been precipitated from the steep sides of the adjoining mountains, or lying in their original situations have had the earth removed from about them by the water, and the cavities thus formed filled in part with stones and rocks of a smaller size and rounded like pebbles, (though many of them are three to four feet diameter,) which have been brought down by the current. The original rocks are so numerous and large that at a small distance they appear to occupy the whole bed of the river, and entirely conceal the water from view. The passes between are of course extremely crooked, and the water flowing with very great velocity; they cannot be passed by a boat of the size of ours, (which was 56 feet long and 7 wide) with any loading without almost a certainty of being dashed to pieces. We were therefore under the necessity of taking out our baggage and stores in order to lighten the boat as much as possible; these we had to carry over excessively rough rocks to the lower end of the falls (as we then supposed), but after a few perches of moderate water, on sudenly turning a point, we were again surrounded by rocks as large as Hay stacks, and some as large as moderate sized dwelling-houses. With great difficulty and danger however we

2942 worked our way through them. These rocks present the most formidable bar to improvement of any thing we have yet seen. To form a passage through them near the shore so as to render the descent quite safe and also to give a perfect command of ascending boats, by means of a tracking way, &c., I should suppose would require for these two miles---------- $5,000

Fall in the 2 miles 60.68 f.

63d mile—A continuation of the same kind of rude bed and savage shores, with encreased difficulty of descending; at one place we were not only obliged to take out our baggage and stores, but also to take down our cabin, and transport the whole over the rocks; after the boat was thus lightened, by the exercise of skill and dexterity in the boatmen that were truly astonishing, they succeeded in passing a very crooked course through these great rocks over excessively rapid water; but not without imminent danger. This fall is succeeded by about 100 poles of smooth deep water quite clear of rocks, but then occurs a fall of still greater difficulty to pass than any preceding it. We had again to unload and take down our cabin, and then get deep into the water behind a rock and hold the boat by a rope attached to the stern, to prevent her from being dashed to pieces against rocks at a short distance below, and exactly in front of a narrow opening through which she had to pass, over an abrupt fall of three feet. After passing two or three such falls the load and cabin were again taken on board; and carried a very short distance, then again put out on the rocks, and the boat passed down another dangerous fall in the same way; just below which the mile ends. The expense of improving this mile may be estimated at-------- 2.000

Fall 17.48 f.

64th mile—Begins with good water, than a fall of 7, feet, after which good navigation to the end; the expense of
2943 improving-- 400

Fall 8.24 f.

65th mile—Begins with a fall of about three feet; just below which the river suddenly expands from less than 100 yards in width to about ¼ of a mile, and smooth and deep to the end of the mile. The small fall at the beginning will require a little improvement which may probably be done for---------------------------- 250

Fall 3.34 f.

66th mile—A continuation of wide deep water; at ¼ passed the mouth of Gauley river, below which the river is known by the name of Kanawha, and continues wide, but becomes shallow with some fall, no improvement necessary in this mile. Fall 2.78 f.

67th mile—The river still continues wide and most of the width shallow; but the navigation tolerable. Fall 4.45 f.

68th mile—At fifty perches in this mile are the great falls of Kanawha; which we find to be 20.37 f. where we unloaded our boat, took down the cabin, hauled her over the rocks and launched her into the deep water below Stockton's saw mill. This is one of the most convenient situations for the application of water power I have ever yet seen.

Total expense from Bowyer's ferry to the falls of Kanawha-- $18,850

Total fall from the mouth of Greenbrier to the foot of the falls of Kanawha 743.77 f.

As we descend the valley of the New River from the mouth of Greenbrier it becomes gradually more contracted, and its mountain boundaries higher and more rugged; several small tracts of bottom land are found in the first 10 or 12 miles, but from thence to Bowyer's ferry, 10 acres of good land in a body rarely

occurs. About 5 or 6 small cabins are the only human habitations that are to be seen in 35 miles. From the mouth of Man's creek ¼ below Bowyer's ferry to the mouth of Gauley river 18 miles, not a trace of human industry or art is any where
2944 to be seen, except a part of a small field which approaches
the river at the mouth of Mill creek. Indeed for a large portion of that distance a spot of earth of sufficient dimensions for the ground plan of a moderate sized dwelling house is rarely to be seen.

The Sewell mountain rising in the midst of a broken mountainous country, presents an exterior different from those around it. The rise from its base is very long and of course less precipitous than most others; and instead of a narrow ridge on its summit, the form that the surrounding mountains generally assume, it spreads out, and exhibits to the view a considerable extent of very high undulating land, the spurs projecting from it in various directions bearing different names. For more than 40 miles, the New river has worked its way through this great tract of elevated land: above Bowyer's ferry the appearance from the river is that of high mountains on each side, indented by the water courses which rise in the high grounds beyond the view, and descend by rapid cascades to the river. In places perpendicular cliffs of great height are seen, but the general appearance is a steep slope covered with trees; contracting the water to an average of about 120 yards. Below Bowyer's ferry the scene is considerably changed; tremendous cliffs from 5 to 7 or 800 feet in height generally form the boundaries of this frightful ravine: these are so continuous that in one part for four miles in extent, the river is entirely unapproachable by man from either side. Confined within these rugged limits to a very narrow space, the water sometimes rises to the extraordinary height of 50 feet, notwithstanding the very great fall in its bed.

In making the surveys of the Greenbrier and New rivers, the alternatives mentioned in our instructions were not forgotten, but as it was demonstrably clear, that surveys of, and estimates for all the different descriptions of navigation mentioned could not be made by us in one season, and comply with our other important duties; we selected according to our own judgment, that mode which we believed the rivers themselves, and other circumstances
connected with the navigation pointed out as most eligible,
2945 leaving the others to be taken up at a future time, if it
should be deemed necessary. But notwithstanding we have thus limited the field of our labours, yet we hope such information will be derived from our reports as to enable the board to determine whether further surveys and estimates may be useful.

It may be observed, that so far as the sluicing plan has been recommended, the estimates are made with a view to the sluice in every instance being made contiguous to one or other of the shores; so that the boatmen may always avail themselves of the advantage of a towing line when the rapidity of the current requires it.

And to what has been already said relative to the tracking plan, recommended for the more rugged parts of the river, where sluices cannot be made, nor setting poles used with advantage, it may be added, that by the use of a block and pulley attached to the boat to be used at particular places, the power of a few men will be adequate to the towing or warping of a loaded boat up any current that will probably occur. But it must be remembered, that this description of navigation is only calculated for comparatively low water, that is, from the state in which we saw the river to about 10 feet higher, which may be about the usual spring heighth. In freshets any navigation in the bed of the stream must be dangerous in consequence of the violence of the current and the roughness of the water. The construction of an independent canal along this ravine from Bowyer's ferry to the falls appears to be quite inexpedient, if not utterly impossible. But I think it is possible on the left or west side to level the fallen rocks at the foot of the cliffs, just above high water mark, so as to admit of a railway the whole distance. It would, however, be very expensive and will probably be left for posterity to execute.

NEW RIVER

On the 28th of the 8th month, I left Abingdon, for the purpose of viewing that part of the New River, mentioned in my instructions, and arrived at Captain Newell's ferry, opposite to the
2946 Lead Mines, on the evening of the 29th. The next morning, in company with Hugh P. Taylor, commenced the examination.

The navigation is good for about 3 miles below the Lead Mines: there occurs a small shoal that will require a little improvement; immediately below this, there is another, where the water falls about 5 feet in 200 yards, and will require a sluice on the left shore, and a low wing dam, to turn in the water. I am of opinion that $1,000 will be sufficient to effect the improvement of these two shoals.

About 5 miles below the Mines, are Foster's Falls. It appears the fall may be about 18 feet in half a mile, divided into 9 or 10 parts, by small ledges of rocks, none of which occasions a perpendicular fall, and but very little appearance of rock above water, so that the passage is perfectly safe to descend, in almost any part, except when the river is low.

But there will be some difficulty in procuring an easy ascending navigation. The left side presents the greatest facility for a graduated sluice, over some of the upper ledges, but near the lower end of the fall on that side, it would be rapid, and the rocks very smooth for polling. It would, however, be close in shore, and some advantage might be taken of towing lines, ring bolts in the rocks, &c. On the right shore, there appears to be excellent ground for a canal and locks, if that plan should be thought most advisable. But as we had no boat to cross over, so as to examine both sides critically, I cannot say with certainty which side ought to be adopted. If a sluice on the left side will answer the purpose, I think it may be made for $1,200.

Between these falls and the mouth of Reedy creek, there are four small falls, the last of which is called Deer falls, and is the worst of the four. They all consist of smooth ledges, making swift water, but not dangerous, nor very difficult of ascent; they may, however, be a little improved for a very moderate sum, say $150 each.

Just below Reed creek, is Reed island, at the lower end of which is a small fall of about one foot, over a ledge of rock, through this there is a sluice close to the right shore: then 2947 smooth water for about two miles, where there are small ripples opposite to Pine run, which require very little improvement. In the next 4 or 5 miles, there are three or four ripples that may require slight improvements. A small island then occurs, near to the left shore; opposite to which, there is more fall than for several miles above, in the same distance. It is, however, so regular, that it presents but little difficulty to ascending, and none to descending boats, except that a natural sluice may require a little opening.

From Reed creek to the lower end of this island, I think $600 will do all that is necessary to be done.

From this island, for several miles down, to Ross's falls, there is but little fall, but the river is generally wide, and in places, rather shallow; a few of the ledges will require opening; the expense of which may be estimated at $500. Ross's falls are situated nearly opposite to Captain Ross's house; the fall is about 2½ feet in 50 yards, and will require a graduated sluice on the right side, which will probably cost $700. Then for about two miles tolerably good, but a few ledges may require some improvement, for which may be allowed $300. Then occurs a long fall, probably nearly equal in the whole, to Foster's before described. It was impossible, without a boat, to decide with certainty, how it ought to be improved; but the most probable plan appeared to be, by a graduated sluice near the right shore, or rather, several short ones, the expense of which may be estimated at $1,200. This fall is just above the dividing line between Wythe and Montgomery counties.

Below this fall, there is nearly a mile of good water; after which, commences a long fall, composed of a number of ledges in succession, none of them large, but several will require improvement by opening passages, constructing wings, &c. I think $1,000 ought to be allowed for this purpose. Then to Peak creek, there is but little fall, but the river is wide, and in places shallow; to improve these $300 will probably be required. About the mouth of Peak creek there are several islands and some fall; the sum of $500 may be estimated for procuring a
2948 good navigation through them. Then good water to the late Col. Trigg's farm; opposite to which, there is a fall of two to three feet in 200 yards. Through this fall it will probably require $400 to procure a passage. There is also another small fall, about the lower end of this farm, which will require but little improvement. Then good water to within half a mile of English's ferry, where there is a fall of about 3 feet in [illegible]00 yards, and a quarter of a mile of swift water below. The upper part requires improving, which may cost $400.

From English's ferry to near Pepper's ferry, there is no obstruction to navigation worth noting.

A short distance above the latter, there is a fall of nearly 8 feet in a quarter of a mile, but the descent is so regular, that loaded batteaux might then have descended near the right shore with perfect safety, and ascended with light loads: and with water a little higher, boats might ascend in every part, for there are no projecting rocks. But to make it quite easy to ascend, there must be a graduated sluice on the left shore, for nearly half a mile; this would also be the downward passage in very low water: and would cost, I think, at least $1,000. The navigation is then good to Shell's falls, 2 miles below the ferry. These present a more serious obstruction than any above. The fall is estimated at 7 feet in less than 200 yards, and at the lower end very abrupt and broken; there is, however, on the right side, which is much the longest end of the falls, a gravel bed that rises above all the ledges; over this the water flows with a tolerably regular shallow current. A sluice might be made on this side that would be quite easy; but it would be liable to fill with gravel, unless it was well guarded on the river side. To effectuate such a sluice would probably require an expense of $1,500. Either this plan must be adopted, or a lock must be constructed on the left side, which would cost a much larger sum.

From this place round the Horse-shoe and quite down to Michael Brown's, there are only a few inconsiderable ripples: but a short distance below his farm, the river becomes wide
2949 and shallow, with a moderate fall; it will probably require improvement in places down to the gap mountain falls, a distance of 3 miles, for which may be estimated $300 per mile.

The falls just mentioned occur at the passage of the river through the Gap mountain, and at the line between Montgomery and Giles counties. The fall is about 6 feet in 200 yards. It appears from the best view that could be taken of it without a boat, which was from the left shore, that the plan for improvement will be by a graduated sluice on the right side; this may be made much longer than the fall, and I believe will very well admit of a tracking way on the shore, which will make it very easy. The expense may be estimated at $1100. Ledges commence a little below the principal fall, and continue in succession for a mile or upwards: no one of these presents any great obstruction to navigation, but taken collectively, they form a very considerable fall, and in order to get a good passage through them, in an easy direction, it will probably require the expenditure of $600. Thence to Sinking creek, the navigation is generally good; there are, however, a few ledges that may require some expense; I believe $600 will be amply sufficient for the whole.

In this examination, I was considerably aided by the map and field notes of a survey of the river, lately taken by James Caruthers and Hugh P. Taylor: The latter of whom accompanied me with these documents the whole distance from the lead mines to Sinking creek. By that survey this distance is 68 miles 52 rods.

* * * * *

2949½ Before I close this report, it is but justice to add, that our assistants, engaged in the arduous labors of the late season, acquitted themselves, in the several duties assigned them, with faithfulness and propriety. Thomas Mifflin Ladd, of this city, has become expert in the use of the levelling instrument, and with further practice, and the experience of a few more years, may become useful to the community. The same may be said of Hugh P. Taylor, who, although a young man, is in possession of much topographical knowledge of the interior of this State. Moncure Robinson of this city, is eminently entitled to our respect. Without any compensation, whatever, except the payment of his expenses, he accompanied us nearly the whole season, and always performed the duty of a hand, without shrinking from the most laborious tasks. He possesses much information for his age, and a mind calculated to render him useful to his fellow-citizens.

I also feel it a duty to say, that our two principal boatmen, captain Robert Creasey and Isham Scruggs, are entitled to great credit, for their good conduct whilst in our employ; and particularly for the deliberate judgment, courage, skill and dexterity, exhibited in conducting our boat through the long and tremendous rapids of New river; which, considering the size of our boat, I must believe, was a voyage fraught with as much difficulty and danger, as ever was completed with perfect safety.

With great respect, this Report is submitted, by

THOMAS MOORE.

2950 *Government exhibit 33*

REPORT OF THE U. S. ENGINEER DEPARTMENT SECRETARY OF WAR, YEAR 1877

(pp. 62; 331–332)

7. Improvement of New River, from the lead-mines in Wythe County, Virginia, to the mouth of the Greenbrier River, West Virginia.—A survey of this portion of the New River was made in 1872. A report was printed in the annual report of the Chief of Engineers for 1873. Two estimates were submitted—one looking to an improvement to facilitate the navigation by the keelboats now used, at a cost of $100,000; the other contemplating a 3-foot steamboat navigation, to cost $1,000,000.

The first appropriation for the work was $15,000, August 14, 1876; but it was not made available until May 1877. As this appropriation was insufficient for a general improvement, it seemed necessary to confine what should be done at present to a limited portion of the river, and to that scheme which involved the least expense, viz., for the keel-boats now in use, it being the understanding that what is first done in the smaller improvement should be arranged with a view to its utilization and adaptation some future day, when the means provided shall suffice to enter upon the improvement of the river for light steamboats.

It seemed also expedient that the first portions of the river treated should be in the vicinity of New River bridge, in order to facilitate communication of at least a portion of the country through which the river flows with an existing outlet east and west—the Virginia and Tennessee Railroad—which is itself in connection with the whole system of rail and water intercommunication of the country.

It is expected that the work will be completed, as far as the funds available will allow, before the close of 1877.

Amount appropriated by act approved August 14, 1876	$15,000.00
July 1, 1877, amount expended during fiscal year	78.25
July 1, 1877, amount available	14,921.75
2961 Amount (estimated) required for completion of existing project	85,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1879	50,000.00

F 7

Improvement of New River, From the Lead-Mines, in Wythe County, Virginia, to the Mouth of Greenbrier River, West Virginia.

A survey of this portion of the New River was made in 1872, and a report submitted January 9, 1873, which may be found in print in the Annual Report of the Chief of Engineers for 1873, beginning at page 852. Two estimates were therein made for the improvement of the river.

The first looked to facilitating the navigation by the keel-boats now used, at a cost of $100,000. This was to be accomplished by constructing slight deflectors or dams of rock and brush, in order to concentrate the volume of the water and increase the depth over the shoals from the present average of about 12 inches to about 2 feet, which could be done without too much increase of velocity. And some of the falls which are almost always vertical and of an average height of about 4 feet, could be greatly improved by blasting sluices through them about 30 feet in width and of an average length of 50 feet. In many cases the falls have already natural chutes or sluices through them susceptible of a similar improvement.

But there is a strong demand for the introduction of steamboats on the river. Hence the second estimate, which was for a 3-foot steamboat navigation, to cost $1,000,000. It was supposed that light-draught steamboats could, for short distances, ascend a grade of 1 in 400, with a current of 5 miles an hour. It was therefore proposed to excavate sluice-ways 90 feet wide and 3 feet deep through all shoals having a grade not exceeding 1 in 400. Where the grade exceeds this, low regulating dams were proposed, with sluices having a fall not exceeding 1 foot at each. In several cases dams were to be introduced containing locks, and in two other places lateral canals.

The first appropriation made for this improvement was $15,000, August 14, 1876, but authority for its expenditure was not given until in May, 1877. As this appropriation was insufficient for a general improvement, it seemed necessary to confine what should be done at present to a limited portion of the river and to that scheme which involved the least expense, viz, for the keel-boats now in use; it being the understanding that what is first done in the smaller improvement should be arranged with a view to its utilization and adaptation some future day, when the means provided shall suffice to enter upon the improvement of the river for light steamboats.

It seemed also expedient that the first portions of the river treated should be in the vicinity of New River Bridge, in order to facilitate communication of at least a portion of the country through which the river flows with an existing outlet east and west, the Virginia and Tennessee Railroad, which is itself in connection with the whole system of rail and water intercommunication of the country.

Captain J. W. Cuyler, Corps of Engineers, has been assigned to the immediate supervision of this work, which is expected to be completed, as far as the available funds will allow, before the close of 1877.

MONEY STATEMENT

Amount appropriated by act approved August 14, 1876	$15,000.00
July 1, 1877, amount expended during fiscal year	78.25
July 1, 1877, amount available	14,921.75
Amount (estimated) required for completion of existing project	85,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1879	50,000.00

2952 *Government exhibit 34*

Report of the Chief of Engineers, Year 1878

(pp. 69; 495–499)

8. **Improvement of New River, from Lead Mines in Wythe County, Virginia, to mouth of Greenbrier River, West Virginia.**—The plan adopted for the improvement of this river contemplates a channel-way 30 feet wide and 2 feet deep below the lowest water, suited for the keel-boats now in use, but at the same time capable of utilization and adaptation, at some future day, in a further improvement of the navigation for light steamboats, should means be provided therefor.

The season's work was commenced at the bridge of the Atlantic, Mississippi, and Ohio Railroad, and carried continuously upstream toward the lead mines, 9 miles, as far as Falls Branch Falls, resulting in the removal of all obstructions in that portion of the river to the adopted depth and width. The work was done by hired labor, and the purchase of material in open market.

The ledges and detached bowlders were blasted out under water, and the debris scoured out of the channel and built into the facings and heads of the wing-dams and training-walls; the gravel shoals were excavated through, and materials made into the heartings of these constructions. By these means sluices and chutes, affording an unobstructed water-way, were made, without increasing insurmountably the velocity and volume of the water in them. The plan adopted has proved its capability to accomplish its design. It is, therefore, proposed, during the ensuing year, to continue it, with slight modifications, working still up the river, but on an enlarged scale, so as to open up fully another 10 miles of river.

July 1, 1877, amount available	$14,921.75
Amount appropriated by act approved June 18, 1878	15,000.00
	$29,921.75
July 1, 1878, amount expended during fiscal year	6,492.26
July 1, 1878, amount available	23,429.49
2953 Amount (estimated) required for completion of existing project	$70,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1880	35,000.00

F 8

UNITED STATES ENGINEER OFFICE,
CAMP NO. 1, FALLS BRANCH, NEW RIVER,
Pulaski County, Virginia, July 1, 1878.

GENERAL: I have the honor to submit herewith the annual report of operations for fiscal year ending June 30, 1878, for the work of river improvement under my charge temporarily.

Very respectfully, your obedient servant,

JAS. W. CUYLER,
Captain of Engineers.

Brig. Gen. A. A. HUMPHREYS,
Chief of Engineers, U. S. A.

IMPROVEMENT OF NEW RIVER FROM LEAD MINES IN WYTHE COUNTY, VIRGINIA, TO THE MOUTH OF GREENBRIER RIVER, WEST VIRGINIA

Having been assigned by my predecessor in charge of the work, Maj. W. P. Craighill, Corps of Engineers, to its local charge, June 28, 1877, I took station at New River Depot, Pulaski County, July 6, after having first visited Wytheville, in order to obtain some necessary information, and make certain needed arrangements, proceeding thereupon to inaugurate the work.

The project of Major Craighill, which was to form a clear channel, 30 feet wide by 2 feet deep, below minimum low-water,

through the rock in place, constituting the "falls" and "ripples" in the river, and the coarse gravel constituting the "bars," such channel to be adapted to the existing navigation, i. e., "keelboats" or batteaux, with an average carrying capacity of 8 tons, on a draught of water 21 inches, and to be so arranged as to be capable of utilization, in the more general and permanent project contemplated, for a channel 90 feet wide by 3 feet deep, suitable for light-draught steamers, having been approved by the Chief of Engineers, June 7, 1877, I made a reconnaissance of the
2954 portion of the river extending 20 miles above and 7 miles
below the determined-upon initial point of the work, i. e., the bridge of the Atlantic, Mississippi and Ohio Railroad spanning New River, between July 1 and 15, 1877, with a view of fixing the several localities for work.

The engineering as well as local considerations, pointing to the advisability of carrying the work forward progressively entirely upstream, a gravel "flat" 16 feet long by 8 feet beam and a "stone-boat", with 4 canoes, were built; 2 keel-boats 50 feet long by 7 feet 9 inches beam, were hired for quarters and transportation; boats, tools, and supplies collected, and a working force organized by July 23, when work was begun on the four ripples next above the railroad bridge and distant from it from 200 to 600 yards.

The nature of the work involved, for the removal of the rock in place, blasting under water as the method of working; "juniper-drills" were decide upon, as from the overhanging of the ledges and the fact that the workmen had to stand in quick and strong water, in order to drill, suitable "churn-drills" would have proved too unwieldy and heavy; holes of 2 inches diameter were fixed on as best suited to the work, and these were drilled on an average 3 feet below bed, and spaced as nearly equally apart as the lay of the rock would permit, varying from 2 feet to 8 feet.

In view of the facts that the labor of the country composing the force was entirely ignorant of the method of handling dynamite or "giant-powder," and that I had not time before leaving Baltimore, my nearest point of supply for such explosives, to arrange for procuring them, I decided upon the use of the "Orange" blasting-powder, and after several experiments with tin cartridge-cases and gutta-percha and india-rubber patent tubing for same, finally selected the "pitch bag" cartridge, a cylindrical bag of close ticking, made around a wooden core, and immersed in a mixture of pitch and tar of the proper consistency, with a piece of "double-tape" fuse inserted in the mouth and choked, which selection was followed by the best results, not 1 per cent. of blasts failing, as due to the cartridge, during the two and one-half month's opera-
2955 tions of 1877. For the removal of the gravel-bars the pick
and shovel were used.

Lying as the work did in a country sparsely peopled and relatively inaccessible, it became a necessity to feed and tent the entire working party. Working on the above plan, a party of 50 were worked during the season of 1877.

After finishing the four ripples above referred to to width and nearly the proper depth, and building training-walls and wing-dams at them with the rock excavated, a fifth ripple—a narrow ledge offering no serious obstruction—half-way between Ripple 4 and "Jones" (for reference to localities, vide survey-map of 1872), was cut through; a gravel-shoal 80 feet in length, opposite "Jones" was dug through, and lacking but a few inches of the requisite depth; a "gathering-dam," extending 110 feet up river, was put in, raising the water to the proper level without blasting, and the main work of the season reached the passage of Ingle's Falls 3½ miles above the railroad bridge.

These falls consist at head of eight distinct ledges of hard gneiss rock, running straight across the river, successively, for 600 feet, barring back a pool extending up 3½ miles, with from 9 feet to 3½ feet water in it; below these ledges for 350 feet extend large detached bowlders, through which the natural sluice winds with great velocity of flow, succeeded by a gravel-shoal 240 feet in width, the "falls" being terminated by another gravel-shoal 300 feet wide just above the broken-down piers of the old Virginia and Tennessee Turnpike Bridge, in themselves, as they stand, an obstruction to descending boats, which latter require the removal of certainly the westerly pier of the two; the stretch of river embraced in the "falls" is 1,010 yards, and the total fall in this distance 7.11 feet, the width of low-water bed at head being 700 feet, narrowing suddenly at the lower "gravel" to 530 feet. Three-fourths of this fall of 7.11 feet occurs in the upper 900 feet through rock; and the gravel-shoals below, as well as the generally rough and irregular nature of the entire bed of the lower section, are undoubtedly due to the abrupt change of slope in the bottom, occasioning all 2956 the particles brought down through the rock-falls to be dropped in the sinuosities of the natural sluice.

Through the entire course of these obstructions, a channel-way of the prescribed dimensions was formed, and from an examination made last month, after the experience of the ice and freshets of the winter and spring ice, there are no decided signs of the filling in of the cut through the "gravel."

The working section, at Falls Branch, 4½ miles above Ingle's Falls, was next commenced upon. This work, lying on the convex side of a deep horseshoe bend, consists at head of falls of five rock ledges running across the river; vertical fall 3 feet 6 inches succeeded below by deep pool of still water, cut diagonally across as the river bends by longitudinal ledges, the lower section consisting of rock ledges, straight across, again terminated by an abrupt fall over a gravel-bed; fall in this lower section 4 feet to surface of pool extending up from "Ingle's"; width of low-water bed 900 feet narrowing to 670 feet in bend, and total length in river of the obstructions 1 mile. The rock here, a disintegrated slate, blasting but very badly, proved so troublesome, that but little progress was made, and on October 11, high water and cold weather setting in, work had to be abandoned for the season, and the property put in store at the railroad bridge.

The work of the season had been of a character before untried, and to a certain extent experimental, but what had been done having proven that the project adopted was fully capable of meeting the object held in view by it, with the exception of following invariably the natural sluices and channels, if the present work was to be utilized in the more general project proposed, the winter was devoted to preparing a complete outfit suitable in character for operating on a larger scale. The lack of "plant," transportation, tents, &c., had closely restricted the operations of 1877 by itself, even had there been no other reason to conduct the work tentatively, and a party of 50 was the maximum for advantageous working in the season of 1877. Plans were made for a special class of boats adapted to the work in hand, on which six boats were built, including a "crane-boat," with light machinery; and all preparations being complete by June 1, on 2957 June 14 the work of the season was begun, the delay being due to the unusual high stage of water in the river and constant violent rains. The completion of the "Falls Branch" section, the terminus of last fall, was taken in hand and is at date completed.

After the close of work on October 11, 1877, a small field-party made the necessary surveys for enlarged maps of localities worked at, which should show details and changes which the survey of 1872 did not exhibit.

On October 22, I made a series of gaugings of the river extending to October 30, the point selected being at and below Ingle's Falls, this point being chosen not so much with an eye to the regularity of river section, but because it was the most serious obstacle to navigation, on the line of the season, and was a characteristic type of that class of obstructions—the worst in the river—it was desired to ascertain, with as near a degree of approximation as the nature of the case would permit of, the amount of obstruction to steam navigation of the river.

The observations were made with tin ellipses, submerged to various depths, and wooden floats; and while numerous observations were made with all the care practicable, the nature of the stream itself and the particular locality rendered solutions within exact limits impossible. From the measurement and the formulas used, good approximate results were obtained, showing the mean velocity of the river at this point to be about 5¼ miles, and the discharge equal to about 900 cubic feet per second, with a gauge-reading of 7.75 inches. For a more complete solution a series of gaugings should be continued at various stages of the river, and a connection made with the more permanent gauge boards established in the lower New River, a mean distance of 100 miles below the site of this work, and referred to the Charleston (Kanawha) plane.

The above-given figures furnish all requisite information for immediate practical purposes; for more exact results, observations extending over some time and nicely conducted are required, so great and so sudden are the variations in the stages of this river, and so many anomalous features does its upper course of 128 miles present.

2958 The rocks passed through in excavating, consist mainly of the common limestones, often holding fine crystals of dog-tooth spar and slates.

At Ingle's Falls the rock was almost entirely a hard, tough gneiss. The limestones are often found partially disintegrated, and more often the slates, the latter, when lying in nearly horizontal beds, proving a very troublesome and costly bed to excavate, as involving quarrying after blasting, or blowing out in small fragments; the gravel in the river is large and may better be termed a "shingle." As a rule, the excavations have furnished about the necessary material for the dams, training-walls &c., in which no brush has as yet been worked, the inner constructions of this material, with stone by private parties, for special, local objects, and by the government of the States lately in rebellion, not having proved stable or satisfactory.

It is proposed in the further progress of the work, to use more extensively the gathering-dams and training-walls, as a means of securing the necessary depths, with a diminished amount of blasting; also to use, in certain cases, "giant-powder" as an explosive, and introduce the use of the churn-drill.

As a general description of this upper New River, it may be said to consist of a series of pools from 100 feet to 4 miles in length, with from 3 feet to 10 feet depth in them, some few points, "holes," showing 20, 30, and more feet. These pools are separated by ledges straight across or diagonal to the river, in groups of from 5 to 10. The total fall between pools rarely exceeds 7 feet, more often 3 feet or 4 feet, the actual vertical fall, not frequent, at a single ledge scarce ever being more than 18 inches; in fact, the so-called "falls" should be more appropriately termed "rapids."

There are some stretches of river showing long shoals, not bars, of the coarse gravel, but the pools and rock ledges predominate, pockets of gravel being generally found in and at foot of the "rapids." With such a regimen any improvement made as to deepening and widening the channel introduces the new obstacle of largely-increased velocity and volume; so that though the main and more important navigation of this river must ever be that of descending boats, yet no scheme of improvement can
2959 fully meet the requirements of the case without considering and aiming to counteract this induced obstacle to navigation.

Appended with be found tabular statements exhibiting figures of work, localities of same, and gauge-readings for the season of active operations of 1877–'78.

From the first table in will be seen that the work has been done at figures considerably below the estimates of the report of 1873, the general lowering of prices for labor and supplies of course largely affecting this, as also the favorable season for work shown by the gauge-tables.

With a gauge reading of +12 inches, which is the usual river's stage from November 1 to May 15, operations of the kind being carried on are impracticable.

As to the amount of work to be done for either the 30 feet or 90 feet width of channel-way, the experience of the year leads me to conclude that the estimates, as set forth in the report of 1873, are below considerably the actual amounts required.

Sketches of the more important working sections, Ingle's Falls and Falls Branch, are appended.

DETAILS OF WORK DONE. 1877–1878

Rock excavated and moved	cubic yards	724
Gravel excavated and moved	cubic yards	775
Number of holes drilled		1,044
Number of feet of holes drilled	feet	3,027
Average depth of holes	feet	2.9
Average depth of hole (2 inches) drilled per day per drill	feet	9.75
Number of blasts fired		984
Number of blasts missed		60
Number of cartridges made		1,076
Average charge of powder in each cartridge	pounds	5/8
Average loosening of rock per blast	yards	3/4
Average cost of pitch-bag cartridge completed		$0 19.5
Average cost of rock excavation, including blasting, scowing away debris, and building same into training-walls, &c	per yard	$3.50
Average cost of gravel for do	per yard	$0.70

STATEMENT SHOWING LOCALITIES OF WORK DONE 1877–'78 AS PER SURVEY-MAP OF 1872

	Width across of ledge
1. 200 to 600 yards above railroad bridge—	
Ripple No. 1	50 feet
Ripple No. 2	110 feet
Ripple No. 3	20 feet
Ripple No. 4	20 feet
2960 2. Ripple No. 5 between Ripple No. 4 and "Jones"	20 feet
3. Gravel shoal opposite "Jones"	80 feet
	Total length of falls and rapids in river
4. Ingle's Falls	½ mile
5. Falls Branch	1 mile

MONEY STATEMENT

July 1, 1877, amount available	$14,921.75
Amount appropriated by act approved June 18, 1878	15,000.00
	$29,921.75
July 1, 1878, amount expended during fiscal year	6,492.26
July 1, 1878, amount available	23,429.49
Amount (estimated) required for completion of existing project	70,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1880	35,000.00

2961 *Government exhibit 35*

REPORT OF THE CHIEF OF ENGINEERS, YEAR 1879

(pp. 79; 530–545)

11. Improvement of New River from the lead mines in Wythe County, Virginia, to the mouth of Greenbrier, West Virginia.—The work of the year has been in continuation of that of the preceding year and following the same plan, making a practicable channel-way for the keel-boats now running on the river, but keeping in view a more extended improvement for light-draught steamboats.

From July 1 to September 13, 1878, the work progressed well on the section of the river immediately above the bridge of the Virginia and Tennessee Railroad, the object being to bring that portion into close connection with a railway running east and west.

A very severe freshet in September, 1878, did so much damage that it was considered inexpedient to resume there, so nearly was the season closed.

For special reasons work was commenced in September, 1878, on the portion of the river immediately above the mouth of the Greenbrier River at Hinton, in West Virginia. This continued actively until near the end of November. Work was resumed on the same section as early in 1879 as the state of the river permitted, viz., early in June.

July 1, 1878, amount available	$23, 429.49
Amount appropriated by act approved March 3, 1879	12, 000.00
	35, 429.49
July 1, 1879, amount expended during fiscal year	19, 125.01
July 1, 1879, amount available	16, 304.48
Amount (estimated) required for completion of existing project	114, 160.00
Amount that can be profitably expended in fiscal year ending June 30, 1881	20, 000.00

2962 F 11

IMPROVEMENT OF NEW RIVER FROM THE LEAD MINES IN WYTHE COUNTY, VIRGINIA, TO THE MOUTH OF GREENBRIER RIVER, WEST VIRGINIA

The plan adopted for this river has been the formation of a channelway 30 feet wide and 2 feet deep below the lowest water, suited for the keelboats now in use, but at the same time capable of utilization and adaptation at some future day, in a further improvement of the navigation for light steamboats, should means be provided therefor.

The ledges and detached bowlders have been blasted out under water, and the debris removed from the channel and built into the wing-dams and training-walls. The gravel shoals were excavated through and the materials placed in the hearts of the dams, &c. By these means sluices and chutes have been made, affording a good water-way, without insurmountably increasing the velocity and volume of the water in them. The work has been done altogether by hired labor, and the purchase of materials in open market.

Operations were confined to the section of the river above the crossing of the Virginia and Tennessee Railroad, under the personal supervision of Capt. J. W. Cuyler, Corps of Engineers, until September 13, 1878, when a very severe freshet occurred, causing a considerable loss of property, and doing some damage to the unfinished works. It was so late in the season that operations were not resumed on that section.

The appended report of Captain Cuyler gives a detailed description of them.

In August, 1878, it was decided to commence work at once on the section of the river immediately above the mouth of the Greenbrier, at Hinton, in West Virginia. These operations were placed under the immediate supervision of Assistant A. M. Scott, and vigorously continued until near the end of November. The report of Mr. Scott, appended hereto, gives the details of the work. This was resumed in June, 1879, under the direction of Col. W. P. Smith, assistant engineer. The working season is short, as the river must be low, the water clear and not too cold.

June 3, a small force was at work on Greenbrier Shoals.
2963 June 18, a force was engaged upon the Blue Stone Shoals, and June 17, on Land Craft Shoals.

It is found necessary to increase the estimate for the completion of the work by the sum of $56,160. The reasons for this are that the original estimate was approximate, being based on insufficient data, though the best then attainable; and actual experience has shown the quantities involved and the extent of the work to be done greater than previously supposed.

MONEY STATEMENT

July 1, 1878, amount available	$23, 429. 49
Amount appropriated by act approved March 3, 1879	12, 000. 00
	35, 429. 49
July 1, 1879, amount expended during fiscal year	19, 125. 01
July 1, 1879, amount available	16, 304. 48
Amount (estimated) required for completion of existing project	114, 160. 00
Amount that can be profitably expended in fiscal year ending June 30, 1881	20, 000. 00

REPORTS OF CAPTAIN JAMES W. CUYLER, CORPS OF ENGINEERS

1

UNITED STATES ENGINEER OFFICE,
Baltimore, Md., July 3, 1879.

MAJOR: Pursuant to your instructions to this effect, I respectfully submit herewith the annual report of operations, improvement of Upper New River, Virginia, for fiscal year 1878–'79, in so far as these fell under my immediate charge.

For this report I adopt and submit, hereto attached, the report of operations for the season of 1878, after July 1, of date March 15, 1879. This latter report brings the record of operations up to October 15, 1878, when the operations under my immediate charge closed, and the entire work was transferred by your orders to a new locality, 84 miles down-stream.

The report of March 15, 1879, will be found to cover all the details of my operations, as also my general views on certain points, which may have a practical bearing in any further prosecution of the work, and which seemed clearly indicated to me
2964 by the experience of two seasons' work upon the river.

After October 15, 1878, I transferred to others, by your orders, the immediate charge of this particular work.

In this connection, I avail myself of the opportunity afforded me to express recognition of the valuable services rendered by my assistant in the office, Mr. William Costello, and by Messrs. Ranson and Gilliam, who acted as head overseers.

The plan adopted for this work was that of making a clear channel through all the obstructions in the river-bed, 2 feet deep below minimum low-water, 30 feet wide, for the now navigation of the stream—bateaux—to be later on enlarged to 3 feet depth and 90 feet width, for light steamboat navigation.

Original estimated cost of the work as now being carried on	$100,000
Whole amount appropriated since adoption of present project	42,000
(First appropriation, August 14, 1876; last appropriation, March 3, 1879.)	
Amount expended to date	25,697

The original estimate is insufficient to carry out to completion the existing project. The reasons for this excess of cost are, firstly, that when the original estimate was made the data on which it was based were in themselves not sufficiently full to admit of a close estimate; and, secondly, because in the light of the actual experience had, both the quantities involved and the extent of the words are greater than at first estimated for by a considerable amount.

I estimate as the probable additional sum required for completion, $56,160. This sum covers 128 miles of river to be improved under present project, at the rate of $1,220 per mile, which the actual figures of the two working seasons show to be a safe estimate per mile at the lowest.

Amount, exclusive of former appropriations, required for entire and permanent completion, $114,160.

While the nature of this work does allow of a permanent completion, this same nature involves an expenditure annually for maintenance and repairs; the probable sum of this, as nearly as can be estimated in this case, is $4,000.

Amount that can profitably be expended during fiscal year 1879–'80, $20,000.

2965 No revenue collected and no statistics to show amount of commerce or navigation that would be benefited by completion; the completion would, it is confidently believed, create a considerable amount of both.

No abstracts of proposals or abstracts of contracts, the work being done entirely by the United States, with all purchases in open market.

I have the honor, sir, to remain, very respectfully, your obedient servant,

JAS. W. CUYLER,
Captain of Engineers.

Maj. W. P. CRAIGHILL,
Corps of Engineers, U. S. C.

2

UNITED STATES ENGINEER OFFICE,
Baltimore, Md., March 15, 1879.

MAJOR: I have respectfully to submit the following report of operations on the Upper New River, Virginia, for the season of 1878, the period of time so covered extending from July 1, 1878, to which date my annual report of operations for 1877–'78 brought up the record to October 15, 1878, when all operations whatsoever were brought to a close.

After July 1, the work of completing the then working section, Falls Branch, by completing its two upper subsections, Bucks Falls and Egypt Falls, was continued, as previous to that date. The monthly reports set forth fully the difficulties and disappointments attending this work, all delaying the completion of it till August 20, far beyond the estimated date for completion. The length in river of this Falls Branch working section aggregated 1 mile, over which almost continuously work of some kind was done. Next, minor obstructions at Egypt Ford, 1/4 mile farther up stream, and at Woolwine's Island, 1 mile beyond latter, were removed, and the work completed hereat (for localities, vide survey map of 1872). August 21, also, was begun the work at the Peak Creek section, 4 1/2 miles above the Falls Branch one. For a detailed description of this new section and the special difficulties 2966 of its work, I respectfully refer to the monthly reports.

The position required a large amount of work of a preparatory nature; indeed, this was the main amount, and it was accomplished; no large amount of work in addition was required to complete the section, with a channel 30 feet wide in the lower subsection of 2,900 feet of river length, and 20 feet wide in the upper of 3,600 feet, a total length of river of 6,500 feet covered by the obstructions. On the 13th of September, while the above work was not entirely completed as above indicated, a freshet unprecedented—27 feet high at Peak Creek—unexpectedly and abruptly terminated the season's operations, by washing away and destroying the camp with its plant for the work, and greatly endangering the lives of all the working force. Though this flood ran out rapidly, the river until December, when winter froze it tight, kept much too high for any operations. After the flood, examinations were made at all the several working sections to determine the effects of the flood upon the works, the results of which have been submitted to you in a special report. The detail maps of the season's operations completed in the office, the property collected together and put in repair, and, finally, all boated down to Hinton, W. Va., at mouth of Greenbrier River, a distance of 84 miles, to which point, under your decision, operations were to be transferred in future as a base. Everything was closed up by October 15.

Appended are detailed exhibits expressed in figures; these show results satisfactory and gratifying in the improvement made over the corresponding figures of the season of 1877, due to a larger force, better organization, and adequate preparations, made in advance of beginning work, both as to the aggregates of work done and the several details of the same, the same general plan of operations being continued in both years. In no case did the preparations made the previous winter fail to meet their designed purpose.

The two bateaux built by informal contract drew but 5 inches of water, light, and with 3 tons load but 15 inches, answering entirely to the requirements of moving the force, stores, &c., from camp to camp, as also for reconnaissances, examinations, 2967 &c.; the craneboat, though she could not be used as much as was expected, owing to the obstructed channels rendering it impossible often to get her into position, lifted 2½ tons on a draught of 6 inches of water, with her legs or spuds down. This device did admirably, a slight change, only practice pointed out, was needed in decreasing the outward spread from sides of boat of these spuds. The stone and gravel boats, drawing 6½ inches light carried from 3 to 5 tons at a load on 16 inches of water, and, notwithstanding their weight, due to their solid construction, and the inevitable difficulty of handling such a style of boat in such a river as this, yet proved their efficiency, and went through a very trying (on them) season without any repairs being put on them; to make the plant on this line as perfect as it is possible to make it, they but require to be supplemented by a fleet of smaller boats—large strong canoes built with knees—carrying from ¾ to 1¾ tons on 12 inches of water, for use in the worst places.

The use of the churn-drill was introduced, but successfully only exceptionally; it was too unwieldy for one man to manipulate in such water, and experience confirmed that the jumper, with the 2-inch-diameter holes (for powder), first started with, was the best and cheapest system of drilling. Deeper holes, 3.75 feet (average) against 2.9 feet in 1877, were used, as it was found absolutely necessary to go below the grade of bottom as laid out, so as to get at completion the required depth; thus with an average charge (of powder), less than in 1877, 0.54 pound and 0.65 pound, more rock was moved per blast, 1 yard (cubic) against ¾ yard. Though considerably more labor was thus involved, yet the work per drill per day (average) increased from 9.75 feet, 1877, to 12.78 feet, 1878. Giant powder No. 2 was also introduced, and with such successful results as to indicate the advantage of using it almost exclusively in future work, provided proper arrangements be made, in Baltimore, in advance, to supply it regularly in small

quantities at a time. With this, 1¼-inch-diameter holes were used as ample. and only ⅓ pound cartridges (average); by it so used the rock was so riven along the seams that it could be easily hoisted out in large blocks by the craneboat; larger holes or
2968 cartridges were disadvantageous as pulverizing the rock too much; of course, with this explosive, good judgment in its use is indispensable to produce good results; not unfrequently, however, in this work, if the rock is without seams or planes of stratification, the ordinary blasting-powder will do the desired work.

With the satisfactory results above noted accomplished, it may be further added that these were accomplished in the face of an unfavorable season for river work; it did not fairly open till the last part of June, and after July 1 comprised but 57 days on work proper, against 60 such days in 1877, beginning then July 23 and closing October 11. The appended plotted gauge-readings show, too, that the river in 1878 did not fall below—6½ inches on gauge, and the average stage for the season was not less than—3 inches, with three distinctly marked high freshets, entirely suspending operations for their continuance of 2 or 3 days, while in 1877 the stage was as low as—13 inches, with an average of—8½ inches, and but one freshet of note. The bearing on the work of this stage for 1878, higher by 6 inches all through, and about 4 inches above the ordinary summer low-water stage, is best appreciated in considering that with a gauge-reading of +10 inches, work is very difficult; and with +18 inches absolutely impracticable, so that but small limits as to stage of river are afforded for advantageous working.

A study of the readings on the gauge-pegs established at each camp, as the work progressed up stream, but all carefully connected with and referred to the initial peg near railroad bridge, shows some anomalous features, due, it is believed, to special local conditions predominating at each locality; on no gauge did synchronous readings give corresponding levels for the water surface, the differences being as small as ⅜ inch and as large as 5½ inches, and apparently not governed by any period or other continuous and distinct law or ratio, but subject to unaccountable fluctuations; these suggest the difficulty of maintaining the same continuous grade for the bottom, when, in the progress of the improvement, long stretches of river came under treatment.

2969 To summarize: 13½ miles of river have been improved, at a round cost of $1,220 per mile; the last work—at Peak Creek Shoals—being at the obstruction which more effectually than any other, in the whole line of 19 miles up from initial point—railroad bridge—originally projected for improvement, estopped navigation in the low-water stages; the map shows this, the natural channel running for ¾ of a mile over a gravel slope underlaid by flat rock no lower than 1 foot, with the river over 400 yards wide, and most of its water in the deep pools barred by ledges on the other (easterly) bank. As was to be expected, 4 to 6 inches of water was often alone available, and no loads at all could get over; add to this a fall of 13.479 feet in the 6,661 feet of obstructions in bed (the survey of 1872 gave 14.80 feet fall, but the new leveling is believed to be the correct one), and the difficulty and importance of the section demonstrate themselves.

The freshet of September 1878, undoubtedly went to impair much the improvement made, involving an expenditure of from $2,000 to $3,600 to do over work once completed; but with this, even, there has been a decided betterment of navigation effected. The fact, however, originally set forth must not be lost sight of—that if any marked benefit is to accrue from the improvement it must be extended up 5 miles—to make the 19 miles first projected—or to Mac's Creek, at a cost of $7,600 more. This point is in this region the down-stream boundary of an extensive and rich mineral-producing district, which is the main interest to be served by the improvement, and which alone can and would inaugurate fully use of it when once made. To utilize, then, the work already done commensurately with its cost, necessitates as immediate a completion to Mac's Creek as possible.

A review of two seasons' operations establishes certain general points, which seem to call for consideration here. The practicability of the original project has been fully proven, with the modification of abandoning the idea of selecting the present natural sluices to patch up, not only for the contemplated steam-navigation, but even for the bateau navigation and rafting.
2970 It is necessary, in my opinion, to adopt a more general and radical method to effect a permanent improvement than has heretofore been tried. With this in view, I recommend a free use of dams to collect into pools the water, which constructions should be much more elaborate than any heretofore attempted. Further application of the approved formula convinces me that 900 cubic feet per second is the maximum discharge of the river to be calculated upon in the yearly low stages. Generally, as low as 700 feet only will pass. The worst places invariably are where this constant volume discharges through a section enlarged by widening of the low-water bed. The mere rock ledges, per se, form a minor type of obstructions, as always they have above and below them pools more or less deep, and blasting through them readily gives a good sluice with regular grade. The velocity is certainly hereby injuriously affected; but low regulating dams or long training walls below always can be put in to better dis-

tribute, and thus rectify this induced obstacle to navigation. With the shoals and rapids the case is different. Here the simple go-ahead work of blasting down to a depth and clearing out obstructions is ineffective, as by as much nearly as the bottom is so lowered does the surface fall shortly afterwards. The supply of water must, firstly, be augmented by going up to the very head of the obstruction, probably 1, 2, or 3 miles up, and constructing the water-way by building out bodily from the banks low but solid dams, followed down stream by guide-walls. In such structures I should use largely brush in mats or bundles; for while the river does not carry in it much sediment, and the dams would generally find rock to rest on, yet it would allow of broad bases, and would make thus not only a cheaper but a more water-tight dam than rock alone.

I should project for future work more construction of this kind, much less blasting.

The new system, more like to a slack-water system, would probably entail a cost beyond that of the original estimate for this improvement, by reason of the greater quantities of work involved. The work, however, can be, and has been done, done at figures below that estimate. The proposed system would be un- 2971 questionably slow of execution, too slow for those requirements other than the engineering ones; the main dams, all requiring correct location, would necessitate a study of and acquaintance with the river throughout the year—a residence on it, by the engineer in immediate charge. In this country, where to move from point to point, to transport supplies, &c., is slow work at best, it is impossible for the engineer to properly manage works spread over any considerable stretches, and yet in any extended operations, to attain the desired execution, such spreading out is necessary, as 100 men to a locality and camp are about the advantageous working maximum. On this basis, working on the present plan, not more than $18,000 can be expended in one season, so short are these. Every preparation must be completed before work actually begins, as also the essential duty of examining and locating by permanent marks the works proposed for that season; this would require the maintenance of a small permanent party making surveys, maps, &c., and a large quantum of labor and exposure for the engineer.

For the river from Hinton up to Sifford, 64 miles, the open-river system of improvement will, I think, be found to be but partially applicable; the dimensions of the river and of the main falls will necessitate the construction, at these latter, of locks and dams; with the open sluices, some system of towing up ascending boats, by cables on the bottom, the motor being steam or air, located on the banks, or better, on large floats fixed in the

still upper pools, will, in my judgment, be found essential. The main feature of the present plan, that of low constructions, should in all cases be held in practice, as far as practicable. Experience, as developed by the universal fate of the work of the late Confederate States on this river (though this now seems to have been injudiciously located and poorly built), is adverse to anything like rigid structures, such as large timbers bolted down to the bed-rock, interfering with the free discharge of the waters, in the sudden and great freshets incident to this river, and which, as the country towards its headwaters becomes stripped of its forests and gradually opened to cultivation, must be looked
2972 for more frequently and of greater size, with periods of years to elapse.

That the proposed improvement will be of real and decided local benefit, I consider now proven. It, and it alone, can and will afford an adequate outlet for a region good agriculturally; and with ascertained workable mines of the ores of lead, zinc, coal, and iron, and a considerable lumbering district all favoring the building up of local manufacturing interests, an outlet alone is needed to put in motion at once a considerable and increasing trade. Statistics on these heads, in the present condition of things, it is impossible to give, as not existing. I have the honor, sir, to remain, in conclusion,

Very respectfully, &c.,

JAS. W. CUYLER,
Captain of Engineers.

Maj. W. P. CRAIGHILL,
Corps of Engineers, U. S. A.

TABULAR STATEMENT OF WORK DONE

Average force worked during season, men	number	102
Working days in season, on work, men	do	57
Rock excavated, moved (by boats), and built into constructions, or wasted, cubic yards		1,940
Gravel excavated, moved (by boats), and built into constructions, or wasted, cubic yards		1,092
Cost of rock work, as above specified	per cubic yard	$2.20
Lead, in boats, from 50 yards to 200 yards.		
Cost of gravel work, as ditto		$0.61
Amount of constructions	linear feet	2,325
Average base, 11 feet; height, 433 feet; slopes, 1½ B to 1 P, and 1 B to 1 P.		
Holes drilled	linear feet	8,734
Average depths of holes	do	3.75
Average depth of holes drilled per day, per drill, 10 hours	do	12.78
Blasts fired	number	2,219
Misfires	do	51
Holes abandoned	do	226
Ratio of misfires to blasts	per cent	2⅛
Average charge powder, per cartridge	pounds	0.54
Average charge dynamite	do	0.33

Average rock moved per blast	cubic yards	1
Cost complete of pitch-bag cartridge (cartridge 15 inches long over all, 13 inches of powder, 1 quart tar to 2 gallons pitch-mixture; diameter, outer, 1¾ inches, full)		$0.175
Explosives used, powder	pounds	1,275
Explosives used, dynamite	do	235
Fuse used	linear feet	13,182
Fuse length, average per cartridge—4 minutes' time	do	5.8
Cost of commissary department per day, per man	cents	17⅛

Ration per day: 1 pound pork, 2¼ pounds cornmeal, 1.08 pounds sugar, 5 pound coffee, vegetables.

2973 REPORT OF MR. A. M. SCOTT, ASSISTANT ENGINEER

UNITED STATES ENGINEER OFFICE,
Charleston, Kanawha County, West Virginia, May 26, 1879.

COLONEL: The following report on the improvement of New River, immediately above Hinton (mouth of the Greenbrier), from the beginning of operations in September last to date, is respectfully submitted.

In compliance with your instructions, dated Hinton, August 23, 1878, received through Lieutenant Turtle, I went at once to that place to estimate and arrange for starting the work. Your instructions were, in effect, to plan to do the least possible at any one point compatible with the navigation of the steamer then building at Hinton by the New River Steamboat Company, so that as much of the river as possible might be gone over during the low-water season.

I found, by conferring with the directors of the company, that they were anxious to have improvements made as soon as possible that would enable them to run their boat up to the mouth of Lick Creek, about 22 miles above Hinton. This would open to navigation considerable fine farming country, and practically connect with the important Tazewell County road. As the small appropriation could not possibly be applied to advantage over a greater distance, I limited my investigations to that point, and it was finally thought best, owing to the lateness of the season and the need of economy in applying the money, not to attempt anything last fall above the foot of Bull's Falls, and a project and estimate for opening a preliminary channel up to that place (11 miles above Hinton) were submitted as soon as possible, and approved by you in letter dated September 5.

As to a description of New River above the mouth of the Greenbrier, the susceptibility to improvement for steam navigation, the characteristics of the beautiful and promising country through which it runs, I can add nothing to your quite full reports of December 1872 and January 1873, printed as Appendix T 29, of the Chief of Engineer's Report for 1873.

The work, as planned and partly carried out last season, consisted principally of blasting a channel 50 feet wide and about 2 feet deep at low-water, through the solid ledges of which 2974 the shoals are mainly composed. There were also many large detached pieces and bowlders to be removed either by a crane-boat or blasting, or both, and more or less smaller stone and gravel, best managed by hand.

The following is an abstract of the project and estimate approved by your letter of September 5:

For a craneboat	$600.00
For 1 batteau	75.00
For 3 skiffs	75.00
For tools and blasting material	450.00
For labor, including foremen, to be expended in blasting and removing by hand solid rock and loose stone at the different shoals, viz:	
Between the landing at Hinton and head of Greenbrier Shoals (mostly solid rock)	1,375.00
Pack's Ferry Shoals (bowlders)	85.00
Deer Lick and Blue Stone Shoals (bowlders and solid-rock)	530.00
Land Crafts Ford and Shoal (solid rock)	900.00
Buffalo Shoal (bowlders and solid rock)	165.00
Gardner's Ledges (solid rock)	490.00
Ellis Shoal (bowlder and solid rock)	245.00
To operate craneboat 35 days, with a force of 11 men, including foremen, at $18 per day	630.00
For blacksmithing	125.00
For superintendence and contingencies	800.00
Amount of estimate	6,545.00

Arrangements for beginning work, the procuring of tools, boats, blasting materials, &c., were made at once, and a force of hands got to work on the shoals between the landing and the foot of Greenbrier Shoal on September 7.

Operations were a good deal delayed by the unprecedented rise in the river, which on September 13 reached 20.20 feet above low-water at Hinton. At the mouth of Blue Stone River, 5 miles above, its highest point was 23.7 feet above low-water. This was from 5 to 6 feet higher than ever known before. It did much damage in the valley. At Upper or Old Hinton 16 buildings, several of them good frame houses, were carried away. The sawmill of Mills and Company, the only one then in operation in the place, was also seriously damaged.

The damage to the mill delayed us considerably about the building of the craneboat, and we did not succeed in getting it ready for work till October 12. The boat, as built, overran the estimate, costing, complete, $730. It is 48 by 17 feet, rigged with a good double-geared crab, capstan, spuds, and a strong four-2975 pronged grapple of 5 feet reach. It proved to be well adapted to the work. Both it and the smaller crane sent down from the upper river did good service, and will be indispensable in future operations.

The boats, tools, camp equipage, &c., that had been in use by Captain Cuyler on the upper part of the river were received at Hinton October 13. As stated, the most of the work consisted in blasting. This was all under water, generally in a current so swift that breakwater-dams were necessary and could only be carried on to advantage in low, clear stages. The season was very unfavorable; besides the big flood of September, the work was frequently stopped by small rises and bad storms. Owing principally to so much of the work being in the water a good deal of trouble was had in getting hands, particularly after the weather turned cool, and we were finally obliged to send a number from Kanawha to keep up the force. From 40 to 75 men, distributed at different points, were kept employed whenever the weather and water would permit, till November 27, when we were obliged to suspend for the season. Nothing has been done in the river since, except to place three additional ring-bolts and remove a few particularly troublesome stones at Greenbrier Shoals.

The work was carried out substantially as planned, but at a greater proportional cost, up to the head of Blue Stone, and a considerable amount was done on Land Crafts, the next shoal above. We were unable to do anything above that point.

The following is a statement of the rock removed at the different shoals measured in piles, side walls, &c., after excavation:

	Cubic-yards
Between Hinton Landing and foot of Greenbrier Shoal (estimated)	43
On Greenbrier Shoals	1, 754
On Pack's Ferry Shoal (estimated)	12
On Deer Lick Shoal	227
On Blue Stone Shoal	221
On Land Crafts Shoal	437
Total	2, 694

As appears, the greater part of the work was done on Greenbrier Shoals. This is a bad place, consisting of a series of solid ledges, beginning at the mouth of Greenbrier River and extending up 3,600 feet. The fall in this distance, Hinton gauge reading 3.30 feet per levels by Mr. Schoonmaker, was 7.20 feet.

2976 The work on this shoal exceeded my estimate a good deal, and there is still considerable work to be done on some of the ledges at straightening and widening the channel. The average cost not including outfit, boats, tools, &c., of all the excavation, measured in the pile, was a little over $2 per cubic yard. On Greenbrier Shoal, where the work was heavier and more connected, the cost was about $1.40 per yard.

Dynamite or giant powder was used almost exclusively, with very satisfactory results. It proved to be much better for the work than common powder.

The width of channel adopted, 50 feet, has been found by trial to be too narrow in places for the new steamer, and it will be necessary to increase it to about 75 feet at some points where the current is very swift or somewhat indirect. As a rule, though, it is thought 50 feet will answer present purposes.

As to slopes, depths, &c., but little was attempted at grading the chutes; and at several places it was found impracticable, under the plan pursued, to reduce the slope to less than about 1 in 130, and on a few of the ledges and falls it will be even steeper than this. With such grades, a depth of not more than about 2 feet (equal to an available low-water depth of about 18 inches) could be made; and this was finally adopted and worked for throughout.

By extending the side-walls somewhat, and the occasional use of short wing-dams (the rock excavated for channels was used for these purposes as far as it went), it is thought an available ordinary low-water depth, of from 20 to 22 inches, can be made at very reasonable expense.

Steamers will be obliged to "wind" through some of the chutes, and must be provided with steam capstans for this purpose. To facilitate the ascent of boats, the channel at the shoals was located next the shore as far as practicable; and at other points, where the current was too strong to be stemmed, ring-bolts were placed.

The steamboat company got their new boat, the Cecilia Miller,
ready to run by the middle of December, and have since made
several trips, during rather high stages of water, to the
2977 foot of Bull's-Falls. They are unable though, when the
Hinton gauge reads less than 3½ feet (corresponding to
2.60 feet above low water), to get above Land Crafts, the point
reached by our work last fall.

The boat is a well built stern-wheeler, 100 by 20 feet, provided with a steam boiler, 8 by 30 inch cylinders, a steam capstan, and good machinery throughout. She draws, when light and under way, less than 12 inches. She is thought to be rather too large for the navigation intended, but is considered as having fully demonstrated the practicability of making this part of the river navigable for small light-draft steamers.

The benefit afforded to the lumbering interest, which is considerable and increasing, should also be noticed. Many of the old batteau channels and "notches" are so narrow and crooked that rafting is attended with a good deal of risk; our channels being wide enough for the rafts, will render the passage of the shoals comparatively safe.

The desirability of continuing the improvement up to the mouth of Lick Creek as soon as possible, has been referred to.

This, as stated, would benefit quite an extent of good farming country, notably the rich Crump's Bottom and Indian Creek districts, and connect with the Tazewell, Mercer, and Monroe County wagon-road. Between Land Crafts and the mouth of Lick, the principal points to be improved, mentioned in order going up, are Gardner's Ledges, Bull's Falls, War Ford Shoal, Crump's Ledges, and McDaniel's Falls. War Ford, which has a fall of about 8 feet in 1,000, is the most serious. It is thought a permanent winding-line or wire-rope will be advisable at this shoal, and some arrangement of this kind is likely to be found expedient at other points.

The additional expenditure necessary to complete the improvement, as begun, to the mouth of Lick Creek, I have estimated roughly at from $18,000 to $24,000.

My duties on the Kanawha Improvement made it necessary for you to employ a local superintendent, and I take pleasure in acknowledging the efficient services of Mr. T. Schoonmaker, assistant engineer, who acted in this capacity during the working season. From notes and sketches made by Mr. 2978 Schoonmaker, maps (five in number) of the shoals where work was done were made on a scale of 1 inch to 100 feet.

During the progress of the work, temporary gauges, referred to approximate low-water, were kept at various points on the shoals; these were finally connected with permanent bench-marks.

Agreeably with your instructions, and by permission of Lieutenant Turtle, I went to Hinton on the 19th instant and turned the records, property, and work generally, over to Col. William Proctor Smith, assistant engineer.

Very respectively, your obedient servant,

A. M. SCOTT,
Assistant Engineer.

Maj. WM. P. CRAIGHILL,
Corps of Engineers, U. S. A.

SURVEY OF NEW RIVER, FROM LEAD MINES, IN WYTHE COUNTY, TO THE MOUTH OF WILSON CREEK, IN GRAYSON COUNTY, VIRGINIA

UNITED STATES ENGINEER OFFICE,
Baltimore, Md., January 10, 1879.

GENERAL: In the river and harbor bill of June 18, 1878, was a requirement for an examination or survey of New River, Virginia, from the Lead Mines, in Wythe County, to the mouth of Wilson Creek, in Grayson County. A survey had been previously made (in 1872) of the portion of the river from the Lead Mines down to the mouth of the Greenbrier, at Hinton in West Virginia, and in 1874, in connection with the surveys of the central water-line, a survey had been made of the part of the river from Hinton to the mouth of the Gauley, where the New and Gauley unite and form the Great Kanawha. The whole of the river, therefore, from the mouth of Wilson Creek to its mouth has been surveyed and mapped.

The New River rises in North Carolina and crosses the line between that State and Virginia nearly at the mouth of Wilson Creek, the initial point of the survey of 1878. After flowing in a general easterly direction from the mouth of Wilson Creek, it
turns down again into Alleghany County, of North Caro-
2979 lina, whence it soon re-crosses into Virginia. The point of
its junction with the Gauley, in West Virginia, is almost due north of the place of its crossing from North Carolina into Virginia.

The survey of this year was made in September by Col. W. Proctor Smith, lately of the Corps of United States Topographical Engineers. His report, dated January 10, 1879, and maps, prepared in this office, are forwarded; the report by mail, and the maps by express.

The portion of the river surveyed by him has a length of 62 miles. The survey was as complete as the money available allowed. Colonel Smith's report is quite full, and, together with the maps, gives much valuable information concerning the river, and the country through which it passes.

It appears, from a study of the regimen of the river, that there is an "abundance of water for any system of navigation that may be inaugurated."

Three estimates are presented for the improvements, as follows:

1. For a two-foot navigation for keelboats, with a channel not less than 30 feet wide, with tracking or towing paths at the falls and rapids	$115,000
2. For a steamboat navigation, with a channel 90 feet wide and not less than 3 feet deep, with a grade always less than 1 in 400, including 28 locks and dams	1,200,000
3. For a five-foot steam navigation	1,600,000

Very respectfully, your obedient servant,

Wm. P. Craighill,
Major of Engineers.

Brig. Gen. A. A. Humphreys,
Chief of Engineers, U. S. A.

Report of Col. Wm. Proctor Smith, Assistant Engineer

Baltimore, *January 10, 1879.*

Colonel: I have the honor to submit the following report of a survey of New River, made last fall, under your directions, and with it the following maps, viz: Seven sheets of map of New

River, scale 1 inch to 800 feet; one tracing of map of New River, scale 1 inch to 5 miles; eleven sheets of profile of New River, scale 1 inch to 400 feet; one sheet of profile of New River, scale 1 inch to 4,000 feet.

2980 The first maps exhibit the meanderings of the stream, its width and depth, as well as position of ledges, shoals, and falls, also topography. The second gives the outlines of the stream, on a smaller and more convenient scale. The third indicate the slope of the water surface, from the mouth of Wilson to the Lead Mines, on an exaggerated scale. The fourth, the same slope on one sheet, for greater convenience.

The maps are of such a scale, and the whole report written in such a manner, as to make the survey an extension of the one made, under your directions, by N. H. Hutton, in 1872, from the Lead Mines to the mouth of the Greenbrier.

Only so much of the river was surveyed as lies between the mouth of Wilson, in Grayson County, Virginia, and the Union Lead Mines, in Wythe County, Virginia, a distance by the course of the river of 62 miles.

An examination of this section was made, in 1874, by S. T. Abert, United States civil engineer, who described the country and river and reported thoroughly on its mineral and agricultural resources to the Chief of Engineers of the United States Army, January 7, 1875.

The party was organized and equipped on the 26th of August, at Wytheville, the county-seat of Wythe County, Virginia, 47 miles from the mouth of Wilson via Independence, the county-seat of Grayson County, Virginia. On the 28th of August it was in camp at Fox Creek, a few miles from the mouth of Wilson, ready for work, but owing to a rise in the river of 8 feet, operations were not commenced until the 2d of September, and finished October 1, at the Lead Mines.

Level and transit lines were run throughout the entire distance, determining the meanderings of the river, the slope of the water-surface, and the form and character of the obstructions. Numerous soundings were made, and sufficient topography taken for the purposes of the survey.

September the 12th, at the 18th mile, a sudden and unprecedented rise of the river took place; 18½ feet above ordinary low-water, and 7½ feet higher than the great flood of May 1840. At Samuel Cox's mill, below Peachbottom Creek, the rise was 22 feet.

2981 New River is formed by two tributary streams, which rise in the mountains of North Carolina and unite on the border of Virginia. The North Fork rises in Ashe County, the South Fork in Watauga County, and they flow together

4 miles above the mouth of Wilson, the initial point of this survey. From the latter point the river runs between the different ranges of the Blue Ridge and the Alleghany Mountains, in an easterly direction for 22 miles, and thence northeasterly to the terminus of the survey. The headwaters are 2,500 feet above tide-water; the country mountainous, the roads rough and sometimes impassable.

Throughout this distance, except where the river flows through the mountains, the valleys present some bottom-lands in places from one-half to three-quarters of a mile wide. The hills bordering on the river, however, are cultivated to their very summits.

Beginning of the mouth of Wilson, with a width of 300 feet and an average depth in the pools of 4 feet, the river gradually widens to 1,000 and 1,100 feet, and contracts again to the width of 450 feet, and an average depth in the pools of 5 feet at the Lead Mines.

Between the mouth of Wilson and the Lead Mines, several streams of no inconsiderable size empty into New River; among them, from the south and east, are Potato, Carolina-Elk, Meadow, Chestnut, and Crooked Creeks, and Little River; from the north and west, Fox, Saddle, Bridle, Peachbottom, Elk, Eaglebottom, Surgener, Brush, Snowhill, and Cripple Creeks, and Bull Run. All of these are mountain streams, furnishing from 25 to 200 cubic feet of water per second, at ordinary stages.

The drainage area of the river, within the limits of the survey, amounts to 900 square miles.

The river during a portion of the time of this survey was down to what the inhabitants call summer water, but they had known it 3 or 4 inches lower. The stream, however, was sufficiently low for the results of observation for velocity and quantity of water to be relied upon. The discharge indicated 2 miles below the mouth of Wilson was 1,200 cubic feet per second; and 1,800 cubic feet per second at a point 4 miles above the Lead Mines. These results show that the stream affords abundance of water for any system of navigation that may be inaugurated.

2982 As is usual with mountain streams, this river presents pools of comparatively deep and still water, separated by rapids, shoals, and falls. The water flows in the pools at about the rate of 1 mile per hour; over the rapids at about the rate of 3 miles per hour, and over the falls at about the rate of 5 miles per hour. The depth usually, over the falls, is from 9 to 12 inches; frequently, however, obstructions are formed below, by bowlders, which increase this depth to 2 feet.

Throughout this survey the pools are very short, whole miles being composed of ledges of gray and blue granite or slate, a few hundred feet apart, with very short pools between. Only five pools of a mile in length in this portion of the river.

The total fall in the river from the mouth of Wilson to the Lead Mines is 507 feet, or about 8⅙ feet per mile; a grade, although very heavy, that, if distributed equally throughout the entire distance, would not present an insuperable obstacle to the navigation of the stream.

The obstructions to navigation consist of solid flat rock on the bottom of the river, loose rock, gravel, and sand; ledges over which the water flows, those which scarcely disturb the surface, and collections of bowlders, showing many feet above the surface. The ledges encountered for the first 20 miles of this survey are composed of gray granite almost entirely; for the next 30 miles this same rock, called by the inhabitants gray river rock, largely predominates, interspersed with blue granite or slate, soap and sandstone, and some gneiss and ferruginous rock; for the last 5 miles the ledges are almost exclusively limestone. In a great many instances these deposits are distorted and upheaved in such a manner as to make their removal easy by blasting.

The following statement of the obstructions met with in each mile will give a good idea of the work necessary for the improvement of the river. The stream elsewhere than where these obstructions prevail affords a good navigation of 4 feet at low stages.

Commencing at the mouth of the Wilson, with an elevation above tidewater of 2450.9 feet, four shoals, over gray granite ledges, are to be found in the—

2983 First mile.—One at ford, 300 feet long, fall 3 feet; one 100 feet long, no fall; one 800 feet long, loose rock, fall 1.8 feet; and one 300 feet long at ford, fall 1.1 feet. Fall in the mile 7.74 feet.

Second mile.—Elevation 2443.16 feet, one shoal 100 feet long, no fall; slight rapids, flat rock bottom for 2,450 feet, fall 3.6 feet. Fall in the mile, 6.47 feet.

Third mile.—Elevation 2436.69 feet; Fox Falls, 2.55 feet in 150 feet, over 2 ledges of solid rock; one fall .6 foot in 75 feet; and rocky shoal 400 feet long, fall 1 foot. Fall per mile 5.76 feet.

Fourth mile.—Elevation 2430.93 feet; one slight shoal 2000 feet long; fall 1.4 feet. Fall in the mile 3½ feet.

Fifth mile.—Elevation 2427.3 feet; one shoal full of bowlders, 1550 feet long, 2.2 feet fall; one shoal 300 feet long, no fall; one fall .7 foot in 100 feet. Total fall 4.53 feet.

Sixth mile.—Elevation 2422.90 feet; one shoal 2000 feet long, bowlders at Cedar Island, flat-rock bottom, fall 6.88 feet; one shoal 300 feet long, fall 1.2 feet. Total fall 10.57 feet.

Seventh mile.—Elevation 2412.33 feet; one shoal 250 feet long, full of bowlders, fall .4 foot; slightly shoal for 2600 feet, bowlders, fall 3.9 feet. Total 6.91 feet.

Eighth mile.—Elevation 2405.42 feet; good water; one ledge, 1 foot high, extends ¾ way across the stream. Fall in the mile 2.83 feet.

Ninth mile.—Elevation 2402.59 feet; fall of 1 foot in 50 feet, good soundings over it, and there smooth water; one shoal 300 feet long, no fall. Total fall 2.83 feet.

Tenth mile.—Elevation 2399.76 feet; Osborne's Falls consisting of a succession of ledges, from 6 inches to 18 inches, over which the water falls nearly vertical; 1st fall 8 feet in 1200 feet, then pool 1100 feet long; 2d fall, 7½ feet in 600 feet, then rapids, with deep water, but full of bowlders, fall 1½ feet; 3d fall, 3¼ feet in 200 feet. Fall in the mile 20¾ feet.

Eleventh mile.—Elevation 2379.01 feet; good water for
2984 600 feet; balance wide and shoal; shoal between island and
mainland; gravel and loose rock. Total fall 7.36 feet.

Twelfth mile.—Elevation 2371.65 feet; one ledge 50 feet long; fall ½ foot; one shoal 500 feet long, full of bowlders; 2 ledges; fall 2 feet; shallow between island and mainland; one fall .8 foot in 50 feet; one shoal 800 feet long, full of bowlders, at Elk Creek Ford; fall 3½ feet. Fall in the mile 9.44 feet.

Thirteenth mile.—Elevation 2362.62 feet; bowlders at island; one 500-foot shoal at Horse Ford, flint rock and flat bottom; .6 foot fall; fall of 2½ feet in 250 feet; one shoal 450 long; fall .4 foot. Total fall per mile, 7.84 feet.

Fourteenth mile.—Elevation 2354.37 feet; one shoal 500 feet long; fall .6 foot; one slight shoal 800 feet long; fall 3 feet; one shoal 400 feet long; fall 1 foot. Fall per mile 6.8 feet.

Fifteenth mile.—Elevation 2347.57 feet; slight shoal 1700 feet long; fall 3 feet; river broad, shoal and rapids for 1450 feet; 3 feet fall. Fall per mile 7.41 feet.

Sixteenth mile.—Elevation 2340.16 feet; rapids and fall at beginning over blue granite or slate; fall 3 feet, balance good water, gravel bottom, some sand islands. Total fall per mile 5.68 feet.

Seventeenth mile.—Elevation 2334.48 feet; commences with good water; then shoal 1600 feet long at Doughton's and Middle Ford. Total fall 4.38 foot.

Eighteenth mile.—Elevation 2330.10 feet; at beginning shoal for 400 feet, at Taliaferro's Ford; fall 1 foot; then pool, and at end shoal 750 feet long; fall 3.3 feet. Fall per mile, 7.03 feet.

Nineteenth mile.—Elevation 2323.07 feet; good navigation. Fall per mile 2.71 feet.

Twentieth mile.—Elevation 2320.36 feet; good water. Fall per mile 6.82 feet.

Twenty-first mile.—Elevation 2313.54 feet; one shoal 1700
2985 feet long; fall 4 feet; one shoal 1600 feet long; fall 3 feet
Fall per mile 7.55 per feet.

Twenty-second mile.—Elevation 2305.99 feet; rapids for 300 feet; 1.3 feet fall; 2 slight shoals, 400 feet long each; balance pool. Fall per mile 5.79 feet.

Twenty-third mile.—Elevation 2300.20 feet; shoal 175 feet long; fall 2 feet; at Peachbottom Creek and Cox's Ford, slightly shoal for 2400 feet, water smooth and still. Fall per mile 4.94 feet.

Twenty-fourth mile.—Elevation 2295.26 feet; ~~rapids for~~ 250 feet, good water, however; balance pool. Total fall 6.2 feet.

Twenty-fifth mile.—Elevation 2289.6 feet; rapids for 100 feet; falls .4 foot; rapids and falls for 700 feet; 2.7 feet fall; balance good water. Total fall 5.19 feet.

Twenty-sixth mile.—Elevation 2283.87 feet; mouth of Little River, shoal for 800 feet. Total fall 2.61 feet.

Twenty-seventh mile.—Elevation 2281.26 feet; pool 2200 feet long; one shoal 300 feet long; ½ foot fall; pool 1200 feet long; balance flows rapidly. Total fall 5.16 feet.

Twenty-eighth mile.—Elevation 2276.10 feet; 900 feet shoal at Collins's old ford; fall 1.8 feet; balance good water. Fall per mile 4.17 feet.

Twenty-ninth mile.—Elevation 2271.93 feet; pool for 3300 feet; shoal for 2000 feet. Total fall 4.97 feet.

Thirtieth mile.—Elevation 2266.96 feet; shoals and pools about equal. Fall in the mile 6.44 feet.

Thirty-first mile.—Elevation 2260.52 feet; one shoal for 200 feet and another for 800 feet; fall 8 feet. Fall in the mile 3.24 feet.

Thirty-second mile.—Elevation 2257.28 feet; Island Ford, rapids for 700 feet; 2.3 feet fall; one small vertical fall and then rapids for 400 feet. Total fall 5¾ feet.

Thirty-third mile.—Elevation 2251.53 feet; rapids for 800 feet, then succession of short rapids and pools, and a fall of
1½ feet in 200 feet. Total fall 8.05 feet.
2986 Thirty-fourth mile.—Elevation 2243.48 feet; one shoal
1[illegible]00 feet long; fall 2 feet; one shoal 600 feet long; fall 1 foot. Fall per mile 4.31 feet.

Thirty-fifth mile.—Elevation 2239.17 feet; one shoal 200 feet in length; one shoal 1000 feet long and rocky. Fall per mile 3.35 feet.

Thirty-sixth mile.—Elevation 2235.82 feet; for 800 feet rocky and rough, but good water; one shoal 500 feet long. Fall in the mile 3.86 feet.

Thirty-seventh mile.—Elevation 2231.96 feet; good water. At end very wide; some sand islands. Total fall 3.37 feet.

Thirty-eighth mile.—Elevation 2228.59 feet; slightly shoal for 1200 feet; fall 1.6 feet one shoal 150 feet long. Fall per mile 3.38 feet.

Thirty-ninth mile.—Elevation 2225.21 feet; one shoal 500 feet long; 1.3 feet fall; balance good water. Total fall 4.6 feet.

Fortieth mile.—Elevation 2220.61 feet; good navigation. Fall per mile 5.31 feet.

Forty-first mile.—Elevation 2215.30 feet; one shoal 800 feet long at Garrison's Ford. Total fall 2.18 feet.

Forty-second mile.—Elevation 2213.12 feet; good water. Fall per mile .9 foot.

Forty-third mile.—Elevation 2212.22 feet; at end Boone's Ford; quite wide, shoal for 2400 feet, and in it a fall of 1 foot in 200 feet. Total fall 4.76 feet.

Forty-fourth mile.—Elevation 2207.46 feet, Bull Run Falls; one fall 1.2 feet in 450 feet and rapids 1600 feet long; then a fall of 1 foot in 400 feet, and rapids for 300 feet with 1 foot fall; then water flows over 3 ledges and rapids for 1700 feet, full of bowlders; fall 9½ feet. Fall per mile 16.1 feet.

Forty-fifth mile.—Elevation 2191.36 feet; 1 foot fall in 450 feet; pool 1300 feet long; 3 ledges and rapids, Mallory's Falls for 1700 feet; fall 12 feet; then pool for 1800 feet. Total fall 15.98 feet.

Forty-sixth mile.—Elevation 2175.38 feet; 3 falls and rapids; De Priest's 1900 feet long; fall 14 feet; then rapids for 1400 feet; Bartlett's Shoals and Rapids, at end, 1750 feet long; 6 feet fall. Fall per mile 21.15 feet.

Forty-seventh mile.—Elevation 2154.23 feet; 1750 feet
2987 full of rock and some gravel, but good water; 6½ feet fall;
one shoal 300 feet long, also some sand islands; balance pool. Fall per mile 10.45 feet.

Forty-eighth mile.—Elevation 2143.78 feet; good water. Total fall 1.3 feet.

Forty-ninth mile.—Elevation 2142.48 feet; good navigation for 2700 feet; then Dickinson's Shoals and Ford for 2600 feet; fall 5½ feet. Fall per mile 6½ feet.

Fiftieth mile.—Elevation 2135.98 feet; Dickinson's Rapids and Falls, a succession of heavy falls and rapids with three short pools. Fall for the mile 25.66.

Fifty-first mile.—Elevation 2110.32 feet; Surgener's Rapids and Falls; 3 falls and 3 short pools. Fall in the mile 22¾ feet.

Fifty-second mile.—Elevation 2087.57 feet; 700 feet lower portion of Surgener's Falls; pool 1800 feet long; fall 2½ feet; ends in Dowling's Falls and Rapids. Fall in the mile 15¾ feet.

Fifty-third mile.—Elevation 2071.82 feet; Grayson's Springs, Shoals, Rapids, and Falls; consisting of 4 shoals, 3 short pools, and 1 small fall at end. Fall in the mile 21.79 feet.

Fifty-fourth mile.—Elevation 2050.03 feet; fall ½ foot in 50 feet; shoal for 600 feet; fall 2½ feet; then the Gulf, consisting of rapids and two falls, in all 10 feet; very rough and full of bowlders. Total fall 11.65 feet.

Fifty-fifth mile.—Elevation 2038.38 feet; good water; Allen's Ferry. Fall per mile 10.80 feet.

Fifty-sixth mile.—Elevation 2027.58 feet; Early's Shoals, 500 feet long; fall 2.8 feet; pool 2500 feet long to beginning of Wilkinson's Falls. Total fall 1645 feet.

Fifty-seventh mile.—Elevation 2011.13 feet; Wilkinson's Rapids and Falls. Throughout this mile, water very swift, full of bowlders, loose rocks, and ledges entirely across the river. Fall per mile 28.05 feet.

Fifty-eighth mile.—Elevation 1983.08 feet; one shoal 800 feet long; fall 5 feet; one shoal 1100 feet long; fall 4 feet. Foot of Ewing's and Poplar Camp Mountains; limestone commences here. Total fall 16.40 feet.

2988 Fifty-ninth mile.—Elevation 1,966.68 feet; shoal for 2,600 feet; fall 6 feet; balance good water. Total fall 9¾ feet.

Sixtieth mile.—Elevation 1,956.93 feet; a ledge for 50 feet, and a fall of 1½ feet in 300 feet, but deep water; remainder of mile good water. Total fall 3.45 feet.

Sixty-first mile.—Elevation 1,953.48 feet; good navigation. Fall per mile 2.70 feet.

Sixty-second mile.—Elevation 1,950.78 feet; shoal 900 feet long and 3 ledges; fall 3 feet; 2 other ledges, but good water over them. The survey is 62 miles and 566 feet, but for convenience the feet are included in the last mile. The estimate is made for a lock and dam at the Lead Mines; the channel, however, between the island and the left bank of the river can be cut out to the proper width and depth, if desirable. Fall per mile 6.92 feet; elevation at top of dam 1,946.23 feet; elevation at foot of dam 1,943.86 feet.

After a careful examination of the map and profile, it is considered possible to improve the river to and including the 43d mile by the usual methods of excavation and lateral dams, with the exception of Osborn's Falls, where locks and dams will have to be introduced. Slack-water navigation will also have to be made for the next 14 miles through the mountains; from the base of these to the terminus, 5 miles, but slight work will be required.

The improvement of this portion of the river must be considered as a whole. It is not possible to divide it into sections and treat such separately with regard to lateral means of transportation, by railway or otherwise, for no such means exist.

Perhaps the best method of improvement that can be used in the wide, and of consequence shoal portions of the river, is to build

dams to concentrate a sufficient quantity of water into the channel,
and then to reduce the grade and velocity by the use of low regu-
lating-dams with sluices in them. At present this portion of the
river is not used at all for transportation purposes. Only the
ordinary canoe is seen, and it is merely used for ferrying and
2989 fishing. For keel-boat navigation a channel 2 feet deep and
30 feet wide, with tracking or towing paths at the falls and
rapids, will answer all purposes.

Rock excavation, removing bowlders, sand, and gravel, and building lateral dams will cost for the—

62 miles, at an average of $1,200 per mile	$74,400
20,300 linear feet of towing-path, at $2	40,600
Total	$115,000

The resources of the country are such, however, as to require a steamboat navigation. For this a channel 3 feet deep and 90 feet wide, with a grade always less than 1 foot in 400 feet, it is thought, will suffice. A channel less wide could be used, but the velocity would be much increased.

The locks and dams are to be of crib-work filled with stone, for which an abundance of material is found all along the river. The estimate for the locks is based on that of an 8-foot lift, with 4 feet depth on the miter-sills, costing $11,500; and of the following dimensions: walls, 11½ feet wide and 17 feet high; chambers, 25 feet wide and 120 feet long; total length, including lower wings, 175 feet; total width, 48 feet.

The dam corresponding to a lock of the above description is estimated as having a width of 16 feet, a front 12 feet high, and a back 8 feet high, with supporting walls 8 feet apart longitudinally. Top covered with 3-inch plank, and at the crest an ice-breaker 3 inches thick and 6 feet deep. Estimated cost per linear foot, $20. Each abutment is estimated as equal in cost to 55 linear feet of dam. The smaller dams are estimated at an average height of 6 feet, with a width at base of 12 feet.

The proposed locks and dams are shown in red on the maps. All shoals not otherwise marked are indicated to have sluice-ways cut through them. . .

Owing to the large rain-fall and extensive rises in the river during the progress of this survey, and the limited time to be devoted to it, it was found impossible to locate accurately the locks and dams mentioned as a part of the suggested system of navigation. Sufficient data, it is believed, however, was obtained to make the estimate submitted below, for a 3-foot navigation, nearly correct.

2990 TABLE SHOWING THE ESTIMATED COST OF EACH MILE FOR 3-FOOT NAVIGATION

First mile	$13,800
Second mile	4,400
Third mile	7,000
Fourth mile	4,300
Fifth mile	15,300
Sixth mile	36,500
Seventh mile	8,700
Eighth mile	700
Ninth mile	3,700
Tenth mile	59,600
Eleventh mile	12,300
Twelfth mile	10,400
Thirteenth mile	10,600
Fourteenth mile	15,700
Fifteenth mile	18,000
Sixteenth mile	10,600
Seventeenth mile	6,400
Eighteenth mile	10,500
Nineteenth mile	00,000
Twentieth mile	00,000
Twenty-first mile	16,900
Twenty-second mile	6,000
Twenty-third mile	11,500
Twenty-fourth mile	4,100
Twenty-fifth mile	7,000
Twenty-sixth mile	7,000
Twenty-seventh mile	2,100
Twenty-eighth mile	4,600
Twenty-ninth mile	7,100
Thirtieth mile	14,900
Thirty-first mile	11,200
Thirty-second mile	4,500
Thirty-third mile	$8,500
Thirty-fourth mile	9,500
Thirty-fifth mile	6,800
Thirty-sixth mile	3,200
Thirty-seventh mile	5,000
Thirty-eighth mile	3,000
Thirty-ninth mile	2,500
Fortieth mile	0,000
Forty-first mile	4,000
Forty-second mile	0,000
Forty-third mile	13,200
Forty-fourth mile	48,300
Forty-fifth mile	51,600
Forty-sixth mile	43,400
Forty-seventh mile	38,800
Forty-eighth mile	00,000
Forty-ninth mile	13,900
Fiftieth mile	75,800
Fifty-first mile	78,400
Fifty-second mile	44,100
Fifty-third mile	44,400
Fifty-fourth mile	35,000
Fifty-fifth mile	00,000
Fifty-sixth mile	57,800
Fifty-seventh mile	81,800
Fifty-eighth mile	50,500
Fifty-ninth mile	13,200
Sixtieth mile	2,500
Sixty-first mile	0,000
Sixty-second mile	21,100
Total	1,101,700

The amounts in the following table are included in the table for estimated cost per mile.

TABLE SHOWING THE ESTIMATED COST OF EACH LOCK AND DAM FOR 3-FOOT NAVIGATION

The abutments are regarded as a part of the dam, and included in its estimate, but the table shows the actual length of dam without abutments)

No. of locks	Location	Lift of lock	Cost	Linear feet in dam	Cost	Total
		Feet				
1	Osborne's Falls, tenth mile	8	$11,500	270	$7,600	$19,100
2	do	7	11,000	290	7,600	18,600
3	do	5	10,000	370	8,200	18,200
4	Bull Run Falls, forty-fourth mile	10	12,500	540	24,500	37,000
5	Mallory Falls, forty-fifth mile	7	11,000	700	15,600	26,600
6	do	5	10,000	670	13,300	23,300
7	De Priest's Falls, forty-fifth mile	8	11,500	450	11,200	22,700
8	do	6	10,500	350	8,300	18,800
9	Bartlett's Rapids, forty-seventh mile	10	12,500	890	22,200	34,700
10	Dickinson's Falls, fiftieth mile	10	12,500	590	15,400	27,900
11	do	6	10,500	510	11,200	21,700
12	do	9	12,000	430	11,300	23,300
13	Sergener's Falls, fifty-first mile	10	12,500	490	13,200	25,700
14	do	9	12,000	450	11,700	23,700
15	do	7	11,000	430	15,200	26,200
16	Dowling's Falls, fifty-second mile	9	12,000	450	11,700	23,700

TABLE SHOWING THE ESTIMATED COST OF EACH LOCK AND DAM FOR 3-FOOT NAVIGATION—Continued

No. of locks	Location	Lift of lock	Cost	Linear feet in dam	Cost.	Total
2991						
		Feet				
17	Grayson Spring Falls	6	$10,500	370	$8,700	$19,200
18	Grayson Spring Falls, fifty-third mile	7	11,000	330	8,400	19,400
19	Do	10	12,500	370	10,500	23,000
20	The Gulf Falls, fifty-fourth mile	10	12,500	490	13,200	25,700
21	Wilkinson's Falls, fifty-sixth mile	8	11,500	300	8,200	19,700
22	Do	9	12,000	660	15,700	27,700
23	Wilkinson's Falls, fifty-seventh mile	8	11,500	790	18,000	29,500
24	Do	7	11,000	650	14,500	25,500
25	Do	7	11,000	490	11,400	22,400
26	Wilkinson's Falls, fifty-eighth mile	8	11,500	340	9,000	20,500
27	Do	5	10,000	400	8,700	18,700
28	At Lead Mines, sixty-second mile	6	10,500	450	10,100	20,600
	Total					663,100

STATEMENT OF FOREGOING ESTIMATE

136,750 yards of rock excavation, at $2 yer yard	$273,500.00
10,121 yards of bowlder excavation, at $1.65 per yard	16,700.00
90,200 yards of loose rock and gravel, at 75 cents per yard	14,400.00
26,800 linear feet of small dams, at $5 per foot	134,000.00
28 locks and dams	663,100.00
Total	1,101,700.00

A lock-and-dam navigation of 5 feet from the mouth of Wilson to the Lead Mines, overcoming a fall of 507 feet in 62 miles, will cost—

Locks and dams	$1,524,000.00
38,000 yards rock excavation, at $2	76,000.00
Total	1,600,000.00

SUMMARY

Two-foot navigation	$115,000.00
Three-foot navigation	1,101,100.00
Five-foot navigation	1,600,000.00

The counties traversed by the river within the limits of this survey are Grayson, Carroll, and Wythe, in Virginia, and Alleghany in North Carolina. These, with Ashe, a portion of Watauga, and Surrey, North Carolina, are dependent upon the river for a commercial outlet.

Alleghany County produces wheat, corn, oats, rye, buckwheat, potatoes, tobacco, hay, wool, butter, sheep, hogs, cattle, horses, &c. The growth of tobacco is a new industry, and the product small as yet. There has been some improvement in the mode of farming and in the yield of products since the census of 1870. The Peach Bottom Copper Mine, located in this county, 8 miles from the Mouth of Wilson, 12 miles from Independence, and 3 miles south of the river, was worked before the late war, but is now idle. The Elk Creek Iron Furnace is located 6 miles from Mouth of
2992 Wilson. The ore used is found in extensive deposits on both sides of the river in Alleghany County, North Carolina,

and Grayson County, Virginia, about 7 miles from Mouth of Wilson. Mine and furnace both idle. The Collins Iron Works, about 16 miles east of Mouth of Wilson, in this county, are now idle. There are deposits of iron, and indications of copper, asbestos, mica, and other minerals in various parts of this county, which only require capital and enterprise for their development.

The productions of Ashe County, North Carolina, are very similar to those of Alleghany. Ashe has a larger area of improved lands and more wealth; the quality of the soil is also better; hence the agricultural products are larger though the same in kind. Ore Knob is located in this county about 15 miles above the Mouth of Wilson, and 3 miles from the south fork of New River. This mine is extensively worked by a Baltimore company, Mr. James Clayton, the principal proprietor, managing it. Only the pure copper is shipped to market, and that over a very rough and mountainous road at great expense. By increased facilities for transportation, the sulphur and peroxide of iron, now worthless and waste products, could be utilized.

There is also another vein of copper at Elk Knob, about 35 miles southwest of the Mouth of Wilson, in Watauga County; this mine is said to be very rich in its copper deposits, and some work is about commencing there for the purpose of testing their extent.

Hilton Furnace is situated in the county of Grayson, 10 miles west of the Mouth of Wilson. Extensive deposits of iron ore are found on both sides of the State line, and said to be of the finest quality. Furnace not now in operation.

There are also valuable soapstone quarries in Ashe County. One quarry near Jefferson, about 20 miles southwest of Mouth of Wilson, furnishes the supply of soapstone for the furnaces at Ore Knob, of a very superior quality and as white as alabaster.

Surry County, North Carolina, differs but little in its agricultural products from the other counties named, only in tobacco
and sweet potatoes, which are extensively raised here.
2993 Nothing was ascertained about the mineral productions of
this county.

There are extensive manufacturing establishments at Elkins and Mount Airy. At the former place, cotton and woolen establishments; at the latter, cotton, woolen, and tobacco factories, and also a factory for making ax handles, &c., and another for boots and shoes. Mount Airy is about 50 miles east of Mouth of Wilson, and 20 miles south of New River at the nearest point. Elkins is about 45 miles southeast from Mouth of Wilson, and 24 miles south of New River. Dr. William Hampton has opened a valuable copper mine near the mouth of Little River, in Grayson County, Virginia, but as yet it is not worked. He has also a soapstone quarry near by.

Grayson, Carroll, and Wythe are reported to be better agricultural counties than those described above, and their mineral resorces are wonderful. Cripple Creek, in Wythe County, is lined with iron furnaces. Snow Hill Branch, in the same county, has on it, near the river, large quantities of iron, zinc, and lead ores. It is deemed unnecessary, however, to give any further description of the resources of these counties, for the subject is thoroughly treated, as heretofore stated, by Colonel Abert and Maj. N. H. Hutton, in their reports, Appendix W of Annual Report of the Chief of Engineers of the United States Army for 1875, and Appendix T of Annual Report of same officer for 1873, to which attention is respectfully called.

I am indebted to Col. A. M. Davis, of Independence, Grayson County, Virginia, for much valuable information with regard to the resources of the counties in North Carolina.

Much credit is due J. M. Wolbrect, transitman, M. Cooke, leveler, and J. D. Hoffman, draughtsman, for the efficient performance of their respective duties.

Respectfully submitted.

Wm. Proctor Smith,
Civil Engineer.

Col. William P. Craighill,
Major Engineer Corps, U. S. A.

2994 *Government exhibit 36*

Report of the Chief of Engineers, Year 1880

(pp. 107–108; 676–681)

19. New River, from the mouth of Wilson, in Grayson County, Virginia, to mouth of Greenbrier River, in West Virginia.—This improvement was commenced in the summer of 1877 on the section of the river just above New River Bridge, in Pulaski County, Virginia, the crossing of the Virginia and Tennessee Railroad, and continued in the low-water season of 1878. It is for the benefit of the bateaux now in use and for very light steamboats, and consists in giving a depth of channel of about 2 feet at low-water, the width to vary from 30 to 50 feet according to location and direction. This plan involves the blasting under water and removal of ledges and loose rock, placing the debris in wing-dams and training walls, excavating through gravel shoals and placing the material in the hearts of the dams, and thus making sluices and chutes, affording a good waterway without too much increasing the velocity and volume of the water in them. The operations on this section covered about 13½ miles.

In September 1878, for special reasons, the working force was transferred to the section of the river near Hinton. The character of the work has been the same. The space worked over has been about 15 miles. A small steamer has been put on this section.

Before the improvement was begun navigation was suspended during low-water. It can be continued now at any season on the improved portions.

In the last river and harbor act, Congress specially appropriated, for the first time, for the portion of the river above the Lead Mines in Wythe County, Virginia, thus extending the area of operations.

The total amount expended up to June 30, 1880, has been $41,916.74, with the results as stated above.

The last appropriation of $24,000, of June 14, 1880, will be expended according to the plan already indicated: $12,000 on
2995 the Greenbrier or lower section, over about 8 miles of new
work, and in perfecting some of the old, about 20 miles in all; $7,000 on the middle or New River bridge section, as high up, it is hoped, as Mac's Creek, about 19 miles from the bridge; $5,000 on the upper section, where the work will be entirely new and its limits cannot be accurately defined at present.

The appropriation of $24,000, asked for the year ending June 30, 1882, it is proposed to apply in the same proportions to the several sections of the river as this year.

July 1, 1879, amount available	$16,304.48
Amount appropriated by act approved June 14, 1880	24,000.00
	$40,304.48
July 1, 1880, amount expended during fiscal year	16,221.22
July 1, 1880, amount available	24,083.26
Amount (estimated) required for completion of existing project	205,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1882	24,000.00

G 19

Improvement of New River From the Mouth of Wilson, in Grayson County, Virginia, to Mouth of Greenbrier River, in West Virginia

The full title of the last appropriation for this river is the following:

Improving New River from mouth of Wilson, in Grayson County, Virginia, to mouth of Greenbrier River, $24,000, of which sum $12,000 shall be expended in the continuation of the work from the mouth of Greenbrier up, $7,000 in the continuation of the work formerly prosecuted on the river in Wythe County, and $5,000 between the lead mines, in Wythe County, and the mouth of Wilson, in Grayson County.

The appropriation is divided into three parts. The general plan of improvement adopted has been for the keel-boats now in use on the river, viz, to give a depth of channel of about 2 feet at low-water, the width to vary from 30 to 50 feet, according to location and direction. This plan involves the blasting under water and removal of ledges and bowlders, placing the debris in wing-dams and training walls, excavating through gravel shoals and placing the material in the hearts of the dams, and thus making sluices and chutes affording a good water-
2996 way without too much increasing the velocity and volume
of the water in them. All this work has been so irregular in character as to lead to the rejection of the contract method of doing it, and to the adoption of the method of procuring materials and labor by open purchase and hire as needed.

The first appropriation for this river was made August 14, 1876, and was for $15,000. Subsequent grants, including that of June 14, 1880, $24,000, have amounted to $66,000. The first work undertaken was in the summer of 1877, under the immediate supervision of Capt. James W. Cuyler, Corps of Engineers, on the section of the river above the crossing of the Virginia and Tennessee Railroad, in Pulaski County, Virginia. The working season on this river is necessarily short, being limited to that of low-water and warm water, as most of the work is best done by men standing in the water. Captain Cuyler's operations were successfully prosecuted in the summer and early autumn of 1877, resumed in 1878, and continued until the severe freshet of September, 1878, which caused a considerable loss of property and some damage to the unfinished portions of the work. The details of Captain Cuyler's work are fully stated in his reports in the Annual Reports of the Chief of Engineers for 1878 and 1879.

In August, 1878, it was decided to commence work at once on the section of the river immediately above the mouth of Greenbrier, at Hinton, in West Virginia, as the indications of immediate usefulness of the improved river in that section seemed greater than in the section worked over by Captain Cuyler. The operations near Hinton were placed under the supervision of Mr. A. M. Scott, and vigorously continued until near the end of

November, 1878. The work was resumed in June, 1879, under Col. William Proctor Smith. The reports of Mr. Scott and Colonel Smith in the annual report for 1879, and hereto appended, give the detailed history of the progress made up to June 30, 1880. A steamboat has been built at Hinton and runs on the river, taking advantage of the improvement as high as it has been carried above that point, about 15 miles. The bateaux have much greater ease in navigation and can carry larger loads. Other incidental advantages are mentioned by Colonel Smith in his report.

2997 If the appropriation of 1880 had been available earlier, advantage could have been taken for operations in the whole working season. As much will be done as can be. Operations will be resumed at once on the Greenbrier section, and to expend the portion of the money thereto allotted in the law, in making needed improvements in the channel already commenced and in use between Hinton and War Ford Shoals, a space of 11¾ miles; in finishing War Ford Shoals; in improving that portion of the river from War Ford Shoals to the mouth of Lick Creek, about 8 miles of new work. The last work is subdivided into eleven parts at different points.

Nearly two years having elapsed since the cessation of work on the section above New River Bridge, in Pulaski County, it will be necessary, although it is reported as in good condition, to make a careful examination there before it can be determined what should be undertaken. No unnecessary delay will be had in entering upon the work in this section as well as upon the section from the lead mines, in Wythe County, to the mouth of Wilson, in Grayson County. Of this last part a survey was made by Col. William Proctor Smith in 1878. A report thereof may be found in the Annual Report of the Chief of Engineers for 1879, page 538, Appendix F. No work has been done upon that portion of the river, but what is appropriate is supposed to be the same as has been in progress on the other parts. The estimate for a 2 feet navigation for bateaux, was $115,000; for a 3 feet steamboat navigation, $1,200,000; and for a 5 feet steamboat navigation, $1,600,000.

The combined estimates for the completion of the improvement of the three sections of the river for navigation by bateaux and small steamboats amount to $205,000. The same amount is asked for appropriation at the next session of Congress as was just granted, viz, $24,000, to be divided along the river as in the law of June 14, 1880.

MONEY STATEMENT

July 1, 1879, amount available	$16,304.48
Amount appropriated by act approved June 14, 1880	24,000.00
	$40,304.48
July 1, 1880, amount expended during fiscal year	16,221.22
July 1, 1880, amount available	24,083.26
Amount (estimated) required for completion of existing project	205,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1882	24,000.00

2998 REPORT OF MR. WILLIAM PROCTOR SMITH, ASSISTANT ENGINEER

BALTIMORE, MD., *March 30, 1880.*

COLONEL: According to instructions received from you May 1, 1879, I examined the notes, maps, and reports of the New River improvement, in your office, in order to familiarize myself with my new duties.

On the 12th of May I went to Hinton, W. Va., and next day to Charleston, W. Va., to confer with Mr. A. M. Scott, assistant engineer in charge; returned on the 15th and formally took charge on the 20th, at which time Mr. Scott transferred the property.

From that time until the 3d of June, preparations were made for the season's operations, and a small force was set at work building walls in Greenbrier Shoals; not until the 16th, however, could any blasting be done, as the river was too high and muddy.

A full account of operations from the time I took charge to July 1, will be found in my reports for May and June.

From July 1 to November 8, 1879, the work was prosecuted with vigor, with a loss of only thirteen days out of a possible 113, and four of these were lost on account of delay in making the appropriation for 1879 available. The season was exceptionally good, so much so that I was not able to change one of the gravel-boats into a craneboat, which you authorized, as I wished the laborers employed on the work to make the change in bad weather, and thus keep them occupied.

The river remained nearly all of the time below the zero established last season and regarded as ordinary summer low-water, corresponding to a reading of 1.6 feet on the Hinton gauge. At one time the water was 7 inches below the point referred to. No one living on the river had ever seen it so low.

On the 8th of November 1879, I struck camp and moved to Hinton, and on the 30th finished all of the surveys.

The number of men employed averaged about eighty, and were divided into three parties; this was rendered necessary, as the

work was much scattered, at one time as much as 7 miles between
extremes. These parties were in camp, the men boarding
2999 themselves. I have two camps, one at the mouth of Blue
Stone River, 4½ miles above Hinton, and the other at the
upper end of War Ford, 12¼ miles above the same place.

There was no difficulty in getting laborers and wages were low, viz, $1 per day of ten hours, until the 15th September, at which time wages were increased to $1.25, and maintained so until the 1st of November, when $1.50 per day had to be paid for ten men five or six days, as the water was exceedingly cold. This was necessary, as it was desirable to get a channel, even though narrow, through War Ford Shoals.

The same dimensions of channel were adopted as used last season, 50 feet wide and 2 feet deep at ordinary low-water, which for this season would give about 18 inches at extreme low-water, and from 20 to 22 inches during an ordinary summer. In many places where there was a bend in the channel it was given a width of from 75 to 100 feet.

The material excavated was soft and had sandstone, loose rock, gravel, and large bowlders. The obstructions to navigation consist of a series of shoals from 100 feet to two-thirds of a mile in length, and the greater part of these composed of a series of ledges of solid rock, through which the channel had to be cut. So far as the work has progressed, comparatively small amounts of gravel and loose rock have been found, and no sand.

When it was practicable, the channel was located in the bateau "chutes" to save expense. In a number of instances, however, this would not answer and a straight line was adopted. In several cases the channel is crooked, as for instance, at the head of Greenbrier Shoals and the foot of Gartin's Ledges. To straighten these would have cost so much as to prevent much needed improvements beyond.

Upon the assurance of the owners of the steamboat that they could, and as they actually did, navigate these places, and at their urgent request, the work was carried on farther up the stream. The desire of the steamboat owners to get their boat through War Ford Shoals to Crump's Bottom, caused several points to be left in an unfinished condition, viz: Greenbrier Shoals, in which two walls should be built to check cross currents, the lower "chute" somewhat widened, and a small portion
of the lower ledge taken off. Some rock should be re-
3000 moved from the upper end of Deer Lick Ledges, and
possibly some gravel removed at the foot of Landcraft's
Shoals, as well as a slight wall at Tom's Run Ledges, and points of some of the ledges should be softened down between Hinton's Landing and the mouth of Greenbrier River.

The improvement, as now made, enables the steamboat to go up 12½ miles at ordinary low-water, and with a rise of 7 inches she can go, and has gone, up above Crockett's Store, 15 miles from Hinton.

The work is of great benefit to bateaux, enabling them to go through with a great deal of ease and to carry much larger cargoes than formerly, and, in fact, they can run now where it was utterly impossible before, owing to low water. Of these lines there are three, one to Bluestone, 5 miles, one to Crockett's Store, 14½ miles, and one to Lick Creek, 20 miles above Hinton.

It is also an advantage to the lumber business, as rafts can get through easily, and many hundred thousand feet have been taken down the stream this season from the region of the Bluestone.

The country is beautiful, with the usual river hills, the tops and sides of which are cultivated to a considerable extent, with here and there fertile bottoms. At the head of the improvement this season begins Crump's Bottom, which is 5 miles long and exceedingly rich.

Notwithstanding the heavy grade a large number of wagons, laden with agricultural products of a rich portion of Mercer County, daily uses a road which crosses the river by ferry just above Bull's Falls, and leads thence down the stream to the Chesapeake and Ohio Railroad at Hinton.

Going up farther, to the mouth of Indian Creek, another road is met, which leads, with a fine grade, to the Red Sulphur Springs and beyond, and as this celebrated watering place is only 6 miles distant, it would be a pleasant trip for persons wishing to visit it to take boat at Hinton, pass delightfully the few hours occupied in making the 16 miles in relaxtion from railroad travel and in viewing the beautiful scenery. Arriving at the point referred to, coaches could carry them to their destination.

The best road in the country, however, comes to and crosses the stream at the mouth of Lick Creek, 20 miles above
3001 Hinton. By this route nearly all of the marketable stuffs from the rich counties, Tazewell, Mercer, and Monroe, seek an outlet. Taking this into consideration, it is regarded as very desirable to push the improvement to that point next season, if possible.

With regard to the boat, it now, at low-water, makes trips three times a week to Bull's Fall, and, when there is a slight rise, extends them to Crockett's Store.

The machinery is somewhat too light for the dimensions of the boat, and it is in contemplation to either reduce its size and use the same machinery, or else let it remain as it is and increase the power.

There is no doubt about the steam navigation on this river being a success, for there is plenty of water, as the following observations for quantity, a few hundred feet above Bull's Fall will show, and all that is necessary is for it to be concentrated into one channel.

The quantity of water at the point referred to is 2,100 cubic feet per second at the extremest low-water, quite sufficient for any system of improvement.

Further, with regard to the resources of this country, it may be well to state that for miles south of and including Peter's Mountain, at the "Narrows" along the river, there is a large amount of brown and red hematite and specular iron ore.

A narrow-gauge railroad is now being constructed along the banks of the stream, and as it will cross at some point, as yet undetermined, the question of a draw in the bridge, or of a grade sufficient to allow the boat to pass under, will have to be looked into.

As giant powder or dynamite had been thoroughly tested the previous season, its use was continued with good effect. After the rock was blasted the stone was placed by hand on "jolly-boats" and carried to the walls, which were built with sufficient strength and height, but without regard to slopes. Wing-dams were built in a similar manner.

Ring-bolts, to which lines are attached to "wind" through the difficult "chutes," have been placed at frequent intervals.

From the tables, which give in detail much information
3002 with regard to the work, it will be seen that Bull's Fall has
a grade of 1 foot in 100 feet, and a current of 7 miles per
hour, and yet the boat "winds" through without difficulty. Owing
to the strong current it was very difficult to make the shelter-dams
stand in these falls. The work, however, was prosecuted with
energy in good weather and without accident. The successful
means employed in making this channel will be of great benefit
when similar falls, found above, are to be improved.

War Ford Shoal is 2,200 feet long, with a fall of 1 foot in the upper 1,000 feet, and 5.4 feet in the lower 1,200 feet. In the latter, which has a current of 4 miles per hour, it is thought that a wire cable may be used with advantage for "winding." The width of channel in the upper portion, as left this season, is only 30 feet; this will have to be given the proper width as early as possible. The velocity of the water in this section is about 2 miles per hour.

Through the main "chutes" at Garten's Ledges, Bluestone Shoals, and lower Greenbrier Shoals, the current is strong and grade heavy, but the boat has not experienced any difficulty in getting through.

To finish the work as now projected, from Hinton to the upper end of War Ford Shoals, will require $2,000.

From War Ford Shoals to the mouth of Lick Creek, 20 miles above Hinton, will require $11,000.

Beyond this point I have not sufficient data to make an estimate; it is not important, however, for the work cannot begin until a new appropriation is made, which will necessarily cause the working to be so short as to render it doubtful whether the improvement can be carried to Lick Creek, much less beyond.

In a good season it is thought that $25,000 can be advantageously expended on this improvement.

Detailed maps of the points worked at have been made on a scale of 100 feet to the inch, comprised in 9 sheets. Also one showing the readings of the water-gauge at Bluestone and War Ford during the working season.

A map of New River, from the steamboat landing at Hinton to the upper end of War Ford, 12¼ miles, showing the positions of the shoals and ledges, with appropriate references to maps in detail, on a scale of 800 feet to the inch, accompanies this report. 3003

The property belonging to the improvement is stored at Mr. M. Smith's, near Bull's Fall.

I am much indebted to Mr. T. Schoonmaker, superintendent, for valuable services rendered in construction, surveying, and mapping.

Respectfully submitted.

Wm. Proctor Smith,
Assistant Engineer.

Col. Wm. P. Craighill,
Major, Corps of Engineers, U. S. A.

TABLE SHOWING THE DISTANCES FROM STEAMBOAT LANDING AT HINTON, W. VA., TO FOOT OF SHOALS AND LEDGES, THEIR LENGTH OR WIDTH, AND DIFFERENCES OF LEVELS BETWEEN THE HEAD AND FOOT OF SAME, 1879

Shoal or ledge	Distance in miles	Length or width in feet	Fall in feet
Ledges between Hinton and Greenbrier Shoals	¼	5,940	4.95
Greenbrier Shoals	1½	3,700	7.20
Pack's Ferry Ledge	3½	200	0.70
Deer Lick Ledges	4½	200	1.83
Bluestone Shoals	4⅞	380	2.47
Landcraft's Ford Shoals	5⅛	2,950	2.20
Landcraft's Shoals	5⅞	1,900	4.05
Buffalo Shoals	7½	2,400	3.35
Barker's Shoals	8⅝	100	0.75
Gartin's Ledge Shoals	9	4,000	4.34
Ellis's Shoals	10¾	1,200	1.75
Bull's Fall	11⅛	300	2.70
Tom's Run Ledges	11⅜	200	1.70
War Ford Shoals	11¾	2,200	6.40

The readings of the temporary water-gauges, and during the season, were noted at the time the above levels were taken, and all found to be below the zero or ordinary low-water mark, except Ellis's which was slightly above.

Elevation of the mouth of Greenbrier River above tide-water — 1.352 feet
Elevation of the head of War Ford Shoals above tide-water — 1.406 feet

3004 TABLE SHOWING THE QUANTITY AND QUALITY OF MATERIAL EXCAVATED IN MAKING CHANNEL, 1879

Location	Solid rock	Loose rock	Gravel	Total
	Cub. yds.	*Cub. yds.*	*Cub. yds.*	*Cub. yds.*
Ledges between Hinton and Greenbrier Shoals	327	40		367
Greenbrier Shoals	743			743
Pack's Ferry Ledges	20	80		100
Rufus Pack's Bowlders	16			16
Deer Lick Ledges	27			27
Landcraft's Ford Shoals	523	350	173	1,046
Landcraft's Shoals	1,914		264	2,178
Buffalo Shoals	397	524	148	1,069
Barker's Shoals	85			85
Gartin's Ledges Shoals	577	222	371	1,170
Ellis's Shoals	5	474	28	507
Bull's Fall	775			775
Tom's Run Ledges	84			84
War Ford Shoals	3,071			3,071
Total	8,564	1,690	984	11,238

	Per cubic yard
Total excavation, including all materials	$1.60
Solid rock	1.72
Loose rock	1.00
Gravel rock	1.60

The gravel is high, owing to its having to be removed by hand, with shovels, in very swift water.

The quantities were obtained by measuring the main and wing walls, composed of the material excavated.

TABLE SHOWING DETAILS OF BLASTING, 1879

Number of holes drilled		6,843
Number of feet of holes drilled	feet	12,023
Average depth of holes	do	1.73
Average depth of holes (1½ inches) drilled per day per drill	do	13.35
Number of blasts fired		7,003
Number of blasts missed		160
Average charge of powder in each cartridge	pounds	0.383
Average loosening of rock for blast	yards	1¼

TABLE SHOWING SHIPMENTS FROM NEW RIVER, AT HINTON, W. VA., 1879

Tobacco	pounds	670,550
Wheat	do	623,311
Butter	do	22,796
Beans	do	15,582
Flaxseed	do	6,821
Wool	do	7,889
Feathers	do	650
Eggs	dozen	8,559
Lumber	feet	1,898,400

3005 *Government exhibit 37*

REPORT OF THE CHIEF OF ENGINEERS, YEAR 1881

(pp. 144–145; 904–911)

21. New River, from the mouth of Wilson, in Grayson County, Virginia, to mouth of Greenbrier River, in West Virginia.—From the mouth of Wilson, in Grayson County, Virginia, to steamboat landing at Hinton, Summers County, West Virginia, 1½ miles below the mouth of Greenbrier River, is 191½ miles. The appropriations have been made in such a manner as to divide this portion of the river into three sections as follows:

	Miles
Upper or Lead Mines	62
Middle or New River Bridge	43
Lower or Greenbrier	86½

Throughout this distance, the navigable channel originally consisted of natural chutes, through the ledges and shoals, of varying widths, rarely over 1 foot in depth, in some places so tortuous as to render navigation extremely difficult and dangerous.

The original project adopted for the improvement of these natural channels was to widen them to 30 or 50 feet, as might be required, and deepen them to 2 feet, and straighten such as needed it. This was for keel-boat navigation, the improvement, however, to be made in such a manner as to aid the work, should a greater depth and width be required in the future.

A small steamboat, draught 12 inches, when light, having been built at Hinton, in the fall of 1878, rendered it necessary to make the channel, in that section, 50 feet wide at all points, and in many from 75 feet to 100 feet, the depth of 2 feet being retained.

June 30, 1880, there was a channel, 50 feet wide and 2 feet deep, from Hinton Landing to Hubbard's Ripple, a distance by river of 12¼ miles, giving an outlet to the products of Mercer County, West Virginia.

3006 At the close of the season's work for 1880, there was a channel, of the same width and depth, from Hinton Landing to McDaniel's or Harvey's Falls, a distance of 17¾ miles, giving an outlet to the farmers and graziers of Crump's Bottom and the Indian Creek country. And, in addition to the above, 12 miles of improvement from New River Bridge to Peak's Creek, with a channel 30 feet wide and 2 feet deep, giving outlet for timber and farm products, but not available for iron or other ores, until Radford Furnace can be reached.

The appropriation for the fiscal year ending June 30, 1882, will carry the improvement on the Greenbrier division through Wiley's Falls, 26 miles above Hinton, passing the mouth of Lick Creek, 20 miles above Hinton, thus opening up the trade from Tazewell and other rich counties adjoining.

The appropriation for the fiscal year ending June 30, 1882, will carry the improvement on the New River Bridge division to Carter's Ferry, 33 miles above the bridge, and give an outlet to the iron from Radford Furnace, 18 miles above the bridge, to the ores from an iron mine 8 miles beyond, to Graham's new furnace and iron-works, the former 31 miles, and latter 33 miles above the bridge, as well as to two zinc mines in the same section.

The appropriation for the fiscal year ending June 30, 1881, will carry the improvement on the Lead Mines division to the "Gulf," 8 miles above the mines, giving outlet to charcoal and timber.

No appropriation for the fiscal year ending June 30, 1882.

With a channel, as now proposed, 20 feet wide and 2 feet deep, the estimate of $181,000 would be sufficient to complete it, but as that portion from Hinton to New River Bridge has to be made 50 feet wide, at a cost of about $2,000 per mile, the above amount should be increased to $275,000, and if it becomes absolutely necessary to use locks and dams for the improvement of some of the falls, this estimate will have to be further increased by the amount of their cost.

On the lower division there are 8 keel-boats, 6 tons each, 18 inches draught, loaded; one small stern-wheel steamboat, 30 tons, 18 inches draught, loaded, and another being built.

3007 On the middle division two keel-boats, of the same tonnage and draught as above, are in use carrying ores, and six more building.

On the upper division only canoes are in use. Many rafts on each of these divisions, but their number was not ascertained.

July 1, 1880, amount available	$24, 083. 26
Amount appropriated by act approved March 3, 1881	$24, 000. 00
	$48, 083. 26
July 1, 1881, amount expended during fiscal year, exclusive of outstanding liabilities July 1, 1880	16, 179. 09
July 1, 1881, amount available	31, 904. 17
Amount (estimated) required for completion of existing project	181, 000. 00
Amount that can be profitably expended in fiscal year ending June 30, 1883	25, 000. 00

G 21

IMPROVEMENT OF NEW RIVER FROM THE MOUTH OF WILSON, IN GRAYSON COUNTY, VIRGINIA, TO THE MOUTH OF THE GREENBRIER RIVER IN WEST VIRGINIA

The operations of 1880 subsequent to June 30 appear in detail from the following report of Col. W. P. Smith, Assistant Engineer, dated April 8, 1881:

BALTIMORE, MARYLAND, *April 8, 1881.*

COLONEL: I have the honor to submit the following report of operations on New River, Virginia and West Virginia, for the season of 1880.

A project for the expenditure of $12,000 appropriated for this work, from the mouth of the Greenbrier up, for the fiscal year ending June 30, 1881, was submitted to and approved by you early in July.

On the 26th I went to Hinton, W. Va., and commenced the work on the 2d of August, with a force of about 70 men, divided into two parties, under competent foremen. Later in the season another force was organized, composed of from 12 to 15 men, to make necessary improvements in the channel already made. The interval, from 26th July to 2d August, was used in getting ready for the work.

From August 2 to October 31 the work was carried on with good results; after that a party of 15 men was employed in trimming up the walls and getting out loose stone.

The latter part of the season being cool, the men dropped
3008 off considerably, reducing the general average for the whole time to fifty.

Out of eighty-nine working days only eight were lost; the gauge standing at or near zero, ordinary low-water never reading more than 1 foot above, nor 0.5 foot below.

The improvement of the former work consisted in building two walls in Greenbrier Shoals to check cross-currents and placing a ring-bolt at the head of the lower one; gravel taken out of the lower part of Land Craft's Shoal; stone removed from Garten's Ledges and Ellis Shoals; wall renovated at Bull's Fall; stone taken out, and channel widened at Tom's Run; width of channel increased from 30 feet to 50 feet in the upper 1,000 feet of War Ford Shoals, and on the south side a natural channel behind an island, 600 feet long, improved by blasting the rock at the upper and lower ends, and cutting off intermediate points; the steamboat now owned by an agent of the Standard Oil Company, which company is getting out a large number of staves in this section, will use this channel in high-water going up stream, the long "chute" to be used at all times for low-water.

This part of the work covers a river space of 12⅙ miles with a fall over the ledges and shoals of 44.09 feet, and with a combined length of shoals and ledges equal to 25,670 feet. This work is shown on the maps prepared the previous seasons.

The new work for 1880 consisted in opening a channel through Hubbard's and Sweeny's Ripples, three in all; Crockett's and Sweeney's Ledges, six in all; removing gravel from Indian Creek Shoals, also some loose rock, but not enough to classify, and

Crump's Ledges, five in number, composed of sound rock exceedingly hard, with iron pyrites running through it, rendering the drilling very difficult and expensive, making the average price for the season 20 cents more per cubic yard than last; the gravel, however, in Indian Creek Shoals was handled at small cost, reducing the average price to one-half what it was last season. One of the walls in Crump's Ledges will have to be extended to prevent washing of the banks; the weather got too cold to attend to it last fall.

3009. This work covers a river space of 5½ miles, with a fall of 10.54 feet over ledges and shoals and 6,460 feet of cutting through them, the shoals varying in length from 100 feet to 1,900 feet, the heaviest grade being less than 0.4 foot per 100 feet, levels taken with gauge reading at 0.5 foot above zero. For width or length, fall, distance from Hinton, and material taken out of shoals and ledges, reference is made to the tables.

The river is now open from Hinton Landing to McDaniell's or Harvey's Falls, a distance of 17¾ miles, with a channel 50 feet wide and 2 feet deep at ordinary and 18 inches at extreme low-water.

The actual amount of cutting through these ledges and shoals, in the entire distance, amounts to 6$1/12$ miles, with a fall over the same of 54.81 feet, levels taken with gauge reading nearly at zero; total fall 62 feet, averaging 3½ feet per mile.

Four thousand nine hundred and ten linear feet of new wall, averaging 8 feet wide and 3 feet high, were built, and 715 cubic yards of material put in old walls. Cost of solid rock $1.92 and gravel 71 cents per cubic yard.

Two and a half miles will carry the improvement to the mouth of Lick Creek, 20 miles above Hinton, a point which it is very desirable to reach to get freight from the rich counties adjoining, as fully set forth in Mr. A. M. Scott's report, May 26, 1879, and in mine March 30, 1880, forming a part of your annual report to the Chief of Engineers, United States Army, for 1880.

In this distance about $4,000 will have to be expended to get a channel through two falls, two ledges, and one shoal.

I would respectfully suggest that a careful survey of Neilly's or Shumate's falls and rapids, about 30 miles above Hinton, be made, with reference to a lock and dam at that point; they may possibly be improved by cutting a sluice along the left bank, but the survey should be made to ascertain its feasibility. Whole fall, 11 feet; 6 feet of this nearly vertical.

3010 Four lines of keel boats, eight in all, now run regularly on this part of the river, the improvement enabling them to carry two-thirds more freight than formerly; for instance, 1,500 feet of lumber used to be a load; now it is 4,500 feet.

The latter part of June you notified me that I was to assume control of the improvement of this river between New River Bridge, in Pulaski County, Virginia, and the lead mines in Wythe County, Virginia, for the continuation of which $7,000 had been appropriated, as well as the expenditure of $5,000 from the lead mines to the mouth of Wilson, in Grayson County, Va.

Accordingly, about the middle of August, as soon as the work from the mouth of Greenbrier up was well under way, I went to New River Bridge and examined the river to the mouth of Reed Island Creek, 26½ miles, with a view of getting data for making a project for the expenditure of the money appropriated for this section. That accomplished, I went to the lead mines and examined the river south to the foot of what is called the "Gulf," in Carroll County, Virginia, nearly 8 miles from the mines; then returned to Hinton and submitted project, as directed, for the improvements in these localities; was notified of the approval of the same September 15, and on 18th started for New River Bridge; got to work building boats and canoes 23d, and on October 4 commenced clearing out the channels made by Captain Cuyler, United States Engineers, during the seasons of 1877 and 1878, which had been injured to a considerable extent by the severe flood of September 14, 1878.

The principal part of this work, which extends from the bridge to Peake's Creek, 12 miles, was at Buck's Falls, where the supporting walls had been washed away and channel filled up; this channel is 30 feet wide and 2 feet deep for bateaux, with walls so arranged that it can be widened and deepened for steam navigation when desired.

The weather becoming cold the work was suspended on 1st November. The force having to be moved every few days, in three small boats, caused loss of time, and consequently increased the price of getting out the limestone rock to $2.10 and gravel to 95 cents per cubic yard.

Four hundred and thirty-eight linear feet of new wall
3011 was built, averaging 7 feet wide and 3 feet high, and 73
cubic yards of material put in old walls.

This work is shown on detail maps in your office, made by Captain Cuyler, United States Engineers.

The owner of Radford Iron Furnace, 18 miles above New River Bridge, as well as those of a furnace on Little Reed Island Creek, 26½ miles from the bridge, are anxious to send iron and ores down by bateaux; and, in addition, the following may be expected to ship: Forge at mouth of Little Reed Island Creek; Barren Spring Furnace; furnace near this belonging to Graham and Robinson; Bertha Zinc Works; Falling Cliff Zinc Works, to be started soon, and yet another, by a New York company, near the Bertha mine.

As only bateaux will navigate this stream for the present, the project submitted and approved calls for a channel 2 feet deep and 20 feet wide, which will allow rafts to pass as well as boats.

For further description of this improvement, reference is made to the following reports of Capt. J. W. Cuyler, Engineer Corps, United States Army, July 1, 1878, March 15, and July 3, 1879, forming a part of your annual report, for the same years, to the Chief of Engineers, United States Army.

These reports are referred to especially, as no new work was done this season, and all of the river gone over is minutely described therein.

From the lead mines up, it is proposed to make a channel as below, 2 feet deep and 20 feet wide, a width sufficient for bringing charcoal for the furnaces down in bateaux, and for rafts of timber, of which there is an abundance in this region; there are also large deposits of copper in Carroll County, which it is thought will be eventually mined and shipped over this route.

For 5 miles above the lead mines the obstructions in the river are about the same as described elsewhere; then the fall becomes very abrupt, as the mountains are here reached; these extend for 14 miles, which will necessarily make the work heavy for that distance.

For description of this section, reference is made to my
3012 report of a survey made of this part of the river, dated
January 10, 1879, contained in your annual report to the Chief of Engineers, United States Army, for the same year.

Owing to the lateness of the season, no work was done on this division.

As Foster's Falls, 37 miles above New River Bridge, offers such an obstruction to navigation as to prevent the lead mines and furnaces above from shipping their products down the river, it is respectfully recommended that a careful survey be made of them with a view to their improvement by locks and dams; "the fall is about 18 feet, over slate and limestone ledges, in 2,300 feet, with a short pool and a succession of ledges."

During the winter, the country in the vicinity of New River Bridge and the lead mines was explored in search of suitable timber for crane and other boats to be used on the works the coming season.

Much of the timber has been secured and boats are now being built.

Maps on a scale of 1 inch to 100 feet, comprised in four sheets, have been made, showing the details of the work on the Greenbrier division; also one exhibiting the readings of the water-gauge at War Ford.

Two maps showing portions of the river improved on a scale of 800 feet to an inch, one from War Ford to Harvey's Falls, 5⅔ miles; the other from New River Bridge to Peak's Creek, 12 miles, with appropriate references to detail sheets, accompany this report.

Tables explanatory of the work in detail, as well as others giving shipments from New River at Hinton Station, on the Chesapeake and Ohio Railway, and nine stations on the Atlantic, Mississippi, and Ohio Railway, are appended.

I am indebted to Charles F. Littlepage and Reuben Hurley for valuable assistance in the execution of this work, the former on the Greenbrier division, the latter at New River Bridge and the lead mines; their judgment and good management are to be commended.

3013

SUMMARY

From the mouth of Wilson, in Grayson County, Virginia, to steamboat landing at Hinton, Summers County, West Virginia, 1½ miles below the mouth of Greenbrier River, 191½ miles. The appropriations have been made in such a manner as to divide this portion of the river into three sections, as follows:

	Miles
Upper, or Lead Mines	62
Middle, or New River Bridge	[illegible]
Lower, or Greenbrier	86½

Throughout this distance the navigable channel originally consisted of natural chutes through the ledges and shoals, of varying widths, rarely over 1 foot in depth, in some places so tortuous as to render navigation extremely difficult and dangerous.

The original project adopted for the improvement of these natural channels was to widen them to 30 or 50 feet, as might be required, and deepen them to 2 feet, and straighten such as needed it.

This was for keel-boat navigation; the improvement, however, to be made in such a manner as to aid the work, should a greater depth and width be required in the future.

A small steamboat, when light, draught 12 inches, having been built at Hinton, in the fall of 1878, rendered it necessary to make the channel in that section 50 feet wide at all points, and in many from 75 feet to 100 feet, the depth of 2 feet being retained.

June 30, 1880, there was a channel 50 feet wide and 2 feet deep from Hinton Landing to Hubbard's Ripple, a distance by river of 12½ miles, giving an outlet to the products of Mercer County, West Virginia.

At the close of the season's work for 1880, there was a channel of the same width and depth, from Hinton Landing to McDaniell's or Harvey's Falls, a distance of 17¾ miles, giving an outlet to the farmers and graziers of Crump's Bottom and the Indian Creek country. And in addition to the above there are 12 miles of improvement from New River Bridge to Peak's Creek, with a channel 30 feet wide and 2 feet deep, giving outlet for timber and farm products, but not available for iron or ores until Radford Furnace can be reached.

The appropriation for the fiscal year ending June 30, 1882, will carry the improvement on the Greenbrier division through Wiley's Falls, 26 miles above Hinton, passing the mouth of Lick Creek, 20 miles above Hinton, thus opening up the trade from Tazewell and other rich counties adjoining.

The project as far as Lick Creek has been approved.

The appropriation for the fiscal year ending June 30, 1882, will carry the improvement on the New River Bridge division to Carter's Ferry, 33 miles above the bridge, and give an outlet to the iron from Radford Furnace, 18 miles above the bridge, to the ores from an iron mine 8 miles beyond, to Graham's new furnace and iron works, the former 31 miles and the latter 33 miles above the bridge, as well as to two zinc mines in the same section. The project as far as Jones's Ford Shoals, 20½ miles above New River Bridge, has been approved.

The appropriation for the fiscal year ending June 30, 1881, will carry the improvement on the Lead Mines division to the "Gulf," 8 miles above the mines, giving outlet to charcoal and timber. This project has already been approved. No appropriation for the fiscal year ending June 30, 1882.

With a channel, as now proposed, 20 feet wide and 2 feet deep, the estimate of $205,000 would be sufficient to complete it; but as that portion from Hinton to New River Bridge has to be made 50 feet wide, at a cost of about $2,000 per mile, the above amount should be increased to $275,000, and if it becomes absolutely necessary to use locks and dams for the improvement of some of the falls this estimate will have to be further increased by the amount of their cost.

The tables give a clear exhibit of the products shipped from the valley of New River at the various railroad stations in 1880, and also the tonnage received for the same section.

On the lower division there are eight keel-boats, 6 tons each, 18 inches draught, loaded. One small stern-wheel steamboat, 30 tons, 18 inches draught, loaded, and another being built.

On the middle division two keel-boats, of the same tonnage and draught as above, are in use carrying ores, and 6 more building.

On the upper division only canoes are in use. Many rafts are on each of these divisions, but their number was not ascertained.

Respectfully submitted.

Wm. Proctor Smith,
Assistant Engineer.

Lieut. Col. **Wm. P. Craighill,**
United States Engineer.

3013-A TABLE SHOWING THE DISTANCES FROM STEAMBOAT LANDING AT HINTON, W. VA., TO FOOT OF SHOALS OR LEDGES, THEIR LENGTH OR WIDTH, AND DIFFERENCE OF LEVEL BETWEEN THE HEAD AND FOOT OF SAME; ALSO, THE QUANTITY AND QUALITY OF MATERIAL EXCAVATED IN MAKING AND IMPROVING THE CHANNEL IN 1880

Shoal or ledge	Distance	Length or width	Fall	Solid rock	Gravel	Total
	Miles	*Feet*	*Feet*	*Cub. yds.*	*Cub. yds.*	*Cub. yds.*
Ledges and shoals from Hinton to and including War Ford	12⅙	25,670	44.09	528	296	924
Hubbard's Ripple	12⅗	100	0.20	88	44	132
Sweeny's Ledges	12¾	1,860	2.47	509		509
Sweeny's Ripples	13½	1,150	0.93	70	70	140
Crockett's Ledges	14⅚	500	1.92	373		373
Indian Creek Shoals	15⅗	1,350	3.06		908	908
Crump's Ledges	15⅘	1,500	2.14	2,075		2,075
Total		32,130	54.81	3,743	1,318	5,061

TABLE SHOWING THE SAME AS ABOVE FOR FALLS, SHOALS, AND RIPPLES, WORKED AT DURING THE SEASON OF 1880, ON THE MIDDLE DIVISION, NEW RIVER BRIDGE BEING THE INITIAL POINT.

Falls, shoals, and ripples	Distance	Length or width	Fall	Solid rock	Gravel	Total
	Miles	*Feet*	*Feet*	*Cub. yds.*	*Cub. yds.*	*Cub. yds.*
Ripple No. 1	⅕	110	[1] 0.54	50		50
Ripple No. 2	⅛	20	[1] 0.50	2		2
Ingle's Falls	2⅗	2,640	7.11		14	14
Moore's Gravel	6¾	2,200	[1] 2.79		5	5
Buck's Falls	7⅚	400	[1] 1.00	91	333	424
Egypt Falls	8⅙	700	[1] 0.98	6		6
Peak's Creek, shoals and ledges	10⅚	6,661	13.48	10		10
Total		12,731	26.40	159	352	511

[1] Levels need verifying.

TABLE SHOWING THE DETAILS OF BLASTING FROM HINTON, WEST VA., UP THE RIVER, 1880

Number of holes drilled		2,932
Number of feet of drilling		4,984
Number of blasts fired		3,066
Number of blasts missed		24
Number of blasts fired under bowlders		110
Average depth of holes	feet	1.70
Average depth of holes drilled per day per drill	do	11.50
Average charge of powder	pounds	0.38
Average loosening of rock per blast	cubic yards	1.22

3014 **TABLE SHOWING THE DETAILS OF BLASTING, FROM NEW RIVER BRIDGE, SOUTH, 1880**

Number of holes drilled		138
Number of feet of drilling		230
Number of misses		2
Average depth of holes	feet	1.75

STATEMENT OF TONNAGE SENT FROM AND RECEIVED AT HINTON STATION, CHESAPEAKE AND OHIO RAILWAY, FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1880

(Furnished by R. P. Fisher, Auditor)

Articles	Hinton		New River	
	Sent	Received	From—	To—
Lumber	14,194.24	70.52	2,180.00	
Coal	99.12	530.52		
Salt	20.96	285.16		6.10
Bacon	27.20	22.52	20.40	22.52
Lard	2.12	100.40	2.12	100.40
Flour	3.20	57.60		
Whisky	.80	5.28		
Merchandise	136.32	838.56	55.40	644.20
Wheat	1,746.48		1,251.28	
Hay	97.28	30.00	97.28	30.00
Butter	25.36		25.36	
Cattle	41.52		41.52	
Eggs	25.28		25.28	
Horses	15.00			
Sheep	40.36		40.36	
Wool	46.56		46.56	
Corn	104.20		104.20	
Dried fruit	27.76		27.76	
Rye	.28		.28	
Flaxseed	24.88		24.88	
Leaf tobacco	401.80		401.80	
Oats	2.68		2.68	
Sundries	8,309.56	108.56	6,225.56	55.00
Total	25,392.96	2,049.12	10,572.72	858.22

This table shows that 41½ percent of the products shipped from and to Hinton is from the section of New River now being improved; 400 tons from New River were shipped at Lowell, a station on Greenbrier River, and 87 tons sent thereto.

3015 **STATEMENT OF TONNAGE SENT FROM AND RECEIVED AT THE FOLLOWING STATIONS ON THE ATLANTIC, MISSISSIPPI AND OHIO RAILWAY FOR THE YEAR ENDING DECEMBER 31, 1880**

(Furnished by E. E. Portlock, auditor)

Name of stations	Sent	Received	General classification of tonnage sent	
			Products	Tons
	Tons	*Tons*		
Christiansburg	4,816.72	2,104.55	Of animals	8,098.57
Central	719.70	182.20	Of agriculture	4,143.79
New River	987.53	253.61	Of the forest	612.75
Dublin	3,937.31	1,326.17	Of manufactures	265.06
Martin's	5,335.00	4,508.36	Of the mines	12,704.58
Max Meadow	4,109.22	1,382.40	Of vegetables	565.11
Wytheville	2,495.31	2,415.64	Other articles	358.68
Crockett	3,822.68	604.51	Miscellaneous	1,136.89
Rural Retreat	1,661.96	552.93		
Total	27,885.43	13,330.37		27,885.43

The above is all from the two upper sections of New River now being improved, and it may be safely asserted that not less than one-third of this amount will be shipped by water as soon as the channel is made.

Of the products of the mines, which amount to 7,044 tons, exclusive of coal, seven-eighths will be carried in boats down to New River Bridge Station.

The proportion of tonnage received, that will be sent over this route, could not be ascertained.

W. P. S.

Operations were suspended at the close of October 1880, and not resumed until May, 1881. As much of the work is done by men in the water, it can only be carried on when the water is low, is clear, and not too cold.

An appropriation of $24,000 was made March 3, 1881, for the application of which a project, given below, was submitted to the Chief of Engineers April 27, 1881, and by him soon after approved. Under this and previous projects the work has been actively continued to the end of the fiscal year, and will be as long as the state of the river allows in 1881, and will be resumed as early as possible in 1882.

3016

MONEY STATEMENT

July 1, 1880, amount available	$24,083.26
Amount appropriated by act approved March 3, 1881	24,000.00
	$48,083.26
July 1, 1881, amount expended during fiscal year, exclusive of outstanding liabilities July 1, 1880	16,179.09
July 1, 1881, amount available	31,904.17
Amount (estimated) required for completion of existing project	181,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1883	25,000.00

PROJECT OF LIEUTENANT-COLONEL WILLIAM P. CRAIGHILL, CORPS OF ENGINEERS

BALTIMORE, MD., *April 27, 1881.*

GENERAL: In accordance with your instructions I have the honor to submit below a project for the expenditure of the appropriation of March 3, 1881, for the New River in Virginia and West Virginia.

The phraseology of the appropriation is the following:

Improving New River from the Lead Mines in Wythe County, Virginia, to mouth of Greenbrier River, $24,000, of which sum $15,000 shall be expended in the continuation of the work from the mouth of Greenbrier up and $9,000 in the continuation of the work from the Lead Mines to Wythe County down.

The general plan of improvement adopted has had reference to a navigation by the boats now in use on the river. This has consisted of making a channel 2 feet deep at ordinary low-water and 18 inches deep at extreme low-water, and varying in width from 30 to 50 feet according to location and direction. In some extraordinary cases, where the channel is necessarily quite crooked, an additional width of from 25 to 50 feet has been given.

This plan involves blasting above and below water and the removal of ledges and bowlders, placing the debris in wing dams and training walls, excavating through gravel shoals and placing the material in the hearts of the dams, and thus making sluices and chutes, affording an improved waterway without too much increasing the velocity and volume of the water in them.

It is proposed to continue this method of improvement in the expenditure of the last appropriation, distributing the work as follows:

3017 1. IN THE SECTION FROM HINTON OR THE MOUTH OF THE GREENBRIER UP

To complete work already begun from the mouth of Greenbrier to Lick Creek, 20 miles in extent	$1,500
At mouth of Lick Creek	250
At Shanklin's Ferry Ledge, 20¼ miles from Hinton	250
At Shanklin's Ford Shoal, 20¾ miles from Hinton	2,150
Shoals, 21 miles above Hinton	450
Walker's Lower Shoals, 21¾ miles above Hinton	500
Walker's Upper Shoals, 22½ miles above Hinton	3,100
Pendleton's Ledge, 24 miles above Hinton	300
Pendleton's Shoals, 24 miles above Hinton	750
Round Bottom, 24½ miles above Hinton	700
Shoals, ripples, and ledges between Round Bottom and Wiley's Falls, 25 miles above Hinton	2,050
Wiley's Falls, 25½ miles above Hinton	2,500
Surveys (and estimates) of Neilly's Falls, to decide whether a sluice may be made or a lock necessary, 30 miles above Hinton	500
	15,000

2. IN THE SECTION FROM THE LEAD MINES IN WYTHE COUNTY DOWN

Nunn's Ledges, 21.6 miles above New River Bridge	$500
Ledge just below Clark's Falls	125
Clark's Falls, 22.8 miles above New River Bridge	950
Clark's Ledges, 22.9 miles above New River Bridge	550
Lake Island ledge, 23 miles above New River Bridge	625
Hollingsworth Branch ledge, 23 miles above New River Bridge	100
Burden's Ledge, 24.8 miles above New River Bridge	200
Ledge, 25.6 miles above New River Bridge	100
Crumm's ledges and shoals, 26.6 miles above New River Bridge	1,300
Howard's ledges, 26.9 miles above New River Bridge	250
Pine Run Shoals and Rapids, 27.7 miles above New River Bridge	3,500
Ledge, 31.5 miles above New River Bridge	150
Sawyer's Shoals, 32 miles above New River Bridge	150
Survey of Foster's Falls, 37 miles above the bridge, to locate locks and dams (these falls are 18 feet in height)	500
	9,000

The foregoing distribution is necessarily approximate, but is as near as can be made until the work is actually in hand, which is very irregular in character, and such that accurate estimates and specifications of the details in extent and kind cannot be given. This irregularity has led to the rejection of the contract system on this river up to this time, and to the adoption of the method of procuring materials, boats, and machinery, and labor by open purchase and hire when needed.

It is recommended that this latter method be continued as most economical and satisfactory. It is not expected to expend more than $15,000 of the appropriation in 1881, but to carry the operations over to the end of the fiscal year terminating June 30, 1882.

Very respectfully, your obedient servant,

WM. P. CRAIGHILL,
Lieutenant-Colonel of Engineers.

Brig. Gen. H. G. WRIGHT,
Chief of Engineers, U. S. A.

3018 *Government exhibit 38*

REPORT OF THE CHIEF OF ENGINEERS, YEAR 1882

(pp. 140–142; 912–919)

23. New River, from the mouth of Wilson, in Grayson County, Virginia, to mouth of Greenbrier, in West Virginia.—From the mouth of Wilson, in Grayson County, Virginia, to steamboat landing at Hinton, Summers County, West Virginia, 1½ miles below the mouth of Greenbrier River, is 191½ miles.

The appropriations have been made in such a manner as to divide this portion of the river into three sections, as follows:

	Miles
Upper or Lead Mines	62
Middle or New River Bridge	43
Lower or Greenbrier	86½

Throughout this distance the navigable channel originally consisted of natural chutes, through the ledges and shoals, of varying widths, rarely over 1 foot in depth, in some places so tortuous as to render navigation extremely difficult and dangerous.

The original project adopted for the improvement of these natural channels was to widen them to 30 or 50 feet, as might be required, and deepen them to 2 feet, and straighten such as needed it. This was for keel-boat navigation, the improvement, however, to be made in such a manner as to aid the work should a greater depth and width be required in the future.

A small steamboat, draught 12 inches, when light, having been built at Hinton in the fall of 1878, rendered it necessary to make the channel, in that section, 50 feet wide at all points, and in many from 75 feet to 100 feet, the depth of 2 feet being retained. This steamboat was not adapted in dimensions and power to the navigation of the river, and has been withdrawn.

The original plan of improvement has been adhered to, except
that the width of channels on the middle and upper divisions has
been reduced to 20 feet, and on the former to 10 feet for
3019 7½ miles, to allow iron to be shipped from the furnaces
above.

June 30, 1881, there was a channel from Hinton to Harvey's Ledge, 17½ miles, 50 feet wide and 2 feet deep; at the close of the work in 1881, this channel had reached a point 26½ miles above Hinton.

At the end of the same fiscal year there was a channel from New River Bridge to Peak's Creek, 12 miles, 2 feet deep and 30 feet wide; at the close of the season this was extended to a point 22 miles above New River Bridge.

At the end of the same fiscal year there was nothing done above the Lead Mines, but at the close of the working season of 1881 a channel 2 feet deep and 20 feet wide was made to a point 5⅓ miles above the mines.

Below is shown the miles of river improved from the commencement of the work to close of 1881, since which time little has been done up to June 30, 1882, on account of high river and coldness of the water in which the men must stand to work:

	1881	Previous	Total
	Miles	*Miles*	*Miles*
Greenbrier division	9	17½	26½
New River Bridge division	10	12	22
Lead Mines division	5⅓		5⅓
Total	24⅓	29½	53⅚

On the lower division there are 13 keel-boats and a small side-wheel steamboat, 75 feet long, 10 feet wide, and 3 feet deep, with another 100 feet long and 15 feet wide being built. Four of the keel-boats run up to Shumate's Falls, 28 miles, carrying supplies to the New and East River railroads.

On the middle division there are eight keel-boats, and parties are about to build a small tug-boat and a light draught steamboat to carry ores down to New River Bridge. On the upper division there are no boats, as the improvement is not yet carried far enough.

The tables attached to the report of the superintending engineer show that of the freight shipped from the stations on 3020 the Chesapeake and Ohio Railway, which are outlets to the river on the lower division, 70 per cent. is from New River, an increase over 1880 of 36½ per cent. The shipments from the various stations on the Norfolk and Western Railroad show an increase of 33 per cent. over last year. The navigation of the river not being continuous as yet, it is practically a feeder to the several railroads which cross it and run along portions of it. It has also been of much use in carrying materials and supplies to the railroads while in process of construction near it. While the freighting on the river has increased, the excessive drought of 1881 diminished greatly the amounts of agricultural products to be carried. It is probable that when the river is fully improved boats will transport one third of all such products and seven-eighths of those of the mines, exclusive of coal.

Operations had been suspended in July for want of funds, but were resumed about the middle of August on the portions of the river within reach of the Chesapeake and Ohio and the Norfolk and Western railroads. The upper section of the river, above the Lead Mines, in Wythe County, being separated from the remainder of the river by Foster's Falls, which are not passable, it has not been deemed expedient to expend the money applicable thereto at this time.

July 1, 1881, amount available	$31, 904. 17
July 1, 1882, amount expended during fiscal year, exclusive of outstanding liabilities July 1, 1881	28, 398. 07
July 1, 1882, amount available	3, 506. 10
Amount appropriated by act passed August 2, 1882	12, 000. 00
Amount available for fiscal year ending June 30, 1883	15, 506. 10
Amount (estimated) required for completion of existing project	169, 000. 00
Amount that can be profitably expended in fiscal year ending June 30, 1884	30, 000. 00

G 23

IMPROVEMENT OF NEW RIVER FROM THE MOUTH OF WILSON, IN GRAYSON COUNTY, VIRGINIA, TO THE MOUTH OF THE GREENBRIER RIVER, IN WEST VIRGINIA

The operations on this river in 1881 were begun June 1 and ceased October, 1881. A detailed account of them is given in the following report of Col. W. P. Smith, assistant engineer:

BALTIMORE, MD., *April 28, 1882.*

COLONEL: I have the honor to submit the following 3021 report of operations on the improvement of New River, Virginia and West Virginia, for the season of 1881.

GREENBRIER DIVISION

Work was begun June 1 and stopped October 31, only losing eight and one-half out of one hundred and thirty-one working days. The surveys and storing were finished December 24. Three parties worked on the new improvement and a smaller one was kept occupied in strengthening the wall at Indian Creek, straightening the channel at Garten's Ledges, and deepening the waterway at other points, rendered necessary by the prevailing low-water.

Average number of men employed, 57; highest water, 10 feet above and lowest 1 foot below zero. The new work covers a river space, with a channel 50 feet wide and 2 feet deep, of 9 miles, fall in the same 40.55 feet, passing through 17 distinct shoals, falls, and series of ledges, reaching to a point 26½ miles above Hinton, with a total fall in that distance of 102.65 feet.

The wing-dams and training walls built this season, if united would make a wall 1⅓ miles long, 9 feet wide, and 3 feet high. In addition to the above, 800 cubic yards of material were placed in the old walls. Actual cutting through ledges, 6,890 feet for the season.

As yet there is only a narrow channel through Wiley's Falls. The extreme low-water affected the cost of this work less than on either of the other divisions, but still it was somewhat more expensive, as the estimates were made for the work with a depth of water nearly 6 inches greater than it proved to be.

Bateaux navigated the stream throughout the summer, carrying their usual loads of about 6 tons, which would have been impossible without the improvement.

The work is now in Virginia, but as only a small point of that State puts in here, the work will essentially be for the benefit of West Virginia, as the counties of Monroe and Mercer in the latter State will supply all of the freight, until the improvement reaches the Narrows, 40 miles above Hinton.

3022 The rock encountered was almost entirely a hard sandstone, with more gravel than has been met with heretofore.

A survey of Shumate's Falls in this division, 28 miles above Hinton, was made in July and August, and a map of the same on a scale of 100 feet to the inch, from an examination of which it is found that a channel can be cut through a point of land that puts in at the falls, and obviate the necessity of a lock and dam. At the point, the cutting will be 300 feet long, 55 feet wide at top and 45 feet at bottom, with an average depth of 6 feet. Above this the channel will be cut through the ledges in the river, and below a crib-work—10 feet wide at bottom, 6 feet at top, and 6 feet deep—400 feet long, will be used to hold up the water. Total length of channel 2,400 feet, with a fall in the same of 10.9 feet, or 0.45 of a foot in 100 feet. This work can be done for $9,000 in round numbers, and the grade is much less than in some other "chutes" through which boats now run successfully. A lock and dam of suitable dimensions for this sort of navigation, at this point, would cost $26,000.

In March, 1882, a careful survey of the shores on the left bank of the river was made at Crump's Ledges, Indian Creek, Crockett's, Warford, and Tom's Run Shoals, to ascertain how much the banks were injured by high-water, and to what extent, if any, this injury was attributable to the improvement.

Seventy-eight per cent. of the freight sent from Hinton came from that portion of New River now being improved; an increase of 36½ per cent. over 1880. Forty-nine per cent. of the freight sent from Lowell came from New River, and 25 per cent. of that received was sent thereto.

NEW RIVER BRIDGE DIVISION

Work was begun June 7 and carried on until October 30, making one hundred and fifteen days out of a possible one hundred and twenty-three. Surveys and storing were finished November 20.

This force was divided into three parties, averaging about twenty men each. Total average, fifty-four. Considerable 3023 difficulty was experienced in getting laborers that would stay on the work; so many railroads and furnaces were being built that the men were constantly going and coming, much to the detriment of the work.

The extreme low-water, this season, increased the amount of work at the points cut through at least fourfold; hundreds of feet had to be taken out, which, with the water 6 inches higher, would not have had to be touched.

The rock encountered was limestone, with ledges nearly vertical; but little gravel.

Highest water 8½ feet above and lowest .92 foot below zero.

The work covers a river space of 10 miles; fall in the same 74.03 feet, passing through nine shoals, falls, and ledges, reaching to a point 22 miles above New River Bridge, with a total fall, in that distance, of 109.38 feet. Actual cutting through the ledges, 8,040 feet for the season. Linear length of walls, 9 feet wide and 3 feet high, 1 mile. Channel from New River Bridge to Peak's Creek, 12 miles and 30 feet wide; from Peak's Creek to Cecil's Ledges, 2½ miles, 20-feet wide, and from Cecil's Ledges to Nunn's Ledges, 7½ miles, 10 feet wide, with a 20-foot channel in the two large ledges of Runyan's Shoals; the channel at all points being 2 feet deep at zero, or ordinary low water.

The 10 foot channel was adopted in order that iron might be shipped from the furnaces, which is now being done from Little Reed Island with 6 batteaux, which carry half loads from the furnace to the head of the improvement, and thence full loads, of from 5½ to 6 tons, to New River Bridge. This 10-foot channel will be widened to 20 feet just as soon as obstructions are removed sufficiently to accommodate the furnaces. Ten-foot channels are not wide enough, as the current is too rapid for the boats in use.

Breeden's Ledges, nearly 25 miles above the initial point, were improved for the shipment of iron ore from the mines to Radford Furnace.

A crane boat and two batteaux were built this season, the former at a cost of $496 and the latter $110 each.

3024 A survey of Foster's Falls, 37 miles above New River Bridge, was made in August and September and mapped, from which it was ascertained that 2 locks of 9 feet lift will have to be built to get around them, together with 1,400 feet of canal 20 feet wide and 4 feet deep. The canal or race belonging to the Pierce Furnace Company can be used for that purpose by deepening it 2 feet, or what will, perhaps, be better, raising the dam at the head of the shoals 2 feet, which will cost about the same. These locks will be at the extreme lower end of the falls, and only far enough apart to allow the length of a boat between. They are to be 110 feet long and 20 feet wide, with 4 feet on the miter sills.

2 locks at $8,000	$16,000
850 cubic yards rock cutting, at $2	1,700
5,500 cubic yards earth cutting, at 25 cents	1,375
10 per cent. for contingencies	1,907
10 per cent. for contingencies	1,907
Total	$20,982

These falls are 1,850 feet long, with a fall of 18.2 feet—about 1 foot in 100 feet—and are divided into three sections, as follows:

Lower, 250 feet long; fall 4.3 feet.
Middle, 400 feet long; fall, 5.0 feet.
Upper, 300 feet long; fall, 5.0 feet.

To show that the attention of capitalists has been called to this part of the river, it may be well to state that two parties wish, the one to put on a small tug-boat and the other a light-draught steamboat, to carry ores from the mines down to projected smelting furnaces at New River Bridge, on the Norfolk and Western Railroad.

LEAD MINES DIVISION

Work commenced June 14 and stopped September 30; ninety working days, out of which eight were lost. Surveys finished and camp struck October 25. Only one party on this Division, averaging about twenty men, for the season. Highest water 5 feet above, and lowest .88 foot below zero, or ordinary summer water.

This work covers a river space of 5½ miles from the Lead Mines to Wilkinson's Forge, passing through eight shoals
3025 and ledges, with a fall of 49.26 feet in that distance. Actual cutting through ledges, 2,976 feet for the season.

The same difficulties attending the work on the middle division, with regard to labor and low-water, were experienced here. The work stops almost in the middle of Wilkinson's Shoals, which are 1¾ miles long, and until they can be finished the improvement amounts to nothing; in fact, to be useful for the shipment of timber and charcoal, it should be carried at least 4 miles farther, to Crooked Creek.

The rock encountered was limestone, dolomite, sandstone, red and blue shale, river rock, and bowlders.

A crane boat and batteau were built here, at a slightly increased cost over those on the middle division, arising from the fact that the material had to be carried farther.

Cost of solid rock and bowlders on the entire work, $1.87½ per cubic yard; cost of gravel, $1.04. Price of labor, 10 cents per hour up to the middle of September, when it was increased to 12½ cents per hour.

Reference is made to the accompanying tables for details of the work for the season, as well as for commercial statistics with regard to shipments to and from the various railroad stations to which this river is tributary.

Maps on a scale of 100 feet to the inch have been made of twenty-six shoals worked at this season, on the lower and middle divisions, comprised in eleven sheets, and eight shoals on the upper division, on a scale of 800 feet to the inch, in one sheet. Shumate's and Foster's Falls were made on the larger scale mentioned above; also three sheets of gauge readings on each of the divisions. Three tracings, on a scale of 800 feet to the inch, showing the portions of the river improved in 1881, with appropriate references to detail drawings, are herewith transmitted.

J. F. Palmer, R. Hurley, and J. A. Welch are entitled to much credit for zeal and energy displayed as superintendents of the lower, middle, and upper divisions.

3026 The original plan of improvement has been adhered to, except that the width of channels on the middle and upper divisions has been reduced to 20 feet, and on the former to 10 feet, for 7½ miles, to allow iron to be shipped from the furnaces above.

June 30, 1881, there was a channel from Hinton to Harvey's Ledge, 17½ miles, 50 feet wide and 2 feet deep; at the close of the work in 1881, this channel had reached a point 26½ miles above Hinton. At the end of the same fiscal year there was a channel from New River Bridge to Peak's Creek, 12 miles, 2 feet deep and 30 feet wide; at the close of the season this was extended to a point 22 miles above New River Bridge. At the end of the same fiscal year there was nothing done above the lead mines, but at the close of the working season of 1881 a channel 2 feet deep and 20 feet wide was made to a point 5⅓ miles above the mines.

Below is shown the miles of river improved from the commencement of the work to close of 1881:

	1881	Previous	Total
Greenbrier division	9	17½	26½
New River Bridge division	10	12	22
Lead mines division	5⅓	0	5⅓
Total	24⅓	29½	53⅚

On the lower division there are thirteen keel-boats and a small side-wheel steamboat, 75 feet long, 10 feet wide, and 3 feet deep, with another 100 feet long and 15 feet wide being built. Four of the keel-boats run up to Shumate's Falls, 28 miles, carrying supplies to the New and East River Railroads.

On the middle division there are eight keel-boats, and parties are about to build a small tug-boat and a light-draught steamboat to carry ores down to New River Bridge.

On the upper division there are no boats, as the improvement is not yet carried far enough.

3027 The tables following show that of the freight shipped from the stations on the Chesapeake and Ohio Railway, which are outlets to the river on the lower division, 70 per cent. is from New River, an increase over 1880 of 36½ per cent.

The shipments from the various stations on the Norfolk and Western Railroad show an increase of 33 per cent. The shipments by river to New River Bridge Station began too late in December for any freight to be sent by rail.

The foregoing shows an increase of freight exceedingly good, considering the drought that prevailed throughout the entire river country.

TABLE NO. 1.—SHOWING THE DISTANCES FROM STEAMBOAT LANDING AT HINTON, W. VA., TO FOOT OF SHOALS OR LEDGES, THEIR LENGTH AND DIFFERENCE OF LEVEL BETWEEN THE HEAD AND FOOT OF SAME; ALSO THE QUANTITY AND QUALITY OF MATERIAL EXCAVATED IN MAKING AND IMPROVING THE CHANNEL IN 1881

Shoal or ledge	Distance	Length	Fall	Solid rock and bowlders	Gravel	Total
	Miles	*Feet*	*Feet*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Ledges and shoals from Hinton to head of Crump's	16	32,130	54.81	770	21	791
Harvey's Ledge	17½	100	.23	55		55
Harvey's Falls	17¾	680	3.44	1,101	200	1,301
Harvey's Ripple	18¼	100	0.52	29		29
Hight's Ripple	18⅓	200	0.96	5		5
Deadmore Shoals	18½	550	1.21	209		209
Deadmore Ripple	18⅝	100	0.32	20		20
Anderson's Falls	19⅝	300	2.26	550	200	750
Lick Creek Shoals	20	540	1.38	384		384
Shanklin's Ledge	20¼	150	0.99	127		127
Shanklin's Shoals	20⅓	1,700	6.52	502	470	972
Island Bar Shoal	21	75	.20	38	15	53
Island Creek Shoals	21⅓	400	1.30	32	20	52
Walker's Shoals	22	7,680	7.04	350	956	1,306
King's Ripple	24	160	0.20	124		124
Pennington's Ledge	24½	60	0.40	20		20
Pennington's Shoals	24⅝	1,900	4.97	654		654
Wiley's Falls	26	660	3.58	170	60	233
Total		47,405	90.33	5,152	1,942	7,094

3028 TABLE NO. 2.—SHOWING SAME AS NO. 1 FOR THE MIDDLE DIVISION, WITH NEW RIVER BRIDGE, VIRGINIA, AS THE INITIAL POINT, 1881

Shoal or ledge	Distance	Length	Fall	Solid rock and bowlders	Gravel	Total
	Miles	*Feet*	*Feet*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Shoals to Woolwine's Island	9⁹⁄₁₀	11,370	22.57			
Peak's Creek Ledges	10⅚	6,661	13.48	1,378		1,378
Wysor's Shoals	12⅓	2,750	7.00	680	202	882
Linkon's Ledges	13½	1,290	4.70	236		236
Cecil's Ledges	14½	6,010	9.97	1,030		1,030
Runyan's Shoals and Ledges	15¾	4,800	12.90	652		652
Allison's Falls	18⅝	300	2.40	47		47
Allison's Ledges	18⅞	6,000	9.20	289		289
Jones' Ford Shoals	20⅓	3,000	7.30	512	290	802
Breeden's Ledges	24⅝	750	2.00	92		92
Total		42,931	91.52	4,916	492	5,408

TABLE NO. 3.—SHOWING SAME AS NO. 1 FOR THE UPPER DIVISION, WITH THE LEAD MINES, VIRGINIA, AS THE INITIAL POINT, 1881

Shoal or ledge	Distance	Length	Fall	Solid rock and bowlders	Gravel	Total
	Miles	*Feet*	*Feet*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Lead Mine Ledges	¼	12	1.00	9		9
Jackson's Island Ledges	⅘	1,120	3.00	106		106
Zimmerman's Shoals	1⅜	200	.60	50		50
Porter's Ferry Shoal	2⅘	400	1.35	75		75
Roe's Shoals	3⅓	125	1.35	20		20
Porter's Ford Shoals	3⅘	2,000	3.00		100	100
Roger's Ledges	4⅙	885	7.00	460		460
Wilkinson's Shoals and Ledges to Wilkinson's Forge	4⅜	6,200	26.00	478		478
Total		10,942	43.30	1,198	100	1,298

ABLE No. 4.—SHOWING THE DETAILS OF BLASTING ON NEW RIVER, VIRGINIA AND WEST VIRGINIA, IN 1881

Subject	Division			
	Lower	Middle	Upper	Total
umber of holes drilled	2,410	3,271	893	6,574
umber of feet of drilling	3,838	7,251	1,875	12,964
umber of blasts fired	3,516	3,401	1,233	8,150
umber of blasts missed	144	130	49	223
umber of blasts fired under bowlders	962		291	1,253
verage depth of holes ... feet	1.99	2.22	2.10	2.10
verage drilling per day per drill ... do	15.00	13.94	11.85	13.60
verage charge of powder ... pounds	.35	.39	.40	.38
verage loosening of rock per blast ... cu. yds	1.46	1.28	1.00	1.25

029 TABLE No. 5.—STATEMENT OF TONNAGE SENT FROM AND RECEIVED AT HINTON AND LOWELL STATIONS, CHESAPEAKE AND OHIO RAILWAY, FROM JANUARY 1, 1881, TO JANUARY 1, 1882

(Furnished by Robert H. Fisher, auditor)

[In tons of 2,000 pounds]

Articles	Hinton		New River		Lowell		New River	
	Sent	Rec'd	From—	To—	Sent	Rec'd	From—	To—
Lumber	6,195.80	(1)	5,214.00	(2)	632.07	(1)		(1)
Wood	12.10	(1)		(2)		(1)		(1)
Salt	1.04	(1)		(2)	1.15	(1)		(1)
Bacon	16.44	(1)	8.25	(2)	3.85	(1)	96	(1)
Butter	4.04	(1)	1.01	(2)	1.19	(1)	40	(1)
Cattle	137.00	(1)		(2)	1,528.22	(1)	1,017.72	(1)
Eggs	61	(1)	.20	(2)	1.05	(1)	26	(1)
Hogs	7.80	(1)		(2)	43.45	(1)		(1)
Horses	19.25	(1)		(2)	11.25	(1)	5.62	(1)
Lard	1.58	(1)	.54	(2)	.29	(1)		(1)
Sheep	15.00	(1)		(2)	64.08	(1)	42.72	(1)
Tallow	.38	(1)		(2)	.02	(1)		(1)
Wool	8.52	(1)	4.95	(2)	7.38	(1)	1.85	(1)
Corn	9.40	(1)	9.40	(2)	.02	(1)		(1)
Dried fruit	25.91	(1)	9.98	(2)	11.05	(1)	5.52	(1)
Flour	6.32	(1)		(2)	9.57	(1)		(1)
Rye	.40	(1)		(2)	1.63	(1)	1.08	(1)
Wheat	141.97	(1)	90.80	(2)	56.92	(1)	37.94	(1)
Flaxseed	3.25	(1)	2.24	(2)	.47	(1)	.23	(1)
Hay	1.03	(1)	1.03	(2)		(1)		(1)
Leaf-tobacco	187.45	(1)	127.22	(2)	115.83	(1)	77.22	(1)
Manufactured tobacco	.05	(1)		(2)	.10	(1)		(1)
Oats	6.01	(1)	4.00	(2)		(1)		(1)
Whisky	1.35	(1)		(2)	.40	(1)		(1)
Lime	.50	(1)		(2)		(1)		(1)
Sundries, merchandise	55.09	(1)		(2)	32.14	(1)	16.07	(1)
Sundries, miscellaneous	165.60	(1)		(2)	47.46	(1)	23.73	(1)
Total								

---

[1] Not classified.

[2] Not returned.

TABLE No. 6.—STATEMENT OF TONNAGE SENT FROM THE FOLLOWING STATIONS ON THE NORFOLK AND WESTERN RAILROAD DURING THE YEAR ENDING DECEMBER 31, 1881

(Furnished by E. E. Portlock, auditor)

[In tons of 2,000 pounds each]

Name of station	Tons	General classification of tonnage	
		Products	Ton
Christianburg	6,839.42	Of animals	10,904.33
Central	1,483.57	Of agriculture	3,042.68
New River	1,058.86	Of the forest	2,601.54
Dublin	5,993.79	Of manufacture	426.56
Martin's	8,098.19	Of the mines	22,515.28
3030 Max Meadow	7,078.00	Of vegetables	1,135.59
Wytheville	2,972.72	Of other articles	79.64
Crockett's	5,443.24	Miscellaneous	857.47
Rural Retreat	2,505.29		
Total	41,563.09		41,563.09

All of the above is from the Upper New River sections, now being improved. Shipments of iron by river only commenced in December 1881, and are not shown. When the river is fully improved it is thought that boats will carry one-third of all the products and seven-eighths of those of the mines, exclusive of coal. The tonnage from these stations is one-third more than in 1880.

Respectfully submitted.

WILLIAM PROCTOR SMITH,
Assistant Engineer.

Lieut. Col. WILLIAM P. CRAIGHILL,
United States Engineers.

Operations were resumed as early as possible in the spring of 1882. The two causes of delay are usually a high stage of the river and the temperature, as much of the work must necessarily be done by men standing in the water.

GREENBRIER DIVISION

Preparations for work were begun the 1st of May, by building a small bateau, gunwales 36 feet, width 6 feet, and depth 2½ feet, repairing the other bateaux and jolly boats, and making a careful survey of the bank of the river on the side of the chute at Wiley's Falls, 26 miles above Hinton, where camp is established.

Preparations were completed June 1. These falls are 3½ feet high, consisting of two well-defined and several broken ledges of peculiarly hard sand rock. Some work was done here last season, but not sufficient to permit the passage of bateaux at ordinary, much less extreme low water. Although the river continued very

muddy, and never fell lower than 0.4 degree above zero, a channel 120 feet long, from 10 feet to 15 feet wide, and 2 feet deep,
3031 was cut through the falls, and several large bowlders removed from between the ledges, occupying ten men fifteen days.

The bateaux, of which there are five, carrying supplies to the East River Railroad to Shumate's Falls, 30 miles above Hinton, now get through quite easily, with fair loads, but the channel must be widened to decrease the velocity of the current, and deepened for extreme low-water. Five bateaux run to Lick Creek from Hinton, and four are carrying stores and other products, making fourteen on the river.

NEW RIVER BRIDGE DIVISION

Camp was established May 10, and the time until June 8 occupied in repairing boats and making other necessary preparations for the work. Fifteen days with one party of twenty men were occupied at the following points:

Head of Jones's Ford Shoals, 20.9 miles from New River Bridge, a channel was made 210 feet long, three-fourths of it through solid and the balance through loose rock.

Nunn's Ledges, 21.6 miles above the bridge, a channel was made through five solid ledges, from 25 to 30 feet wide.

Clark's Falls, 22.8 miles from the bridge; solid rock cutting 20 feet wide; fall 2½ feet.

Clark's Ledges, 200 feet above the falls; channel made through the lower one, 60 feet thick.

Total channel way, 415 feet long, 10 feet wide, and 2 feet deep, the cutting averaging 1 foot, covering a river space of 2 miles, and giving navigation for bateaux nearly 23 miles above New River Bridge. Character of rock, limestone and red shale.

This work was done in the two middle weeks of the month, with the water somewhat muddy and a few tenths of a foot above zero or ordinary low-water; the balance of the month it rained nearly every day, keeping the river very muddy and too high for anything to be done, Gauge readings varied from 1 foot above down to zero.

The channel made this season is of great assistance to the bateaux carrying iron to the Norfolk and Western Railroad,
3032 otherwise the work would not have been done under the adverse circumstances mentioned above.

Four boats are being used to carry iron from Boone, and the same number from Radford Furnace.

LEAD MINES DIVISION

Nothing done. Funds exhausted.

Labor on the river up to this time has been obtained for 10 cents an hour, but owing to the high price of provisions it is thought that 11 or 12 cents will have to be paid in the future.

Could it have been anticipated that May and June would have been so unfavorable, preparations for work would not have been made so early. Last year these months were as good as any throughout the season.

MONEY STATEMENT

July 1, 1881, amount available	$31,904.17
July 1, 1882, amount expended during fiscal year, exclusive of outstanding liabilities July 1, 1881	28,398.07
July 1, 1882, amount available	3,506.10
Amount appropriated by act passed August 2, 1882	12,000.00
Amount available for fiscal year ending June 30, 1883	15,506.10
Amount (estimated) required for completition of existing project	169,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1884	30,000.00

3033 *Government exhibit 39*

REPORT OF THE CHIEF OF ENGINEERS, YEAR 1883

(pp. 144–145; 699–705)

23. New River, from the mouth of Wilson, in Grayson County, Virginia, to the mouth of Greenbrier River, in West Virginia.—As has been stated in previous reports, but is here repeated to save trouble in referring to other volumes, the appropriations have been made in such a manner as to divide this portion of the river into three sections, as follows:

	Miles
Upper or Lead mines	62
Middle or New River Bridge	43
Lower or Greenbrier	86½

Throughout this distance the navigable channel originally consisted of natural chutes, through the ledges and shoals, of varying widths, rarely over 1 foot in depth, in some places so tortuous as to render navigation extremely difficult and dangerous.

The original project adopted for the improvement of these natural channels was to widen them to 30 or 50 feet, as might be required, deepen them to 2 feet, and straighten such as needed it. This was for bateau navigation, the improvement, however, to be made in such a manner as to aid the work should a greater depth and width be required in the future.

A small steamboat, draught 12 inches, when light, having been built at Hinton in the fall of 1878, rendered it necessary to make the channel in that section, 50 feet wide at all points, and in many from 75 feet to 100 feet, the depth of 2 feet being retained. This steamboat was not adapted in dimensions and power to the navigation of the river, and has been withdrawn.

The original plan of improvement has been adhered to, except that the width of channels on the middle and upper divisions has been reduced to 20 feet, and on the former to 10 feet for several miles, to allow iron to be shipped from the furnaces above.

3034 Most of the work of 1882, on the Greenbrier Division, was done at Wiley's Falls, in reducing the grade from 1.95 feet in 100 to 72. The length of navigable channel above Hinton on this division is the same, 26½ miles, as reported a year ago, but it has been much improved.

June 30, 1882, there was a channel from New River Bridge to the head of Jones' Ford, a distance of 22 miles, 2 feet deep, 30 feet wide for 12 miles, 20 feet wide for 2½ miles, and 10 feet wide for 7½ miles. During the season of 1882 this channel was extended through 7¼ miles, with a width of 10 feet and a depth of 2 feet to a point 29¼ miles above the bridge.

Nothing was done during the fiscal year on the Lead Mines Division, as it is separated from the remainder of the river by Foster's Falls, which are not passable.

Nothing was done in 1883 before the end of the fiscal year on the whole river. When work ceased in October, 1882, the property pertaining to each division was placed in store, as usual, in charge of a watchman. The assistant engineer was then brought to Baltimore and employed in preparing his report of past work, making drawings showing the condition of the river at the close of the operations of the season, and the progress of the improvement, with estimates of the cost of what yet remains to be done for its completion.

When Congress adjourned March 3, 1883, without provision for further work, it was deemed best and most economical, instead of keeping the property in store at considerable expense for a long time, to collect it at some convenient place and dispose of it. Hinton was the point selected. The day of sale was April 25, 1883, and the amount realized $415.16, which was turned into the Treasury in conformity to law. The assistant engineer was, with regret discharged at the end of May. His services have been of much value.

It has hardly been practicable to accomplish at any one of the very many points needing improvement all that has been desirable, but the worst places have been worked upon to the greatest extent and efforts thus been made to increase the available navi-
3035 gability of the river over as long stretches as possible, and
to increase the facilities for access of the greatest number to the railroads touching the river, and thus connecting with the eastern and western markets districts otherwise much isolated and hitherto dependent on teaming to railroad stations over long and bad roads.

Should work be resumed, it will be found difficult to collect and organize as efficient a force as that which has been disbanded and necessarily scattered. To replace such a machine takes time and money.

The number of large boats on the river for carrying freight has increased to twenty-five. The following important facts are taken from the report of the superintending engineer:

Of the freight sent from Hinton in 1882, 95 per cent. came from New River, an increase over 1881 of 46 per cent.

Of the freight received at Hinton in 1882, 43 per cent. went up the river; 24½ per cent. increase on shipments from Hinton in 1882 over 1881; 9 per cent. increase on freight received at Hinton in 1882 over 1881.

In the same order as above, the percentages at Lowell and Hinton Stations, Chesapeake and Ohio Railway combined, were respectively 92½, 46, 14, and 55.

The shipments from the various stations on the Norfolk and Western Railroad, tributary to the river, were not received from the auditor, owing to want of time to prepare them, which is much to be regretted, as it is desirable to have comparisons annually.

The navigation of the river not being continuous as yet, it is practically a feeder to the railroads which cross it and run along portions of it. It has also been of much use in carrying materials and supplies to the railroads while in process of construction near it. It is probable that when the river is fully improved boats will transport one-third of the products of the fine agricultural country through which it flows, and seven-eighths of those of the mines, exclusive of coal.

July 1, 1882, amount available	$3,506.10
Amount appropriated by act passed August 2, 1882	12,000.00
	15,506.10
July 1, 1883, amount expended during fiscal year exclusive of outstanding liabilities July 1, 1882	12,419.44
July 1, 1883, amount available	3,086.66
3036 Amount (estimated) required for completion of existing project	169,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1885	50,000,00

H 23

IMPROVEMENT OF NEW RIVER FROM THE MOUTH OF WILSON, IN GRAYSON COUNTY, VIRGINIA, TO THE MOUTH OF THE GREENBRIER RIVER, IN WEST VIRGINIA

The operations on this river in 1882 began in June and ended in October. A detailed account of them is given in the appended report of Col. William Proctor Smith, assistant engineer.

When work on the river ceased in October, 1882, the property pertaining to each division was placed in store, as usual, in charge of a watchman. The assistant engineer was then brought to Baltimore and employed in preparing his report of past work, making drawings showing the condition of the river at the close of the operations of the season and the progress of the improvement, with estimates of the cost of what yet remains to be done for its completion.

When Congress adjourned, March 3, 1883, without provision for work in 1883, it was deemed best and most economical, instead of keeping the property in store at considerable expense for a long time, to collect it at some convenient place and dispose of it. Hinton was the point selected. The day of sale was April 25, 1883, and the amount realized $415.26, which was turned into the Treasury, in conformity to law. The assistant engineer was, with regret, discharged at the end of May. His services have been of much value.

It has hardly been practicable to accomplish at any one of the very many points needing improvement all that has been desirable, but the worst places have been worked upon to the greatest extent, and efforts thus been made to increase the available navigability of the river over as long stretches as possible, and to increase the facilities for access of the greatest number to the railroads touching the river, and thus connecting with the eastern and western markets districts otherwise much isolated and hitherto dependent on teaming to railroad stations over long and bad roads.

3037 Should work be resumed, it will be found difficult to collect and organize as efficient a force as that which has been disbanded and necessarily scattered. To replace such a machine takes time and money.

The statements and statistics in Colonel Smith's report below indicate the value of what has been accomplished. Of the available balance of funds almost the whole pertains to the Lead Mines division, on which it has not been expedient to work during the fiscal year.

MONEY STATEMENT

July 1, 1882, amount available	$3,506.10
Amount appropriated by act passed August 2, 1882	12,000.00
	15,506.10
July 1, 1883, amount expended during fiscal year, exclusive of outstanding liabilities July 1, 1882	12,419.44
July 1, 1883, amount available	3,086.66
Amount (estimated) required for completion of existing project	169,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1885	50,000.00

REPORT OF COLONEL WILLIAM PROCTOR SMITH, ASSISTANT ENGINEER

BALTIMORE, MD., *May 21, 1883.*

COLONEL: I have the honor to submit the following report of operations on the improvement of New River, Virginia and West Virginia, for the fiscal year ending June 30, 1883.

GREENBRIER DIVISION

Work began June 20, 1882, and ended October 31. Out of one hundred and fifteen working days, fifty-one were lost, nineteen from want of funds in July and August, and the remainder from high and muddy water. The surveys and storing were finished late in December. Only one party, of about thirteen men, was employed. Highest water 11.8 feet above, and lowest 0.2 foot below, zero. Nine-tenths of the time the gauge readings were above ordinary low water. Four distinct rises occurred, delaying operations very much. The greater part of the labor was expended on Wiley's Falls, which consisted in making a cut through hard sandstone, interspersed with iron pyrites, 184 feet long, 50 feet wide, and 3 feet deep, with a fall of 3.58 feet. 3038 Originally the grade was 1.95 feet in 100 feet, but is now reduced to 0.72 foot, obtained by deepening the channel and extending the wall, on the river side, made from the material excavated, to a length of 495 feet, 13 feet wide, and 4 feet high, with another on the land side 274 feet long, of the same width and depth as the former.

The work at Kidwell's Ripple and Wiley's Shoals was, for the most part, done with the crane-boat.

Total length of walls 1,141 feet, 12 feet wide and 3½ feet high. River space worked over 1½ miles, fall in the same 5.83 feet, giving a channel from Hinton to Wiley's Shoals, 26½ miles, 50 feet wide and 2 feet deep; total fall in the entire distance, 104.26 feet, and fall over ledges and shoals 91.98 feet. Actual cutting through ledges, 47.875 feet.

The project for the season called for some work at Warford Shoals and Indian Creek, but as it was found that boats could get through these places very well, and that the work would not be injured by letting them alone, and Wiley's Falls being considered more important, the money was expended there, and, as the work was greater than anticipated in the project, there was no money left for the few shoals above that were estimated for this season.

Whilst the men in bad weather could not work, the boat's crew and some other labor was used in making a more careful survey of the line of the proposed channel through Shumate's Falls, as well as to sink test pits to ascertain the quality of the material to be taken out. This work was done to employ the party and to anticipate a call for a project for the improvement of these falls before the weather would be suitable to make the necessary examinations. A map on a scale of 100 feet to the inch has been prepared, together with a profile of the channel, from which a revised estimate has been made, giving the total cost of the work, in round numbers, at $11,000. The same method of improvement is recommended as suggested in my report for the fiscal year ending June 30, 1882.

3039 A careful survey was also made of the bank of the river at and below Wiley's Falls, with cross-sections every 50 feet, showing its exact condition previous to cutting the channel, to note in the future whether any damage had resulted therefrom.

On the improved part of the river, in this division, there are nine saw-mills, employing eleven keel-boats and numerous rafts, which cut in 1882, 2,000,000 feet of lumber, 1,800,000 oil barrels, and 100,000 pipe staves, besides twenty car loads of walnut and as many of locust. Their capacity is from 10,000 to 25,000 feet per day. In addition to the above there are six keel-boats on this section of the river, making seventeen in all.

Round Bottom or Pennington's Ferry, 24½ miles above Hinton, is becoming an important place, as the most of the tobacco, grain, &c., from that part of Mercer County is being shipped from that point.

The stave business is following the improvement very closely; a bucking machine is now in operation just below Round Bottom.

The improvement, when it reaches a point 35 miles above Hinton, will give outlet to Peterstown, Monroe County, West Virginia, a thriving place, about 2½ miles from the river, at which there are three mills with a capacity of 58 barrels of flour and one hundred and twenty bushels of meal per day, three tanneries using 1,500 hides per annum, three stores, one saw-mill, and one cabinet shop.

NEW RIVER BRIDGE DIVISION

Work commenced June 8 and ended September 25; only worked forty days out of a possible ninety-eight. Bad weather, high and muddy water, and lack of funds account for the loss of time. One party of about fifteen men, with one overseer for the whole work, was employed. Highest water 7.4 feet above and lowest 0.25 foot below zero. The gauge reading was below zero for only twenty-three days during the season. Worked over a river space of 8 miles, with a fall over shoals and ledges of 36.37 feet, from the head of Jones' Ford to a point in Pine Run Shoals, 1⅛ miles from their foot, one-third of a mile from their head, and, 29¼ miles from New River Bridge, with a channel 10 feet wide and 2 feet deep. To finish Pine Run Shoals will require cutting through four ledges, about 15 feet wide, and give outlet to Barren Spring Furnace, 30.9 miles above the bridge.
3040 Character of rock, limestone and red shale.

The channel gives outlet to Reed Island Creek Furnace at the mouth of Big Reed Island Creek, 26¾ miles above the initial point. In the 8 miles referred to seventy-three ledges were encountered, twenty-seven of which were improved for the 10-foot channel, and nearly all will have to be worked at when the 20-foot channel is made, which should be as soon as Barren Spring Furnace is reached; to do this, it is thought it will be best to go back to the beginning of the 10-foot channel, at the foot of Cecil's Ledges, 14½ miles above the bridge. The increased width is rendered necessary in some places where there is loose rock and gravel, as 10 feet is not wide enough for the current to keep the channel clear; as, for instance, at Jones' Ford and Crumm's Shoals; in fact, the narrow channel was only adopted to give temporary relief to the furnaces.

Total fall from the head of Pine Run Shoals to New River Bridge, 143 feet; fall over shoals and ledges in that distance 129.89 feet; length of walls, 874 feet, 5 feet wide and 2½ feet high.

Owing to the long distance worked over, the frequent removal of camp, and bad weather, the work cost about twice as much as last season.

Something over 900 tons of pig iron were shipped from Reed Island Furnace, 26¾ miles above New River Bridge, to the Norfolk and Western Railroad at the latter point, and 256 tons from Radford Furnace, 18 miles above the bridge.

Eight keel-boats on this division, with a small side-wheel steamboat, 75 feet long, 8 feet wide, and drawing 3 feet, eighteen charcoal furnaces, four forges, four zinc mines, one lead mine, and many deposits of copper await shipment by the river, and vast forests of the most valuable timber, on the upper division, are kept from market by the non-completion of this work.

LEAD MINES DIVISION

No work this season, but inspectors of the property stored at Wilkinson's Forge, Carroll County, Virginia, were made every sixty days.

An average cost of rock per cubic yard, $2.67, an increase over 1881 of 42 per cent. Cost of gravel, $1.22 per cubic yard.

3041 Taking the total number of cubic yards of material, measured in the walls, removed since the commencement of the work in 1877, and dividing it into the total amount of money expended in that time, it is found that it only cost $2.42 per cubic yard, which shows that the work has been conducted in a very economical manner.

Total number of miles of river improved, 61. The high price of supplies—bacon 20 cents and flour 5 cents per pound—made labor command 12 cents per hour to September 15, and 12½ cents thereafter.

On the 8th of March instructions were received from you to have all of the property belonging to the improvement taken to Hinton, W. Va. On the 17th of March, J. F. Palmer, to whom much praise is due for the efficient manner in which he carried on his work as superintendent last season, as well as for the energy and ability displayed in this movement, commenced that work, and after much difficulty, on account of the weather, low water, and scarcity of labor, succeeded in getting it all at the proper point on the 14th of April, and on the 25th, by your orders, a sale was held, at which everything belonging to the Government was disposed of to the highest bidder.

Of the freight sent from Hinton in 1882, 95 percent came from New River, an increase over 1881 of 46 percent.

Of the freight received at Hinton in 1882, 43 percent went up the river. Twenty-four and a half percent increase on shipments from Hinton in 1882 over 1881. Nine percent increase on freight received at Hinton in 1882 over 1881.

In the same order as above, the percentage at Lowell and Hinton stations, Chesapeake and Ohio Railway, combined, were respectively, 92½, 46, 14, and 55.

The shipments from the various stations on the Norfolk and Western Railroad, tributary to the river, were not received from the auditor, owing to want of time to prepare them, which is much to be regretted, as it is desirable to have comparisons annually.

The tables show the details of the work for the past season, as well as the commercial statistics for the lower division.

3042 Three maps, on a scale of 100 feet to the inch, show the details of the work and surveys at two shoals and two falls on the Greenbrier division, and four maps, on a scale of 200 feet to the inch, show the work at eight shoals and ledges on the Middle or New River Bridge division. The gauge readings on each division were also plotted.

From Hinton, W. Va., to mouth of Wilson Creek, Virginia, the extent of this work is 191½ miles.

Lower Division, 86½ miles; improved, 26⅕ miles.
Middle Division, 43 miles; improved, 29¼ miles.
Upper Division, 62 miles; improved, 5⅓ miles.
Total, 191½ miles; total improved, 60.78 miles.

June 30, 1882, there was a channel 50 feet wide and 2 feet deep from Hinton Landing to Kidwell's Ripple, a distance by river of 25⅑ miles; at the close of the working season for 1882, there was a channel of the same width and depth to Wiley's Shoals, a distance of 26½ miles.

June 30, 1882, there was a channel from New River Bridge to the head of Jones' Ford, a distance of 21 miles, 12 miles 30 feet, 2½ miles 20 feet, and 7½ miles 10 feet wide, and 2 feet deep. During the season for work, 1882, this channel was extended 8¼ miles, to a point above the bridge, 29¼ miles, with a width of 10 feet, and 2 feet deep. No appropriation for the year ending June 30, 1884.

The tables give an exhibit of the commerce of the river in 1882, an increase of nearly 50 percent.

On the entire river there are twenty-five keel-boats and one small side-wheel steamboat.

Respectfully submitted.

Wm. Proctor Smith,
Assistant Engineer.

Lieut. Col. **Wm. P. Craighill,**
U. S. Engineers.

3043 TABLE NO. 1.—SHOWING THE DISTANCES FROM STEAMBOAT LANDING AT HINTON, WEST VIRGINIA, TO FOOT OF SHOALS OR LEDGES, THEIR LENGTH, AND DIFFERENCE OF LEVEL BETWEEN THE HEAD AND FOOT OF SAME; ALSO THE QUANTITY AND QUALITY OF MATERIAL EXCAVATED IN MAKING AND IMPROVING THE CHANNEL IN 1882

Shoal or ledge	Distance	Length	Fall	Solid rock and bowlders	Gravel	Total
	Miles	*Feet*	*Feet*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Hinton to head of Pennington's Shoals	25	46,745	86.15			
Kidwell's Ripple	25⅑	170	.60	106		106
Wiley's Falls	26	495	3.58	1,505	40	1,545
Wiley's Shoals	26½	465	1.65	126		126
Total		47,875	91.98	1,737	40	1,777

TABLE NO. 2.—SHOWING THE SAME AS NO. 1 FOR THE MIDDLE DIVISION, WITH NEW RIVER BRIDGE, VIRGINIA, AS THE INITIAL POINT, 1882

Shoal or ledge	Distance	Length	Fall	Solid rock and bowlders	Gravel	Total
	Miles	*Feet*	*Feet*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Shoals to the head of Jones' Ford	21	42,181	89.52	22		22
Nunn's Ledges	21⅓	3,000	2.98	14		14
Clark's Falls	22⅜	240	2.51	40		40
Clark's Ledges	22½	220	2.31	12		12
Lake Island Shoals	23	3,100	6.51	42		42
Breeden's Ledges	24⅝	750	2.00			
Crumm's Shoals	26	2,640	6.92	78	74	152
Howard's Ledges	26 9/10	4,200	1.93			
Pine Run Ledges and Shoals	27⅞	7,800	11.21	53		53
Total		64,131	125.89	261	74	335

TABLE NO. 3.—SHOWING THE DETAILS OF BLASTING ON NEW RIVER, VIRGINIA AND WEST VIRGINIA, IN 1882

Subject	Division		Total
	Lower	Middle	
Number of holes drilled	548	322	870
Number of feet of drilling	1,186	636	1,822
Number of blasts fired	577	342	919
Number of blasts missed	4	12	16
Number of blasts fired under bowlders	25	8	33
Average depth of holes, feet	2.16	1.98	2.07
Average drilling per day per drill, feet	12.8	12.00	12.40
3044 Average charge of powder, pounds	0.51	0.39	0.45
Average loosening of rock per blast, cubic yards	1.60	1.00	1.30

TABLE NO. 4.—STATEMENT OF TONNAGE SENT FROM AND RECEIVED AT HINTON AND LOWELL STATIONS, ON THE CHESAPEAKE AND OHIO RAILWAY, FROM JANUARY 1, 1882, to JANUARY 1, 1883

(Furnished by Robert H. Fisher, Auditor)

[In tons of 2,000 pounds]

Articles	Hinton		New River		Lowell		New River	
	Sent	Received	From	To	Sent	Received	From	To
Lumber	8,153.01	286.61	7,975.00		1,188.53	68.90		
Wood		12.00						
Coal		954.48				73.79		
Salt	1.13	254.58	.10	120.00	.14	101.28		50.14
Other mineral						.27		
Bacon	3.06	54.50	2.06	25.00	.39	46.21		30.10
Butter	1.45	.17	.65		.60			
Cattle	15.00				707.25	22.00	102.50	
Eggs	.21		.09					
Hogs	.20	.04			1.05			
Horses	32.75	2.00			13.75	15.00	6.90	
Lambs					3.20			
Lard	.05	5.20	.02	2.45		.86		.40
Sheep					66.00			
Wool	7.93		7.00		5.34		3.20	
Corn	30.47	374.35	30.47	300.10	18.21	208.07		40.00
Dried fruit	.69		.45		.18	.60	.09	.30
Flour	8.82	335.39		190.54	6.19	171.32		101.00
Wheat	9.99	6.38	9.10		.33	3.50		
Flaxseed	.36		.30		.25		.25	

TABLE NO. 4.—STATEMENT OF TONNAGE SENT FROM AND RECEIVED AT HI
TON AND LOWELL STATIONS, ON THE CHESAPEAKE AND OHIO RAILWA
FROM JANUARY 1, 1882, TO JANUARY 1, 1883—Continued

Articles	Hinton		New River		Lowell		New. River	
	Sent	Received	From	To	Sent	Received	From	To
Hay	11.12	141.38	11.12	100.38	10.18	76.30		40.
Leaf-tobacco	133.80		133.10		86.50		80.50	
Oats	.15	1.15	.15	1.00		4.05		
Manufactured tobacco	1.56	4.80	.76	1.65		2.36		1.
Whisky	.30	13.01		7.45	29	17.02		17.
Merchandise, sundries	104.90	732.04	45.60	530.00	29.72	654.81		450.
Carbon oil	.03	35.39		22.14		15.99		7.
Cement		27.30		21.05	.60	29.78		29.
Lime	1.22	25.11		5.50		2.10		1.
Sundries	247.40	500.48	110.08	300.18	52.68	133.47	25.00	100.
Total	8,765.60	3,766.36	8,326.02	1,627.44	2,191.68	1,647.68	218.44	870.

3050 *Government exhibit 40*

REPORT OF THE CHIEF OF ENGINEERS, YEAR 1884

(pp. 149; 928)

16. New River, from the mouth of Wilson, in Grayson Count Virginia, to the mouth of Greenbrier River, in West Virginia.— Nothing was done on this river in the year ending June 30, 188 and the act of July 5, 1884, contained no further appropriatio for it. The balance, $3,079.08, reported as available, pertains b special designation in the law of August 2, 1882, to the portion o the river above Foster's Falls, which are not passable. Its ex penditure has seemed of very small benefit and has not been made

MONEY STATEMENT

July 1, 1883, amount available	$3,086.6
July 1, 1884, amount expended during fiscal year, exclusive of outstanding liabilities July 1, 1883	7.5
July 1, 1884, amount available	3,079.0
Amount (estimated) required for completion of existing project	169,000.0
Amount that can be profitably expended in fiscal year ending June 30, 1886	50,000.0

I 16

IMPROVEMENT OF NEW RIVER FROM THE MOUTH OF WILSON, IN GRAYSON COUNTY, VIRGINIA, TO THE MOUTH OF THE GREENBRIER RIVE IN WEST VIRGINIA

Nothing was done on this river in the year ending June 30, 188

MONEY STATEMENT

(Same as last money statement, supra.)

3051 *Government exhibit 41*

REPORT OF THE CHIEF OF ENGINEERS, YEAR 1885

(pp. 287–288; 1859)

3. New River, from the Mouth of Wilson, in Grayson County, Virginia, to the mouth of Greenbrier River, West Virginia.—As has been stated in previous reports, but is here repeated to save trouble in referring to other volumes, the appropriations have been made in such a manner as to divide this portion of the river into three sections, as follows:

	Miles
Upper, or Lead Mines	62
Middle, or New River Bridge	43
Lower, or Greenbrier	86½

Throughout this distance the navigable channel consisted of natural chutes through the ledges and shoals of varying widths, rarely over 1 foot in depth, in some places so tortuous as to render navigation extremely difficult and dangerous.

The original project adopted for the improvement of these natural channels was to widen them to 30 or 50 feet, as might be required, deepen them to 2 feet, and straighten such as needed it. This was for bateau navigation, the improvement, however, to be made in such a manner as to aid the work should a greater depth and width be required in the future.

A small steamboat, draught 12 inches when light, having been built at Hinton in the fall of 1878, rendered it necessary to make the channel in that section 50 feet wide at all points, and in many from 75 feet to 100 feet, the depth of 2 feet being retained. This steamboat was not adapted in dimensions and power to the navigation of the river, and has been withdrawn.

The original plan of improvement has been adhered to, except that the width of channels on the middle and upper divisions has been reduced to 20 feet, and on the former to 10 feet for several miles, to allow iron to be shipped from the furnaces above.

Nothing was done in the year ending June 30, 1884, nor in the year ending June 30, 1885, and the act of July 5, 1884, contained no further appropriation; neither was there an appropriation at the session of 1884–'85. The balance available, $3,000, pertains, by special designation of the law of August 2, 1882, to the portion of the river above Foster's Falls, which are not passable. 3052

Though some anxiety has been manifested by the people interested in that section of the river for the expenditure of this balance, it remains in the Treasury, as the need of it was not apparent until Foster's Falls could be passed. The difficulty about these falls will, however, considerably disappear when the railroad up Cripple Creek is completed, as boats could then ship to the railroad their freight at Porter's Ferry, above the Lead Mines and the falls.

The navigation of the river not being continuous as yet, it is practically a feeder to the railroads which cross it and run along portions of it. It has also been of much use in carrying materials and supplies to the railroads while in process of construction near it. It is probable that when the river is fully improved boats will transport one-third of the products of the fine agricultural country through which it flows, and seven-eighths of those of the mines, exclusive of coal.

MONEY STATEMENT

July 1, 1884, amount available	$3,079.08
July 1, 1885, amount expended during fiscal year, exclusive of outstanding liabilities July 1, 1884	79.08
July 1, 1885, amount available	3,000.00
Amount (estimated) required for completion of existing project	169,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1877	25,000.00

Submitted in compliance with requirements of section 2 of river and harbor acts of 1866 and 1867.

DD3

IMPROVEMENT OF NEW RIVER FROM THE MOUTH OF WILSON IN GRAYSON COUNTY, VIRGINIA, TO THE MOUTH OF THE GREENBRIER RIVER, IN WEST VIRGINIA

Nothing done on this river during the year ending June 30, 1885.

MONEY STATEMENT

(Same as last money statement, supra.)

3053 *Government exhibit 42*

REPORT OF THE CHIEF OF ENGINEERS, YEAR 1886

(pp. 281-282; 1599-1602)

3. New River, from the mouth of Wilson, in Grayson County, Virginia, to the mouth of Greenbrier River, West Virginia.—As has been stated in previous reports, but is here repeated to save trouble in referring to other volumes, the appropriations have been made in such manner as to divide this portion of the river into three sections, as follows:

	Miles
Upper, or Lead Mines	62
Middle, or New River Bridge	43
Lower, or Greenbrier	86½

Throughout this distance the navigable channel consisted of natural chutes through the ledges and shoals of varying widths, rarely over 1 foot in depth, in some places so tortuous as to render navigation extremely difficult and dangerous.

The original project adopted for the improvement of these natural channels was to widen them to 30 or 50 feet, as might be required, deepen them to 2 feet, and straighten such as needed it. This was for bateau navigation; the improvement, however, to be made in such a manner as to aid the work should a greater depth and width be required in the future.

A small steamboat, draught 12 inches when light, having been built at Hinton in the fall of 1878, rendered it necessary to make the channel in that section 50 feet wide at all points, and in many from 75 feet to 100 feet, the depth of 2 feet being retained. This steamboat was not adapted in dimensions and power to the navigation of the river, and has been withdrawn.

The original plan of improvement has been adhered to, except that the width of channels on the middle and upper divisions has been reduced to 20 feet, and on the former to 10 feet for several miles, to allow iron to be shipped from the furnaces above.

3054 There was no appropriation for this river in 1883, 1884, or 1885. July 1, 1886, there was a balance remaining unexpended of $3,000 from the appropriation of August 2, 1882. This pertained by special designation of the law to the portion of the river above Foster's Falls, which are not passable. The balance remained unexpended because of the impassibility of these falls. As the disconnection with routes of transportation caused by these falls would practically disappear on the completion of the railroad up Cripple Creek, and as boats could then ship to the railroad their freight at Porter's Ferry, above the lead mines and the falls, it was concluded to improve the condition of Williamson's Ledges and Shoals. This work was continued as late as the season allowed, a small balance of funds being left unexpended, but not large enough to justify the resumption of operations in the summer of 1886.

The navigation of the river not being continuous as yet, it is practically a feeder to the railroads which cross it and run along portions of it. It has also been of much use in carrying materials and supplies to the railroads while in process of construction near it. It is probable that when the river is fully improved boats will transport one-third of the products of the fine agricultural country through which it flows, and seven-eighths of those of the mines, exclusive of coal.

MONEY STATEMENTS

July 1, 1885, amount available	$3,000.00
July 1, 1886, amount expended during fiscal year, exclusive of liabilities outstanding July 1, 1885	2,533.43
July 1, 1886, amount available	466.57
Amount appropriated by act approved August 5, 1886	10,000.00
Amount available for fiscal year ending June 30, 1887	10,466.57
Amount (estimated) required for completion of existing project	159,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1888	20,000.00

Submitted in compliance with requirements of section 2 of river and harbor acts of 1866 and 1867.

C C 3

Improvement of New River From the Mouth of Wilson, in Grayson County, Virginia, to the Mouth of Greenbrier River, in West Virginia

3055 July 1, 1885, there was a balance remaining unexpended of $3,000 from the appropriation of August 2, 1882. This pertained by special designation of the law to the portion of the river above Foster's Falls, which are not passable. Upon application from parties interested in the navigation of the upper part of the river, in view of the expected construction of a branch railroad up Cripple Creek, which would obviate the difficulty of the impassability of Foster's Falls, and enable the freights from the river to reach the Norfolk and Western Railroad, it was decided to ameliorate the condition of the river at Wilkinson's ledges and shoals as far as the available balance would allow.

Work was commenced September 1, 1885, and continued as long as the weather would permit work in the water. The law having left to the discretion of the Secretary of War to do this work by contract or otherwise, as it might seem most economical and advantageous to the United States, it was decided, in consideration of special circumstances, to dispense with formal contracts, to hire boats and other appliances, as well as the necessary labor.

In 1881 a channel 20 feet wide and 2 feet deep at ordinary low water of summer, was made from the lead mines in Wythe County to within 1,200 feet of Williamson's old forge in Carroll County, a distance by river of over 5 miles. In the autumn of 1885 the channel was continued of the same width and depth for a distance of 1.1 miles to a point 600 feet from the pool of Fowler's Ferry.

The actual cutting amounts to 926 linear feet; the material was made into wing-dams and sustaining walls, of which the combined length was 1,863 feet, with an average width and height of 5 feet and 3 feet, though some were 20 feet wide and 6 feet high. The total material removed amounted to 1,371 cubic yards, at a cost of $1,60 a yard.

The work was prosecuted very vigorously under the immediate superintendence of Col. W. Proctor Smith, formerly of the Corps of Topographical Engineers, United States Army.

MONEY STATEMENT

(Same as last money statement, supra.)

3056 **REPORT OF COLONEL W. P. SMITH, ASSISTANT ENGINEER**

UNITED STATES ENGINEER OFFICE,
Baltimore, Md., November 30, 1885.

COLONEL: I have the honor to make the following report of operations on the improvement of New River, Virginia, during the season of 1885.

In obedience to your instructions I went to Wytheville, Va., on the 21st, and to Ivanhoe Furnace on the 22d of August; on the 24th began preparations for improving Wilkinson's ledges and shoals, 3 miles above. The preparation consisted in building rock-boats and canoes, collecting tools, blacksmith supplies, powder, lumber for shelter for men, and to build turning-dams, and getting the same to the part of the river to be improved, making and putting up water-gauges, building blacksmith shop, making an examination of the ledges, and staking out enough of the channel to begin work, which took until the end of the month.

On the 1st of September the actual work in the river commenced, and continued without interruption until the 10th of October, with the loss of only one day from bad weather. On the 12th of October a hard rain set in, which caused the river to rise 3 feet, and the weather turning cool the work was stopped.

A survey of the part of the river which had been worked over was begun on the 14th, and finished on the 17th, which ended operations for the season in the field.

Wilkinson's shoals and ledges began about 4½ miles above the lead mines, and are 1¾ miles in length. They consist of series or groupes of ledges running entirely across the river, which, owing to bends in the stream, had, at points, to be followed in their general direction north 64° east, and at others crossed diagonally and at right angles. The ledges for the most part consist of blue and red slate, the latter often interspersed with iron pyrites and flint; some of them rise 5 or 6 feet above the surface of ordinary summer water. The fall in these ledges is 54.1 feet. The total fall from Fowler's Ferry, at the head of these shoals, to the lead mines is 79.12 feet in a distance of 6¼ miles.

3057 Between the ledges referred to, a great many bowlders of hard sandstone are found, with here and there small quantities of gravel and sand and a few loose rock.

In 1881 a channel, 20 feet wide and 2 feet deep, at ordinary summer water, was made from the Lead Mines Dam in Wythe County to within 1,200 feet of Wilkinson's old forge in Carroll County, a distance by river of a little over 5 miles. This forge was swept away by the great flood of September, 1878.

On September 1 work was commenced at the point of leaving off in 1881, continuing the channel, of the same width and depth, for a distance of $1\frac{1}{11}$ miles; to the upper or summit ledge, 600 feet from the Fowler's Ferry Pool, a point it was expected to reach this season, and which would have been done had the weather continued favorable one week longer.

In making the channel spoken of, thirty-nine groups, containing one hundred and forty-three distinct ledges, from 6 inches to to 15 feet in thickness, were encountered, as well as from eighty to one hundred bowlders, which, in the absence of a crane-boat, had to be blasted and then removed, as they were too large to be removed by rolling or lifting by hand.

The actual cutting through the ledges amounts to 926 linear feet, averaging 2 feet in depth, the material from which was made into wing-dams and sustaining walls, whose combined length amounts to 1,863 feet, with an average width and height of 5 feet and 3 feet, although some of them were 20 feet wide and 6 feet high. These walls contain 1,035 cubic yards of material and 336 cubic yards wasted; making the total amount of material removed equal to 1,371 cubic yards, at a cost of $1.60 per yard, which is very cheap, and is accounted for by the means used of hiring tools from the contractors of the Cripple Creek Railroad and the New River Mineral Company at a very low rate. No estimate of the cost of loose rock, gravel, and sand was attempted, as the quantity of each was insignificant.

The heaviest work of the season was found in the last 800 feet, where the channel had to be cut through nine groups of ledges, the fall over which is 13½ feet; over some of these ledges
3058 the water was very swift, rendering it difficult to make
turning-dams stay in their places. There were also some rock encountered about half way, where, as stated before, the ledges were full of pyrites and flint, making it very hard to drill.

To complete the work to the head of the ledges, a distance of 600 feet, there will be encountered ten small ledges over which the fall is very slight, which can be taken out at an estimated cost of $300.

The work occupied thirty-four days, with an average, all told, of thirty-two men, whose wages were $1 per day of ten hours until the 17th of September, when the time was reduced to nine hours, and still further to eight hours October 4, owing to cold weather and short days. The laborers boarded themselves and were sheltered in temporary sheds, and some occupied buildings found near the work.

The gauge-readings were below zero or ordinary summer water the whole time, the lowest being 0.95 feet below and the highest 3 feet above zero, the latter occurring during the survey after the work had stopped. For about ten days the water was muddy, which retarded operations somewhat, but on the whole the stage of the river and the weather were excellent. Five hundred holes were drilled to an average depth of 2.17 feet, 724 blasts were fired with an average charge of powder of 0.8 pounds, loosening about 1.7 cubic yards of material per blast. Six hundred pounds of powder were used, contained in 1,087 cartridges 8 inches long and 1¼ inches in diameter. The powder was Hercules No. 2, containing 40 per cent of nitro-glycerine, its lack of strength causing more to be used than heretofore, but the price being about half of that formerly used compensated for the greater quantity. Five thousand feet of double tape-fuze were consumed and 1,225 linear feet of holes drilled. Charcoal was used in the blacksmith shop, at a cost of 5 cents per bushel, purchased in the immediate vicinity of the work.

The month of November was consumed in getting up material for and preparing this report, and in plotting the notes of survey and making maps therefrom. Of the latter, two were made of the upper part of Wilkinson's ledges and shoals, showing the work in detail, and of scales, respectively, 200 feet and 800
3059 feet to the inch; one of the river from the Lead Mines down
to the head of Wilkinson's Shoals, at Fowler's Ferry, on a scale of 800 feet to the inch, showing the work in general throughout that distance, a tracing of which accompanies this report.[10] A graphic description of the guage readings for the season was also made for preservation in the office.

The Cripple Creek Railroad, which is partially built, starts from Martin's (now called Pulaski) Station, on the Norfolk and Western Railway, in Pulaski County, Virginia, strikes New River about 5 miles below the mouth of Red Island Creek, crosses soon after to the right bank and follows it to Jackson's Ford, when it crosses to the left bank and runs up to Snow Hill Branch, about 2¾ miles above the Lead Mines, which it follows, crossing the divide to Cripple Creek at Brown Hill Furnace, and thence up the creek, passing Ivanhoe Furnace, belonging to the New River Mineral Company, located on Snow Hill Branch, about 200 yards from New River at Porter's Ferry. The work on this road was temporarily suspended last June, but orders have been issued for its immediate resumption.

---

[10] Tracing omitted.—W. P. C.

Whilst the work of building the Cripple Creek Railroad was going on, the owners of two saw-mills, between 8½ and 9½ miles above the Lead Mines, with a capacity of 5,000 feet per day, hauled their lumber to the head of the channel just below the Forge and then shipped it by raft to different points along the river and railroad. Another saw-mill is also in existence up Crooked Creek, 9 miles above the mines, the lumber from which will be shipped by raft as soon as the railroad work gets in full operation. There is a large quarry on the river just below Porter's Ford, the stone from which was boated down the stream, through the channel, to the railroad, and will be again when the material is needed.

The channel made this season will benefit these rafts when a rise of about 1 foot occurs, but to do much good the balance of these shoals should be removed and the work carried on through Early's, Elley's, and the Gulf Shoals to a point near Grayson Sulphur Springs between 9 and 10 miles above the mines; in fact, for shipping lumber and minerals the channel should be made as projected, to the mouth of Wilson in Grayson County, 62 miles above the Lead Mines.

Hitherto the obstruction offered to navigation by Foster's
3060 Falls, about 6 miles below the mines, almost rendered it
useless to expend the money appropriated for the division under consideration. The construction of the Cripple Creek Railroad, however, abrogates this and puts this division on a par with those of Greenbrier and New River bridge, for its objective point is a railroad as well as that of the other two, and timber and minerals can just as easily be taken to market therefrom.

No bateaux in use on this part of the river as yet, and there will not be until the channel is made up the river a sufficient distance to make their use profitable. There are, however, one-half dozen large boats for carrying stone lying idle at the quarry referred to, ready for use as soon as times get more prosperous.

As the work stood June 30, 1882, there was a navigable channel 20 feet wide and 2 feet deep at ordinary low water above the Lead Mines Dam for a distance of a little over 5 miles. At the end of this season this distance has been increased to 6¼ miles.

It is not necessary to say anything about the other two divisions of New River, as there was no work done on them, nor were the channels examined; but from inquiries it is thought that the channel-way made in former years still keeps open, and bateaux are in constant use on them, iron having been shipped to New River bridge up to the time of the suspension of the furnaces by the prevailing hard times.

It is not thought necessary to give a description of the wonderful resources of this section of country in minerals, timber, and agricultural products, for the subject is thoroughly treated in your reports to the Chief of Engineers, United States Army, to be found in the annual report of that officer as follows: 1873, Appendix T; 1875, Appendix W; 1879, Appendix F.

Respectfully submitted.

WM. PROCTOR SMITH,
Assistant Engineer.

Lieut. Col. WM. P. CRAIGHILL,
United States Engineer Corps.

3061 *Government exhibit 43*

House Executive Documents, 1st Session, 52nd Congress, 1891–1892, Vol. 3

Report of the Secretary of War, Vol. 2—1891, Engineers, Part 1

(5) New River, from the mouth of Wilson, in Grayson County, Virginia, in the mouth of Greenbrier River, West Virginia. The appropriations have been made in such manner as to divide this portion of the river into three sections as follows:

	Miles
Upper, on Lead mines	62
Middle, on New River bridge	43
Lower, on Greenbrier	86½

throughout this distance the navigable channel consisted of natural chutes through the ledges and shoals of varying widths, rarely over one foot in depth, in some places so tortuous as to render navigation extremely dangerous and difficult.

The original project adopted for the improvement of its natural channels was to widen them to thirty or fifty feet, as might be required, deepen them to two feet, and straighten such as need it. This was for bateau navigation; the improvement, however, to be made in such a manner as to aid the work should a greater depth and width be required in the future.

A small steamboat, draft twelve inches when light, having been built at Hinton in the fall of 1878, rendered it necessary to make the length in that section fifty feet wide at all points, and in many from seventy-five feet to one hundred feet, a depth of two feet being retained. This steamboat was not adapted in dimensions and power to the navigation of the river and was withdrawn.

The original plan of improvement has been adhered to, except that the width and the length of the middle and upper divisions has been reduced to twenty feet, and on the former to ten feet for several miles, to allow the iron to be shipped from the furnaces above.

There was no appropriation for this river in 1883, 1884 3062 or 1885. July 1, 1886, there was a balance remaining unexpended of $3,000 from the appropriation of August 2, 1882. This pertained by special designation of the law to the portion of the river above Foster's Falls, which was not passable. The balance remained unexpended because of the impassability of these falls. As the disconnection with routes of transportation caused by these falls would practically disappear on the completion of the railroad up Cripple Creek, and as boats would then ship to the railroad their freight at Porter Ferry, above the lead mines and fields, it was concluded to improve the condition of Williamson Ledges and Shoals. This work was continued as long as the season allowed and small balance of funds being left unexpended, but not large enough to justify the resumption of operation in the summer of 1886.

There was an appropriation of $10,000 in the law of August 5, 1886, applicable only to the portion of the river above Leadmines. When the money became available it was too late to commence operation in 1886. For more than one reason it seemed inexpedient to expend this appropriation in the year ending June 30, 1888. The portion of the river to which it is applicable is above Foster Falls, and this can only be passed by one or two locks. There are also strong reasons for doubt whether, considering the present development of that section of the country, the construction of such locks would be justified, even if the money were available. The construction of railroads near this stream had diminished very much the importance of the improvement of the portion of reconnaissance of the river and its vicinity, and it was decided to postpone the expenditure of the appropriation until the will of Congress could be further ascertained.

In the River and Harbor Act of August 11, 1888, it was, however, directed that the balance be spent in improving the river between Ivanhoe Furnace, in the Wythe County, and the mouth of Wilson Creek. Operations in accordance with these directions were therefore commenced June 9, 1889, and continued until October 10, 1889.

In 1885 there was a channel two feet deep and twenty feet wide from Ivanhoe Furnace to within six hundred feet of the head of Wilkinson Shoals and Ledges, a distance of 3.9 miles.
3063 In 1889 this channel, with the same width, and depth was extended to the lower end of the approach to the Gulf, a distance of five miles from the initial point, with four-tenths

of a mile further up the river, partially improved. There were no operations on the river in the year ending June 30, 1891, and thereafter no expenditures in that fiscal year. The balance of $2,341.79 remains from the last appropriation, which was in August 1886.

In compliance with the recommendation of the local engineer, it was decided by the Secretary of War not to expend the existing balance at present.

MONEY STATEMENT

Up to June 30, 1891, the amount expended was	$109, 733. 21
July 1, 1890, balance unexpended	$2, 341. 79
July 1, 1891, balance unexpended	2, 341. 79
Amount (estimated) required for completion of existing project	159, 000. 00

Submitted in compliance with requirements of Section 2 of River and Harbor Acts of 1886 and 1887.

115

IMPROVEMENT OF NEW RIVER, VIRGINIA AND WEST VIRGINIA

After the suspension of the operations for some years for want of funds an appropriation of $10,000. was made August 6, 1886, applicable, however, only to the portion of the river above the Lead Mines in Wythe County, Virginia.

Doubt having arisen, in view of the changed condition of affairs on and near the river, as to the propriety of expending this appropriation at once, it was decided by proper authority to defer operations until the will of Congress could be further ascertained.

In the River and Harbor Act of August 11, 1888, it was directed that the balance should be spent in improving the river between Ivanhoe Furnace in Wythe County, and the mouth of Wilson Creek. Operations in accordance with this direction were commenced in June 1889 and continued until October 10, 1889.

The work done was in the neighborhood of Ivanhoe Furn-
3064 ace, and was continued until necessarily suspended by
high water. A balance of $2,341.79 was left, which still remains. The expenditure on this river up to 1886 were highly useful, but since that time the situation has changed. In a report of April 17, 1891, given below, it was recommended that the remaining balance be not spent at present. To this the Secretary of War agreed.

MONEY STATEMENT

(Same as last money statement, supra.)

(For balance of this exhibit see original exhibit 43.)

3065 *Government exhibit* 44

House Documents, Vol. 3, No. 2

Reports of War Department, Engineers, Pt. 1, 55th Congress, 2nd Session, 1897

Page 379

NEW RIVER, VIRGINIA AND WEST VIRGINIA

In its original condition the navigable channel consisted
natural chutes through the ledges and shoals; the chutes were
varying widths and there was rarely over one foot of water
such points.

The original project was adopted in 1875 (report printed
the Annual Report of the Chief of Engineers for 1893, pp. 84
854) and provided for improving the stream from the lead min
in Wythe County, Virginia to the mouth of Greenbrier Rive
West Virginia, by widening the channels from 30 to 50 feet,
might be required, deepening them to 2 feet and straightenin
such as needed it for bateau navigation; the improvement, hov
ever, to be made in such manner as would aid the work shoul
greater depth and width be required in the future.

The extension of the improvements from the lead mines i
Wythe County, Virginia, up to the mouth of Wilson Creek i
Grayson County, Virginia, was provided for in the act of Con
gress of June 14, 1880. (Report on pp. 113–139, part 2 of th
Annual report, of the Chief of Engineers for 1875, and repor
on pp. 538–545, part 1, of the Annual report of the Chief o
Engineers for 1879.)

The sum of $109,691.06 was expended up to June 30, 1896, fo
open river navigation.

There were no expenditures during fiscal year ending June 3
1897. The unexpended balance is, by the act of Congress o
August 5, 1886, available for expenditure between the lead mine
and Wilson Creek. As conditions have changed in late year
the future improvements of that portion of the stream has bee
reported as entirely unnecessary, and the Secretary of Wa
3066 has decided not to expend the existing balance at presen

July 1, 1896, balance unexpended	$2,308.9
July 1, 1897, " "	2,308.9

F. F. 7

Improvements of New River, Virginia and West Virginia (this work was in the charge of Col. Peter C. Hains, Corps of Engineers, until April 30, 1897).

The charge of the improvements of the New River was transferred to me on April 30, 1897, by Col. Peter C. Haines, Corps of Engineers, in accordance with instructions in letter of the Chief of Engineers to Colonel Hains, dated April 17, 1897.

The balance unexpended was furnished by the act of Congress on August 5, 1886, with the stipulation; "continuing improvements between the lead-mines, in Wythe County, and the mouth of Wilson's Creek in Grayson County." By letter dated April 17, 1891, it was reported to the Chief of Engineers that further improvements of that portion of the stream was wholly unnecessary, on account of changed conditions in late years. The Chief of Engineers, under date of April 23, 1891, stated that the Secretary of War had decided that the unexpended balance should be withheld from expenditure until further action is taken by Congress. Nothing has, therefore, been done toward improving the stream since that time.

MONEY STATEMENT

July 1, 1896, Balance unexpended	$2, 308. 94
July 1, 1897, Balance unexpended	2, 308. 94

3067 *Government exhibit 45*

Fifty-Seventh Congress, Sess. 1, Ch. 1079, 1902

The River and Harbor Appropriation Act of 1902 being Chapter 1079, Act of June 13, 1902, provides as follows:

REPEAL OF PROVISIONS IN FORMER ACTS

SEC. 7. That the provisons of river and harbor Acts heretofore passed providing for the prosecution of work upon the following projects are hereby repealed, and any amounts heretofore appropriated for any of the same now remaining unexpended shall be paid into the Treasury of the United States, to wit: Pensaukee Harbor, Wisconsin; New River, Virginia and West Virginia; Wolf Lake, Indiana; Chippewa River, Wisconsin; Yellowstone River, Montana and North Dakota. 32 Stats. at large, 331,374.

3068 *Government exhibit 46*

62D Congress, 3d Session. House of Representatives. Document No. 1410

NEW RIVER FROM RADFORD, VA., TO HINTON, W. VA.

Letter from the Secretary of War, transmitting, with a letter from the Chief of Engineers, report on examination of New River, from Radford, Va., to Hinton, W. Va. February 20, 1913.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, February 19, 1913.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 17th instant, together with copy of a report from Maj. F. W. Altstaetter, Corps of Engineers, dated November 21, 1912, on preliminary examination of New River, from Radford, Va., to Hinton, W. Va., made by him in compliance with the provisions of the river and harbor act approved July 25, 1912.

Very respectfully,

HENRY L. STIMSON,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

3069

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 17, 1913.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of New River from Radford, Va., to Hinton, W. Va.

1. There is submitted herewith, for transmission to Congress, report dated November 21, 1912, by Maj. F. W. Altstaetter, Corps of Engineers, on preliminary examination of New River, from Radford, Va., to Hinton, W. Va., called for by the river and harbor act approved July 25, 1912.

2. New River rises in western North Carolina and flows in a general northerly direction, uniting with the Gauley River to form the Kanawha River. Hinton is located 57 miles above the mouth and Radford 84 miles farther up. The river flows through a sparsely settled, rugged mountain country. From Hinton to

the head of slackwater in the Kanawha River, a distance of 64 miles, the fall is almost 750 feet. The whole section is unfavorable for navigation and the district officer states that the river above it could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount. The stretch under consideration must therefore be considered independently. From the investigation made by the district officer, it appears that there is no demand for river improvement over this section, and that an improvement of value would require the construction of locks and dams at considerable cost. He is of opinion that the river between Hinton and Radford is not worthy of improvement by the United States, and in this opinion the division engineer concurs.

3. This report has been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to the board's accompanying report of December 23, 1912, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore, in carrying out the instructions of Congress, I report that the improvement by the United States of New River, from Radford, Va., to Hinton, W. Va., in the manner apparently desired by the interests concerned as described in the reports herewith, is not deemed advisable at the present time.

W. H. BIXBY,
Chief of Engineers, U. S. Army.

3070 REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

(Third indorsement)

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
December 23, 1912.

THE CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. Hinton is located at the confluence of New River and the Greenbrier, 57 miles above the mouth of New River and 64 miles above the head of slack-water navigation on the Kanawha River. On this reach the fall is 750 feet, and navigation is therefore impracticable. Radford is 84 miles above Hinton, the fall on this reach being 348 feet, or over 4.1 feet per mile. The upper 54 miles of this reach—Glenlyn to Radford—is paralleled for most of

the way by two railroads. From Glenlyn to Hinton, 30 miles, the fall is 128 feet. There is no railroad along the banks of this portion of the stream, but the district officer states that no part of it is more than 15 miles from a railroad.

2. There is no navigation on the reach between Radford and Glenlyn and none is demanded by those in the vicinity who were given an opportunity of expressing an interest in the subject. Some indefinite expressions of interest were shown in regard to the reach between Glenlyn and Hinton, but these were vague and appeared to recognize the fact that the great fall in the river would preclude any form of continuous navigation, except through slack watering the stream.

3. The country adjacent is sparsely settled, and the chief occupation of the inhabitants is farming and stock raising. Just above Radford some iron ore is mined and there are some small lead mines in that vicinity.

4. About $110,000 has been expended on this river in improving the bars by building chutes or sluiceways through them. This afforded possible light-draft navigation and was used to some extent a number of years ago. But little has been done on this river since 1882. There is a very small commerce carried on in the lower part of the reach under consideration by the use of so-called keel boats, which are towed or poled. There being no connection with the river below, the commerce is local.

5. The district officer reports that between Glenlyn and Radford there is no particular need or demand for improvement, and that between Hinton and Glenlyn the commerce is small and the depth of the water now maintained is sufficient for present demands. He therefore reports that the river is unworthy of improvement, and in this view the division engineer concurs.

6. Interested parties were advised of the unfavorable report of the district officer and given an opportunity of presenting their views to the board, but no communications on this subject have been received.

3071 7. There is very little commerce on this river at present, and as there are no commercial or mining industries of importance, no material increase could be expected even if it were improved. Physical conditions are such that it could not be improved for useful navigation except at prohibitive cost. The board, therefore, reports, concurring with the views of the district officer and the division engineer, that it is not advisable for the United States to undertake the improvement of New River from Radford, Va., to Hinton, W. Va.

8. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related sub-

jects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board:

Wm. T. Rossell,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF NEW RIVER FROM RADFORD, VA., TO HINTON, W. VA.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., November 21, 1912.

From Maj. F. W. Altstaetter, Corps of Engineers.
To: The Chief of Engineers, United States Army (Through the Division Engineer).
Subject: Preliminary examination of New River from Radford, Va., to Hinton, W. Va.

1. In compliance with letter of August 3, 1912, from the department, the following report on the preliminary examination of New River from Radford, Va., to Hinton, W. Va., is submitted, as required by the river and harbor act approved July 25, 1912.

2. The New River rises in western North Carolina and flows in a general northerly direction, uniting with the Gauley River to form the Kanawha River. Hinton is located 57 miles above the mouth of New River, and Radford is 84 miles farther up, or 141 miles above the mouth. The drainage area above Hinton is 5,600 square miles and above Radford 2,725 square miles. Drawing K 12/51 (inclosed herewith) shows the river from Hinton and Radford and also its position with respect to the main lines of transportation in the vicinity.

3. The entire New River flows through sparsely settled rugged mountain country. There are no towns of any size between
3072 Hinton and Radford. According to the census of 1910,
the population of the adjacent counties was as follows:

Summers County, W. Va	18,420
Mercer County, W. Va	38,371
Monroe County, W. Va	13,055
Giles County, Va	11,623
Pulaski County, Va	17,246
Montgomery County, Va	17,268

The principal cities are Radford and East Radford, Va. (6,202); Pearisburg, Va. (646); Hinton and Avis, W. Va. (5,088). There is a small hamlet of Glenlyn, with a population of 52, situated 30 miles above Hinton, where the Norfolk & Western and Coal & Coke Railroads leave the river.

4. The inhabitants are engaged chiefly in farming and stoc raising. There is a small quantity of timber and staves marketed There is no underlying coal, the New River fields being some distance from the section under consideration. Just above Radford some iron ore is mined, and there are also some small lead mines in that vicinity.

5. From Hinton to the head of slack water in the Kanawha, a distance of 64 miles, the fall is almost 750 feet. There are many bridges and steep rapids along this portion, including Kanawha Falls, which is about 16 feet high. This whole section is unfavorable for navigation, and the river above it could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount. The navigation between Hinton and Radford must therefore be considered as having no outside river connection. The Chesapeake & Ohio Railroad parallels the river from Hinton to its mouth and continues on down the Kanawha River.

6. Physical characteristics.—From Hinton to Radford the river is shown by seven drawings [11] (inclosed herewith), marked K 12/52, 53, 54, 55, 56, 57, and 58. A survey of this river was made in 1873, and maps of that survey with other information obtainable were used in preparing the above drawings. The river has a breadth varying from 500 to over 1,000 feet, with an average breadth of about 600 feet. The lowest published discharge measured at Radford is given as 1,830 cubic feet per second, but as the discharge in the Kanawha River has been measured as low as 1,100 cubic feet per second, that in the New River is probably lower than indicated above. From a study of the gauges at Radford and Hinton and other sources it appears that at extreme low water the controlling depths over the bars may drop to less than 1 foot. This is due to the great rapidity of the current, the drop between these two places being about 348 feet. The headwaters of the river being in some of the highest mountains east of the Rockies a good discharge is ordinarily maintained, and 2 feet found over the bars.

From Hinton to the vicinity of Glenlyn a boat drawing 2
3073 feet will have sufficient depth of water for navigation at
practically all times. Mean stage conditions give 3 feet over nearly all bars. The river, however, partakes of the characteristics of a mountain stream, with very rapid current and bad rapids, and therefore navigation is dangerous on it.

The drop of the surface of the water is shown in the profiles on the drawings. This whole country has outcroppings of rock over much of the area. The river bottom and banks are rock in many places, so that little change has taken place in years except that the iron-ore washings in the upper river have deposited sediment in the quieter and deeper reaches, and where improvements have been made at the bars loose stones placed there have been moved.

---

[11] Not printed.

The valley is generally narrow, with many steep bluffs frequently rising sheer from the water's edge. At places there is a narrow bench of fertile soil lying quite low, but most of it is well above flood stages.

The Weather Bureau reports 14 feet as a flood stage, both at Hinton and at Radford. At the Radford gauge the extreme variation of water recorded is 36 feet, while at Hinton it is 22.5 feet.

7. Previous examinations, etc.—The previous examinations and reports on this portion of the New River have been made as follows:

First. Survey of 54 miles of the river between Sinking Creek and Greenbrier River was made in 1819 by Moore and Griggs, under the auspices of the board of public works of the State of Virginia, with a view to connecting the waters of the James and Kanawha Rivers by that route.

Second. Examination for 128 miles from the lead mines in Wythe County to the mouth of the Greenbrier River at Hinton. (See Annual Report Chief of Engineers, 1873, pp, 78 and 842.)

Third. Examination of the New River, W. Va., at its confluence with the Greenbrier River. (See Annual Report Chief of Engineers for 1904, pt. 3, p. 2617.)

8. Work done.—The only work done in the past has been the improvement of some of the bars by building a channel chute or sluiceway across them. This channel was about 50 feet wide and 2 inches deep at extreme low water, and was made by cutting out rock where necessary and piling up stones along the sides of the chute to direct the water through it. The work extended from Hinton for a distance upstream of about 25 miles. About $110,000 was expended in this work. The last work was done in 1882, except for the expenditure of $10,000, and the chutes have deteriorated in the meantime due to the natural action of ice and the current.

3074 9. Commerce.—Above Glenlyn the river is paralleled most of the way by two railroads, and there is no river commerce. From Hinton to Glenlyn, a distance of 30 miles, there is some commerce, consisting of lumber, staves, sand, gravel, and also some grain, hay, farm products, and miscellaneous merchandise. No statistics are on hand, but I am informed that the commerce at Hinton amounts to about two railroad carloads per day, and, as Hinton is the only town on this 80-mile section, this is some measure of its amount. This estimate of two carloads a day is thought to be excessive and is believed to be true only at times. In 1883 there were about 17 keel boats in this traffic, and there are said to be 10 or 12 such boats now on the river. These keel boats, as they are called, are the popular boats for this traffic, having an average length of 60 feet, width of 6 to 8 feet, and carrying 20,000 to 27,000 pounds. Their draft is generally about 2 feet. The commerce is altogether local. During the winter season, from December 1 to April 1, the roads are in poor condition, and the inhabitants experience difficulty in transportation of supplies. The section from Glenlyn to Hinton lies almost entirely in Summers County and only traverses about one-half of it. Summers County had a population, at the last census, of 18,420. Probably no more than 2,000 or 3,000 people at most are in any way dependent upon this section of the river. The improvement of the river would probably cause a small increase in commerce, but not a very large one, as there is nothing to move.

10. Obstructions.—The following is a list of bridges, with principal span, and clearance above low water:

Norfolk & Western Ry. bridge at Radford:	
Principal span	130 feet
Clearance	31 feet 7 inches
Highway bridge at Radford:	
Principal span	114 feet.
Clearance	57 feet 2 inches.
Norfolk & Western Ry. bridge near Pepper:	
Principal span	140 feet.
Clearance (about)	33 feet.
Highway bridge at Eagleston:	
Principal span	225 feet.
Clearance	34 feet 5 inches.
Norfolk & Western Ry. bridge at Ripplemead (Big Stoney):	
Principal span	110 feet.
Clearance	32 feet.
Highway bridge at Ripplemead:	
Principal span	150 feet.
Clearance (estimated)	32 feet.
Highway bridge at Narrows, Va.:	
Principal span	216 feet 9 inches.
Clearance	27 feet 8 inches.
Virginia Ry. bridge at Glenlyn:	
Elevation extremely high. No data as to dimensions.	
Highway bridge at Hinton:	
Principal span	242 feet 6 inches.
Clearance (middle of second span)	53 feet 5 inches.

3075 There are no dams in this section of the river.

11. Improvement desired.—The inhabitants between Glenlyn and Radford seem to have no desire whatever to have the river improved. The following are quoted from statements made by some of the citizens in this section:

"Can see no advantage in the project, that part of the State being well provided for with railroads.

"Never heard of anyone who wanted any improvement of the river.

"Think the cost would be very excessive for the benefits that would be derived.

"The idea is entirely new to me; never heard it discussed.

"Do not know of any demand for an improvement.

"Do not think any use would be made of the slack water if provided.

"Do not know of any demand for river improvement.

"Regard this scheme as entirely impracticable; in fact, consider it foolish to contemplate.

"See no demand, either present or prospective, for slackwater navigation.

"Do not think it practicable to improve a short piece of the river without an outlet in the Ohio, which is, of course, impracticable."

From Glenlyn to Hinton inquiry among the inhabitants revealed no one who had heard anything about a possible improvement, but they were more favorably impressed with the idea than the inhabitants in the section from Glenlyn to Radford. Briefly, they favored some form of slack-water navigation, and thought that the river was not suitable for improvement except by slack water. The following are statements made by various prominent citizens of this section:

"Anxious to see something done that would open up the country.

"Consider it would be more advantageous for a pool of water from Narrows to Hinton.

"Think that section certainly needs something done to develop it.

"Think that section of river between Glenlyn and Hinton deserves an improvement.

"Think it probable that most of the timber adjacent to the river has been cut, but there remain great quantities of staves, ties, bark, etc., that will continue for years and that could profitably be shipped by water.

"The chutes made years ago by the Government are used by bateaux in shipping sawed lumber, etc.

"Consider this the worst tied-up country I ever saw."

12. Conclusions and recommendations.—Between Glenlyn and Radford there is no particular need for improvement of the river
and no particular demand for it. Between Hinton and
3076 Glenlyn there is no point more than 15 miles from the
railroad, and that is not an excessive distance to go by
wagon. The number of people and the amount of commerce to be benefited by improvement is small. The depth of water now maintained over this reach is sufficient for the present demands of commerce the principal objection being the swift current. This could be obviated only by slack-water improvement, which

would require 10 dams with a lift of 18 feet each, or their equivalent. It is not believed that the river between Hinton and Radford is worthy of further improvement and it is recomended that no survey be made.

ADDITIONAL SUBJECTS

13. Terminal facilities.—There are practically no terminal facilities for river traffic along this entire section and no mechanical appliances except a simple elevator at Hinton for loading crossties into railroad cars. This is owned by the Chesapeake & Ohio Railroad Co., is seldom used, and is available to the public. There being such little commerce, there seems to be no special demand for terminal facilities.

14. Water power.—Due to the great fall of the river, the narrow sparsely inhabited valley, and the large low-water discharge of the New River, the question of using the water power would merit considerable attention should the river ever be improved by means of locks and dams; in fact, water power could be developed in such large quantities that if a combined water power and navigation project should ever be carried out, navigation would probably be a secondary consideration. At Kanawha Falls, below Hinton, a water-power plant is now established, while above Radford water power is also being developed in the New River. As the total fall from Glenlyn to Hinton is 128 feet and the low-water discharge probably over 1,000 cubic feet per second, the amount of water power available is apparent. Above Glenlyn the presence of the railroads, which are quite near the water surface, would complicate the matter should high dams be built. Coal, however, is very cheap in this vicinity, so that water-power development may not be as attractive as appears on the surface.

15. Other subjects.—There are no other subjects deserving of consideration in this connection.

F. W. ALTSTAETTER.

(First Indorsement)

OFFICE DIVISION ENGINEER, CENTRAL DIVISION,
November 29, 1912.

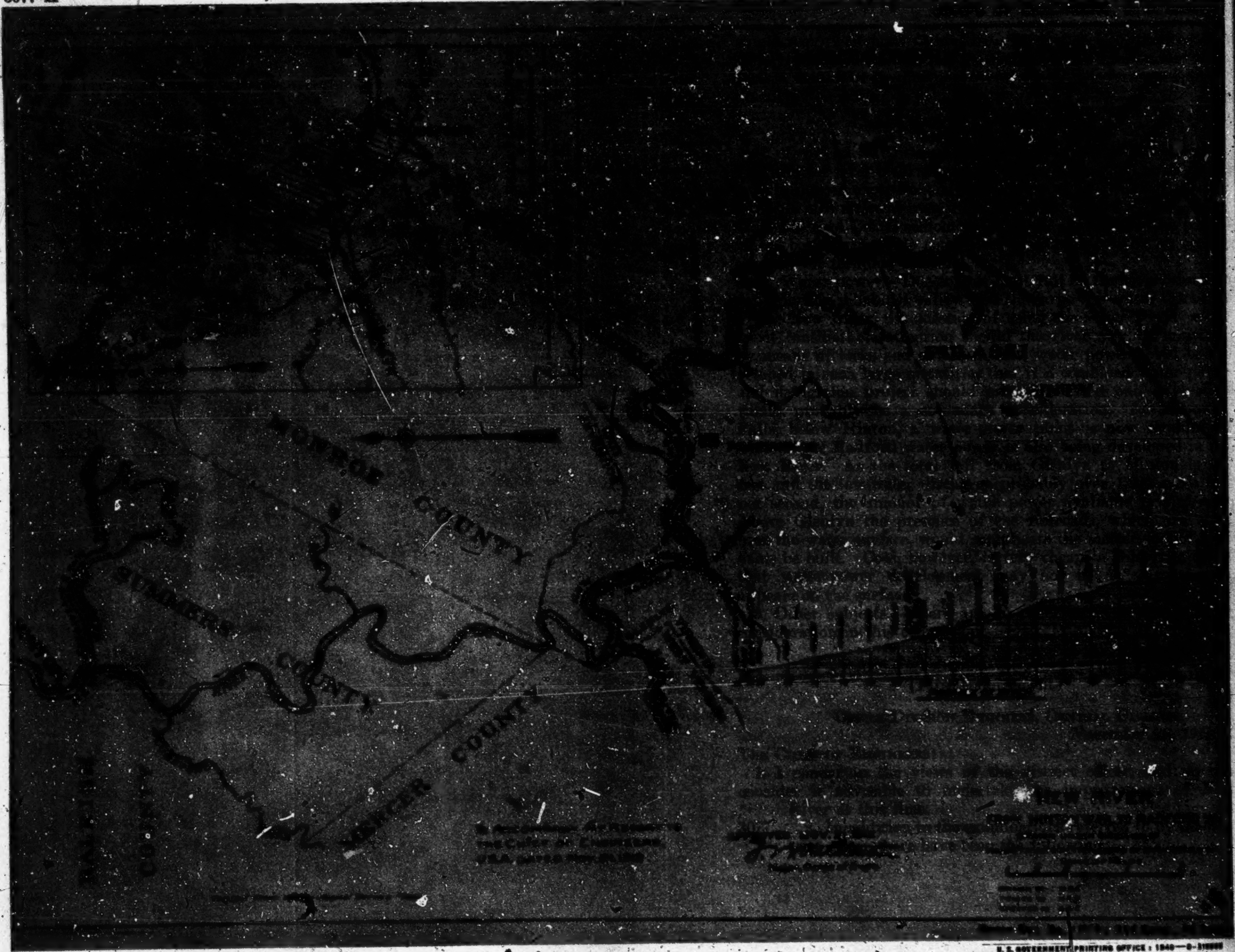
The CHIEF OF ENGINEERS:

1. I concur in the views of the district officer, and do not consider it advisable to undertake the improvement of New River at this time.

3077 2. In addition to the examinations referred to by the district officer there have been the following:

2425-A

3077-A


MONROE COUNTY
SUMMERS COUNTY
MERCER COUNTY
COUNTY
NEW RIVER

U. S. GOVERNMENT PRINTING OFFICE : 1940—O-[illegible]

Examination from the lead mines in Wythe County to the "Mouth of Wilson" in Grayson County, Va. (Annual Report for 1875, pt. 2, p. 133.)

Survey from lead mines in Wythe County to the mouth of Wilson Creek in Grayson County, Va. (S. Ex. Doc. No. 41, 45th Cong., 3d sess.; Annual Report for 1879, pt. 1, p. 538.)

8. The report of Col. William P. Craighill, Corps of Engineers, recommending suspension of work on New River, is given in the Annual Report for 1891, part 4, page 2431.

H. C. Newcomer,
Lieut. Col., Corps of Engineers,
Division Engineer.

(For Report of the Board of Engineers for Rivers and Harbors, see p. 3.)

3078 *Government exhibit 47*

(pp. 1-3; 12-39)

Letter from the Secretary of War. April 21, 1913.—Referred to the Committee on Commerce and ordered to be printed.

War Department,
Washington, April 18, 1913.

The President of the Senate.

Sir: In response to Senate resolution dated April 8th instant, directing the Secretary of War "to furnish to the Senate, if consistent with public interests, copies of all documents and papers in his office or under his control relating to the building of dams or reservoirs by private interests in the Cheat and New Rivers, in the States of Virginia and West Virginia, and copies of all correspondence had with his department relating thereto, together with copies of all rulings or permits, if any, issued or made by his department authorizing the building of any such dams or reservoirs." I have the honor to transmit, herewith, photostat copies of all papers, correspondence, rulings, permits (without maps), etc., of record in the department pertaining to the construction of dams or reservoirs by private parties in Cheat and New Rivers, Va. and W. Va.

Very respectfully.

Lindley M. Garrison,
Secretary of War.

LYNCHBURG, VA., *November 7, 1899.*

SECRETARY OF WAR.

DEAR SIR: Will you please inform me whether the New River of Virginia is under your jurisdiction by reason of its navigability or not.

In other words, I desire to know respecting building dams; and hence if you have any control over such matter, 3079 kindly inform me between what points.

Your prompt attention to this will greatly oblige.

Yours, etc.,

PETER J. OTEY, *M. C.*

Can you not send me some publication regarding the matter?

(Second indorsement)

OFFICE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
November 9, 1899.

Respectfully returned to the Secretary of War.

New River rises in North Carolina and crosses the line between that State and Virginia nearly at the mouth of Wilson Creek in Grayson County. After flowing in a general easterly direction from the mouth of Wilson Creek, it turns down again into Alleghany County, N. C., whence it soon recrosses into Virginia, thence into West Virginia, where it forms a junction with the Gauley.

The whole of the river from Wilson Creek to its mouth has been surveyed from time to time under the direction of Congress. In 1879 a survey of that portion in Grayson County was surveyed and projects for its improvement submitted. At the time this survey was made that portion of the river was not used for transportation purposes, only the ordinary canoe used for ferrying and fishing being seen; but it was stated by the officer who made the survey that a study of the regimen of the river showed that "there is an abundance of water for any system of navigation that may be inaugurated."

Projects were presented:

1. For keelboat navigation with a channel not less than 2 feet deep and 30 feet wide, by rock excavation, removal of bowlders, sand, and gravel, etc., $115,000.

2. For steamboat navigation with channel depths of 3 feet and 5 feet, at cost of $1,200,000 and $1,600,000, respectively.

By the rivers and harbors act of June 14, 1880, Congress
3080 appropriated $24,000, for improving the river from the
mouth of Wilson, in Grayson County, to the mouth of the
Greenbrier River, in West Virginia, and additional appropriations
were made in the acts of 1881, 1882, and 1886.

Work was carried on under these appropriations until 1889, when it was suspended on account of changed conditions which lessened the usefulness of the river as a means of transportation, such as the great development of the railroad systems paralleling the river.

The cost of canalizing this river would be very great and out of all proportion to the benefits to be derived now or in the near future, and at the present time this river is not considered worthy of further improvement by the General Government, but the country is rich in minerals and agricultural products, and as these become enlarged the importance of the river as a natural transportation route may increase to such an extent as to lead Congress to adopt a slack-water system of improvement.

While no work has been carried out on this river for the past 10 years and while there is not understood to be any actual navigation at the present time on the section of the river over which it is desired to construct a dam, it would appear that the action heretofore taken by Congress has indicated its opinion that the New River is a navigable water of the United States, and that under the existing laws the consent of Congress is necessary before a dam can be legally built thereon.

A pamphlet containing the laws on the subject is herewith.

A. MacKenzie,
Acting Chief of Engineers.

War Department,
Washington, November 10, 1899.

Sir: In response to the request contained in your letter of 7th instant, I have the honor to transmit herewith copy of a report of the Acting Chief of Engineers, United States Army, relative to the navigability of New River, Va., also a pamphlet containing the laws on the subject.

Very respectfully,

Elihu Root,
Secretary of War.

Hon. Peter J. Otey,
Lynchburg, Va.

3081 **LAWS FOR THE PROTECTION AND PRESERVATION OF THE NAVIGABLE WATERS OF THE UNITED STATES**

(Pamphlet containing excerpts on the River and Harbor Acts for 1899, 1902, 1894, 1900, and 1905 is omitted.)

(Scott & Staples, attorneys at law, 608–9–10, Terry Building.)

ROANOKE, VA., *November 7, 1899.*

DEAR SAM: Col. Fries, of Winston, wants to know whether or not New River in Grayson County is a navigable stream or under the dominion of the Federal Government. He is interested with a company which wants to build a dam across the river 6 miles above Grayson Springs on or near Chestnut Yards, on the Norfolk & Western Railroad. If the river is not navigable, the owners of the land on the bank of the river, or riparian owners, own to the middle of the stream. If the river is navigable, they own only to low-water mark. If the river is not navigable, they can get authority from the county court of Grayson County to put a dam across the river. If it is navigable, they have to get the consent of the Federal Government.

It is of the utmost importance that they should know about this matter before the 15th. Will you please go to the War Department and ascertain there all the information you can for me on the subject, and let me know. If you discover tomorrow that you cannot get the information yourself, please telegraph me, and if necessary I will go to Washington and get it.

All are as well as usual. Mary Kellogg is up and about again. Let me hear from you as soon as possible, and if necessary for me to get the information that I should go to Washington, telegraph me tomorrow and I will leave here tomorrow night or the next day.

Your affectionate brother,

ABRAM P. STAPLES,

WAR DEPARTMENT,
Washington, November 11, 1899.

SIR: Referring to the letter addressed to you by Abram P. Stables, of Roanoke, Va., expressing a desire to secure
3082 information relative to the navigability of New River, Va., I beg to invite attention to the accompanying copy of report of the Acting Chief of Engineers, United States Army, on the subject, which it is thought contains the information desired.

Very respectfully,

ELIHU ROOT,
Secretary of War.

DR. SAMUEL GRANVILLE STAPLES,
1416 Twentieth Street, NW., Washington, D. C.

HOUSE OF REPRESENTATIVES, U. S.,
Washington, D. C., March 13, 1900.

RETARY OF WAR.

EAR SIR: Will you kindly give me any information in your ession in regard to New River, Va., as a navigable stream. ase see inclosed letter and favor me by returning it with full wer, and oblige.

Yours, etc.

PETER J. OTEY.

(Second indorsement)

OFFICE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
March 19, 1900.

espectfully returned to the Secretary of War.

ew River rises in North Carolina and crosses the line between t State and Virginia nearly at the mouth of Wilson Creek in yson County. After flowing in a generally easterly direction m the mouth of Wilson Creek, it turns down again into Alleny County, N. C., whence it soon recrosses into Virginia, thence West Virginia, where in forms a junction with the Gauley er.

he whole of the river from Wilson Creek to its mouth has been veyed from time to time under the direction of Congress.

y the river and harbor act of June 14, 1880, Congress approated $24,000 for improving the river from the mouth of Wilson

Creek in Grayson County, Va., to the mouth of Greenbrier
3 River in West Virginia, and additional appropriations
were made in 1881, 1882, and 1886.

Vork was carried on under these appropriations until 1889, en it was suspended on account of changed conditions which ened the usefulness of the river as a means of transportation, h as the great development of the railroad systems paralleling river. Radford, the locality mentioned in the within comnication, is between the mouth of Wilson Creek and the mouth the Greenbrier River, and consequently is on the stretch of river for the improvement of which Congress has made approations.

While no work has been carried out on this river for the past years, and while there is not understood to be any actual naviion on the section of the river over which it is desired to conict a dam, it would appear that the action heretofore taken Congress has indicated its opinion that New River is a navile water of the United States and, under the existing laws, the sent of Congress is necessary before a dam can legally be built reover.

A pamphlet containing the laws of Congress on the subject is herewith, and attention is invited to section 9 of the act of March 3, 1899.

JOHN M. WILSON,
Brig Gen., Chief of Engineers, U. S. Army.

WAR DEPARTMENT,
Washington, March 19, 1900.

DEAR SIR: Referring to previous correspondence on the subject, and especially to your letter of 18th instant requesting information respecting New River, Va., especially as to whether it is held to be a navigable stream, I beg to inclose herewith for your information a copy of a report of the Chief of Engineers of this date, together with the pamphlet therein referred to containing the laws of Congress on the subject, and inviting attention to section 9 of the act of March 3, 1899.

Very respectfully,

G. L. MICKLEJOHN,
Acting Secretary of War.

Hon. PETER J. OTEY,
House of Representatives.

3084 IN RE THE APPLICATION MADE TO CONGRESS BY F. H. FRIES AND W. C. RUFFIN, OF THE STATE OF NORTH CAROLINA, FOR PERMISSION TO ERECT A DAM ACROSS NEW RIVER, IN GRAYSON COUNTY, VA.

The following data and explanation thereof have been collected and arranged for consideration in connection with the above application:

Col. F. H. Fries and Mr. W. C. Ruffin propose to erect a cotton mill on the bank of New River, in Grayson County, Va., about 6 miles above Grayson Spring, and near the mouth of Stephens Creek, and contemplate the expenditure thereon of something over half a million dollars. To this end, they have made application to the authorities of the State of Virginia, as provided by law, for their permission to erect across the said river a dam to supply the water power for this enterprise. The State authorities have authorized the erection of the dam across said river at said point, the evidence of which is in the following records:

TO THE HONORABLE J. C. PADGETT,
Judge of the County Court of Grayson County, Va.:

Your undersigned commissioners, J. B. Waugh, H. W. Clark, R. L. Dickenson, T. L. Gwyn, and F. H. Ward, who were appointed by the order of your honorable court to meet on the site of the proposed mill and dam and canal on New River, on the 5th day of April, 1900, and inquire and ascertain whether the mansion house of any person or the outhouses, yards, gardens, or orchards thereto belonging will be overflowed or taken by the erection of the proposed dam or the construction of the proposed canal, and whether and in what degree ordinary navigation and the passage of fish will be obstructed thereby, whether by any, and if any, and by what means such obstruction might be prevented, and whether the health of the neighbors will be injured by the stagnation of waters or otherwise, and with directions to circumscribe so much of the lands not owned by the applicants as will be necessary for the canal, dam, or work to be constructed as aforesaid, not being (beyond what is in the bed of the watercourse) more than one acre for a dam, nor more than 100 feet in width for a canal, and to ascertain what will be a just compensation therefor, and the lands which will probably be overflowed or deprived of water, or otherwise injured by such canal or dam, or be injured by the construction of the work aforesaid shall likewise be examined by them, and they shall ascertain what will be a just compensation to the several owners thereof for the damages to the same, respectively, and to report their proceedings to court, beg leave to submit the following report:

On the 6th day of April 1900, your undersigned commissioners, having first been duly sworn according to law, assembled on the site of the proposed dam, mill, and canal. The certificate of their oath is attached to this report.

That the site of the proposed mill is on the north side of New River, near where Eagle Bottom Creek empties into the same, and not far from the residence of Alfred G. Bartlett, and on the lands of F. H. Fries and W. C. Ruffin.

They find that the site of the proposed dam is across New River, above the upper line of the Jones and Littrel tract, and below the mouth of Stephens Creek; and that the said F. H. Fries and W. C. Ruffin own the land on both sides of the river within the points above designated. They find that the proposed
3084-A canal will extend from the said dam to the said mill
site, and will lie exclusively within the boundaries of the lands of the said F. H. Fries and W. C. Ruffin.

Your commissioners further report that neither the mansion house nor the outhouses, yards, garden, or orchards of any person will be overflowed or taken by the erection of the proposed dam, or the construction of the proposed canal, provided the dam be not in excess of 30 feet in height.

They report that New River at this point is not navigable, and, therefore, the erection of a dam at this point will not in any way interfere with navigation.

They further report that the effect of the erection of the proposed dam will be to obstruct the passage of fish, unless a proper fish ladder is constructed, but if such fish ladder be constructed, then the obstruction by the erection of a dam will be prevented.

They report that the health of no one will affected by stagnant water or otherwise.

They report that no water raised or backed by the erection of the said dam will flood any lands except those owned by the said F. H. Fries and W. C. Ruffin, or the lands on which they have acquired water rights, and have liquidated and settled any contingent or possible damage.

They find that no one will be damaged by the erection of the said dam, or the backing or overflowing of water resulting therefrom.

They further report that there will be no deprivation of water to any person which will operate or interfere with the use of New River below the said dam for any mill purpose, or otherwise, and that no one will be damaged in any way by any deprivation of the water resulting from the erection of the dam, construction of the mill, or the operation.

J. B. WAUGH,
H. W. CLARK,
R. L. DICKENSON,
T. L. GWYN,
F. H. WARD.

VIRGINIA, *County of Grayson, to wit:*

I, T. C. Vaughan, a notary public in and for the county and State aforesaid, do hereby certify that J. B. Waugh, H. W. Clark, R. L. Dickenson, T. L. Gwyn, and F. H. Ward this day personally appeared before me in my State and county aforesaid and made oath that they will, each and every one of them, well and truly perform their duties as commissioners to examine into and report to the county court their findings as to damages in the matter of the application of F. H. Fries and W. C. Ruffin to erect a dam across New River, to construct a canal, and to build a mill, engines, and other machinery.

Given under my hand this the 5th day of April, 1900.

THOS. C. VAUGHAN, *Notary Public.*

VIRGINIA, *Grayson County Court, April 6, 1900:*

On motion of F. H. Fries and W. C. Ruffin for leave to build a dam across New River, and build a mill, and open a canal on the lands of the said F. H. Fries and W. C. Ruffin.

This day, April 6, 1900, came F. H. Fries and W. C. Ruffin by their attorneys and the commissioners heretofore appointed by an order of the county court of Grayson County, entered on the

3d day of April, 1900, upon the motion of said F. H. Fries and W. C. Ruffin, to go upon the lands and real estate set out in the application for the appointment of said commissioners, having returned their report to court on this day, and there being no exceptions to said report, and no one appearing to contest said application, and said report showing that no one will be damaged by the erection of the dam, the digging of the canal, and the erection of the mill for which leave is sought, and it appearing that said proposed canal is wholly upon the lands of said applicants, it is ordered that said report be, and the same is hereby, confirmed, and the said applicants are hereby authorized and empowered to erect, construct, and make the dam, canal, and mill as requested in said application.

And it is further ordered that the said applicants erect a suitable fish ladder for the passage of fish over and across said dam.

Virginia, *Grayson County, to wit:*

I, F. J. Lundy, clerk of the county court of Grayson County in the State of Virginia, do hereby certify that the foregoing is a true copy of the report of the commissioners made and returned under an order of the said county court of Grayson, on the 3d day of April, 1900, appointing them for the purposes contemplated by section 1347 of the Code of Virginia, 1887, and which is fully set out in the report aforesaid, together with a copy of the order of the said county court, confirming said report.

3084-B Given under my hand and seal of the said county court of Grayson County this 11th day of April, 1900.

[SEAL.]

F. J. Lundy,
Clerk Grayson County Court.

Virginia, *Grayson County, to wit:*

I, J. C. Padgett, judge of the county court of Grayson County, in the State of Virginia, do hereby certify that F. J. Lundy, whose name is signed to the foregoing certificate, is the duly elected and qualified clerk of the said court, and that due faith and credence should be given to his said certificate.

Given under my hand this 19th day of April, 1900.

J. C. Padgett,
Judge of the County Court of Grayson County, Va.

Virginia, *County of Grayson, to wit:*

I, F. J. Lundy, clerk of the county court of Grayson County, in the State of Virginia, do hereby certify that J. C. Padgett, whose name is signed to the foregoing certificate, is the duly commissioned and qualified judge of the county court of Grayson County, Va., and that due faith and credit should be given to his said certificate.

In testimony whereof, I have hereunto this 19th day of April 1900, affixed my hand and seal of the county court of Grayson County, Va.

[SEAL.]

F. J. LUNDY,
Clerk of the County Court of Grayson County, Va.

And since action was at one time taken by Congress looking to the improvement of New River in this section, for purposes of limited navigation, it is deemed advisable to secure from Congress permission to erect the dam across the said river at the locality mentioned.

The first action taken by Congress looking to the improvement of this section of New River is found in the river and harbor bill of June 23, 1876, volume 18, of the Statutes at Large, part 3, page 237, which directs the Secretary of War—

"to cause examinations or surveys or both to be made at the following points: On New River from the lead mines in Wythe County to the 'mouth of Wilson' in Grayson County, Va."

It does not appear from the report of the Chief of Engineers of the Army for the year 1876 (C. Appendix S, p. 4) that any report was made in reference to the matter of the improvement of the said river.

The next record appears in the river and harbor bill of June 18, 1878 (vol. 20, Stat. L., p. 153), which provides that—

"the Secretary of War is hereby directed at his discretion to cause examinations or surveys or both and estimates of the cost of improving the property to be made at the following points (p. 154): New River from the lead mines in Wythe County to the 'mouth of Wilson' in Grayson County, Va."

In the report of the Chief of Engineers of the Army for the year 1878 (Appendix F, p. 8) appears a synopsis of the plan of the improvement of New River, and on page 495 a full discussion of the said plan. The synopsis reports the adoption—

"of a plan for the improvement of this river, which contemplates a channel 30 feet wide and 2 feet deep below the lowest water, satisfactory for keel boats now in use, but at the same time capable of utilization and adaptation at some future time to a further improvement of the navigation and for light steamboats."

By river and harbor bill of June 14, 1880 (vol. 21, Stat. L., p. 180), there was appropriated for improving New River from the "mouth of Wilson" in Grayson County, Va., to the lead mines in Wythe County, the sum of $5,000, which is the first appropriation for the improvement of this section of New River.

3084-C In the report of the Chief of Engineers of the Army for the year 1879 (Appendix F, p. 530) is found a full statement of the topography of this section of New River, in which is included a report of the engineer in charge, from which the following is an extract:

"At present this portion of the river is not used at all for transportation purposes. Only the ordinary canoe is seen, and it is merely used for ferrying and fishing. For boat navigation a channel 2 feet deep and 30 feet wide, with tracking or tow-paths at the falls and rapids will answer all purposes. Rock excavation, removing bowlders, stone and gravel, and building lateral dams will cost for the 62 miles $115,000."

In the report of the Chief of Engineers of the Army for the year 1881 (p. 905, Appendix G), Col. W. P. Smith reports as follows:

"For 5 miles above the lead mines the obstructions in the river are about the same as described elsewhere, then the fall becomes very rapid, as the mountains are here reached. These extend for 14 miles, which will necessarily make the work very heavy for that distance. As Fosters Falls, 37 miles above the New River Bridge, offers such an obstruction as to prevent the lead mines and furnaces above from shipping their products down the river, it is respectfully recommended that a careful survey be made of them with a view to their improvement by locks and dams. The fall is about 18 feet over slate and limestone ledges in 2,300 feet, with a short pool and a succession of ledges."

And on page 907 Col. Smith increases the estimate which was made for a 30-foot channel 2 feet deep, at $115,000, to a modified plan for a 20-foot channel 2 feet deep, at a cost of $205,000.

River and harbor bill of October 3, 1881, carried no appropriations for this section of the river.

From the report of the Chief of Engineers for the year 1882 the following extract is taken:

"The work covers a space of 5½ miles from the lead mines to Wilkinson's Forge, passing over eight shoals and ledges, with a fall of 49.26 feet in that distance. The original plan of improvement has been adhered to, except the width of the channels on the middle and upper divisions has been reduced to 20 feet and on the former to 10 feet."

It seems that this work was done during the year 1881, and nothing done during the year 1882.

River and harbor bill of August 2, 1882 (vol. 22 Stat. L., p. 191), appropriates $5,000 for the improvement of this section of the river.

Being without the report of the Chief of Engineers of the Army for the year 1883, and referring to his report for the year 1884, it appears that something like $11,000 was expended over that entire section of the river extending from Greenbrier River in West Virginia to the "mouth of Wilson," in Grayson County, Va.

No work was done by the department on this section of the river in 1884, and there remained an unexpended balance of $3,079 during the year 1885, $2,500 of which was expended on the next mile immediately above the 5¼-mile point above the lead mines referred to in the last quotation.

The river and harbor bill of August 5, 1886 (vol. 24, Stat. L., p. 310), carried an appropriation of $10,000 for this improvement.

In the report of the Chief of Engineers of the Army for the year 1887 the following appears:

"The portion of the river to which it (the appropriation) is applicable is above Foster's Falls, and these can only be passed by one or two locks, at a cost much greater than Congress is likely to authorize. There is also a strong reason for doubt whether, considering the present developments of that section of the country, the construction of such locks would be justifiable, even if the money were available. The construction of railroads near this stream has for the present very much diminished the importance of the improvements to the portion above Foster's Falls."

3084-D And in that report the report of Col. Craighill is cited, as follows:

"While there is much development in progress, and more in prospect for the country on and near this upper section, yet the recent examination of Col. Smith would seem to indicate that while the rafting of timber would be facilitated by expending the available $10,000 in the method suggested by him that kind of navigation is already practicable, and the expenditure of the money would not be advantageous to any important extent to navigation by push boats. Under all the circumstances it seems unnecessary to spend $10,000 on the upper New River in 1887, and it is accordingly recommended that the money be held in reserve." (See Appendix L, p. 1926.)

On page 1927 the report of Col. William Proctor Smith, assistant engineer, states:

"It is thought that the $10,000 now under consideration will make such a channel 20 feet wide and 2 feet deep as far as the Grayson Sulphur Springs, 6.8 miles above the Ivanhoe furnace, into the timber region. Anyhow it will make it as far as the new mineral company's ferry at Cripple Creek; 5¾ miles above the initial point where timber can be had."

The point referred to is the Grayson Sulphur Springs, which it seems is the extreme distance over which the appropriations would *would* permit any improvement, and is between 6 and 7 miles below the point at which it is desired to erect a dam.

The report of the Chief of Engineers of the Army for the year 1886, after considering the report of Col. Smith cited above, says (Appendix M, p. 7):

"After a careful reexamination of the subject and a reconnoissance it was decided to postpone the expenditure of the appropriation until the will of Congress could be further ascertained."

And in the same appendix, page 1760, referring to the section of the river above the lead mines, Col. Craighill says:

"A doubt having arisen, in view of the changed condition of affairs on and near the river, as to the propriety of expending this appropriation at once, it was decided by proper authority to defer operations until the will of Congress could be ascertained."

From the report of the Chief of Engineers for the year 1889 (Appendix O, p. 1962) the following extract is taken:

"The shoals are composed of loose rock and gravel, and had filled up considerably since the formation of the project two years ago. * * * About 35 cubic yards of material was removed from these shoals and built into walls."

This appears to be all of the work that was done during that fiscal year.

From the report of the Chief of Engineers for the year 1890 it appears (Appendix P, p. 7) that—

"In 1885 there was a channel 2 feet deep and 20 feet wide from the Ivanhoe Furnace to within 600 feet of the head of Wilkinson's shoals and ledges, a distance of 3.9 miles. In 1889 this channel with the same width and depth was extended to the lower end of the approach to the gulf, a distance of 5 miles from the initial point, with four-tenths of a mile farther up the river partially improved. The amount expended during the year ending June 30, 1890, has been $6,394."

From the report of the Chief of Engineers of the Army for the year 1891 (Appendix Q, p. 2432), the following extract of Col. Craighill is taken:

"Here attention is called to the effect of the changed condition, which sometimes arises, and New River is a striking illustration of it. In a country rich in minerals and agricultural products a natural waterway may be of great value, especially if there be no competing railroads and the cost of its improvement be not very great. In course of time competing railroads are 3084-E built, the topography being favorable. If the expense of the improvement of the river be great and the available money little, the railroads will take the business, and the river becomes comparatively unimportant. This has for several years been the situation in the New River section of the country, especially the upper portion.

"This condition seems to have been recognized by Congress, from the fact that there were no appropriations for New River in 1883, 1884, and 1885.

* * * * * * *

"There was also considerable reason for doubt whether, considering the present development of that section of the country, the construction of such locks (referring to Fosters Falls) would be justifiable, even if the money were available. The construction of railroads near this stream has diminished very much the importance of the improvements of the portion above Fosters Falls.

* * * * * * *

"In 1889, the channel, with the same width and depth (20 feet, and 2 feet), was extended to the lower end of the approach to the gulf, a distance of 5 miles from the initial point (lead mines), with four-tenths of a mile farther up the river partially improved. This is obviously a very local improvement, made almost entirely of rock, at a great expense, and in my opinion of no value whatever.

"No work was done in the calendar year 1890, and none has been possible as yet in the year 1891, the water being too high and too cold."

From the report of the Chief of Engineers of the Army for the year 1892, it appears that there was no work done during that fiscal year. It appears that no work was done during the year 1893.

His report for the year 1894 shows a balance of $2,341.79 on hand remaining from the appropriations made by Congress for the improvement of this section of the river, and in his report for the year 1897 (Appendix V, p. 2567), the report of Maj. Craighill states:

"Any further improvement of that portion of the stream was apparently unnecessary on account of the changed conditions" and in his report for the year 1898 (Appendix W, p. XIV), the Chief of Engineers of the Army says:

"As conditions have changed in late years, the further improvement of that portion of the stream has been reported as entirely unnecessary, and the Secretary of War has decided not to expend the existing balance at present."

It is believed that this is the last report of the War Department referring to the section of New River above the lead mines in Wythe County and below the "Mouth of Wilson," in Grayson County, Va.

It will be seen that the original project for the improvement of this river had in contemplation character of navigation no more extensive than that which a channel 20 feet wide, and in places reduced to 10 feet wide, and 2 feet deep, could afford; and that this project was considered advisable in view of the conditions which existed in this section of the country at the time of its inception prior to the year 1876; which was a lack of any facilities whatever, other than those afforded by the river, for the transportation of ore and timber from this upper region down to where the railroad crossed the river. Since that time the Norfolk & Western Railroad has extended its lines up the bank of New River, past the points spoken of as lead mines, Fosters Falls, Ivanhoe Furnace, and Grayson Springs, and within 6 miles of the point where it is desired to erect a dam, and that this extension, in the opinion of the Chief of Engineers, removed the necessity for any further expenditure of money upon this section of the river.

The transportation facilities of the railroad, far surpassing those which it was intended to supply by the improvement of the river, have entirely removed the causes which prompted Congress to undertake a task so expensive and of such limited utility.

3084–F If the desired permission is granted and the dam and mills erected the railroad will, of necessity, be extended to that point, and since it was not contemplated by the Engineers of the Army or by Congress to make a continuous navigable waterway of this stream, but only to afford access by water to the railroad as it was then located, it will readily be seen that the primary cause has been removed, and if the plan were ever carried out it would be the expenditure of a large sum of money resulting in no practical benefit to anyone.

Office of the Chief of Engineers,
United States Army,
Washington, May 5, 1900.

Capt. H. F. Hodges,
Corps of Engineers, Cincinnati, Ohio.

Captain: The inclosed bill, H. R. No. 11281, Fifty-sixth Congress, first session, "A bill permitting building a dam across New River," is referred to you for report.

An early report from this office upon this bill is desired, and you are accordingly requested to report by telegraph whether there are, in your judgment, any objections to the bill in its present form.

By command of Brig. Gen. Wilson.

Very respectfully, your obedient servant,

A. MACKENZIE,
Lieutenant Colonel, Corps of Engineers.

(H. R. 11281, Fifty-sixth Congress, first session)

A BILL PERMITTING BUILDING A DAM ACROSS NEW RIVER

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the consent of Congress is hereby granted to F. H. Fries and W. C. Ruffin, of the State of North Carolina, their successors and assigns, to erect, construct, and maintain across New River, in Grayson County, Virginia, at any point within two miles of the mouth of Stephens Creek, a dam and all other works necessarily incident thereto for water-power purposes: Provided, That the said F. H. Fries and W. C. Ruffin, their successors and assigns, shall make at their own expense such change and modification of the said dam as the Secretary of War may from time to
30[illegible] time direct in the interests of the navigation of said river:
Provided further, That ladders suitable for the passage of fish over the said dam shall be constructed and maintained by the said parties, their successors and assigns, as may from time to time be required by the United States Fish Commissioner: Provided further, That in case any litigation arises from the obstruction of the channel by the said dam, or works appurtenant thereto, that the same may be tried in the courts of the United States having proper jurisdiction.

SEC. 2. That this act shall become null and void unless the dam herein authorized shall be commenced within two years and completed within five years of the date hereof.

SEC. 3. That the right to alter, amend, or repeal this act is hereby expressly reserved.

(Memo.—The committee call referred to below was returned and is not now of record in this office.)

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, May 8, 1900.

Hon. ELIHU ROOT, *Secretary of War.*

SIR: I have the honor to return herewith a letter, dated the 5th instant, from the Committee on Interstate and Foreign Commerce of the House of Representatives, inclosing for the views of the War Department thereon H. R. 11281, Fifty-sixth Conress, first session: "A bill permitting building a dam across New ₹iver," and, in reply to its reference to this office, I beg to recomnend certain amendments to the bill indicated on a copy of the ame herewith submitted. As thus amended I know of no objecion to the passage of the bill by Congress, so far as navigation nterests are concerned.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers, U. S. Army.

086 (Telegram)

CINCINNATI, OHIO, *May 9, 1900.*

CHIEF OF ENGINEERS, United States Army,
Washington, D. C.:

No objection known to passage in present form of H. R. 11281 uthorizing New River Dam.

HODGES, *Engineers.*

ENGINEER OFFICE, UNITED STATES ARMY,
Cincinnati, Ohio, May 10, 1900.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, United States Army, Washington, D. C.

GENERAL: I have the honor to state that, in reply to departnent letter of the 5th instant, directing telegraphic report on I. R. bill No. 11281, permitting building a dam across New River, I telegraphed the department yesterday as follows:

"No objection known to passage in present form of H. R. 11281 uthorizing New River dam."

Stephens Creek, in the vicinity of which the dam is to be built, s near the upper end of the part of New River covered by the roject for improvement and above the farthest point already eached by the work. It is not believed that any attempt will ver be made to carry the improvement so far upstream, operaions on the river having been suspended indefinitely.

There is no present or prospective navigation which would varrant any opposition to this dam, which, as I am informed, is lesired by the people of the locality.

Very respectfully, your obedient servant,

H. F. HODGES,
Captain, Corps of Engineers.

(Memo.—The committee call referred to below was returned nd is not on the records of this office.)

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, May 29, 1900.

3087 Hon. ELIHU ROOT, *Secretary of War.*

SIR: I have the honor to return herewith a letter, dated the 26th instant, from the Senate Committee on Commerce, inclosing for the views of the War Department thereon S. 4849, Fifty-sixth Congress, first session, "A bill permitting building a dam across New River," and, in reply to its reference to this office, I beg to state that I know of no objection to the passage of the bill by Congress, so far as navigation interests are concerned.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers, U. S. Army.

(S. 4849, Fifty-sixth Congress, first session)

A BILL PERMITTING BUILDING A DAM ACROSS NEW RIVER

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the consent of Congress is hereby granted to F. H. Fries and W. C. Ruffin, of the State of North Carolina, their successors and assigns, to erect, construct, and maintain across New River, in Grayson County, Virginia, at any point within two miles of the mouth of Stevens Creek, a dam and all other works necessarily incident thereto for water-power purposes: Provided, That the said F. H. Fries and W. C. Ruffin, their successors and assigns, shall make, at their own expense, such change and modification of the said dam as the Secretary of War may from time to time direct in the interests of the navigation of said river: Provided further, That ladders suitable for the passage of fish over the said dam shall be constructed and maintained by the said parties, their successors and assigns, as may from time to time be required by the United States Fish Commissioner: Provided further, That in case any litigation arises from the obstruction of the channel by the said dam, or works appurtenant thereto, that the same may be tried in the courts of the United States having proper jurisdiction.

SEC. 2. That this act shall become null and void unless the dam herein authorized shall be commenced within two years and completed within five years of the date hereof.

3088 SEC. 3. That the right to alter, amend, or repeal this act is hereby expressly reserved.

EXECUTIVE MANSION,
Washington, June 2, 1900.

MY DEAR SIR: The President directs me to submit the accompanying bills, H. R. 11281 and H. R. 9884, for your examination, with the request that you will inform him at the earliest practicable date whether you know of any objections to their approval.

Very truly yours,

GEO. B. CORTELYOU,
Secretary to the President.

Hon. ELIHU ROOT, *Secretary of War.*

(Second indorsement)

OFFICE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
June 2, 1900.

Respectfully returned to the Secretary of War.

I know of no objection to the approval by the President of the accompanying H. R. 11281, Fifty-sixth Congress, first session, "An act permitting building a dam across New River."

JOHN M. WILSON,
Brigadier General, Chief of Engineers,
United States Army.

WAR DEPARTMENT,
Washington, D. C., June 2, 1900.

The PRESIDENT:

In returning herewith House bill 11281, Fifty-sixth Congress, first session, being an act permitting building a dam across New River, I have the honor to state that there is no objection on the part of the department to the approval of the bill.

Very respectfully,

ELIHU ROOT, *Secretary of War.*

3089 OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 20, 1901.

Hon. ELIHU ROOT, *Secretary of War.*

SIR: I have the honor to return herewith a letter, dated the 17th instant, from the Senate Committee on Commerce, inclosing for the views of the War Department thereon S. 1719, Fifty-seventh Congress, first session, a bill permitting the building of a dam across New River.

This bill is identical with an act approved June 4, 1900, which is still in full force and effect, and the necessity for the passage of the bill is not apparent.

Section 2 of the aforesaid act provides that it shall become null and void unless the dam therein authorized shall be commenced by June 4, 1902, and completed by June 4, 1905. It may be the intention of the proponent of the bill under consideration to provide for an extension of the time for the commencement and completion of the dam. If this is the object, it, in my opinion, will be better accomplished by a simple amendment to the original act.

Favorable consideration of the bill is not recommended.

Very respectfully, your obedient servant,

G. L. **Gillespie**,
Brigadier General, Chief of Engineers,
United States Army.

(Memo.—The above-mentioned call of committee was returned; is not now on file.)

(S. 1719, Fifty-seventh Congress, first session)

A BILL PERMITTING THE BUILDING OF A DAM ACROSS NEW RIVER

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the consent of Congress is hereby granted to F. H. Fries and W. C. Ruffin, of the State of North Carolina, their successors and assigns, to erect, construct, and maintain across New River, in Grayson County, Virginia, at any point within two miles of the mouth of Stevens Creek, a dam and all other works necessarily incident thereto for water-power purposes: Provided, That
3090 the said F. H. Fries and W. C. Ruffin, their successors
and assigns, shall make, at their own expense, such change and modification of the said dam as the Secretary of War may from time to time direct in the interests of the navigation of said river: Provided further, That ladders suitable for the passage of fish over the said dam shall be constructed and maintained by the said parties, their successors and assigns, as may from time to time be required by the United States Fish Commissioner: Provided further, That in case any litigation arises from the obstruction of the channel by the said dam, or works appurtenant thereto, that the same may be tried in the courts of the United States having proper jurisdiction.

Sec. 2. That this act shall become null and void unless the dam herein authorized shall be commenced within two years and completed within five years of the date hereof.

Sec. 3. That the right to alter, amend, or repeal this act is hereby expressly reserved.

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, May 5, 1908.

1. Respectfully returned to the Secretary of War, inviting attention to an amended draft of the bill which reaches the original purpose and also embodies certain instructions received by the Chief of Engineers.

2. It is recommended that the amended draft be transmitted to the committee with the approval of the War Department.

A. MACKENZIE,
Brigadier General, Chief of Engineers,
United States Army.

(Third indorsement)

WAR DEPARTMENT, *May 6, 1908.*

Respectfully returned to the chairman Committee on Commerce, United States Senate, inviting attention to the foregoing report of the Chief of Engineers, United States Army, and to the accompanying copy of amended bill referred to.

3091 The department concurs in the views of the Chief of Engineers.

ROBERT SHAW OLIVER,
Acting Secretary of War.

(Fourth indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, May 20, 1908.

1. Respectfully returned to the Secretary of War.

2. The Chief of Engineers has no further suggestions to make and recommends that all papers be transmitted to the Senate Committee on Commerce.

A. MACKENZIE,
Brigadier General, Chief of Engineers,
United States Army.

(Memo.—The above-mentioned call of the committee was returned and is not now on file.)

A [illegible]L PERMITTING THE BUILDING OF A DAM OR DAMS ACROSS NEW RIVER

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That J. J. Mott, a resident of Radford, in the State of Virginia, his heirs, executors, and assigns, be, and he is hereby authorized to construct and maintain a dam or dams across the New River, extending from Burton Station, a point in Giles County on New River in said State, through Pulaski and Montgomery Counties in said State, to Hiwassa, on New River, Pulaski County, including Fall Branch Falls, Ingle Falls, Pepper Falls, Barretts Falls, and Dry Branch Falls, and all works incident thereto, in accordance with the provisions of an act entitled "An act to regulate the construction of dams across navigable waters," approved June first, nineteen hundred and six: Provided, That in acting upon plans for the structures herein authorized, consideration shall be given by the War Department to the bearing of the said structures upon a comprehensive plan for the improvement of the New River, and the full development of water power: And provided further, That the Secretary of War and the Chief of Engineers shall, in accordance with the aforesaid act of June twenty-first, nineteen hundred and six, as a part of the conditions and stipulations therein contemplated, provide for improving and developing navigation, and fix such charge or charges for the
3092 privilege granted as they deem necessary for the present
and future interests of the United States, the proceeds of such charge or charges to be applied to the improvement of navigation: And provided further, That, in pursuance of the provisions of sections four and six of said act, the Secretary of War is authorized and directed, in case the grantees at any time fail to comply with any of the requirements of this act, or of the aforesaid act of June twenty-first, nineteen hundred and six, or with any of the stipulations or conditions prescribed in pursuance of these acts, to revoke the privileges herein granted and to declare the grant void, without prejudice to the equities of the grantee at the time of revocation, and in addition thereto, the right to revoke by act of Congress at any time after fifty years the rights, privileges, and benefits conferred by this act, is hereby expressly reserved, but in the event of such revocation by Congress, the United States shall pay to the owners of said dam and appurtenant works, as full compensation, the reasonable value thereof, exclusive of the value of the franchise hereby conferred, such reasonable value to be determined by mutual agreement between the Secretary of War and the owners of said

properties, and in case they can not agree, then by proceedings instituted in the United States Circuit Court for the condemnation of such properties.

SEC. 2. Unless extended by act of Congress, all the rights and privileges hereby conferred shall terminate at the end of ninety-nine years from the date of approval of this act, unless sooner revoked as hereinbefore provided, and in the event of such termination, unless renewed by Congress, payment shall be made in the manner and to the amount provided as aforesaid.

(Memo.—The committee call referred to below was returned and is not now on file.)

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, May 5, 1908.

1. Respectfully returned to the Secretary of War, inviting attention to the accompanying draft of a bill which reaches the original purpose and also embodies certain instructions received by the Chief of Engineers.

3093 2. It is recommended that the amended draft be transmitted to the committee with the approval of the War Department.

——— ———,
Brigadier General, Chief of Engineers,
U. S. Army.

(Third indorsement)

WAR DEPARTMENT, *May 6, 1908.*

Respectfully returned to the chairman Committee on Interstate and Foreign Commerce, House of Representatives, inviting attention to the foregoing report of the Chief of Engineers, United States Army, and to the accompanying copy of amended bill referred to.

The department concurs in the views of the Chief of Engineers.

ROBERT SHAW OLIVER,
Acting Secretary of War.

(Fourth indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, May 20, 1908.

1. Respectfully returned to the Secretary of War.

2. The Chief of Engineers has no further suggestions to make and recommends that all papers be transmitted to the Committee

on Interstate and Foreign Commerce of the House of Representatives.

A. Mackenzie,
Brigadier General, Chief of Engineers.

(H. R. 20246, Sixtieth Congress, first session)

A BILL PERMITTING THE BUILDING OF A DAM OR DAMS ACROSS NEW RIVER, VIRGINIA

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That J. J. Mott, a resident of Radford, in the State of Virginia, his heirs, executors, and assigns, be, and he is hereby, authorized to construct and maintain a dam or dams across the New River, extending from Burton Station, a point in Giles County, on New River, in said State, through Pulaski and Montgomery Counties, in said State, to Hiwassa, on New River, Pulaski County, including Fall Branch Falls, Ingle Falls, Pepper Falls, Barretts Falls, and Dry Branch Falls, and all works incident thereto in accordance with the provisions of an act entitled "An act to regulate the construction of dams across navigable
3094 waters," approved June first, nineteen hundred and six: Provided, That in acting upon plans for the structures herein authorized, consideration shall be given by the War Department to the bearing of the said structures upon a comprehensive plan for the improvement of the New River and the full development of water power: And provided further, That the Secretary of War and the Chief of Engineers shall, in accordance with the aforesaid act of June twenty-first, nineteen hundred and six, as a part of the conditions and stipulations therein contemplated, provide for improving and developing navigation, and fix such charge or charges for the privilege granted as they may deem necessary for the present and future interests of the United States, the proceeds of such charge or charges to be applied to the improvement of navigation: And provided further, That, in pursuance of the provisions of sections four and six of said act, the Secretary of War is authorized and directed, in case the grantees at any time fail to comply with any of the requirements of this act, or of the aforesaid act of June twenty-first, nineteen hundred and six, or with any of the stipulations or conditions prescribed in pursuance of these acts, to revoke the privileges herein granted and to declare the grant void, without prejudice to the equities of the grantee at the time of revocation; and in addition thereto, the right to revoke by act of Congress at any time after fifty years the rights, privileges, and benefits conferred by this act, is hereby expressly reserved, but in the

event of such revocation by Congress, the United States shall pay to the owners of said dam and appurtenant works, as full compensation, the reasonable value thereof, exclusive of the value of the franchise hereby conferred, such reasonable value to be determined by mutual agreement between the Secretary of War and the owners of said properties, and in case they can not agree, then by proceedings instituted in the United States Circuit Court for the condemnation of such properties.

SEC. 2. Unless extended by act of Congress, all the rights and privileges hereby conferred shall terminate at the end of ninety-nine years from the date of approval of this act, unless sooner revoked as hereinbefore provided, and in the event of such termination, unless renewed by Congress, payment shall be made in the manner and to the amount provided as aforesaid.

3095 UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., April 18, 1908.

Brig. Gen. A. MACKENZIE,
Chief of Engineers, United States Army, Washington, D. C.

GENERAL: 1. I have the honor to submit the following report in compliance with first indorsement on E. D. 67022.

2. The smallest known discharge of the New River at the point referred to is about 700 cubic feet per second. The minimum discharge available for eight months of the year is about 1,880 cubic feet per second. Assuming an efficiency of 78 percent for the wheels and no allowance for locking or leakage, there would be about 167 horsepower available for eight months and a minimum of 62 horsepower during the remaining months for each foot of head.

3. There are a number of falls in this part of the river, ranging up to about 8 feet in height, and the general slope of the river is about 4½ feet per mile. No estimate of the actual horsepower is possible without some knowledge of the number and height of the proposed dams.

Very respectfully,

F. W. ALTSTAETTER,
Captain, Corps of Engineers.

(S. 6409. Sixtieth Congress, first session)

A BILL PERMITTING THE BUILDING OF A DAM OR DAMS ACROSS NEW RIVER

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That J. J. Mott, a resident of Radford, in the State of Virginia, his heirs,

executors, and assigns, is hereby authorized to construct and maintain a dam or dams across the New River, extending from Burton Station, a point in Giles County on New River in said State, through Pulaski and Montgomery Counties in said State, to Hiwassa, on New River, Pulaski County, including Fall Branch Falls, Ingle Falls, Pepper Falls, Barretts Falls, and Dry Branch Falls, and all works incident thereto, including deflection of water from main channel and return to the channel where desired in the utilization of the power to be thereby developed, in accordance with the provisions of an act entitled "An act to regulate the construction of dams across navigable waters,"
3096 approved June first, nineteen hundred and six.

HOUSE OF REPRESENTATIVES,
Washington, D. C., March 26, 1912.

SECRETARY OF WAR, *Washington, D. C.*

DEAR SIR: I would like to know whether the records of your department show if during the present administration, or any prior administration, the right to dam New River was given to one Dr. Mott, or the Appalachian Power Co., or to any other person.

New River runs into my district, and certain large dams are now being constructed thereon. I understand that it is claimed on the part of the persons constructing these dams that they have some sort of license, or permit, from the Secretary of War.

Some years ago a bill was introduced in Congress for the purpose of giving Dr. Mott the exclusive right to dam New River between Burton in Giles County, to Hiawassie, in Pulaski, but this bill was defeated in the committee.

Any information along the above line will be appreciated.

Yours very truly,

E. W. SAUNDERS.

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, April 1, 1912.

1. Respectfully returned to the Secretary of War.

2. It does not appear from the records of this office that authority has been granted by Congress for the construction of a dam in New River, Va., by Dr. Mott or the Appalachian Power Co.

3. By acts of Congress, approved June 4, 1900 (34 Stats. L., 264), authority was granted F. H. Frees and W. C. Ruffin to

construct a dam across New River in Grayson County, Va., and by acts approved February 28, 1911, authority was granted the Virginia Iron, Coal & Coke Co. (36 Stats. L., 921) and the Ivanhoe Furnace Corporation (36 Stats. L., 992), to erect dams near Fosters Falls and at Ivanhoe, Wythe County, Va., respectively.

3097 4. I recommend that Mr. Saunders be so informed with the further information that since New River is an interstate stream, the authority of Congress must, under the law, be obtained for construction of a dam therein, and that the plans therefor must receive the approval of the Chief of Engineers and Secretary of War before the work of construction is begun, but such approval has not been obtained in the cases mentioned.

W. H. Bixby,
Chief of Engineers, United States Army.

War Department,
Washington, April 4, 1912.

Dear Sir: Referring to your letter of 26th ultimo, asking to be advised whether War Department records show that Dr. Mott or the Appalachian Power Co. have ever secured permission to dam New River, Va., I beg to inform you that the Chief of Engineers, United States Army, to whom the matter was referred, reports under date of 1st instant as follows:

"By acts of Congress approved June 4, 1900 (34 Stats. L., 264), authority was granted F. H. Frees and W. C. Ruffin to construct a dam across New River in Grayson County, Va., and by acts approved February 28, 1911, authority was granted the Virginia Iron, Coal & Coke Co. (36 Stats. L. 921), and the Ivanhoe Furnace Corporation (36 Stats. L., 992), to erect dams near Fosters Falls and at Ivanhoe, Wythe County, Va., respectively."

As New River is an interstate stream, the authority of Congress must, under the law, be obtained for the construction of a dam therein, and plans therefor must receive the approval of the Chief of Engineers, United States Army, and the Secretary of War before any work of construction is begun. Such approval has not been obtained in either of the cases above referred to Dr. Mott or the Appalachian Power Co.

Very respectfully,

Robert Shaw Oliver,
Assistant Secretary of War.

Hon. E. W. Saunders,
House of Representatives.

3098

War Department,
United States Engineer Office,
Wheeling, W. Va., November 23, 1912.

From: Maj. F. W. Altstaetter, Corps of Engineers, U. S. A.
To: The Chief of Engineers, U. S. Army, Washington, D. C.
Subject: Water-power dams, New River.

1. In the laws of the United States relating to the improvement of rivers and harbors, published in 1907 at the Government Printing Office, in volume 2, page 909, is an act authorizing the construction of a dam across the New River, with the requirement that the dam should be built within five years. There is nothing on record in this office to indicate that there was ever any correspondence with the Chief of Engineers concerning this act.

2. In 1908 a bill for water-power dam on the upper New River was passed and referred by the Chief of Engineers to this office for remark, in first indorsement dated March 4, 1908 (E. D. 67022). This office made a few remarks about the amount of water power available, after which there was no further correspondence with the Chief of Engineers in the matter.

3. A third bill was passed authorizing a dam across the upper New River, and was referred by the Chief of Engineers to this office for report, in first indorsement dated June 7, 1910 (E. D. 76304), after which there was no further correspondence with the department.

4. There is an Appalachian Power Co. which has the project for six power dams in this upper river, two of which are already completed.

5. This office is exercising no form of supervision over any of these dams; nor is it known whether any other office is doing so. It is quite possible that no supervision is required by this or any other district office, but it was thought best to call the attention of the Chief of Engineers to the matter.

F. W. Altstaetter.

(First indorsement)

Office Chief of Engineers,
December 5, 1912.

To Maj. Altstaetter:

1. It appears from the records of this office that the only acts authorizing the construction of dams across New River, Va.
3099 and W. Va., are one approved June 4, 1900, authorizing the erection of such structures by F. H. Fries and W. G. Ruffin, and two approved February 18, 1911, giving similar privilege to the Ivanhoe Furnace Corporation and to the Virginia Iron, Coal & Coke Co.

2. Plans for these dams have not been submitted to nor received the approval of the department, nor have they been for any other similar structures. By reference to the aforesaid act of June 4, 1900, it will be noted that no duty in connection with the original plans appears to have been committed to the department, but it is considered that under the provisions of section 9 of the river and harbor act of March 3, 1899, approval of the plans should have been obtained from the department prior to beginning the work of construction.

3. The act of June 4, 1900, expired by limitation on June 4, 1905, and any dam built under authority thereof prior to the latter date would be illegal for the reason that plans were not presented to and approved by the department in accordance with section 8 of the act of March 3, 1899. Any dam built subsequent to June 4, 1905, would, of course, be illegal for the same reason and for the additional reason that the act of authorization had become null and void.

4. The two acts approved February 18, 1911, provide that the dams shall be constructed, maintained, and operated in accordance with the general dam act of June 23, 1910, which requires the submission of plans to the department for examination and approval, and also fixes a time limit of one year for commencing the structures. These acts have, therefore, apparently expired by limitation, and any structures built thereover would be unlawful for the reasons above stated.

5. It is not known whether the project of the Appalachian Power Co., to which Maj. Altstaetter refers, has any relation to the aforesaid acts, but if it has, its prosecution is clearly without authority of law. It may be that this company is proceeding on the theory that the upper river being unnavigable the consent of Congress for the building of its projected dams is not required. This, of course, is a question that would ultimately
3100 require judicial determination, and the legal right of this company would depend upon the facts as to whether the dams interfered with navigation or injuriously affected the navigable condition or capacity of the stream.

6. In the absence of approval by the department on plans for the structures no duty in connection with supervision of construction would be assigned to the district officer; but when operations of this character are known by the district officer to be in progress, he should make a careful investigation with a view to ascertaining all the facts and of deciding whether action against the company should be instituted.

By order of the Acting Chief of Engineers.

E. N. Johnston,
Captain, Corps of Engineers.

(Second indorsement)

UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., March 7, 1913.

To the CHIEF OF ENGINEERS, United States Army.

1. This office has had some correspondence with the Appalachian Power Co. since the above letter was written, and I have had a conference with one of their representatives. While very courteous in their dealings with this office, this company seems desirous of taking up the matter in Washington. A recent letter from this company to this office contains the following:

"Because the basic principles as to which there is contention have country wide application and affect other properties, this matter has been taken up congressionally and with the Office of Chief Engineers, United States Army, our representative being Gen. Geo. H. Harries, vice president of H. M. Byllesby & Co.

"Gen. Harries (who has just returned from Washington), informs me that consideration is now being given to a suggestion that by friendly litigation, carried to the Supreme Court of the United States, there be secured a definite judicial determination of all the questions at issue. This procedure is essential because there are now no decisions sufficiently definite to afford sure guidance either to the Government or the investor."

2. It is assumed that this matter for the present is being handled by the department direct, and no further action will be taken by this office in this case unless further instructions are received.

F. W. ALTSTAETTER,
Major, Corps of Engineers.

3101 (Third indorsement)

OFFICE CHIEF OF ENGINEERS,
March 22, 1913.

To Maj. ALTSTAETTER.

1. The matter referred to in second indorsement hereon has not been taken up with the department by the company except in an informal way.

2. The only way to get it before the Supreme Court is to take action on some concrete case, and action in accordance with the instructions in first indorsement hereon should be taken regardless of any statement made to the district officer by the company.

By command of the Chief of Engineers.

E. N. JOHNSTON,
Captain, Corps of Engineers.

(House of Representatives, Committee on Accounts, Washington)

HUNTINGTON, W. VA., *August 10, 1908.*

SECRETARY OF WAR, *Washington, D. C.*

SIR: I inclose you letter from H. F. Staley, at Bluefield, W. Va. I will be glad if you can give him the information asked for in this letter, and return me this letter when you have done so.

Very truly yours,

J. A. HUGHES.

(Inclosure returned and not on file.)

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, August 26, 1908.

1. Respectfully returned to the Secretary of War.

2. New River being a navigable water not wholly within the limits of a single State, authority to construct a dam across the navigable portions thereof must be obtained from Congress and the plans and location of the structure approved by the Chief of Engineers and the Secretary of War before construction is begun, as required by the provisions of section 9 of the river and harbor act of March 3, 1899.

3. The provisions of this section of law apply to the portion of the river in the vicinity of Lurich.

3102 4. I recommend that Mr. Hughes be so advised for the information of his correspondent, and that the inclosure be returned as requested within.

W. L. MARSHALL,
Brig. Gen., Chief of Engineers,
United States Army.

WAR DEPARTMENT,
Washington, August 29, 1908.

DEAR SIR: I have the honor to acknowledge the receipt of your letter of the 10th instant, inclosing a communication addressed to you by Mr. H. F. Staley, of Bluefield, W. Va., requesting information regarding the water rights of New River, from Lurich about 2 miles downstream; also with reference to damming said river for the purpose of securing power.

Replying thereto I beg to inform you that New River being a navigable water not wholly within the limits of a single State the authority to construct a dam across the navigable portions thereof must be obtained from Congress and the plans and location of the structure approved by the Chief of Engineers, United States Army, and the Secretary of War before construction is begun, as required by the provisions of section 9 of the river and harbor act of March 3, 1899. The provisions of this section of the law apply to that portion of the river in the vicinity of Lurich.

The letter of your correspondent is returned herewith, as requested.

Very respectfully,

Luke E. Wright,
Secretary of War.

Hon. J. A. Hughes,
Huntington, W. Va.

Graham, Va., *December 12, 1910.*

Mr. Frank Pierce,
Acting Secretary, Department of the Interior,
Washington, D. C.

Dear Sir: Please accept my thanks for your favor of November 30, in reference to the New River water power, with papers of the Geological Survey.

3103 My object in writing was chiefly to learn the Government's attitude in such matters, supposing the New River to be under Government control, and the requirements to be met in obtaining the right to develop a water-power plant on New River.

Will you please inform me as fully as possible the requirements of the Government in this connection, and oblige,

Yours, respectfully,

Walter Graham.

Department of the Interior,
Washington, December 15, 1910.

Mr. Walter Graham, *Graham, Va.*

Dear Sir: In reply to your letter of December 12:

The Interior Department has no control over streams outside of the public land States. I am therefore unable to furnish the information desired in regard to New River.

The Chief of Engineers, United States Army, has control over the navigable rivers of the country and if the portion of New River in which you are interested has been designated as navigable, it would come under his jurisdiction. Your letter has been referred to the Chief of Engineers for reply.

Very respectfully,

R. A. Ballinger, *Secretary.*

War Department,
Office of the Chief of Engineers,
Washington, December 20, 1910.

Mr. Walter Graham, *Graham, Va.*

Sir: 1. Your letter of the 12th instant addressed to the Secretary of the Department of the Interior, in reference to construction of a water-power plant on New River, Va., has been referred to this office for reply.

2. There is inclosed herewith for your information a pamphlet
of laws enacted by Congress for the preservation and pro-
3104 tection of navigable waters, your attention being invited
to section 9 of the river and harbor act of March 3, 1899,
also to the accompanying copy of a general dam act approved June 23, 1910. There is also inclosed a rule of the department to be observed by parties making application for approval of plans for a bridge, which is applicable to similar requests relating to dams except that the plans for such structures should be submitted in quadruplicate instead of in triplicate.

By direction of the Chief of Engineers.

Very respectfully,

E. N. Johnston,
Captain, Corps of Engineers.

(Second indorsement)

War Department, Chief of Engineers,
Washington, January 13, 1910.

1. Respectfully returned to Mr. Hill, inviting attention to section 9 of the river and harbor act of March 3, 1899, printed in the accompanying pamphlet, relative to constructing dams over navigable waters; also to a copy of a general dam act enacted by Congress and approved June 21, 1906.

2. There is also inclosed for your information a rule of the department, to be observed by parties making application for approval of plans for a bridge, which is applicable to similar requests relating to dams, except that the plans for such structures should be submitted in quadruplicate instead of triplicate.

By direction of the Chief of Engineers.

J. B. Cavanaugh,
Major, Corps of Engineers.

(Above letter of Mr. Geo. H. Hill returned and not now on file.)

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 19, 1910.

1. Respectfully returned to the Secretary of War.

2. The accompanying bill, H. R. 17848, Sixty-first Congress, second session, to authorize the construction of a dam across New River near Foster Falls, Wythe County, Va., is in
3105 the usual form, and its provisions are believed to be satisfactory so far as the interests of navigation are concerned.

3. At the location named in the bill, New River is capable of little navigation, and its future improvement is not likely to be attempted by the United States. While surveys have been made, and some portions of the river have been improved by authority of Congress, operations were indefinitely suspended many years ago, and there is no present or prospective navigation that would be injured by the passage of the bill.

4. As the question of fixing a time limit and exacting the payment of a royalty to the United States for the exercise of a privilege of this kind has been extensively considered by Congress during recent sessions, it is deemed appropriate to invite attention to the fact that provision is not made for these requirements in this bill, and it is understood that provision for imposing such requirements is not contained in the general dam act of June 21, 1906. Without venturing any opinion on the merits of the proposition or the propriety of its adoption, I beg to suggest that if Congress considers such requirements desirable they should be provided for in express terms in the bill, or appropriate amendment should be made to the aforesaid general dam act.

W. L. MARSHALL,
Chief of Engineers, United States Army.

(The call of committee referred to herein returned and not on file.)

(H. R. 17848, Sixty-first Congress, second session)

A BILL TO AUTHORIZE THE VIRGINIA IRON, COAL AND COKE COMPANY TO BUILD A DAM ACROSS THE NEW RIVER NEAR FOSTER FALLS, WYTHE COUNTY, VIRGINIA

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Virginia Iron, Coal and Coke Company, a corporation organized under the laws of the State of Virginia, its successors and assigns, be, and they are hereby, authorized to construct, main-

tain, and operate a dam across the New River at a point near Foster Falls, Wythe County, in the State of Virginia, in accordance with the provisions of the Act entitled "An Act to regulate the construction of dams across navigable waters," ap-
3106 proved June twenty-first, nineteen hundred and six: *Provided*, That the actual construction of said dam shall be begun within two years and completed within five years from the date of the passage of this Act.

SEC. 2. That the right to alter, amend, or repeal this Act is hereby expressly reserved.

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 19. 1910.

1. Respectfully returned to the Secretary of War.

2. The accompanying bill, S. 5248, Sixty-first Congress, second session, to authorize the construction of a dam across New River near Foster Falls, Wythe County, Va., is in the usual form, and its provisions are believed to be satisfactory so far as the interests of navigation are concerned.

3. At the location named in the bill, New River is capable of little navigation, and its future improvement is not likely to be attempted by the United States. While surveys have been made, and some portions of the river have been improved by authority of Congress, operations were indefinitely suspended many years ago, and there is no present or prospective navigation that would be injured by the passage of the bill.

4. As the question of fixing a time limit and exacting the payment of a royalty to the United States for the exercise of a privilege of this kind has been extensively considered by Congress during recent sessions, it is deemed appropriate to invite attention to the fact that provision is not made for these requirements in this bill, and it is understood that provision for imposing such requirements is not contained in the general dam act of June 21, 1906. Without venturing any opinion on the merits of the proposition or the propriety of its adoption, I beg to suggest that if Congress considers such requirements desirable they should be provided for in express terms in the bill, or appropriate amendment should be made to the aforesaid general dam act.

W. L. MARSHALL,
Chief of Engineers, U. S. Army.

(The above-mentioned call of committee was returned and is not on file.)

3107 (S. 5248, Sixty-first Congress, second session)

A BILL TO AUTHORIZE THE VIRGINIA IRON, COAL AND COKE COMPANY TO BUILD A DAM ACROSS NEW RIVER NEAR FOSTER FALLS, VIRGINIA.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Virginia Iron, Coal and Coke Company, a corporation organized under the laws of the State of Virginia, its successors and assigns, be, and they are hereby, authorized to construct, maintain, and operate a dam across the New River at a point near Foster Falls, Wythe County, in the State of Virginia, in accordance with the provisions of the act entitled "An act to regulate the construction of dams across navigable waters," approved June twenty-first, nineteen hundred and six: Provided, That the actual construction of said dam shall be begun within two years and completed within five years from the date of the passage of this act.

Sec. 2. That the right to alter, amend, or repeal this act is hereby expressly reserved.

(Second indorsement)

War Department,
Office of the Chief of Engineers,
Washington, February 11, 1911.

1. Respectfully returned to the Secretary of War.

2. The accompanying bill, S. 10676, Sixty-first Congress, third session, to authorize the construction of a dam across New River near Foster Falls, Va., is similar to a bill, S. 5248, Sixty-first Congress, second session, concerning which I had the honor to make report under date of January 19, 1910.

3. At the location named in the bill, New River is capable of little navigation, and its future improvement is not likely to be attempted by the United States. While surveys have been made, and some portions of the river have been improved by authority of Congress, operations were suspended many years ago, and there is no present or prospective navigation that would be injured by the passage of this bill.

4. Moreover, the measure provides that the dam shall be built in
accordance with the provisions of the general dam act of
3108 June 23, 1910, and as that act is understood to contain all
the provisions considered by Congress and the Executive
necessary to safeguard navigation and other interests of the United

States, I see no objection to favorable consideration of the bill by Congress.

W. H. Bixby,
Chief of Engineers, United States Army.

(Memo.—The committee call referred to above was returned and is not now on file.)

(S. 10676, Sixty-first Congress, third session)

A BILL TO AUTHORIZE THE VIRGINIA IRON, COAL AND COKE COMPANY TO BUILD A DAM ACROSS THE NEW RIVER, NEAR FOSTER FALLS, WYTHE COUNTY, VIRGINIA.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Virginia Iron, Coal and Coke Company, a corporation organized under the laws of the State of Virginia, its successors and assigns, be, and they are hereby, authorized to construct, maintain, and operate a dam across the New River, at a point suitable to the interests of navigation, at a point near Foster Falls, Wythe County, in the State of Virginia, in accordance with the provisions of the act approved June twenty-third, nineteen hundred and ten, entitled "An act to amend an act entitled, 'An act to regulate the construction of dams across navigable waters,' approved June twenty-first, nineteen hundred and six."

Sec. 2. That the right to alter, amend, or repeal this act is hereby expressly reserved.

(Second indorsement)

War Department,
Office of the Chief of Engineers,
Washington, February 18, 1911.

1. Respectfully returned to the Secretary of War.

2. I know of no objection to the President's approval of the accompanying H. R. 31922, Sixty-first Congress, third session, "An act to authorize the Virginia Iron, Coal & Coke Co. to build a dam across the New River, near Foster Falls, Wythe County, Va."

W. H. Bixby,
Chief of Engineers, United States Army.

3109 WAR DEPARTMENT,
Washington, February 18, 1911.

The PRESIDENT:

In returning herewith H. R. 31922, Sixty-first Congress, third session, being an act to authorize the Virginia Iron, Coal & Coke Co. to build a dam across the New River near Foster Falls, Wythe County, Va., I have the honor to state that there is no objection on the part of this department to the approval of the act.

Very respectfully,

J. M. DICKINSON,
Secretary of War.

(Memo.—The call of committee referred to below was returned and is not on file.)

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, June 18, 1910.

1. Respectfully returned to the Secretary of War.

2. The object of the accompanying bill H. R. 26411 is to authorize the construction of a dam across New River at Ivanhoe, Va., a point where the river is not navigable.

3. So far as the interests of commerce, present or prospective, are concerned, I know of no objection to favorable consideration of the bill by Congress; but I suggest that it be amended to conform to the usual form which Congress has adopted for such measures. The suggested amendments have been indicated in red on the bill.

W. H. BIXBY,
Chief of Engineers, United States Army.

(H. R. 26411, Sixty-first Congress, second session)

A BILL ANTHORIZING THE IVANHOE FURNACE CORPORATION, OF IVANHOE, WYTHE COUNTY, VIRGINIA, TO ERECT A DAM ACROSS NEW RIVER

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Ivanhoe Furnace Corporation, of Ivanhoe, Wythe County, Virginia, be, and hereby is, authorized to construct and maintain a dam across New River at Ivanhoe, Wythe County, Virginia, in accordance with the provisions of an act entitled "An act

3110 to regulate the construction of dams across navigable waters" approved June twenty-first, nineteen hundred and six.

SEC. 2. That the right to alter, amend, or repeal this act is hereby expressly reserved.

(First indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, June 7, 1910.

Respectfully referred to Capt. F. W. Altstaetter, Corps of Engineers, for early report.

By command of the Chief of Engineers:

E. N. JOHNSTON,
Captain, Corps of Engineers.

(Second indorsement)

UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., June 13, 1910.

1. Respectfully returned to the Chief of Engineers, United States Army.

2. So far as is known to this office, the Government has never made any improvement on the New River above Ivanhoe, nor is there any commerce on that part of the river. It is, in fact, in the nature of a mountainous stream in that vicinity and would be difficult to make navigable for any depth.

3. I am informed that there is a fixed dam at Fries, 18 miles up the New River from Ivanhoe.

4. I do not know of any valid objection to building a dam at Ivanhoe, as provided in the bill herewith.

F. W. ALTSTAETTER,
Captain, Corps of Engineers.

(Second indorsement)

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, February 18, 1911.

1. Respectfully returned to the Secretary of War.

2. I know of no objection to the President's approval of the accompanying H. R. 31931, Sixty-first Congress, third session—"An act authorizing the Ivanhoe Furnace Corporation, 3111 of Ivanhoe, Wythe County, Va., to erect a dam across New River."

W. H. BIXBY,
Chief of Engineers, United States Army.

WAR DEPARTMENT,
Washington, February 18, 1911.

The PRESIDENT:

In returning herewith H. R. 31931, Sixty-first Congress, third session, being an act authorizing the Ivanhoe Furnace Corporation, of Ivanhoe, Wythe County, Va., to erect a dam across New River, I have the honor to state that there is no objection on the part of this department to the approval of the act.

Very respectfully,

J. M. DICKINSON,
Secretary of War.

3112 *Government exhibit No. 48*

1930—January 24, 1930, to March 11, 1930—"Kanawha River at Kanawha Falls, West Virginia"—automatic gage recorder chart. (Original Exhibit.)

Government exhibit No. 49

1930—March 11, 1930 to April 5, 1930—"Kanawha River at Kanawha Falls, West Virginia"—automatic gage recorder chart. (Original Exhibit.)

Government exhibit No. 50

1930—January 25, 1930, to March 10, 1930"—New River at Caperton, W. Va."—automatic gage recorder chart. (Original Exhibit.)

Government exhibit No. 51

1930—March 12, 1930 to April 4, 1930—"New River at Caperton, W. Va."—automatic gage recorder chart. (Original Exhibit.)

Government exhibit No. 52

1929–1936—"Rating Curve for Kanawha River at Kanawha Falls, W. Va." (Original Exhibit.)

Government exhibit No. 53

1929–1931—"Rating Curve for New River at Caperton, W. Va., (Original Exhibit.)

Government exhibit No. 54

1929–1934—"Rating Curve for New River at Hinton, West Virginia." (Original Exhibit.)

Government exhibit No. 55

October 27, 1928 to September 30, 1931—"Rating table for Kanawha River at Kanawha Falls, W. Va." (Original Exhibit.)

Government exhibit No. 56

November 20, 1928 to September 30, 1930—"Rating table for New River at Caperton, West Virginia." (Original Exhibit.)

3113 *Government exhibit No. 57*

4 sheets constituting "Rating tables for New River near Hinton, W. Va." for the following periods: October 1, 1929 to Sept. 30, 1934; December 1, 1923 to Sept. 30, 1929; December 1, 1923 to ———; December 1, 1923 to ———. (Original Exhibit.)

Government exhibit No. 58

March 15, 1930—"Water Records at Glen Lyn for the week ending Saturday, March 15, 1930." (Original Exhibit.)

Government exhibit No. 59

1930—"Water Records at Glen Lyn for week ending Saturday, March 22, 1930." (Original Exhibit.)

Government exhibit No. 60

1930—Water records at Glen Lyn for week ending March 29, 1930. (Original Exhibit.)

Government exhibit No. 61

1930—"Water records at Glen Lyn for week ending April 1, 1930." (Original Exhibit.)

Government exhibit No. 62

1930—Chart "New River at Eggleston, Va., March 11 to March 31, 1930." (Original Exhibit.)

Government exhibit No. 63

1930—Chart "New River at damsite "A" at Radford for the period from March 10, 1930 to April 1, 1930." (Original Exhibit.)

Government exhibit No. 64

1930—Chart "New River at Allisonia, March 11 to April 1, 1930." (Original Exhibit.)

Government exhibit No. 65

1930—Chart "New River at Ivanhoe from March 11 to April 1, 1930." (Original Exhibit.)

3114 *Government exhibit No. 66*

5 pages, containing rating curves for (a) Glen Lyn 1927–1928; (b) Eggleston 1911–24, 1925–28; (c) Dam site "A"; (d) Allisonia, 1930; (e) Ivanhoe, 1928-1930. (Original Exhibit.)

Government exhibit No. 67

5 sheets containing rating tables for New River at Glen Lyn, 1927–1928; Eggleston, Oct. 1, 1920 to Sept. 30, 1931; Dam Site "A" 1927–1929; Allisonia, 1930; Ivanhoe, 1928–1930. (Original Exhibit.)

Government exhibits Nos. 68 to 83 inc.

Water Supply Papers of United States Geological Survey. (Original Exhibits.)

Government exhibit No. 84

Daily discharges for year ending September 30, 1935 at the gaging station on New River at Ivanhoe, Virginia. (Original Exhibit.)

Government exhibit No. 85

Daily discharges for the year ending Sept. 30, 1935 at the gaging station on New River at Allisonia, Va. (Original Exhibit.)

Government exhibit No. 86

Daily discharges for the year ending Sept. 30, 1935 at the gaging station on New River at Eggleston, Va. (Original Exhibit.)

Government exhibit No. 87

Daily discharges for the year ending Sept. 30, 1935 at the gaging station on Little River at Graysonton, Va. (Original Exhibit.)

3115 *Government exhibit No. 88*

DECLARATION OF INTENTION TO CONSTRUCT A DAM AND OTHER PROJECT WORKS

Curtis, Mallet-Prevost, Colt & Mosle, Counsellors at Law, 30 Broad Street, New York

3116 NEW RIVER DEVELOPMENT COMPANY,
31 NASSAU STREET,
New York, June 25, 1925.

DECLARATION OF INTENTION TO CONSTRUCT A DAM AND OTHER PROJECT WORKS

New River Development Company, a public service corporation organized and existing under and by virtue of Chapter 150 of the Code of Virginia, intending to construct a dam and other project works across, along, over and in New River in the County of Pulaski, State of Virginia, hereby makes and files declaration of its intention so to do, pursuant to the provisions of Section 23 of the Federal Water Power Act and respectfully requests the Federal Power Commission to cause an immediate investigation of such proposed construction to be made.

In compliance with Regulation 7 of the Regulations of the Federal Power Commission, this Declaration of Intention is accompanied by exhibits which are hereby referred to and made a part hereof, as follows:

Exhibit A: Sketch maps showing the stream to be utilized and the approximate location of the project, as follows:

1. Map of Viele, Blackwell & Buck, Engineers, No. A-6836, showing general location of Project on New River;
2. Map of Viele, Blackwell & Buck, Engineers, No. R-7652, showing portion of river immediately affected by Project;
3. Map of Viele, Blackwell & Buck, Engineers, No. R-7656, showing general plan of proposed development.

Exhibit B: A brief description of the Project and its purpose, including data with respect to proposed height of dam, 3117 storage capacity of reservoir, power capacity of the Project and probable effect on present or prospective navigation;

Exhibit C: A statement as to whether, if the Commission finds that the Project will affect the interests of interstate or foreign commerce, the applicant proposes to apply for a permit or a license.

In witness whereof the applicant has caused its corporate name to be hereunto affixed by George N. Tidd, its Vice-President, and its corporate seal to be hereunto affixed and attested by Frank B. Ball, its Secretary, thereunto duly authorized this 25th day of June 1925.

NEW RIVER DEVELOPMENT COMPANY,
By GEO. N. TIDD, *Vice-President.*

Attest:
[SEAL] FRANK B. BALL, *Secretary.*

3118 Exhibit B

DESCRIPTION OF PROJECT OF NEW RIVER DEVELOPMENT COMPANY IN NEW RIVER, VIRGINIA

Under this Project it is proposed to develop for the purpose of generating hydro-electric power the fall in New River from the Norfolk & Western Railroad bridge at Hiawassia, Virginia, to a point near the mouth of Little River, a distance of approximately 20 miles with a fall of 110 feet. The dam is to be located about one mile above Little River or approximately seven miles above the town of East Radford. The development will be formed by a dam across the New River, with the power house in front of the dam fed by short steel penstocks. The dam will be constructed of Cyclopean concrete on solid rock foundations and abutment, and provided with ample flood gates and spillway.

The principal elevations and data pertaining to the project are as follows:

Drainage area	2396 sq. mi.
Water surface at dam site	El. 1730 ±.
High water over dam	El. 1841.
Top of retaining section and intake	El. 1850.
Top of flood gates and flashboards	El. 1840.
Sill of flood gates	El. 1810.
Crest of Spillway	El. 1835.
Height of Spillway section at deepest point	115 ft.
Height of intake section at deepest point	128 ft.
Pond formed by dam about	4,000 acres.
Storage with 10 ft. draft, about	40,000 acre ft.
Installed capacity	60,000 KW or 80,000 HP.
Yearly output	200,000,000 KWH ±.

Eighty percent of all lands and water rights required for the development have already been purchased by or for the Company.

3119 There is no navigation in this section of the River, except ferry travel which will not be interfered with by the development, nor is there any navigation for approximately 160 miles below the proposed development. The proposed Project will be constructed and operated so as not to impair the navigable capacity of the stream below, nor to affect the interests of interstate or foreign commerce.

The foregoing description of Project of New River Development Company is a part of the Declaration of Intention made by the undersigned this 25th day of June 1925.

NEW RIVER DEVELOPMENT COMPANY,
By GEO. N. TIDD, *Vice-President.*

Attest:
[SEAL] FRANK B. BALL, *Secretary.*

Exhibit C

STATEMENT WITH REFERENCE TO APPLICATION FOR PERMIT OR LICENSE

If the Commission should find that the Project will affect the interests of interstate or foreign commerce the Board of Directors of the Declarant Company, immediately upon receipt of advice to such effect, will consider and determine whether
3120 the Declarant proposes to apply for a permit or for a license.

This statement is a part of the Declaration of Intention made by the Undersigned this 25th day of June 1925.

NEW RIVER DEVELOPMENT COMPANY,
By GEO. N. TIDD, *Vice-President.*

Attest:
[SEAL] FRANK B. BALL, *Secretary.*

3121 *Government exhibit No. 89*

1926, Aug. 30—Assignment of Declaration of Intention of New River Development Co. to Appalachian Electric Power Co. (Original Exhibit.)

3122 *Government exhibit No. 90*

APPALACHIAN ELECTRIC POWER COMPANY

APPLICATION TO FEDERAL POWER COMMISSION FOR LICENSE (UNDER ACT OF JUNE 10, 1920) FOR DEVELOPMENT NO. 6, NEW RIVER A MAJOR PROJECT IN THE STATE OF VIRGINIA

1. Appalachian Electric Power Company, a corporation organized and existing under and by virtue of the laws of the State of Virginia, and having its office and principal place of business at

the City of Richmond, in the State of Virginia, does hereby make application to the Federal Power Commission for a license for a project described herein and shown on general and detailed maps signed by applicant on the 30th day of August, 1926, which maps are filed herewith and made a part hereof, said license to authorize the construction, operation and maintenance of certain project works, the principal ones of which are designated as follows on said maps:

(a) Dam and Reservoir.—Concrete dam, height 110 feet, across
New River. Reservoir approximately 19 miles long cre-
3123 ated by dam. Surface area of Reservoir approximately
4,000 acres.

(b) Water Conduits.—Turbines will be connected to intakes by steel penstocks imbedded in retaining section of dam.

(c) Power House.—Power House will be a brick and steel structure containing 4 and possibly 5—15,000 K. W. alternating current generators.

(d) Transmission lines.—Power is generated at 13,200 volts 60 cycles, and is conducted into the transmission system already in operation located outside of project boundary about 500 feet from Power House.

2. The location of the project applied for is as follows:

(a) In the State of Virginia;

(b) In the County of Pulaski;

(c) On the following named stream: New River. Navigable and carrying commerce to the following extent: None, but tributary to the Kanawha River, which is navigable and carrying commerce up to Montgomery, W. Va., 155 miles below the project.

(d) In the region of the following named cities and towns: Radford, Virginia; Pulaski, Virginia.

3. The proposed scheme of development for project is as follows:

A concrete dam across New River 1627 feet long made up as follows:

	Length	Max. height
	Feet	*Feet*
South retaining section	240	100
Intake section	210	128
Spillway section	715	115
Flood gate section	282	72
North retaining section	180	42

South of the main dam a small dyke will be required about 300 feet long and 30 feet high.

The spillway allows for 6 feet overflow for a length of 675 feet and the gate section contains 4 flood gates 30′ x 50′.

3124 Power house is adjacent to and below south end of dam and will comprise 4 or possibly 5, 20,000 H. P. vertical shaft turbines driving 15,000 K. W. 60 cycle generators. Turbines will have steel scroll cases connected to intakes by steel penstocks imbedded in retaining section of dam. The operating head will range from 100 to 110 feet.

4. The proposed market for the power to be developed is as follows:

All power which can be generated will be fed to an interconnected transmission system now in operation, which passes the proposed project site, and is connected with an operating network which is already generating approximately 300,000 K. W. by steam and water power and rapidly increasing. Network is interconnected from Ohio down to North Carolina.

All power generated can be utilized as soon as available.

5. The location and capacity of all power projects owned or operated by the applicant, the markets supplied thereby and the relation thereof to the Project applied for, are briefly described as follows:

	Location	Capacity
Glen Lyn Steam Plant	Glen Lyn, Virginia	85,000 K. W.
Cabin Creek Steam Plant	Cabin Creek, West Va	83,200 K. W.
Logan Steam Plant	Logan, West Va	40,000 K. W.
Kenova Steam Plant	Kenova, West Va	16,750 K. W.
Back Water Creek Steam Plant	Lynchburg, Virginia	3,000 K. W.
Walnut Avenue Steam Plant	Roanoke, Virginia	7,000 K. W.
Slack Street Steam Plant	Charleston, West Va	8,450 K. W.
Hazard Steam Plant	Lothair, Kentucky	16,000 K. W.
Sprigg Steam Plant	Sprigg, West Va	7,500 K. W.
Byllesby Hydro Plant	Byllesby, Virginia	18,000 K. W.
Buck Hydro Plant	Buck, Virginia	6,210 K. W.
Reussens Hydro Plant	Lynchburg, Virginia	4,500 K. W.
Niagara Hydro Plant	Roanoke, Virginia	2,926 K. W.
Total		298,536 K. W.

The foregoing include all the plants of the applicant and its subsidiary companies.

Applicant, together with its subsidiary companies, supplies electric energy to the western portion of Virginia, the southern half of West Virginia and the eastern portion of Kentucky.

The total K. W. H. output of applicant's system for the year 1925 was approximately 860,000,000 K. W. H. This output
3125 of electric energy was used in the various industrial communities in Virginia and West Virginia and Kentucky, a large proportion of the coal in this region being mined thereby and many chemical works being operated thereby, in addition to the service of light and power to many cities and communities.

The project applied for will, upon completion, become part of the above described system and will supply additional electric energy which is demanded by the territory served.

6. The following exhibits are filed herewith and are hereby made a part of this application:

Exhibit A: Certified copy of Organization papers;

Exhibit B: Other evidence that Applicant is qualified to proceed with the Project applied for;

Exhibit C: Statement re field notes of Project boundary;

Exhibit D: Statement re applicant's compliance with requirements of laws of State of Virginia;

Exhibit E: Statement of nature, extent and ownership of water rights;

Exhibit F: Statement of nature, extent and ownership of lands;

Exhibit G: Statement concerning financial ability of applicant to carry out project applied for;

Exhibit H: Statement of effect of Project on stream flow;

Exhibit I: Estimate of power capacity of project;

Exhibit J: General map covering the entire project area;

Exhibit K: Detail map covering entire project area;

Exhibit L: General design drawings of principal structures and appurtenant works;

Exhibit M: General descriptions and specifications of mechanical, electrical and transmission equipment;

Exhibit N: Estimate of cost of developing project;

Exhibit O: Statement of time desired for completing construction of project works.

In witness whereof the applicant has caused its name and corporate seal to be hereunto signed and affixed by N. M. 3126 Argabrite, its Vice-President thereunto duly authorized, this 30th day of August, 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (S) N. M. ARGABRITE, *Vice-President.*

Attest:

(s) FRANK B. BALL, *Secretary.*

Exhibit A—Pursuant to Regulation 4, Section 1

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

CERTIFIED COPY OF ORGANIZATION PAPERS

Organization papers of the applicant are submitted herewith, as Exhibit A, as follows:

1. Copy of Articles of Association of Appalachian Electric Power Company, filed in the office of the Secretary of the Commonwealth of Virginia, March 4, 1926, certified by the Secretary of the Commonwealth of Virginia.

2. Copy of Merger Agreement, Appalachian Electric Power Company, Appalachian Power & Light Company and Appalachian Power Company, filed in the office of the Secretary of the Commonwealth May 1, 1926, certified by the Secretary of the Commonwealth of Virginia.

This statement is a part of the application for license made by the undersigned this 30th day of August, 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By (S) N. M. ARGABRIT, *Vice-President.*

3164 Exhibit D—Pursuant to Regulation 4, Section 4

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT RE APPLICANT'S COMPLIANCE WITH REQUIREMENTS OF LAWS OF STATE OF VIRGINIA

Applicant is a corporation duly organized and existing under the laws of the State of Virginia, with powers to construct, maintain and operate works, including all kinds of water, electric and other power plants, to be used for public service in the business of a general electric lighting and power corporation, with all the rights, powers, and privileges of such corporations under the laws of the State of Virginia. Such rights and powers include statutory right and power to acquire by condemnation, in the event the applicant cannot agree with the owners upon terms of purchase, all lands and rights, including rights as to bed and banks of the stream, necessary to construct, maintain and operate the project applied for.

There are no other requirements of the laws of the State of Virginia with respect to bed and banks and with respect to the right to engage in the developing, transmitting, and distributing of power and in any other business necessary to effect the purposes of the license applied for, which need be complied with by the applicant.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

Exhibit E—Pursuant to Regulation 4, Section 5

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

3165 STATEMENT OF NATURE, EXTENT AND OWNERSHIP OF WATER RIGHTS

Under Virginia law water rights pertain to the riparian owners, on nonnavigable streams such as New River. Applicant and its predecessors in interest have been engaged for many years past in negotiation for the purchase of riparian lands and appurtenant water rights required for the project applied for and has acquired by purchase approximately eighty percent (80%) of the necessary riparian lands, with appurtenant water rights. It has proceeded, as far as practicable, in perfecting its rights to use sufficient water for proper operation of the project works and has found that it will be necessary to institute condemnation proceedings to acquire the balance of the necessary water rights.

There exists in Virginia no State agency authorized or empowered to give a certified statement setting forth the extent and validity of the applicant's water rights.

No approval or permission of any State agency is required by Virginia law as a condition precedent to the applicant's right to take or use water for the operation of the project works.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

Exhibit F—Pursuant to Regulation 4, Section 6

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT OF THE NATURE, EXTENT AND OWNERSHIP OF LANDS

Approximately 80% of the total acreage of lands required for the construction and operation of the project, includ-
3166 ing all land within the project area, has already been acquired by the Applicant. The Applicant plans to acquire the balance of the necessary lands by condemnation proceedings under the laws of the State of Virginia and or under the Federal Water Power Act.

The applicant at the time of filing this application has acquired the right to occupy and use lands owned by others as follows:

Acquired from	Date	Nature of right	Term	Expiration of term
S. T. Rigney, et ux	4/12/24	To submerge lands	Perpetual	
Bruce Clark, et ux	3/11/25	To submerge lands	Perpetual	
F. E. Roope	9/19/23	Railroad right-of-way	Perpetual	
H. L. Flagg, et ux	9/19/23	Railroad right-of-way	Perpetual	
W. C. Flinchun, et ux	9/19/23	Railroad right-of-way	Perpetual	
W. A. Earhart	9/21/23	Railroad right-of-way	Perpetual	
Bd. Supervisors, Pulaski County	6/22/25	To submerge lands	Perpetual	

This statement is part of the application for license made by the undersigned this 30th day of August, 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

Exhibit G—Pursuant to Regulation 4, Section 7

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT CONCERNING FINANCIAL ABILITY OF APPLICANT TO CARRY OUT PROJECT APPLIED FOR

Applicant is a going concern, owning and operating, directly and through subsidiary corporations, extensive electric light and power properties in the States of Virginia, West Virginia, and Kentucky.

Applicant's capitalization is substantially as follows:

	Outstanding with public
Funded Debt:	
Underlying Divisional Bonds	$23,991,000
3167 First and Refunding Mortgage Gold Bonds 5% Series of 1956	35,000,000
Appalachian Power Company 6% Gold Debentures	4,000,000
6% Note due on or before April 1, 1929	5,000,000
Capital Stock (no par value):	
Preferred Stock, $7 Cumulative	225,000 Shares
Second Preferred Stock, $7 Cumulative	100,000 Shares
Common Stock	5,000,000 Shares

Earnings for the twelve months ending February 28, 1926 derived from properties now owned by the applicant and its subsidiary corporations were substantially as follows:

Gross Earnings	$15,380,631
Operating Expenses, Maintenance and Taxes	7,474,502
Net Earnings	$7,906,129
Annual Interest Requirements on Underlying Divisional Bonds held by the Public	$1,249,550
$35,000,000 First and Refunding Mortgage Gold Bonds	1,750,000
	2,999,550
Balance available for other charges, renewals and replacements reserves, dividends, etc	$4,906,579

It has recently marketed an issue of $35,000,000 First and Refunding Mortgage Gold Bonds (included in the capitalization above set forth) on a 5.20% yield basis. Its financial resources are deemed sufficient to finance the project applied for, which is designed to form one of the production units of applicant's system, the development of which is in response to the growth of an already existing consumers' demand for electric energy.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

3168 Exhibit H—Pursuant to Regulation 4, Section 8

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT OF EFFECT OF PROJECT ON STREAM FLOW

Proposed reservoir will back up water for approximately 19 miles above dam. Surface area of reservoir about 4,000 acres. Storage with 10 foot draft on reservoir 40,000 acre feet.

The minimum flow proposed to be released during periods of low water shall be such amount as shall be required for the purposes of power, navigation, flood control and municipal water supply. The proposed ponding of water will tend to equalize seasonal variations, to increase the minimum flow during low water periods and reduce flood peaks below the project.

This statement is a part of the application for a license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

Exhibit I—Pursuant to Regulation 4, Section 9

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

ESTIMATE OF POWER CAPACITY OF PROJECT

Estimate of power capacity of the project is the continued product of:

A. The factor, 0.08.

B. The average static head in feet, viz, 106 feet; and

C. The water supply in cubic feet per second and not in excess of the hydraulic capacity of the approved project works, estimated (from duration curve) to be available from net flow or from storage, or from both, for 90% of the time, viz, 1,200, equals 10,176 H. P.

3169 Data upon which such estimate is based is attached hereto and submitted herewith, viz: Duration curve, marked Exhibit I-A. (for static head, see Exhibit L-4).

A list of all sources of power for the system of which the project will be a part is set forth in Exhibit A-5, hereto attached, to which reference is hereby made.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

Appalachian Electric Power Company,
By N. M. Argabrite, *Vice-President.*

Exhibit J—Pursuant to Regulation 4, Section 10

Application for License—Appalachian Electric Power Company

GENERAL MAP COVERING ENTIRE PROJECT AREA

A general map covering the entire project area showing drainage area and important features of the project, state and county lines, etc., on a single sheet is submitted herewith denominated "Exhibit J." This map is accompanied by two blue prints.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

Appalachian Electric Power Company,
By N. M. Argabrite, *Vice-President.*

Exhibit K—Pursuant to Regulation 4, Section 10

Application for License—Appalachian Electric Power Company

DETAIL MAP COVERING ENTIRE PROJECT AREA

3170 Detail map covering entire project area, on a single sheet, is submitted herewith, denominated "Exhibit K." The drawing is accompanied by two blue prints. The lands marked on said map "A. P. Co." are owned by the applicant. The lands for which applicant holds rights of use and occupancy for purposes of the project are referred to in "Exhibit F" hereof.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

Appalachian Electric Power Company,
By N. M. Argabrite, *Vice-President.*

Exhibit L—Pursuant to Regulation 4, Section 12

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

GENERAL DESIGN DRAWINGS OF PRINCIPAL STRUCTURES AND APPURTENANT WORKS

The following drawings are submitted herewith:

L-1 Elevation and Plan of Dam Site;
L-2 Flood Gates;
L-3 Profile of Diamond Drill Holes;
L-4 Cross Section and Analysis of Dam;
L-5 Analysis of Flood Gate Piers.

Each drawing is accompanied by two blueprints.

This statement is a part of the application for license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

Exhibit M—Pursuant to Regulation 4, Section 13

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

3171 ### GENERAL DESCRIPTIONS AND SPECIFICATIONS OF MECHANICAL ELECTRICAL AND TRANSMISSION EQUIPMENT

Hydraulic Data—4 vertical shaft Francis type single runner turbines, steel scroll cases, details concerning which will later be submitted. (A 5th unit may be installed.) Nominal rating 20,000 H. P.

Generator & Exciter Data—4 vertical shaft 13,200 volt 60 cycle alternating current generators with direct connected exciters (a 5th unit may be installed), details concerning which will later be submitted.

Transmission—Cables will be led from generators through conduits to interconnected transmission systems beyond the project boundary where voltage will be transformed to system voltage.

This statement is a part of the application for a license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

Exhibit N—Pursuant to Regulation 4, Section 14

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

ESTIMATE OF COST OF DEVELOPING PROJECT

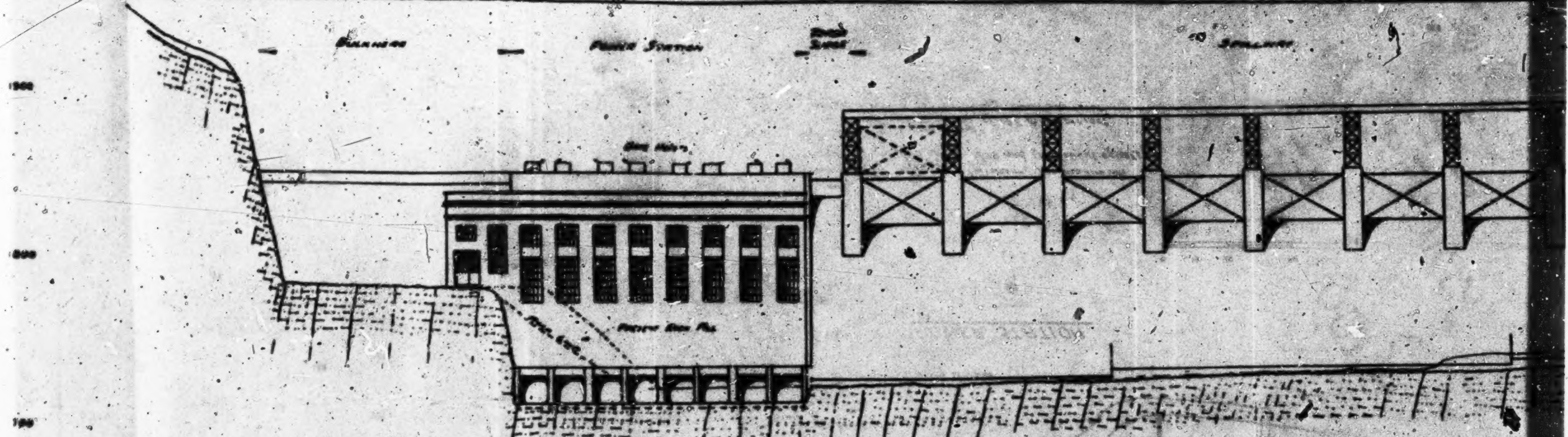
Estimate of cost of developing the project is as follows:

Unwatering	$200,000
Preparing bottom	50,000
No. retaining wall, 180′:	
Excavation—Earth, 1,200 c. y. @ $1	1,200
Excavation—Rock, 500 c. y. @ $4	2,000
Concrete 3,000 c. y. @ $8.50	25,500
Reinforcing 5,000# @ $0.05	250
	28,950
Flood gates, 282′:	
Excavation—Earth, 14,000 c. y. @ $1	14,000
Excavation—Rock, 3,000 c. y. @ $4	12,000
Concrete 20,000 c. y. @ $9	180,000
Reinforcing 100,000# @ $0.05	5,000
3172 4 Stoney Gates, hoist & towers 30′ x 50′	130,000
1 set of stop logs & hoist	17,000
Lights, power, wiring, etc	5,000
	363,000
Spillway section, 715′:	
Excavation—Earth, 13,000 c. y. @ $1	13,000
Excavation—Rock, 8,000 c. y. @ $4	32,000
Concrete, 160,000 c. y. @ $8	1,280,000
Reinforcing, 200,000# @ $0.05	10,000
Trash chute logs & details	1,500
Tunnel, stairs, etc	5,000
Flashboards 675′ x 5′	5,000
	1,346,500
Intake section, 210′:	
Excavation—Earth, 17,000 c. y. @ $1	17,000
Excavation—Rock, 2,000 c. y. @ $4	8,000
Concrete, 49,000 c. y. @ $8.50	416,500
Reinforcing, 100,000# $0.05	5,000
Racks, supports, guides, etc. 6,000 sq. ft. @ $4	24,000
1 gate and gantry	20,000
4—16′ ¢ penstocks 660,000# @ $0.08	52,800
Pipings, cover, lights, power, etc	5,000
	548,300
South retaining wall, 240′:	
Excavation—Earth, 8,000 c. y. @ $1	8,000
Excavation—Rock, 2,000 c. y. @ $4	8,000
Concrete, 24,000 c. y. @ $8.50	204,000
Reinforcing, 40,000 lbs. @ $0.05	2,000
	222,000

Dam in hollow south of main dam, 325':	
Excavation	$1,000
Core wall concrete, 1,200 c. y. @ $12	14,400
Earth fill, 16,000 c. y. @ $0.75	12,000
	27,400
Power house substructure, 210:	
Excavation—earth, 13,000 c. y. @ $1	13,000
Excavation—rock, 6,000 c. y. @ $2.50	15,000
Concrete, 19,000 c. y. @ $14.00	266,000
Reinforcing, 600,000# $0.05	30,000
Piping	5,000
	329,000
Power house superstructure:	
730,000 cu. ft	165,000
Tail race:	
Excavation—Earth, 72,000 c. y. @ $0.75	54,000
Excavation—Rock, 22,000 c. y. @ $2.50	55,000
Concrete, 9,000 c. y. @ $9.00	81,000
	190,000
Power house equipment:	
Water Wheels, gov. etc., 80,000 H. P., @ $3.50	280,000
Frt. & erection	42,000
Generators & exciters, 60,000 K. W., @ $8	480,000
Frt. & erection	48,000
Switchboard & switches	50,000
Frt. & erection	10,000
Pumps, piping & elec. supplies	25,000
75 ton crane	19,000
4, 16' ¢ Butterfly valves	120,000
Frt. & erection	12,000
	1,086,000
3173 Camp & plant:	
Clearing & grubbing camp site	5,000
10 cottages @ $4,250 (permanent operators)	42,500
Temporary buildings & equipment	80,000
Construction plant	350,000
Maintenance of Const. plant	70,000
Construction trestles	25,000
R. R. siding	20,000
Roads	25,000
	617,500
	$5,173,650

Government exhibit No. 90–A

In addition to the sheet of plans printed below, Exhibit 90–A contains 5 sheets of plans, each of which carries the notation "War Department, approved so far as the plans affect the navigable capacity of navigable waters of the United States" which approval is signed by the Chief of Engineers and the Secretary of War.

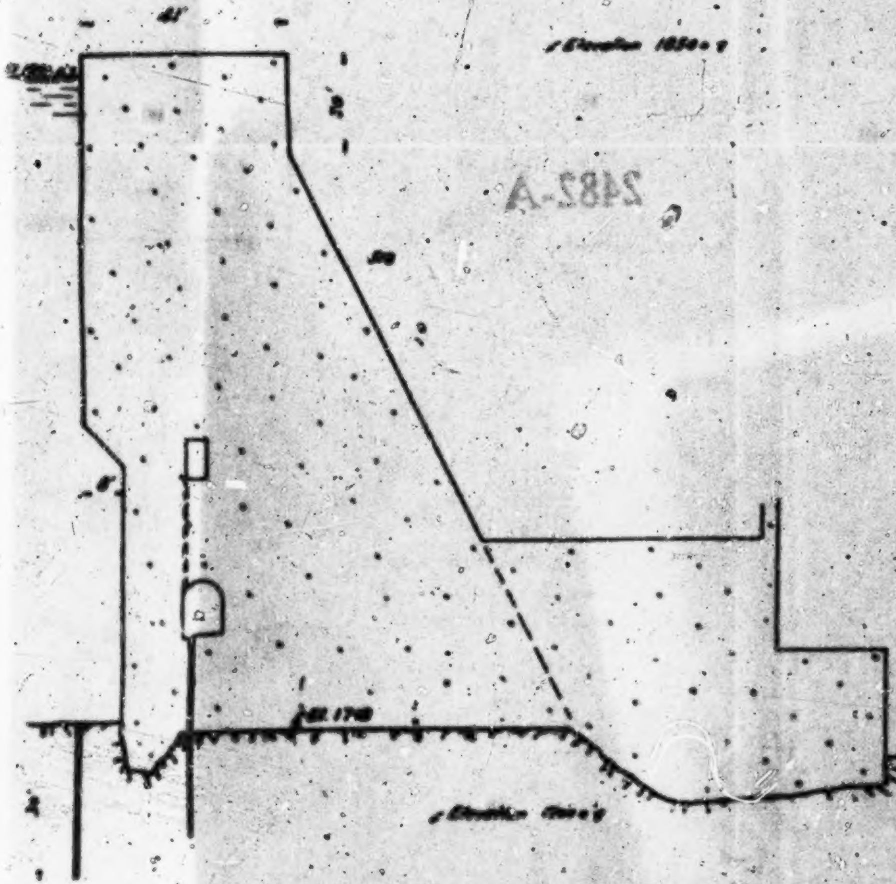


DOWN STREAM ELEVATION

Scale 1:40 ft

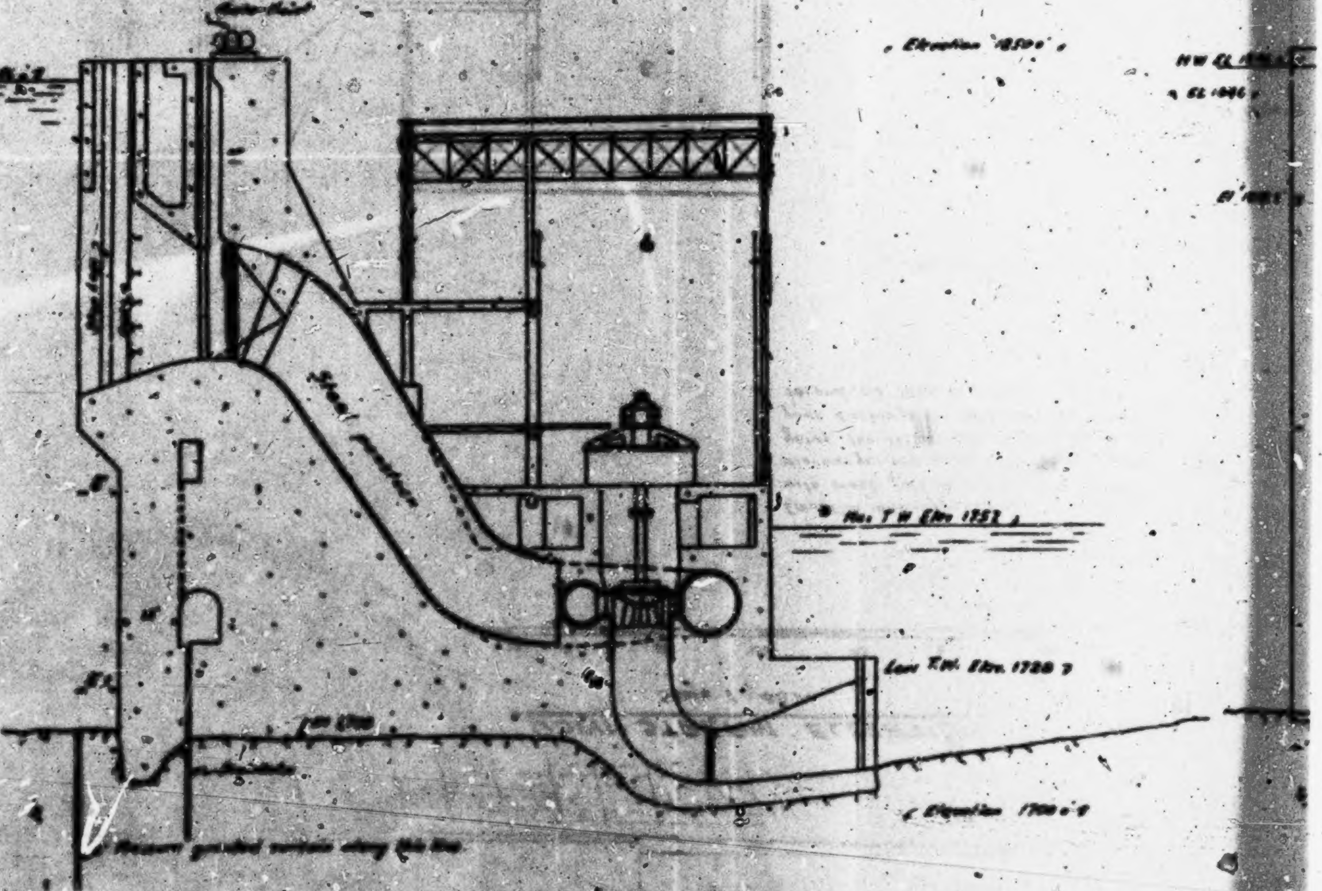
Locations of changes from dolomite to limestone are only approximate.

Elevation 1880—approximate head water with crest gates entirely open, but no discharge thru power station or sluice gates, for 165,000 sec ft, being approximate peak discharge for maximum floods of record, viz, 1878 and 1916



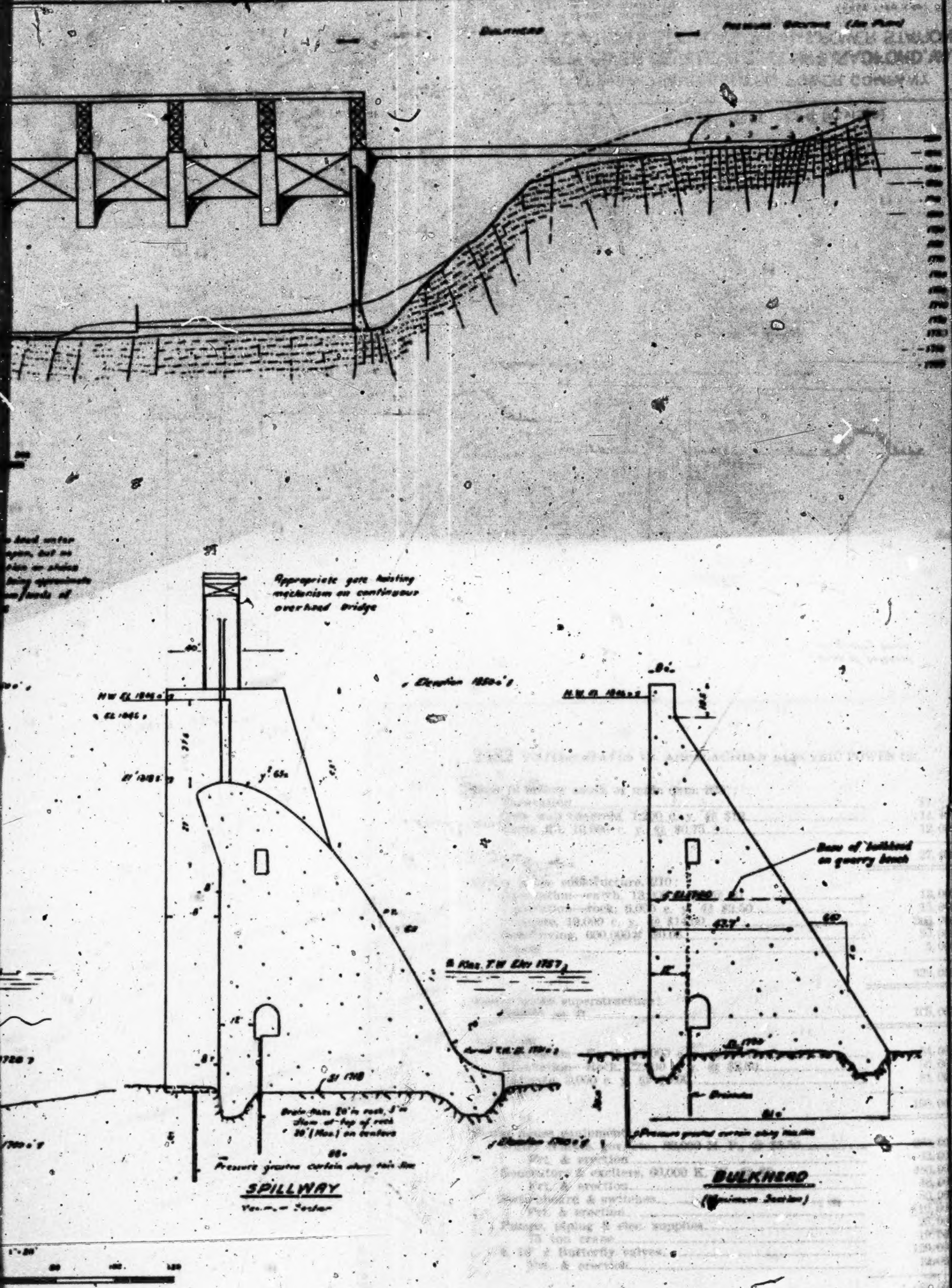
POWER STATION HEADWORKS

(Section midway between ℄s of units)



POWER STATION

hibit 90-A
ction "War
navigable
n approval
f War.



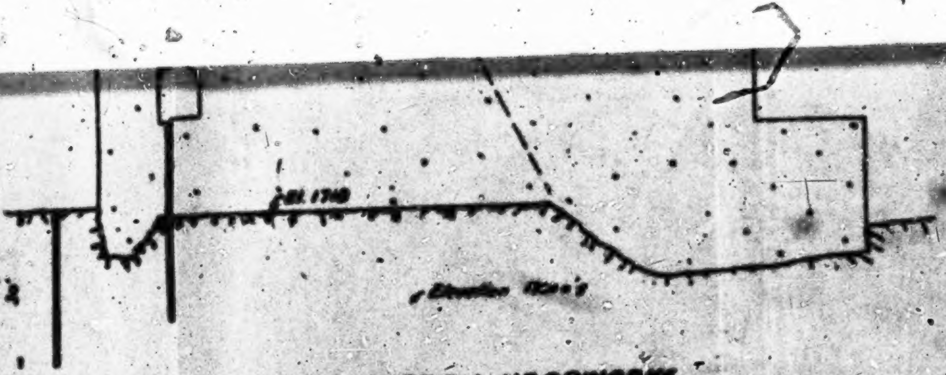
Bulkhead
Pressure Grouting (See Plate)
head water
gram, but no
tion or sluice
being approximate
/levels of
Appropriate gate hoisting mechanism on continuous overhead bridge
40'
HW El 1846.0'
El 1845
El 1818
Elevation 1850.0'
1728
1700.0'
El 1718
Drain holes 20' in rock, 3" in diam. at top of rock 20' (Max.) on centers
Pressure grouting curtain along toe line
1" = 20'
20
100
120
H.W. El 1846.0
Base of bulkhead on quarry bench
B Max. T.W. Elev 1757
El 1730
Drainage
Pressure grouted curtain along toe line
Elevation 1700.0'

SPILLWAY

Maximum Section

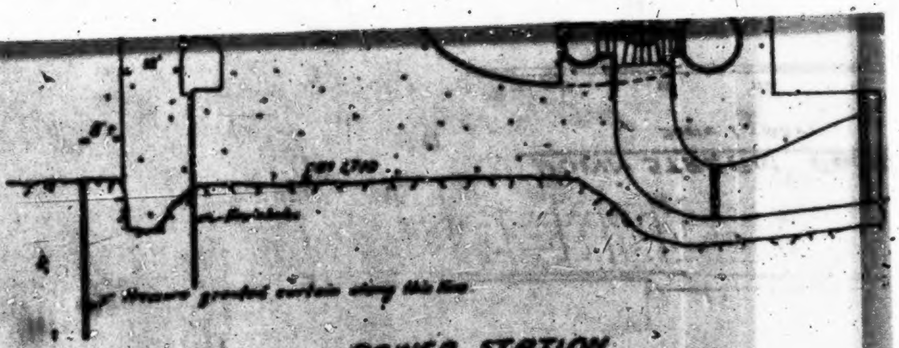
BULKHEAD

(Maximum Section)


El. 1710
Elevation 1620±

POWER STATION HEADWORKS

(Section midway between ℄s of units)

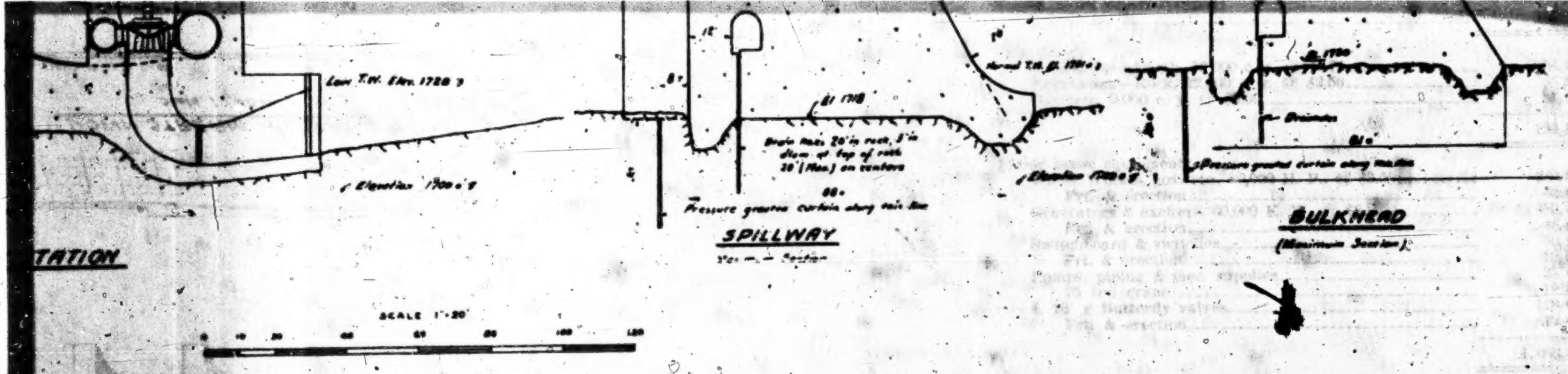

El. 1710
Pressure grouted curtain along this line

POWER STATION

* Approximate maximum tailwater, for maximum floods of record, viz., 1890 and 1891 (actual figures).

Datum

Elevations are in terms of A.E.P.Co. project datum which is approximately equal sea level.


Low T.W. Elev. 1728 ±
Elevation 1700 ± ±
12'
8'
El 1718
Drain holes 20' in rock, 3' in diam. at top of rock 20' (Max.) on centers
88'
Pressure grouted curtain along this line
Normal T.W. El. 1701 ±
Elevation 1700 ±
El. 1730
Drainage
80'
Pressure grouted curtain along this line
TATION
SPILLWAY
Maximum Section
BULKHEAD
(Maximum Section)
SCALE 1"=20'
0
10
20
40
60
80
100
120

…, for maximum
… (estimated figures).

… R. Co. project
… pool level.

WAR DEPARTMENT

APPROVED SO FAR AS THE [illegible] NAVIGABLE CAPACITY OF NAVIGABLE WATERS OF THE UNITED STATES

Lytle Brown

This drawing Exhibit L-4 is part of the application for license made by the undersigned the 30th day of August, 1926
APPALACHIAN ELECTRIC POWER COMPANY

By ______
Vice Pres. Gen'l.
[illegible]

EXHIBIT L-4 (REVISED)

APPALACHIAN ELECTRIC POWER COMPANY

NEW RIVER DEVELOPMENT NO 8 (RADFORD, VA.)

ELEVATION & SECTIONS OF DAM & POWER STATION

DANIEL W. MEAD
F. W. SCHEIDENHELM
CONSULTING ENGINEERS

SCALE 1"=20' & 40'.
[illegible]

734-12

AEP-RD-3005

U. S. GOVERNMENT PRINTING OFFICE : [illegible]

General expense:	
Clearing, reservoir, 3,000 A @ $10	$30,000
New Highway, 10 mi. @ $5,000	50,000
Motorizing 4 Ferries	10,000
2 New ferries, Peek Creek	10,000
Concrete casing to R. R. Viaduct	2,000
Raising Highway Bridge	6,000
Insurance on labor	50,000
Fire Insurance & protection	10,000
	168,000
	$5,341,650.00
Superintendence, engineering, and contingencies 15%	801,247.50
	$6,142,897.50

The above estimate does not include the following items: Cost of property, interest during construction.

This statement is a part of the application for a license made by the undersigned this 30th day of August 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

3174 Exhibit O—Pursuant to Regulation 4, Section 15

APPLICATION FOR LICENSE—APPALACHIAN ELECTRIC POWER COMPANY

STATEMENT OF TIME DESIRED FOR COMPLETING CONSTRUCTION WORKS

A period of one year from the date of license is desired for beginning construction of the project works and a period of four years from the date of license is desired for completing construction of the project works.

This statement is a part of the application for a license made by the undersigned this 30th day of August, 1926.

APPALACHIAN ELECTRIC POWER COMPANY,
By N. M. ARGABRITE, *Vice-President.*

3176 *Government exhibit 91*

SIXTH ANNUAL REPORT OF THE FEDERAL POWER COMMISSION

FISCAL YEAR ENDED JUNE 30, 1926

3177 Seventy-seventh meeting, held in the office of the Secretary of War, March 2, 1926

Meeting called to order at 3.45 p. m.

Present: Secretary Davis, chairman, Secretary Work and Secretary Jardine, members of the commission; O. C. Merrill, executive secretary; Maj. Glen E. Edgerton, chief engineer; Maj. Paul S. Reinecke and D. J. Guy, assistant engineers; Maj. Lewis W. Call, chief counsel; and William V. King, chief accountant.

The meeting was devoted in part to a public hearing on the declaration of intention of the New River Development Co. to construct a power project on New River about 7 miles above East Radford, Va. Attorneys for the declarant were heard by the commission in appeal from the tentative conclusion of the executive secretary that the project would affect the interests of interstate or foreign commerce. The Attorney General and the counsel for the corporation commission of the State of Virginia also appeared in opposition to the assumption of jurisdiction over the project by the Federal Power Commission.

A report of the hearing made by Douglas O. Morgan, shorthand reporter, is in the files of the commission.

At the conclusion of the hearing, the commission took up the regular order of business in executive session.

Seventy-eighth meeting, held in the office of the Secretary of War, March 26, 1926

Meeting called to order at 4.15 p. m.

Present: Secretary Davis, chairman; Secretary Work and Secretary Jardine, members of the commission; O. C. Merrill, executive secretary; Maj. P. S. Reinecke, assistant chief engineer; Maj. Lewis W. Call, chief counsel; J. F. Lawson, assistant attorney; and William V. King, chief accountant.

The commission then took up the regular order of business in executive session.

The record of the proceedings of February 27, 1926, and March 2, 1926, was approved.

The executive secretary presented a list of three applications, Nos. 697, 698, and 699, received since the meeting of March 2, 1926, and stated that three projects had been advertised.

Authorization for license—Declaration of intention

The executive secretary submitted the following statement: The New River Development Co., of New York City, organized under the laws of Virginia, on June 26, 1925, submitted a declaration of intention to the Federal Power Commission under the provisions of section 23 of the Federal water power act, covering the proposed construction of a dam and water power project across New River, in Pulaski County, near Radford, Va.

The New River rises in North Carolina, flows through Virginia and West Virginia, and 155 miles below the proposed dam in conjunction with the Gauley River forms the Kanawha River, a navigable waterway of the United States. The proposed power project includes a concrete dam about 115 feet high with provision for raising its crest 5 feet by means of flashboards. The reservoir formed by the dam will be about 20 miles long, 3178 will have an area of 3,500 to 4,000 acres, and will have a storage capacity of more than 100,000 acre-feet of water.

The declaration of intention was referred to the Chief of Engineers for investigation and report. A report unfavorable to the contentions of the declarant was made, and at its request the papers were returned to the Chief of Engineers for the consideration of additional data furnished by the declarant. After reconsideration of the question, the Chief of Engineers reported that "so far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project."

After study of the case by the commission's staff and the consideration of additional data not before the Chief of Engineers the declarant was informed that it was proposed to recommend to the commission that it find that the proposed project would affect the interests of interstate and foreign commerce. The attorneys for the declarant thereupon requested a hearing before the commission, which hearing was held on March 2. No new data were presented at the hearing, but arguments were made and briefs filed covering not only legal considerations but also the facts upon which the staff of the commission had reached its tentative conclusions.

The matter now comes before the commission for action, and the following review is submitted:

The greater part of the report of the Chief of Engineers is taken up with a discussion of whether New River is or is not a navigable stream. He concludes that it is not. In view of the fact that the navigability of the stream is at least doubtful is denied by the declarant, and in consequence a declaration of intention has been filed, the commission need not pass upon the question of navigability, over the determination of which it has been given no specific authority under the law, but may proceed to act upon the declaration as such under the duty imposed upon it by section 23 of the Federal water power act.

The second paragraph of section 23 of the act, respecting declarations of intention is as follows:

That any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States, may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws.

Before the enactment of the Federal water power act authority to construct dams on navigable streams could be secured only by an act of Congress. There was no means of determining prior to actual erection and operation whether a dam on other streams would or would not affect the interests of commerce. Protection could be had, therefore, only by applying for legislative authority. It was to cure this situation that the provisions of section 23 as above quoted were included in the act. These provisions had two purposes: (1) To protect the interests of navigation by controlling the erection and operation of structures which might otherwise be injurious, rather than by abating the structures or compelling modification in their operation after they are 3179 erected; and (2) to protect applicants by providing a means whereby they can have an authoritative ruling before investment is made.

In the case of United States v. Rio Grande Dam & Irrigation Co. (178 U. S. 770), the Supreme Court said:

> The jurisdiction of the general Government over interstate commerce and its natural highways vests in that Government the right to take all needed measures to preserve the navigability of the navigable water courses of the country.

In discussing the act of September 19, 1890 (26 Stat. 454), subsequently amended in March, 1899, which prohibits "the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of any waters in respect to which the United States has jurisdiction," the court said:

> It is not a prohibition of any obstruction to navigation, but any obstruction to the navigable capacity, and anything, wherever done or however done, within the limits of the jurisdiction of the United States, which tends to destroy the navigable capacity of one of the navigable waters of the United States is within the terms of the prohibition.

When Congress, through the medium of the Federal water power act, fixed the conditions under which dams might be erected under its jurisdiction and empowered the Federal Power Commission to authorize such erection, it by so doing placed upon the commission the responsibility of taking "all needful measures to preserve the navigability of the navigable water courses of the country" in such cases. Where the stream was not navigable, or the effect upon navigation was in doubt, Congress gave prospective developers the option of having the relation of the project to navigation determined before construction by filing a declaration of intention with the commission, or of having such relation determined after construction through proceedings which might be instituted by the United States. But Congress did not give the Commission the option of directly or indirectly authorizing the erection of a dam with intent of having its effect upon navigation determined by other agencies after construction instead of by the commission before construction. The language of the act itself and the discussions upon it in Congress evidence the intent of Congress to place upon the commission and upon nobody else the duty of determining, when declarations of intention are filed, the effect of the proposed construction upon navigation, and to authorize the commission to waive the requirements of a license only when it is convinced that the project will not, in fact, either in its construction or in its operation affect the interests of interstate or foreign commerce.

There is no merit in the contentions made by the representatives of the declarant in their briefs and arguments that the commission is bound by the report and conclusions of the Chief of Engineers, on the ground either that the War Department is the authority to which the development and protection of navigable waters have been confined by Congress, or that the War Department is the sole investigating arm of the Federal Power Commission in matters affecting navigation. As stated above, whatever may be the provisions of other or earlier legislation, Congress in the Federal water power act placed upon the commission the responsibility of determining the effect of power dams on interstate and foreign commerce, a responsibility which it can not legally pass on to some other agency. If this were not so, there would have been no occasion for the declarant's appearance before the commission.

The act provides that "the work of the commission shall be performed by and through the Departments of War, Interior, and Agriculture, and their engineering, technical, clerical, and other personnel, except as may be otherwise provided by law." It does not provide that any particular work shall be performed by any specified agency. The commission may, if it wishes, make its investigations of the effect of dams on navigation through individuals in the Agricultural or Interior 3180 Departments. Furthermore, the act provides for the detail by the President to the commission of an officer from the Engineer Corps to serve the commission as engineer officer. If the opinion on an engineer question of any individual were to be binding upon the commission, it would appear to be that of the officer detailed as its engineering adviser.

Since the close of the hearing representatives of the declarant have advanced the contention that since they failed to present at the hearing any evidence in support of their position other than the revised report of the Chief of Engineers, the commission in reaching its decision can give no consideration to any information or opinion from any other source. Even if the record before the commission did not contain data and conclusions other than this report of the Chief of Engineers, it would be competent for the commission, if it were not satisfied with the information before it, to secure any other or further information it might wish, whether or not presented at the hearing, and whether or not in the record of the case. The declarant was given a hearing. It was for the declarant to make its own case and to present whatever evidence it might wish. The hearing was ex parte. The declarant can not, by failure to produce evidence in rebuttal of what it knew the record contained, cause that evidence to be excluded from consideration by the commission. Furthermore, evidence other than the revised report of the Chief of Engineers is considered and argued in the briefs filed by the declarant as part of the record of the hearing.

Proceeding to a consideration of the reports and facts in the case which bear upon the question of the effect of the proposed power development upon navigation: In his first report of August 20, 1925, the Chief of Engineers said:

> This river is one of the principal tributaries of the Kanawha River, which has been improved for about 90 miles by the construction of 10 locks. It is really the Kanawha River under another name, and the flow if not properly regulated could have an adverse effect on navigation during low water stages in the Kanawha River. * * *
>
> To fully protect the interests of interstate or foreign commerce any license granted should be made subject to the following conditions:
>
> 1. That the licensee shall permit a continuous flow past its dam not less than the low-water flow of the stream as determined by the records of the stream gauging stations required by the preliminary permit, subject to such modifications as the Secretary of War may prescribe in the interests of navigation, and shall

not at any time interfere with the natural flow of the river to such an extent as to interfere with or impede navigation.

2. That the operations of the licensee, in so far as they affect the use, storage, and discharge of the river shall be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation.

Subsequently, the chief of engineers reported:

So far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project.

The opinion of the Chief of Engineers with respect to lack of effect of the New River project upon navigation appears to be based upon two considerations: (1) That the drainage area below the proposed dam would alone supply "the necessary water for navigation on the Kanawha River under the existing project," and (2) that the character of the stream bed is such "that any periodic fluctuations in flow due to normal operations of the project works would be so attenuated by the time they had reached the Kanawha River 155 miles distant as to preclude the probability of any adverse effect upon navigation on that river."

With respect to the first consideration named: From records received and published by the United States Geological Survey, it
appears that the monthly mean flow past the proposed dam,
3181 which controls 27.5 per cent of the total drainage area
above lock 2 on the Kanawha, has ~~been in~~ times of low
water 40 per cent or more of the total available at lock 2, with the percentage greater as the aggregate flow is less. Leakage alone through the locks and dam at lock 2 is estimated at 700 cubic feet per second, an amount greater than would be available in certain months were the water from the area above the proposed dam shut off. It is the opinion of the district engineer in charge of the Kanawha that approximately 1,100 cubic feet per second is needed for satisfactory operation of the Kanawha locks and dams. This amount might not be available for periods of two or more months, should the declarant fill its reservoir for the first or subsequent times under such run-off conditions as prevailed in September and October of 1902. This, however, is not the primary consideration in the possible effect of the use of storage capacity upon navigation. The most serious effects are likely to be caused by variations in river discharge during critical river stages.

In his revised report of December 29, 1925, the Chief of Engineers says, "There is no known method of computing with any degree of accuracy the effect of fluctuations in flow at the dam on the stage of the river at various distances below the dam." He concludes, however, that under the conditions which it is assumed will obtain on the New River there is no probability of adverse effect on the Kanawha arising from variations in discharge from the power plant.

No actual data have been presented by representatives of the declarant to support their position. They have stated that the operation of existing plants on the New River does not show that variations in power plant discharge cause material variation in flow in the river; but they have submitted no data to support the statement. Their reliance is placed wholly upon the theoretical computations, which the Chief of Engineers correctly says have no value, upon the personal opinion of their own engineers supported by no data, and upon the statement of the Chief of Engineers that "so far as can be predicted from available data and records" there would be no adverse effect on navigation. The only evidence of real value would be actual measurements of variation upon the New River itself or upon some other comparable stream.

Subsequent to the receipt of the Chief of Engineer's revised report the staff of the commission secured detailed records showing the effect of variations in power plant discharge upon the flow of the Pit and Sacramento Rivers in California. The records cover a distance of 125 miles from the Pit No. 3 plants of the Pacific Gas & Electric Co. to Red Bluff on the Sacramento River 71 miles below the mouth of the Pit.

The data plotted on a uniform scale for four gauging stations show conclusively that quantitative variations in river discharge persist over long distances. The data were submitted to representatives of the declarant for their information and they have attempted to reply to them in their brief with the claim that the only portion of the stream covered by the diagram which is comparable with the New River is the 80-mile section from the Ydalpom gauge on the Pit to the Red Bluff gauge on the Sacramento. Of these 80 miles, 71 are on the main Sacramento River having a flatter slope than the New River. An examination of the diagram will show that for the 41 miles on the Pit between plant No. 3 and Ydalpom the quantitative variations in discharge are practically unchanged, and that in the 80 miles on the lower Pit and Sacramento 70 per cent of the variations still persist at Red Bluff.

If daily fluctuations of considerable magnitude are created in the Kanawha they will require at low stages of the river frequent operation of the movable dams, a use for which the dams are not intended, thereby increasing the difficulty and expense of maintaining conditions suitable for navigation, if not making it impracticable.

A plant producing 60,000 kilowatts (the proposed installation, at a head of 100 feet) with an efficiency of 85 per cent will require a maximum flow of about 8,300 cubic feet per second.
3182 If operated on a "normal" load factor, the minimum flow used would be about one-third of the maximum, or 2,800 cubic feet per second, a daily variation of 5,500 cubic feet per second. If, on the other hand, as is becoming more frequently the practice, and as the proposed installation in the New River plant indicates, the plant should be operated as a "peak load" plant in connection with steam installation, it might be closed down entirely during certain periods of the day, causing an extreme variation in daily discharge of the full 8,300 cubic feet per second. If these variations are quantitatively reduced in the degree indicated on the Sacramento River—that is, with about one-third of the variation at the head of each 80-mile section disappearing in that section—the amount of the variation which would persist at the first lock on the Kanawha might vary from 2,000 to 4,000 cubic feet per second, according as the plant was operated on "normal" load factor or on "peak." Even if only one-third of the variation remains, the daily variations at lock 2 might still be from 1,500 cubic feet per second to 2,800 cubic feet per second.

The movable dams on the Kanawha River are usually kept up until the flow reaches approximately 6,000 cubic feet per second and then lowered. Should daily variations of from 1,000 cubic feet per second to 2,000 cubic feet per second be caused when the normal flow is in the vicinity of 6,000 cubic feet per second, constant raising and lowering of the dams would be involved, and serious interference with navigation would be caused. Furthermore, navigators are accustomed to note the stage of the stream as they pass a river gauge and to rely on there being no unusual change in the river stage until another gauge is reached. If variations in the flow, such as appear possible from unregulated operation of the storage on the New River should be of sudden and frequent occurrence, considerable damage to tows and to floating plant might readily result.

Experience on the Kanawha River has shown that no depletion of water supply in a dry season can be made without materially increasing the difficulty of maintaining conditions suitable for navigation. The proposed works have ample capacity not only to decrease the flow in the Kanawha River in considerable amount over long periods in the low-water season, but to cause such variation in daily river discharge as seriously to interfere with operation of the navigation facilities. Under such circumstances it is believed to be the duty of the commission "to take all needed measures to preserve the navigability" of the Kanawha River; and that these measures can be taken only by requiring the dam to be constructed under a license containing such condition as will avoid the possibility of serious interference with navigation.

The commission, after discussion, directed that the case with the additional data collected be returned to the Chief of Engineers for further consideration.

3183 FISCAL YEAR ENDED JUNE 30, 1927

3184 Eighty-eighth meeting, held in the Office of the Secretary of War, June 1, 1927

Meeting called to order at 9.25 a. m.

Present: Secretary Davis, chairman; Secretary Work, member of the commission; O. C. Merrill, executive secretary; Maj. Glen E. Edgerton, chief engineer; Maj. Lewis W. Call, chief counsel; J. F. Lawson, assistant counsel; and William V. King, chief accountant.

Decisions on declarations of intention

The executive secretary presented two declarations of intention submitted under section 23 of the Federal water power act upon which action was taken as follows:

1. The executive secretary made the following statement: The New River Development Co., of New York City, organized under the laws of Virginia, submitted on June 26, 1925, a declaration of intention covering the proposed construction of a power development on the New River in Pulaski County, near Radford, Va. Under date of September 2, 1926, Appalachian Electric Power Co., as successor in interest to New River Development Co., submitted an application for license for the project with the request that action upon the declaration of intention be deferred for consideration at the same time as the application for license. Since the investigation of the application for license is now complete and final action now awaits only the applicant's determination of the exact location for the dam, it is recommended that the commission proceed to make finding with respect to the declaration of intention.

The declaration of intention was referred to the Chief of Engineers in the usual manner who reported on August 20, 1925 that the project, if not properly regulated, could have an adverse effect on navigation during the low-water stages in the Kanawha. Subsequently, after reviewing the case at the request of the applicant, the Chief of Engineers reported that "so far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project." In reviewing the report of the Chief of Engineers the engineers of the commission had the advantage of certain studies made upon the Pit River in California showing the effect on the discharge of that river of irregular release of water from Pit No. 3 power plant of Pacific Gas and Electric Co. It was the conclusion of the engineers of the commission that these data clearly indicated the probability that adverse effects upon navigation on the Kanawha would be produced by intermittent discharges of water from the proposed power plant of New River Development Co. It was accordingly recommended to the commission that it find that the proposed project would affect the interests of interstate and foreign commerce, and in support of this recommendation a memorandum was submitted which appears at page 133 of the sixth annual report of the commission.

On account of the different conclusions of the executive secretary and the Chief of Engineers, the commission at its meeting of March 26 directed that the case, with the additional data collected, be returned to the Chief of Engineers for further consideration. On July 23, 1926, General Deakyne, Acting Chief of Engineers, reported as follows:

* * * * *

"The previous report of this office, dated December 29, 1925, on the effect the proposed project would have on the navigation in the Kanawha River was based on records of stream flow from 1909 to 1916, inclusive. These records showed that during
3185 the period in question the drainage area below the proposed plant would provide sufficient water to meet the needs of navigation in the Kanawha River. The summer of 1925 was exceptionally dry, and considerable difficulty was experienced in maintaining navigation in the Kanawha River. It appears, therefore, that at long intervals there may be seasons in which the stream flow is smaller than that covered by the years 1909–1916 and during which the run-off from the area below Radford might be inadequate for navigational purposes.

"I therefore report that there is reason to believe that in the future exceptionally dry seasons may occasionally occur during which the proposed project near Radford, if unregulated, might adversely affect the navigable capacity of the Kanawha River."

In view of the importance to navigation interests of determining to what extent variations in river discharge produced by irregular power-plant operation may persist on the stream below the power plant, as was clearly indicated from the records of Pit River, the commission undertook to have studies made on other streams. A report under date of May 2, 1927, from the commission's representative in California of studies made on the Klamath River in that State bears out in full the conclusions reached from the Pit River records. Quantitative variations in river discharge on the Klamath River were reproduced in full 64 miles below the power plant and to approximately 75 percent at a distance of 132 miles.

For the reasons presented by the Chief of Engineers in the above-quoted report, and for the further reason of effect of irregular power-plant discharge as set forth in the memorandum presented to the meeting of March 26 and as confirmed by the report above referred to, it is concluded that the proposed project of New River Development Co. would affect the interests of interstate or foreign commerce, and it is recommended that the commission so find.

The commission thereupon took action as follows:

In the matter of the declaration of intention, under the provisions of section 23 of the Federal water power act, of New River Development Co., a corporation organized under the laws of the State of Virginia, to construct a dam and other structures across and in New River in the vicinity of Radford, Pulaski County, State of Virginia, said dam and other structures being part of a power project proposed to be constructed for the purpose, inter alia, of the development and utilization of power, said declaration having been submitted to the commission under date of June 26, 1925: The commission having caused investigation of such proposed construction to be made and it appearing from such investigation and from reports submitted thereon that said project, unless operated in the interests of interstate or foreign commerce in accordance with the requirements of said act, would have an adverse effect on such interests, but if operated in accordance with such requirements would materially benefit such commerce, thereupon found that said river in the part thereof involved in said declaration is not "navigable waters" within the definition thereof in said act, but that the interests of interstate or foreign commerce would be affected by such proposed construction.

2. The executive secretary stated that S. A. Lawrence, of Cleveland, Ohio, has declared his intention to construct a dam approximately 25 feet high across the North Fork of New River about 248 miles above Kanawha Falls and near Weaversford, in the

County of Ashe, State of North Carolina; that the Chief of Engineers has reported that the proposed project is on a tributary to the Kanawha River, a navigable waterway of the United States, but due to the small capacity of the proposed reservoir and the distance above the head of navigation he believes the project will have no adverse effect on the navigable capacity of the Kanawha River. The executive secretary recommended that the commission find that the interests of interstate or foreign commerce would not be affected by construction of the proposed project.

3186 The commission thereupon took action as follows:

In the matter of the declaration of intention of S. A. Lawrence, of Cleveland, Ohio, to construct a dam across and in North Fork of New River in the vicinity of Weaversford, in Ashe County, N. C., for the purpose of developing power: The commission having caused investigation of such proposed construction to be made and it appearing upon such investigation that said North Fork of New River in said vicinity is not "navigable waters" as defined in the Federal water power act, and that such proposed construction would not affect the interests of interstate or foreign commerce, it was voted that the commission finds that the interests of interstate or foreign commerce would not be affected by such proposed construction.

3187 FISCAL YEAR ENDED JUNE 30, 1928

3188 Ninety-third meeting, held in the office of the Secretary of War, May 28, 1928

Meeting called to order at 11 a. m.

Present: Secretary Davis, chairman; Secretary Work and Secretary Jardine, members of the commission; O. C. Merrill, executive secretary; Maj. Glen E. Edgerton, chief engineer; Maj. Paul S. Reinecke, assistant chief engineer; Maj. Lewis W. Call, chief counsel; J. F. Lawson, assistant counsel; and William V. King, chief accountant.

The record of the proceedings of March 26, 1928, was approved.

The executive secretary presented a list of 19 applications, Nos. 5, 497, 663, 862, and 887 to 901, inclusive, received since the meeting of March 26, 1928; and stated that nine applications had been advertised and two declarations of intention had been received.

* * * * *

Licenses confirmed—Miscellaneous

Secretary Jardine called attention to a request that had been received from Appalachian Electric Power Co. for a reference to the Attorney General of certain questions of law respecting the applicability of the Federal water power act and of the standard form of license issued thereunder to projects on nonnavigable streams. The request in the form of a letter of April 26, 1928, addressed to the commission and inclosing copy of a previous letter of March 1, 1928, is as follows:

APRIL 26, 1928.

(Identical with draft of April 12, 1928)

Hon. DWIGHT F. DAVIS, *Secretary of War;* Hon. HUBERT WORK, *Secretary of the Interior;* Hon. WILLIAM M. JARDINE, *Secretary of Agriculture*, constituting Federal Power Commission.

Subject: Project 739, Virginia Appalachian Electric Power Co.

SIRS: Appalachian Electric Power Co. proposes to construct a waterpower development near Radford, Va., on New River, a stream held by the War Department and the Federal Power Commission to be nonnavigable. The project would be located entirely within the State of Virginia and the nearest navigable waters, those of the Kanawha River to which the New River is a tributary, are in the State of West Virginia and more than 150 miles down-stream from the proposed power site. No land nor other property of the United States is involved.

Under date of March 1, 1928, this company addressed to the Federal Power Commission a request, a copy of which is inclosed herewith, that it issue for this project a license containing provisions limited to those which are relevant for the protection of navigation on the Kanawha River. Discussion of that letter with the executive secretary of the commission has left counsel for the company with the impression that the commission can not accede to the request of the company, in respect at least of the major points thereof.

The company is unwilling to surrender its property and constitutional rights to the extent of accepting a license such as the commission can or proposes to issue; yet it is desirous of commencing the construction of the project at the earliest possible date. Unless, therefore, it is feasible for the commission to
3189 issue a license the terms of which relate solely to naviga-

tion, the company proposes to proceed with the construction of the project without obtaining a license from the Federal Power Commission.

However, the company desires to make it clear that as regards the construction and operation of its proposed development, it is willing to accept all conditions which are reasonably designed to protect the navigability of the waters of the United States and, specifically, is willing to subscribe to, and at all times to be controlled by, any reasonable rules and regulations which the Secretary of War may prescribe in the interests of navigation.

The legal aspects of this case are exceedingly important from the standpoints both of prospective developers of water power on nonnavigable streams and likewise of the commission itself.

The company assumes that it is the policy of the commission to promote and to cooperate with legitimate business and developments of water power. Consequently it appears reasonable that the commission should seek and utilize opinions as to the legal phases of the problem from the Attorney General of the United States.

Under the circumstances, therefore, the company believes that it would be appropriate, and hereby respectfully and earnestly requests, that the commission obtain from the Attorney General of the United States an opinion on the pertinent points, including the following:

1. When under the Federal water power act

(a) A corporation has under section 23 made a declaration of intention;

(b) The commission, upon investigation, has found that the interests of interstate or foreign commerce would not be affected by such proposed construction;

(c) Permission is thereby granted by the commission to construct the project;

(d) At some later time, due either to the construction or operation of the project, there is created an obstruction to the navigable capacity of waters of the United States;

does there remain to the Federal Government a remedy to prevent or regulate the obstruction by proceeding against the company for a violation of the act of March 3, 1899 (30 Stat. L. 1151)?

2. With specific reference to all the facts in the case of Appalachian Electric Power Co., when in the case of a declaration of intention under section 23 of the Federal water power act, the Chief of Engineers of the Army finds in essence that it is problematical and at least uncertain whether the proposed project could or would adversely affect the interests of interstate or for-

eign commerce, may the Federal Power Commission lawfully make a finding that the project (positively) would affect (adversely) the interests of interstate or foreign commerce?

3. With specific reference to all the facts in the case of Appalachian Electric Power Co., the major facts of which are

(a) The company has made a declaration of intention under section 23 of the Federal water-power act;

(b) The commission, upon investigation, has found that "the interests of interstate or foreign commerce would be affected by such proposed construction";

(c) The company has applied for a license;

(d) The commission has tendered to the company a draft of license which it proposed to issue to the company;

(e) The company thereupon has requested that the provisions of the license be limited to such as are reasonable, relevant and appropriate for the protection of navigation;

(f) The commission has notified the company that it can not or is unwilling to issue a license so limited;

in event the company should now proceed with the con-
3190 struction of the project without a license from the Federal
Power Commission, what procedure against the company would then be legally and practically available to the commission and/or the War Department, with special reference to the Federal water power act of June 10, 1920, the act of March 3, 1899, and any other pertinent law?

4. When under section 23 of the Federal water power act a declaration of intention has been filed to construct a project in a stream other than one defined as "navigable waters" by the act, and upon investigation of the proposed construction it is found to be difficult to ascertain in advance and therefore not certain whether the interests of interstate or foreign commerce would be affected by such proposed construction, could the commission refrain from making any finding as to whether the proposed construction would or would not affect the interests of interstate or foreign commerce and thereby leave the jurisdiction of the project to the War Department under the act of March 3, 1899?

In case the commission or the Secretary of War should request such an opinion from the Attorney General, the company respectfully requests that, in certifying any facts of the case to the Attorney General, there be included the above-mentioned letter of the company to the commission dated March 1, 1928, and also that part at least of the letter of the Acting Chief of Engineers of the Army to the executive secretary of the Federal Power Commission, dated July 23, 1926, which reads as follows:

"4. I therefore report that there is reason to believe that in the future exceptionally dry seasons may occasionally occur during which the proposed project near Redford, if unregulated, might adversely affect the navigable capacity of the Kanawha River."

Respectfully yours,

APPALACHIAN ELECTRIC POWER CO.,
By CURTIS, MALLET-PREVOST, COLT & MOSLE.

MARCH 1, 1928.

Hon. DWIGHT F. DAVIS, *Secretary of War;* Hon. HUBERT WORK, *Secretary of the Interior;* Hon. WILLIAM M. JARDINE, *Secretary of Agriculture,* constituting the Federal Power Commission, Washington, D. C.

Subject: Project 739, Virginia Appalachian Electric Power Co.

DEAR SIRS: The engineering and geological investigations which have been carried on for more than a year at the proposed dam and reservoir site for this project have progressed to the point where it seems advisable to consider the license which the Federal Power Commission proposes to issue to Appalachian Electric Power Co.

June 1, 1927, the Federal Power Commission took the following action on the declaration of intention filed by the New River Development Co.:

"In the matter of the declaration of intention, under the provisions of section 23 of the Federal water power act, of New River Development Co., a corporation organized under the laws of the State of Virginia, to construct a dam and other structures across and in New River in the vicinity of Radford, Pulaski County, State of Virginia, said dam and other structures being part of a power project proposed to be constructed for the purpose, inter alia, of the development and utilization of power, said declaration having been submitted to the commission under date of June 26, 1925: The commission having caused investigation of such proposed construction to be made and it appearing from such investigation and from reports submitted thereon that said project, unless operated in the interests of interstate or foreign commerce in accordance with the requirements of said act, would have an adverse effect on such interests, but if operated in accordance with such requirements would materially benefit such commerce, thereupon found that said river in the part thereof involved in said declaration is not 'navigable waters' within
3191 the definition thereof in said act, but that the interests of interstate or foreign commerce would be affected by such proposed construction."

This finding was made even though the project is located on the New River entirely within the confines of the State of Virginia and the nearest navigable waters, those of the Kanawha River to which the New River is tributary, are in the State of West Virginia and more than 150 miles downstream from the proposed power site.

The original declaration of intention was filed by the New River Development Co. June 26, 1925. In a letter dated September 2, 1926, addressed to the Federal Power Commission by Curtis, Mallet-Prevost, Colt & Mosle, attorneys for Appalachian Electric Power Co., there was inclosed a formal assignment to Appalachian Electric Power Co. of the declaration of intention filed by New River Development Co. In the same letter there was also inclosed an application by Appalachian Electric Power Co. for a license for the proposed project. This letter stated that the application for a license was submitted on the understanding that such application could be withdrawn if it should develop that a Federal license would not be required.

On July 1, 1927, the Federal Power Commission forwarded to the office of Curtis, Mallet-Prevost, Colt & Mosle, duplicate copies of the license which it is proposed to issue to this company for a power project in the New River near Radford, Pulaski County, Va.

After careful examination of the provisions of this proposed license, and upon advice of counsel, Appalachian Electric Power Co. has come to the conclusion that the proposed form of license in the present instance either is not authorized by a proper construction of the Federal water power act or, if the construction be proper, is predicated upon an act which is, at least in part, unconstitutional. Appalachian Electric Power Co. is advised that where a license is to be issued under section 23 of the act and where the project is located entirely on nonnavigable waters and utilizes no public lands of the United States, the commission is not authorized to insert in the license any provisions, whether specified by section 10 of the act or not, which go beyond what is reasonable and appropriate to protect the navigable waters of the United States.

The company is not in this case concerned with the validity of the act in so far as it may be applicable to projects on Government lands, upon navigable waters or in the organized territories of the United States. But the company submits that the only authority of Congress, and the only authority which would be deemed to be conferred validly upon the commission in this case, is to protect the navigable capacity of the waters of the United States and that the limit of the commission's power, if it has any power in the premises, is to impose conditions and regulations reasonable and appropriate for that purpose. The insertion of any other provision is, in the company's judgment and in any view of the act, unauthorized or, if it could be deemed as specifically authorized, unconstitutional.

The company submits that the only possible interpretation of the Federal water power act which could in any view be regarded as consistent with its constitutional validity, and which would permit the commission to issue a license to it, would be that such a license should embody neither such provisions or conditions as those which are set forth in section 10 of the act and which have no bearing upon the protection of navigation nor the recapture provision of section 14 of the act. That is to say, the only valid requirement or authority for a license in this case would be for a license the provisions and conditions of which would insure protection of the navigable capacity of the Kanawha River.

Appalachian Electric Power Co. will accept a license containing conditions reasonably and appropriately designed for the protection of the navigable waters of the United States, but it can not accept a license containing terms which are beyond
3192 the authority of the commission to impose. The company
submits that the tendered license contains many provisions wholly unauthorized by any admissible construction of the act in view of constitutional limitation.

In the light of the foregoing, the company desires to call the attention of the commission to certain provisions in the proposed license which has been tendered to Appalachian Electric Power Co.:

The last clause of the preamble and the granting clause found on page 3 of the proposed license are as follows:

"Whereas the licensee, on the day of ____________, pursuant to an authorization of its board of directors, a copy of the record thereof being hereto attached, accepted in writing all the terms and conditions of the act and of this license.

"Now, therefore, the commission hereby issues this license to the licensee for the purpose of constructing, operating, and maintaining certain project works necessary or convenient for the development and improvement of navigation and for the development, transmission, and utilization of power across, along, from, or in said New River and constituting a part of the project hereinafter described; said license, including the period thereof, being subject to all the terms and conditions of the act and of the rules and regulations of the commission pursuant thereto as amended and made effective on the 1st day of April, 1924, as though fully set forth herein, which said rules and regulations are attached hereto and made a part hereof and being subject also to the following express conditions and limitations, to wit:"

Under the proposed wording, the company would be required to place itself in a position where it might be urged that the company would be bound by all the terms and conditions of the act and of the proposed license; moreover, the license contains the statement that the license would be "subject to all the terms and conditions of the act and of the rules and regulations of the commission pursuant thereto." For reasons hereinbefore and hereinafter stated, the company can accept neither all the conditions of the act nor all the rules and regulations of the commission pursuant thereto nor all the conditions of the proposed license. The company is willing, however, to accept such conditions of the act, such rules and regulations of the commission, and such conditions of a license as are reasonable and appropriate for the protection of the navigability of the waters of the United States.

Article 1.—That part of article 1 which reads: "in consideration of such license and the benefits and advantages accruing thereunder to the licensee it is expressly agreed by the licensee that the entire project, project area, and project works as hereinafter designated and described, whether or not located in, on, or along said New River or upon lands of the United States, shall be subject to all the terms and conditions of the act and of the rules and regulations of the commission pursuant thereto and made a part of this license," the company is unwilling to accept. The commission in the present case has no authority to impose this condition, because it would mean, for example, that the company would thereby agree to the recapture provisions of section 14 of the act and other provisions clearly inappropriate and unconstitutional as applied to the project here involved.

Article 2.—It is not apparent that all the conditions of this article are reasonable and appropriate for or relevant to the protection of navigation. Nevertheless, the company raises no objection to this article.

Articles 3 to 5, inclusive.—To the extent that the requirements of these articles are reasonable and appropriate for or relevant to the protection of navigation, the company is willing to accept them.

3193 Article 6.—The company is willing to accept the conditions of this article.

Article 7.—The terms of this article appear to go beyond that which is reasonable and appropriate for the protection of navigation. Nevertheless, the company is willing to accept this article, provided there be omitted from the fourth sentence thereof, the following: "and the ownership or possession, or the right of use and occupancy, of which are subject to acquisition by the United States under the provisions of section 14 of the act."

The company submits that any conditions providing for or referring to the recapture of this project by the United States are wholly unauthorized by the act and beyond the constitutional power of Congress.

Articles 8 to 12, inclusive.—The company is willing to accept the conditions of these articles.

Articles 13, 15, and 16.—Those conditions of these articles which pertain to navigation facilities appear to be relevant only in the case of a project located on a navigable stream, but in the present case, inasmuch as New River in the part thereof involved in this proposed project is not navigable, appear to be irrelevant, inappropriate, and unauthorized. Nevertheless, the company is willing to accept the said conditions.

Article 14.—The company is willing to accept any conditions which are reasonably designed to protect the navigability of the waters of the United States. However, there are certain conditions in this article which appear not to fall in that category.

The first condition of the article, namely: "The United States specifically retains and safeguards the right to use water in such amount to be determined by the Secretary of War as may be necessary for the purposes of navigation," appears to be relevant only in the case of a project on a navigable stream, and therefore, in the present case, appears to be irrelevant, inappropriate, and unauthorized. Nevertheless, the company is willing to accept the said condition.

The company is willing to accept the condition that "the operations of the licensee so far as they affect the use, storage, and discharge from storage of waters affected by this license shall at all times be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation."

However, the company wishes to point out that the condition reading: "Provided, That the licensee shall discharge at least 9,000 acre-feet of water per week over or through the dam, and whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 cubic feet per second, the licensee shall, unless otherwise authorized by the Secretary of War, discharge in each 24 hours the natural flow of the river entering the reservoir during the same period, such weekly and daily discharges being subject to the reasonable rules and regulations hereinbefore mentioned," seems unreasonable and more stringent than the needs of navigation require.

The condition that "the operations of the licensee. * * * shall at all times be controlled by such reasonable rules and regulations * * * as the Federal Power Commission may prescribe in the interests of flood control" is construed by the company as having reference merely to the protection of navigation and a license containing this condition would be accepted only with such understanding.

The condition of this article in which there is an attempted reservation of authority in the commission to prescribe rules and regulations in the interest "of the fullest practicable use of said waters for power purposes" appears to be irrelevant, 3194 inappropriate, and unauthorized for the protection of navigation. However, inasmuch as the company is in sympathy with any requirement which will provide for the fullest practicable use of the river for power purposes, it is willing to accept the said condition of this article.

Article 17.—The company, like the commission, is desirous that the higher portions of the reservoir area be properly cleared and hence is willing to accept the conditions of this article.

Article 18.—The company can not accept the conditions of this article. It is advised that the commission has, under the circumstances, no authority to impose such conditions and earnestly submits that they should be omitted from any license which the commission issues for this project.

Article 19.—Although the company is advised that there is doubt as to the authority of the commission to require such conditions in a license for this project, the company is sympathetic with the principle that there should be compensation for beneficial storage and hence is willing to accept the conditions of this article.

Article 20.—The company is willing to accept the conditions of this article, but it is suggested that the technical determination of the power capacity be discussed between the engineers of the commission and those of the company. In passing, however, it is desired to point out that the second item of charge specified in the first sentence of this article is irrelevant and without application for the reason that no "lands or other property" of the United States are involved in the project.

Article 21.—The company can not accept the provisions of this article. It is advised that the commission has, under the circumstances, no authority to impose such conditions and earnestly submits that they should be omitted from any license which the commission issues for this project.

Article 22.—The company is willing to subject itself to such of the conditions of this article as are necessary and appropriate for the protection of navigation, but is unwilling to accept such a condition as that which requires that any lease which it may make of the project property shall be subject to "all the conditions of * * * the act and of said rules and regulations of the commission."

Article 23.—The company is willing to subject itself to such of the conditions of this article as are reasonable and appropriate for the protection of navigation, but is unwilling to accept any conditions which are not reasonable or appropriate for the foregoing purpose and instead are predicated upon and refer to the so-called recapture provisions of sections 14 and 15 of the act.

Article 24.—The company is willing to accept that part of article 24 which reads:

"The licensee shall abide by such reasonable regulation of the services to be rendered to customers or consumers of power, and of rates and charges of payment therefor, as may from time to time be prescribed by any duly constituted agency of the State in which the service is rendered or the rate charged."

The rates and services rendered by the company are at this time being regulated by the State of Virginia, and the power of the State to do so has never been doubted. The remainder of article 24 the company is unwilling to accept, for the reason that the commission has no authority to regulate the services, rates,
3195 or securities of this company, whether or not the State should have a commission or other authority for such regulation and control.

Article 25.—The company is willing to accept the conditions of this article.

Article 26.—The company objects to any implication that in accepting a license (in the modified form as proposed herein) it would accept also such provisions of the act and such rules and regulations of the commission as are not relevant, appropriate, or authorized for the protection of navigation.

Despite the foregoing enumeration of specific provisions of the tendered license to which the company has objection, it desires to assure the commission that it is willing to accept every provision which may be reasonable and appropriate for the protection of the interests of the Federal Government in the navigable waters of the United States. At the same time the company insists that there shall be eliminated from the license provisions which are unreasonable and inappropriate to that end. The company trusts that the commission will be willing to cooperate with it and is therefore desirous that it be informed by the commission which, if any, of the objectionable provisions the commission is willing to eliminate, in order that the company may consider the tendered license as modified by such eliminations.

This communication and the expression of the company's willingness to accept a license upon the terms which have been stated are without prejudice to the company's right, in case this proposal is not accepted, to urge the invalidity of the authority claimed by the commission upon any and all grounds including the construction or constitutionality of the act.

Respectfully yours,

APPALACHIAN ELECTRIC POWER CO.,
By CURTIS, MALLET-PRÉVOST, COLT & MOSLE.

After discussion, it was voted that reference of such questions to the Attorney General would not be appropriate and that the commission was of the opinion that modification of the form of license as requested in the letter of March 1 would be in violation of the provisions of the Federal water power act.

At 11.30 a. m. the meeting was adjourned.

O. C. MERRILL, *Executive Secretary.*

3196 FISCAL YEAR ENDED JUNE 30, 1931

3197 One hundred and eighth meeting held in the office of the Secretary of the Interior, November 25, 1930

Meeting called to order at 4.10 p. m.

Present: Secretary Wilbur, acting chairman; Secretary Hyde, member of the commission; F. Trubee Davison, Acting Secretary of War, acting member of the commission; F. E. Bonner, executive secretary; Lieut. Col. M. C. Tyler, chief engineer; J. F. Lawson, acting chief counsel; Chas. A. Russell, solicitor; Maj. F. K. Newcomer, assistant chief engineer; E. C. Bebb, F. F. Henshaw, N. B. Keeler, and R. R. Randell, engineers; Maj. R. Y. Stuart, forester, United States Forest Service; B. F. Heintzleman, assistant regional forester, Alaska,

The executive secretary presented a list of 22 applications, Nos. 863 and 1113 to 1133, inclusive, received since the meeting of August 27, 1930.

* * * * *

Authorizations for licenses

The executive secretary presented applications for licenses, with reports and recommendations thereon, upon which action was taken as follows:

1. The executive secretary stated that a minor-part license application of the Appalachian Electric Power Co. for a development near Radford on New River, a nonnavigable stream, project 739, Virginia, was ready for consideration and that in accordance with the opinion of the Attorney General of September 22, 1930, the commission has full authority to exercise its dis-

cretion in waiving certain provisions under section 10 (i) of the act in connection with any license issued in this case.

After due consideration the commission declined to take action on the application, favorable or adverse. It was concluded that in view of the importance of the questions of jurisdiction as between the United States and the State of Virginia involved in this case a court adjudication is desirable.

One hundred and fifteenth meeting, January 26, 1931

Present: Commissioners Draper, Garsaud, McNinch, Williamson, and Chairman Smith.

Discusssion—Application of Appalachian Electric Power Co.

Col. F. W. Scheidenhelm and Mr. Graham Claytor, representing the Appalachian Electric Power Co., having application for a power project, No. 739, on the New River, appeared before the commission informally urging early action and decision upon their application for a minor-part license.

These gentlemen briefly surveyed the history of their efforts to procure a license and stated that approximately $1,750,000 had been expended in the preliminary work on New River in rebuilding roads, purchasing lands, establishing quarters, and for engineering expenses, and that no further progress could be made until the Federal Power Commission had definitely decided its position in regard to the application.

Reference was made to previous information furnished by Mr. William E. Carson, chairman of the Virginia State Commission on Conservation and Development, to the effect that one 3198 town in the vicinity of this work, and within 3 or 4 miles of the proposed construction, was at the present time, and had been for some weeks, feeding at public expense 500 families; that deaths are actually occurring in the vicinity due directly or indirectly to the inability of the community to care for the people who are out of employment; that the construction work on this project would relieve that situation; and that action upon the application, even through it were adverse to the company's request for license, would improve local conditions.

Individual members of the commission expressed their realization of the importance of early action on the application, but expressed also the opinion that the decision in this case involved so fundamentally the underlying principles of interpretation of the Federal water power act that any action upon the part of the commission would act as a precedent guiding the future acts of the commission and, therefore, due to the extreme importance of the legal questions involved, expressed the view that a public hearing should be had at which time the attorneys for the power company, or any State interested, or any other interested party, would have an opportunity to present, either upon written brief or orally, or both, any arguments which they might desire involving the interpretation of the Federal water power act affecting the granting of minor-part licenses or affecting the jurisdiction of the Federal Power Commission.

It was the consensus of opinion that such hearing, if had, should be held at as early a date as possible and was tentatively set for Monday, February 16, 1931, subject to change at the convenience of the parties interested.

One hundred and sixteenth meeting, January 28, 1931

Present: Commissioners Draper, Garsaud, McNinch, Williamson, and Chairman Smith.

Order for public hearing

The following order was unanimously approved:

It is hereby ordered that a public hearing be held before the Federal Power Commission at 10 a. m., room 5243, Interior Building, February 16, 1931, at which time parties interested can present by oral argument or written brief, or both, any arguments touching upon the request for a license now pending before the Federal Power Commission by the Appalachian Electric Power Co. in connection with its proposed power development upon New River, Va.

It is further ordered that notice of this hearing be immediately sent by wire to the Appalachian Electric Power Co. and also to the governors of the following States who have registered with the commission by letter indications of their interest in this question: Virginia, West Virginia, Tennessee, and Akransas.

One hundred and twenty-third meeting, February 25, 1931

Present: Commissioners Draper, Garsaud, McNinch, Williamson, and Chairman Smith.

The chairman reported that Mr. Judson King had informally requested extension of time for filing his brief in the New River case.

It was voted that Mr. King be told that as February 28 is the limit fixed for the filing of briefs and it is now too late to notify other interested parties of any extension of time, no formal extension is possible, but that his brief will be considered by the commission when received.

3199 One hundred and twenty-sixth meeting, March 10, 1931

Present: Commissioners Draper, Garsaud, McNinch, Williamson, and Chairman Smith.

The chairman reported that supplemental briefs following the public hearing on project 739–Virginia were received before the close of business February 28 from the Appalachian Electric Power Co. by Curtis, Mallet-Prevost, Colt & Mosle; the State of Pennsylvania, by Geo. W. Woodruff, personal counsel to Governor Pinchot, concerning utility matters, and the State of Virginia, by William E. Carson, chairman Virginia Conservation and Development Commission; also, that the brief submitted by Judson King, as director of the National Popular Government League, was received on March 9, the other brief, purporting to come from the same organization and received on February 25, having immediately thereafter been declared by Mr. King as unauthorized and mailed through inadvertence.

One hundred and thirty-fourth meeting, April 3, 1931

Present: Commissioners Draper, Garsaud, McNinch, Williamson, and Chairman Smith.

Opinion and order

In the matter of the Appalachian Electric Power Co., project No. 739, Virginia:

On June 26, 1925, the New River Development Co., predecessor of the Appalachian Electric Power Co., filed a declaration of intention to construct a proposed dam and power project on New River near Radford in the State of Virginia. The declaration of intention was filed under the provisions of section 23 of the Federal water power act (41 Stat. 1063).

On September 2, 1926, the successor company filed formal application for a license for said project, "upon the understanding that such application can be withdrawn if it should develop that a Federal license is not required."

Pursuant to hearings held by the commission on March 2, 1926, and on October 28, 1926, at which time evidence was introduced by the interested parties, the Federal Power Commission, on June 1, 1927, adopted and entered in its minutes the following order:

"In the matter of the declaration of intention, under the provisions of section 23 of the Federal water power act, of New River Development Co., a corporation organized under the laws of the State of Virginia, to construct a dam and other structures

across and in New River in the vicinity of Radford, Pulaski County, State of Virginia, said dam and other structures being part of a power project proposed to be constructed for the purpose, inter alia, of the development and utilization of power, said declaration having been submitted to the commission under date of June 26, 1925; the commission having caused investigation of such proposed construction to be made and it appearing from such investigation and from reports submitted thereon that said project, unless operated in the interests of interstate or foreign commerce in accordance with the requirements of said act, would have an adverse effect on such interests, but if operated in accordance with such requirements would materially benefit such commerce, thereupon found that said river in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said act, but that the interests of
3200 interstate or foreign commerce would be affected by such proposed construction."

And, pursuant to said order, on July 1, 1927, tendered to the said applicant a license in standard form.

On February 4, 1930, the applicant company, having previously refused said license, requested the commission to reconsider the finding as made to the effect that the proposed project would affect the interests of interstate or foreign commerce, or in the alternative to issue a minor-part license for this project.

On October 6, 1930, the applicant company applied to the Federal Power Commission for a minor-part license for this project.

On November 25, 1930, the minutes of the Federal Power Commission at it final meeting prior to its reorganization show that—

The executive secretary stated that a minor-part license application of the Appalachian Electric Power Co. for a development near Radford on New River, a nonnavigable stream, project No. 739, Virginia, was ready for consideration, and that in accordance with the opinion of the Attorney General of September 22, 1930, the commission has full authority to exercise its discretion in waiving certain provisions under section 10 (i) of the act in connection with any license issued in this case.

After due consideration the commission declined to take action on the application, favorable or adverse. It was concluded that in view of the importance of the questions of jurisdiction as between the United States and the State of Virginia involved in this case a court adjudication is desirable.

The present Federal Power Commission, organized on December 22, 1930, set a hearing on the matter, and, on February 16 and 17, 1931, the applicant appeared and was duly heard and filed brief.

At the same time Hon. E. Lee Trinkle, for the region in which project is proposed to be constructed in Virginia; William E. Carson, Esq., chairman, Virginia Conservation and Development Commission; E. W. Caffee, Esq., mayor of Pulaski, Va.; F. M. Livezey, Esq., for Public Service Commission of West Virginia; C. R. Luker, Esq., representing Governor of Kentucky; Hon. Roy H. Beeler, representing State of Tennessee; Hon. John H. Caldwell, assistant attorney general of Arkansas; and Hon. Edwin H. Gibson, assistant attorney general of Virginia, appeared and several of said parties submitted briefs in support of the protests of their respective States theretofore filed with the Federal Power Commission objecting to the said commission taking jurisdiction on the said application.

Also there were filed with the commission briefs by George W. Woodruff, personal counsel to Hon. Gifford Pinchot, Governor of the State of Pennsylvania, and by Herbert S. Ward and other counsel for the National Popular Government League in support of the jurisdiction of the commission in the specific instance covered by this application and like instances.

Commissioner McNinch proposed, and Commissioner Draper supported, such proposal, that this commission should reconsider and reverse the finding of the former commission, "that said river in the part thereof involved in said declaration of intention is not 'navigable waters' within the definition thereof in said act."

The majority of the commission is of the opinion that the suggestion does not involve the question of the jurisdiction of this commission over New River, but merely the question of the ground upon which such jurisdiction shall be predicated, and that the ultimate determination of what is "navigable waters" under the Federal water power act in any case is one for the courts and that any finding made by this commission as to what are navigable waters in law would not be binding upon the courts.

It is the judgment of a majority of the commission, in view of the conflicting evidence and opinion as to New River being "navigable waters within the definition of the act," that jurisdiction is more properly based upon section 23 of the act,
3201 applicable to streams of this character where the authority of the commision is clearly defined, leaving to the

courts the determination of the question of "navigable waters as defined in the act."

It is the unanimous opinion of the commission that the evidence clearly sustains the finding that the proposed construction would affect the interests of interstate and foreign commerce. New River is the principal tributary of the Kanawha River and as such in low-water periods supplies the principal part of the flow of the Kanawha River, a navigable stream presently used in interstate and foreign commerce, and the Kanawha River is one of the principal tributaries of the Upper Ohio River, a navigable stream presently used in interstate and foreign commerce. These facts, together with others in the record, support such finding. It is the opinion of this commission that such finding when so based upon valid evidence is conclusive in view of the authority conferred upon this commission by section 23 of the act.

Now, therefore, this commission having reviewed the evidence, records, and files of this office, bearing upon the issues hereinbefore set forth, having heard argument and carefully read the briefs above referred to, and being fully advised in the premises, hereby orders:

1. That the motion of the applicant company to reconsider the finding of June 1, 1927, "that the interests of interstate or foreign commerce would be affected by such proposed construction" be, and the same is hereby, denied;

2. That the application, dated October 6, 1930, for a minor-part license for this project be, and the same is hereby, denied; and

3. That the applicant shall be tendered a standard form license under the act, and it is hereby ordered that it shall not proceed with construction until it shall have received and accepted such license.

Approval of form of license

Commissioner McNinch submitted a form of license for the Appalachian Electric Power Co., project 739–Virginia, and moved its adoption. The motion to adopt was seconded by Commissioner Williamson and approval of the form was unanimously voted.

Commissioner Garsaud was of the opinion that the full text of the findings of the commission of June 1, 1927, should be inserted in the license.

One hundred and fifty-first meeting, May 5, 1931

Present: Commissioners Draper, Garsaud, McNinch, Williamson, and Chairman Smith.

3202 FISCAL YEAR ENDED JUNE 30, 1932

3203 Two Hundred and Third Meeting, October 26, 1931

Present: Commissioners Draper, Garsaud, McNinch, and Chairman Smith.

Resolution

On motion of Commissioner Draper, the following resolution was unanimously adopted:

Resolved, The commission by letter of October 21, 1931, having authorized the Attorney General to raise the issue of navigability of New River in the Appalachian Electric Power Co. case and Assistant Attorney General Seth W. Richardson in a letter to the commission dated October 23, 1931, having requested the commission to proceed without delay in obtaining available evidence upon this issue, the commission hereby delegates to Commissioner McNinch the duty of cooperating with the Department of Justice in discovering and preparing in usable form all evidence obtainable for presentation to the court in support of the Government's contention and in the performance of this task Commissioner McNinch is authorized to use such portion of Acting General Counsel Lawson's time as may be found necessary and all or such part of the time of Attorney Gatchell as he may think necessary. If further assistance is deemed necessary by him from time to time he shall make know such further requirements to the commission with his recommendations in regard thereto.

A Declaration of the Navigability of New River

(Project No. 739)

On October 12, 1932, the following resolution, offered by Commissioner McNinch, and seconded by Commissioner Draper, was adopted by unanimous vote:

Whereas, it has been brought to the attention of the Federal Power Commission that plaintiff, in its brief and on oral argument in the United States District Court before Mr. Justice Luther B. Way, at Norfolk, Va., on July 19, 1932, in the case of the Appalachian Electric Power Co. against George Otis Smith et al., Equity No. 494, stated that the defendants, as members of the Federal Power Commission, did on April 3, 1931, reaffirm and adopt a finding of the predecessor commission dated June 1, 1927, that New River was nonnavigable; and

Whereas it appears from said brief and oral argument of plaintiff's counsel that the position and action of this commission in respect to the said finding of June 1, 1927, by a predecessor commission of the nonnavigability of New River has been misunderstood and the purpose and effect of the action taken by this commission on April 3, 1931, has been construed by plaintiff's counsel contrary to the intent and understanding of this commission of its said action, and this commission desiring to correct such misinterpretation and misunderstanding and to clarify its position in regard thereto;

Does hereby declare that neither this commission, as constituted on April 3, 1931, nor the members of the commission, by the action taken on said April 3, 1931, either adopted or reaffirmed, or intended its action to be understood or interpreted as an adoption or reaffirmation of the finding of the predecessor commission on June 1, 1927, to the effect that New River was non-
navigable, but that on the contrary, as the record of this
3204 commission's action plainly shows, this commission made
no finding as to the navigability or nonnavigability of said New River, as it was of the opinion that it was not required to make any finding upon such question;

That, as a further evidence that this commission did not adopt or reaffirm the finding of nonnavigability of New River by the predecessor commission on June 1, 1927, and did not intend that its action taken April 3, 1931, should be so construed, this commission after plaintiff's bill had been filed did on October 21, 1931, by letter to the Attorney General of the United States authorize the Attorney General to submit the question of the navigability of New River to the courts and expressed its readiness to furnish the Attorney General with such facts and evidence as are obtainable upon this question; that pursuant to authority given in said letter, the first answer of the members of the commission traversed the allegation of plaintiff company to the effect that the present commission had reaffirmed and adopted the finding of the predecessor commission that New River was nonnavigable; and the second answer of the members of the commission averred that said river is navigable, which averment of navigability had the approval of this commission and the members thereof;

And this commission further declares that, in view of the misunderstanding and misinterprtation of the action taken by this commission on April 3, 1931, and of the authority subsequently given to the Attorney General to submit the question of the navigability, of the New River to the courts, and of the answers filed by the Attorney General on behalf of the commission and the members thereof, and upon the whole record and evidence before the commission in this matter on April 3, 1931, including the doctrine of navigability as laid down in numerous cases by the United States Supreme Court, and the records of surveys of New River authorized by Congress, appropriations by Congress for the improvement of New River, official reports to Congress recommending improvement of New River, reports of improvements made upon said river, the report of the Board of Engineers appointed to examine the James River and the Kanawha Canal project, reports by the Chief of Engineers relative to the navigability of New River and the effect of the proposed project on interstate commerce; also reports by the Secretary of War and the Chief of Engineers on the survey of New River, the report of Moore and Briggs upon the survey and navigability of said river, the acts of Congress authorizing construction of dams across New River, permits by the Secretary of War for construction of bridges across said river, and numerous statutes by the States of Virginia and West Virginia recognizing the navigability of the said river;

The commission finds and declares that New River, from the mouth of Wilson Creek, Va., north, is navigable waters within the definition thereof, as set forth in section 3 of the Federal water power act.

Commissioner Williamson concurring:

The action of the commission on April 3, 1931, as given in its written decision, was designed to express the fundamental basis upon which Federal jurisdiction was predicated.

The commission by that action took jurisdiction over New River for the purposes of the Federal water power act. This jurisdiction having been declared and the provisions of the Federal water power act made operative upon the applicant, the commission action was complete, regardless of the reasons given as justification therefor.

Thereafter, action was instituted by the applicant company, after refusal of the tendered license, questioning the jurisdiction of the United States in the premises.

The statement of the former commission, "that said river in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said act," can not, in my opinion, be considered as a finding of fact. It was in form, as well as content, merely a conclusion of law. In fact, the present commission did not consider such finding as one of fact, nor
3205
pertinent to the decision of the case, and as not binding upon the courts.

Economy Light & Power Co. v. United States, 256 U. S. 113.

No attempt was made by this commission to pass upon the question of navigability in fact of New River, nor in my opinion was the question of navigability of New River necessarily before either the former commission, or this commission, the statute having been engaged upon a Declaration of Intention by the applicant company filed pursuant to the provisions of section 23 of the act.

The question was as to whether interstate and foreign commerce was affected. Prior to the passing of the Federal water power act the power to make this determination vested exclusively in Congress and its exercise was a function of that body.

Congress has the supreme power to regulate commerce with foreign nations, and among the several States, and with the Indian tribes by virtue of clause 3, section 8, Article I of the Constitution of the United States, and its declarations as to what is or is not necessary to its exercise of this power are beyond the jurisdiction of the courts to question.

In section 23 of the act this power is delegated to the Federal Power Commission, and in the exercise of that authority its decision, lawfully made, as to what will or will not affect interstate commerce, is subject to the same conclusiveness as pertains to Congressional action.

In the instant case there was evidence in the record supporting the commission's finding that the proposed project would affect interstate and foreign commerce and this is sufficient, in my opinion, to protect the finding of the commission against attack.

Crowell v. Benson, 285 U. S. 22.

It not only gives to the commission ample ground upon which to assert its jurisdiction, regardless of navigability in fact, but brings that determination within the body of decision law defining the dignity of such administrative action.

This being the view of the commission, the decision of April 3, 1931, should not be construed as a finding for or against navigability in fact of New River, nor can the existence of the finding of the former commission on June 1, 1927, be legitimately construed as an indication of this commission's view upon the question of navigability in fact.

It was my opinion then, and it is my opinion now, that the ground stated by this commission on April 3, 1931, is not only the strongest legal position the Government can take in support of the jurisdiction of the Federal water power act in this particular case, but is otherwise advantageous to the Government's interest. However, that New River has been navigated and that it is navigable water within tests applied by the court in many cases is clear.

The commission having asserted its jurisdiction and its position now being apparently misunderstood, the issue of navigability so far as it is pertinent to the Government's position should not, in my opinion, be encumbered by any misunderstanding or misconstruction of this commission's former action.

For these reasons I concur in this action.

3206 *Government exhibit No. 92*

1925, Aug. 20—Report of General Taylor, Chief of Engineers on Declaration of Intention for project No. 739.

3207 War Department,
Office of the Chief of Engineers,
Washington, August 20, 1925.

Refer to File No. 7495 (New River Developt. Co.)—3

The Executive Secretary,
Federal Power Commission,
Washington, D. C.

Dear Sir: 1. In reply to your request of July 1, 1925, the following report is submitted on the declaration of intention by the New River Development Company, to construct a power development in the New River, Va., near the town of Radford, Pulaski County, Va.

2. New River rises in the northwestern corner of North Carolina, near the Tennessee line, and flows northeasterly through and between spurs and branches of the Blue Ridge until it reaches the lead mines in Wythe County, Va. From this point it flows in the same general northeasterly direction between and parallel to the main divides of the Blue Ridge and the Alleghenies, cutting alternately through spurs, from the one to the other, until in the fifty-fifth mile of the survey at what is known as the Horseshoe, it turns abruptly to the northwest and breaks through the five ranges into which the Alleghenies are here divided, keeping the same direction to the mouth of the Greenbrier, 73 miles beyond.

3. Commencing at the lead mines with a width of 350 feet and an average depth of 5 feet, the river gradually expands to a width of 900 feet and an average depth of 6 feet, just above the Greenbrier, subject to expansions and contractions normally found in natural watercourses.

4. On its course, between the lead mines and the Greenbrier, New River receives several tributaries of varying size. Among them in the east are Big Reed Island and Big Stony Creeks and Little and Indian Rivers; on the west, Cripple, Reed, Walker's, and Wolfe Creeks and East and Blue Stone Rivers. All of these are mountain streams, furnishing from 50 to 200 c. f. s. of water at ordinary stages.

3208 5. (a) The original project was adopted in 1876, and provided for improving the stream from the Lead Mines in

Wythe County, Virginia, to the mouth of the Greenbrier River in West Virginia, by widening the channel from 30 to 50 feet as might be required, deepening it to two feet and straightening as needed for bateau navigation, the improvement however, to be made in such manner as would aid the work should greater depth and width be required in the future. The sum of $109,691.06 was expended up to June 30, 1898, for open river navigation.

(b) The declaration of intention involves the so-called New River bridge or Middle Division.

(c) Moore & Briggs, in 1819, surveyed 54 miles of the river between Sinking Creek and Greenbrier River under the auspices of the Board of Public Works of the State of Virginia. In their report the statement appears that "not withstanding it was represented to us as being remarkably low it afforded (July, 1819) a superabundance of water for every purpose of internal navigation." They also stated they ascended all the principal falls with their boat.

6. In the report submitted by Major W. P. Craighill, covering a distance of 128 miles of the river, dated Baltimore, Md., December 17, 1872, observations and measurements during unusually low water stages indicated a discharge at the dam of the Wythe Union & Lead Company in Wythe County, Va., of 2,000 c. f. s. and 3,000 c. f. s. at Sifford's Falls, 65 miles downstream, which the report states would indicate that the stream affords abundant water at all seasons for any scheme of navigation improvement that might be adopted.

7. On page 915, Annual Report, Chief of Engineers, for 1882, the following statement appears:

Miles of River Improvement

	1881	Previous	Total
Greenbrier Division	9	17½	26½
New River Bridge Division	10	12	22
Lead Mines Division	5⅓	0	5⅓
	24⅓	29½	53⅚

3209 8. The amount expended during the fiscal year 1881-82, exclusive of outstanding liabilities July 1, 1882, was $28,398.07 (See page 919, Annual Report, C. of E., 1882). On page 702, Annual Report, C. of E., 1883, the following is taken from the report of Lieut. Col. W. P. Craighill, dated Baltimore, Md., May 21, 1883:

Greenbrier, or Lower Division.....Improved 26⅛ miles.
New Bridge, or Middle Division.....Improved 29¼ miles.
Lead Mines, or Upper Division.....Improved 5⅓ miles.

9. At the close of the working season of 1882 there was a channel 50 feet wide and 2 feet deep from Hinton Landing to Wiley's Shoals, a distance by river of 26½ miles; also a channel from New River bridge to the head of Jones Ford, a distance of 21 miles as follows:

12 miles,	30 feet	wide,	2½	feet	deep
2½	"	20	"	"	"	"	"
7½	"	10	"	"	"	"	"

This channel was extended same year 8½ miles above the bridge.

10. Page 236, Annual Report, C. of E., for 1890, the following statement appears regarding the three sections under improvement: "The amount expended in the year ending June 30, 1890, has been $6,394.45 and the total to that date is $109,733.21."

11. On page 506, House Document No. 1491, 63rd Congress, 3rd Session, are found the following data on appropriations for River and Harbor improvement on New River, Va., and West Va.:

August 14, 1876	$15, 000
June 18, 1878	15, 000
March 3, 1879	12, 000
June 14, 1880	24, 000
March 3, 1881	24, 000
October 2, 1882	12, 000
October 5, 1886	10, 000
Total	$112, 000

12. On page 5, House Document No. 1410, 62nd Congress, 3rd Session, the following statement appears: "From Hinton to the vicinity of Glenlyn, a distance of 30 miles, a boat drawing 2 feet will have sufficient depth of water for navigation at practically all times," and on page 6 of same document "From Hinton to Glenlyn, * * * there is some commerce, consisting of lumber, staves, sand, gravel, and also some grain, hay, farm
3210 products, and miscellaneous merchandise."

13. Commerce on the New River during the calendar year 1882 was reported as more than 11,000 tons. Commerce on the Kanawha River, of which the New River is the most important tributary, is reported as follows:

Year	Tons	Value	Passengers	Floated timber[1]	
				Tons	Value
1919	892, 253	$12, 138, 677	2, 267	312	$7, 488
1920	1, 451, 084	9, 304, 983	1, 105	273	2, 138
1921	1, 118, 691	8, 778. 335	2, 768	220	1, 980
1922	942, 451	8, 746, 201	2, 235	157	1, 498
1923	1, 572, 821	7, 828, 786	3, 262	15	135

[1] The tonnage and value of floated timber are not included in the amounts shown in Columns 2 and 3.

14. Hinton is in West Virginia, while Glenlyn is in Virginia, the New River therefore constituting an interstate stream so far as navigation is concerned. The proposed project involves falls, shallows and rapids which would probably compel land carriage.

15. The low water flow of the Kanawha at its junction with the Ohio is estimated as little, if any, less than the flow of the Ohio at the same point.

16. The River and Harbor Appropriation Act of June 13, 1902, repealed the previous acts providing for prosecution of work of improvement of New River, and directed that unexpended funds be paid into the Treasury of the United States. Congress has asserted jurisdiction over the New River in the past by having expended moneys on this stream for channel improvement with the view to improving the entire stream for navigation. Four proposed power developments on New River have been projected since the enactment of the Federal Water Power Act and have been considered as coming within the jurisdiction of the Federal Power Commission. They are—

Project No. 223 W. Va.—Preliminary permit granted to Charles B. Hawley, Washington, D. C., for power development at Sandstone Falls about 90 miles below the proposed project. This permit expired November 5, 1924.

Project No. 379 W. Va. and Va.—Preliminary permit granted the West Virginia Power Company, Charleston, W. Va., for power development at the mouth of the Bluestone River, about 79 miles below the proposed project. This permit is still in force.

3211 Project No. 542 N. C.—Application submitted and pending for preliminary permit for power development on the New and Reddies Rivers in North Carolina about 100 miles above the proposed project.

Project No. 575 Va. and N. C.—Application submitted and pending by the Eastern States Development Company, Wheeling, W. Va., for power development on the New River in Virginia, and the Fisher River in North Carolina, about 50 miles above the proposed project.

17. A. (a) This river is one of the principal tributaries of the Kanawha River, which has been improved for about 90 miles by the construction of 10 locks. It is really the Kanawha River under another name and the flow if not properly regulated could have an adverse effect on navigation during low water stages in the Kanawha River.

(b) The possible adverse effect is not such as to warrant refusal to allow the proposed construction to proceed if control is maintained by the United States.

(c) No action by any other agency of the United States will be necessary or desirable to protect fully the interests of interstate or foreign commerce.

B. (a) Proper regulation of the flow of the river would naturally be of benefit to navigation. The extent of this benefit has not been fully determined.

(b) To fully protect the interests of interstate or foreign commerce any license granted should be made subject to the following conditions:

1. That the licensee shall permit a continuous flow past its dam not less than the low water flow of the stream as determined by the records of the stream gauging stations required by the preliminary permit, subject to such modifications as the Secretary of War may prescribe in the interests of navigation, and shall not at any time interfere with the natural flow of the river to such an extent as to interfere with or impede navigation.

2. That the operations of the licensee, so far as they affect the use, storage and discharge of the river shall be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation.

18. From the above facts it is established that New River has been under Federal improvement for navigation, that navigation has actually existed and that the river was physically 3212 capable of interstate navigation although very light draft. The fact that navigation does not exist at present is not understood to change the legal status of the stream. Congress has in the past signified its intention to assert jurisdiction of the New River by appropriating money for its improvement with a view to making the stream navigable, and it is not seen that the fact that the reversion to the Treasury of unexpended funds was later ordered alters its status. If free from any control by the United States it would be difficult to ascertain authoritatively that the proposed development would be in general accord with the most beneficial utilization of the water for navigation, water power, flood control and other beneficial public uses. It is obvious that such utilization is essential to the best interests of commerce. Therefore, while the navigable capacity of the stream is limited, this office must report that no sufficient reason is seen why the Federal Power Commission should not exercise jurisdiction over the proposed project.

Very respectfully,

(Signed) H. TAYLOR,
Major General, Chief of Engineers.

Government exhibit No. 93

1925, July 23—Report of District Engineer, Major A. K. B. Lyman and Endorsement (7/25/29) Division Engineer C. W. Kutz, on declaration for project No. 739.

3214

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
13TH FLOOR, COAL EXCHANGE BUILDING,
Huntington, West Virginia, July 23, 1925.

Refer to File No. M668

Subject: Report on declaration of intention dated June 25, 1925, by the New River Development Company for proposed water-power development in the New River near Radford, Virginia.

To: The Chief of Engineers, U. S. Army, Washington, D. C. (through the Division Engineer, Central Division).

1. Improvements for navigation.—(a) Improvement for navigation have been made on the New River extending from Hinton, West Virginia, to a distance upstream for about twenty-five miles. About $110,000 was expended on the work. The last work was done in 1882, except the expenditure of $10,000 since that date.

(b) Surveys and examinations were made but no improvements on that part of the river involved in this declaration of intention.

(c) The improvements made for navigation in the New River consist of building channel chutes or sluiceways across bars. These channels were about 50 feet wide and 2 feet deep at extreme low water and were improved by cutting out rock where necessary and piling up stones along the sides of chutes to direct water through them.

2. Use of stream.—The stream has been used to a limited extent for transportation of persons and property. This has been limited to the floating of logs and operation of row boats and ferries. The only use made at present of the river for navigation is limited to ferries.

3. Interruption to navigable parts of stream.—The proposed project does not involve falls, shallows or rapids compelling land carriage.

4. Jurisdiction of Congress.—The New River while not navigable in fact is legally a navigable stream, the Government in
3215 the past having expended moneys on this stream for channel improvement. The following proposed developments of water power on New River have been projected since the enactment of the Federal Water Power Law and have been considered as coming within the jurisdiction of the Federal Power Commission:

Project No. 223—W. Va. Preliminary permit granted to Charles B. Hawley, Washington, D. C., for power development at Sandstone Falls. This permit expired November 5, 1924.

Project No. 379—W. Va. and Va. Preliminary permit granted to the West Virginia Power Company, Charleston, W. Va., for power development at the mouth of the Bluestone River. This permit is still in force.

Project No. 542—N. C. Application submitted and pending for preliminary permit for power development on the New and Reddies Rivers in North Carolina.

Project No. 575—Va. and N. C. Application submitted and pending by the Eastern States Development Company, Wheeling, W. Va., for power development on the New River in Virginia and the Fisher River in North Carolina.

5. Effect on commerce.—(a) The proposed water-power development would be a benefit to navigation due to its probable regulation of low-water flow, provided the natural minimum low-water flow be not decreased.

(b) A permit or license for the proposed project should include a provision that the minimum flow immediately below the proposed dam be not less than the average minimum natural low-water flow, which is necessary for the maintenance of the pools above the dams in the Kanawha River, which stream is formed by the junction of the New and the Gauley Rivers.

(c) No action by any other agency of the United States will be necessary or desirable to fully protect the interests of commerce.

6. It is the opinion of this office that the New River is a navigable stream as defined by the Federal Power Act and that the proposed water-power project of the New River Development Company should be considered as coming under the jurisdiction of the Federal Power Commission.

(Signed) A. K. B. Lyman,
Major, Corps of Engineers, District Engineer.

3216 (Views of Division Engineer, Central Division, on Report of the District Engineer, Huntington, W. Va. dated July 23, 1925, on Declaration of intention dated June 25, 1925 by the New River Development Co. for proposed water-power development in the New River near Radford, Va.)

1st Ind.

CWK/a.

Office Div. Engr., Cent. Div., July 25, 1925.

To the Chief of Engineers:

1. The Division Engineer concurs in the opinion of the District Engineer that the reach of New River under consideration comes under the jurisdiction of the Federal Waterpower Commission.

This opinoin is based primarily upon the fact that this reach of river was recommended to Congress for improvement after investigation under its authority, though not actually improved.

(Signed) C. W. KUTZ,
Col., Corps of Engineers, Division Engineer.

3217 *Government exhibit No. 94*

1925, October 15—Letter and memorandum of Major Trippe, District Engineer to Lt. Col. Edgerton, on probable effects of proposed Radford project on Kanawha River.

3218
WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
13th Floor Coal Exch. Bldg.
Huntington, W. Va., October 15, 1925.

Address Reply to U. S. Engineer Office, Huntington, W. Va.
Refer to File No. M668/8.

Subject: Effect of proposed power dam near Radford, Va. on navigation

Major G. E. EDGERTON, *Chief Engineer,*
FEDERAL POWER COMMISSION, *Washington, D. C.*

DEAR MAJOR EDGERTON: We have prepared the data you requested during your visit here October 10. The inclosed paper is a statement of the effect of the proposed dam of the New River Development Co. on New River near Radford, Va., on the navigation of the Kanawha River. We are also inclosing the memorandum you left here.

Very truly yours,

H. M. TRIPPE,
H. M. Trippe,
Major, Corps of Engineers, District Engineer.

2 inclosures—Statement; Memorandum.

3219 EFFECT ON NAVIGATION OF PROPOSED NEW RIVER DEVELOPMENT CO. PROJECT ON NEW RIVER NEAR RADFORD, VA.

In order to prevent interruption to navigation on the Kanawha River there must be enough discharge in the river to maintain the pools at their normal elevation. This means that the discharge must be equal to or greater than the leakage plus the lockage requirements or the pools will be drawn down and navigation interrupted because of insufficient depth. The movable dams have a greater leakage than the fixed dams; hence their pools are the hardest to maintain.

During periods of occasional low water great difficulty is encountered in maintaining these pools. It is necessary to calk the wickets with timbers, brush, cinders, weeds, straw, manure, etc., to seal the spaces between the wickets. The past low water season, July, August and September, 1925, was the driest of record and in spite of the utmost care exercised it was impossible to maintain the pools of the movable dams up to normal. The natural flow of the river was not sufficient to provide for the leakage and the water required for lockages at any of the dams, fixed or movable. If the river discharge is decreased below the amount which occurred during the past season navigation would be proportionately restricted.

A table of the discharge records of the 1925 low water period and the 1914 low water period follows. The 1914 low water period was a period of occasional low water and the only such period for which complete records of flow for these points are available. The frequency of occasional low water is about once in five years.

	Miles below proposed dam	Drainage area sq. mi.	1914 low water—mean discharge in sec. ft.					1925 low water—mean discharge in sec. ft.			
			July	Aug.	Sept.	Aver.	%	July	Aug.	Sept.	Aver.
1. Lock No. 2	157	8,470	2,610	2,290	2,070	2,323	100	2,096	1,353	1,230	1,360
2. Radford	7	2,720	1,650	1,480	1,330	1,[illegible]	84				
3. Inflow between Radford and proposed dam		320	287	318	207	271	12				
4. Site of proposed dam	0	2,400	1,363	1,162	1,128	1,216	52				
5. Lock #2 minus discharge at site of proposed dam (1–4)			1,247	1,128	947	1,107	48				
6. Percentage disch. at proposed dam to disch. at Lock #2			52	51	54	52					

3220 NOTE.—No. 3 figured by multiplying the ratio of drainage areas of Copper Valley gaging station on Little River to total difference in drainage area between Radford and the site of proposed dam by the discharge at Copper Valley. Thus, $\left(\frac{320}{195}\right)\times 175$ sec. ft. = 287 sec. ft., or the mean discharge for July, 1914.

The proposed reservoir with a dam 115 feet high is 4,000 acres in area and will doubtless store more than 100,000 acre feet of water. In a period of occasional low water such as that of 1914 the full flow of the river for 40 days will be required to fill the reservoir for the first time. Such a condition would seriously interefere with navigation.

The proposed installation is 80,000 horse power. Full operation at 85% efficiency and a head of 100 feet requires a discharge of 8300 second feet. The Federal Power Commission uses 70% efficiency in figuring the power capacity of a project, while the actual efficiency obtained is much greater. If the plant were operated as a daily peak load carrier in low water seasons it would release 8300 second feet for nine hours a day and nothing during the remainder of the day. A discharge of 6,000 second feet at Dam No. 5 produces one foot of depth on the crest of Dam No. 6. At this discharge it is generally necessary to lower the dam. The releasing of such a wave could cause the lowering and raising of the Kanawha River movable dams every day. This is utterly impractical.

Operation as a daily peak load carrier in a season of occasional low water such as 1914 would exhaust the 40,000 acre feet of storage in 11 days and require the full 24-hour flow for 16 days to fill again. This would seriously interefere with navigation.

The proposed dam above Radford may be operated so as to be beneficial to navigation by increasing somewhat the dry season flow by drawing upon the storage, but in the absence of authorized control the operation may be so conducted as to be a menace to navigation by causing alternate waves of excess and deficient discharge during the dry period. It is therefore concluded that the Federal Power Commission must retain jurisdiction over the proposed project in order to assure uninterrupted navigation.

U. S. Engineer Office,
Huntington, W. Va.,
October 15, 1925.

3221 *Government exhibit No. 95*

1926, April 7—Letter from Merrill, Executive Secretary, to General Taylor, C. of E., transmitting data with respect to Pitt River. Attached is memo initialed "R. W. D." and diagram of variations on Pitt and Sacramento Rivers. (Original Exhibit.)

3222 *Government exhibit No. 96*

1926, July 23—Report of Hubert Deakyne, C. of E., to Merrill Executive Secretary on declaration for project No. 739.

3223

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, July, 23, 1926.

Address Reply to Chief of Engineers, U. S. Army, Washington, D. C.

Refer to File No. 7495 (New River Developt. Co.) 25.

The EXECUTIVE SECRETARY,
Federal Power Commission, Washington, D. C.

DEAR SIR: 1. Reference is made to your letter dated April 7, 1926, and the accompanying data with respect to the Pit and Sacramento Rivers in California and the application of these data to the variation of flow in the New River.

2. After having made a careful study of the data submitted I am of the opinion that due to the peculiar conditions existing in the Pit River as shown by the fact that there is practically no decrease in the height of the wave between its source at Pit #3 and Ydalpom, a distance of about 40 miles, the data do not give a true picture of how a wave travels down a river. Further, due to the totally different character of the two rivers, considerable doubt is felt as to the possibility of computing wave attenuation in the New River from data obtained in the Pit and Sacramento Rivers even if sufficient data on the latter streams were available. In my judgment the only correct procedure will be to study the action of the waves produced by the intermittent operation of the present plant at Ivanhoe on the New River. Such a study has been started and will be continued until a satisfactory answer is obtained.

3. The previous report of this office dated December 29, 1925, on the effect of the proposed project would have on the navigation in the Kanawha River was based on records of stream flow from 1909 to 1916 inclusive. These records showed that during the period in question the drainage area below the proposed plant would provide sufficient water to meet the needs of navigation in the Kanawha River. The summer of 1925 was exceptionally dry and considerable difficulty was experienced in maintaining navigation in the Kanawha River. It appears, therefore, that at long intervals there may be seasons in which the stream flow is smaller than that covered by the years 1909–1916 and during which the run off from the area below Radford might be inadequate for navigational purposes.

4. I, therefore, report that there is reason to believe that in the future exceptionally dry seasons may occasionally occur dur-

ing which the proposed project near Radford, if unregulated, might adversely affect the navigable capacity of the Kanawha River.

Very respectfully,

HERBERT DEAKYNE,
Brig. Gen., C. of E.,
Acting Chief of Engineers.

3224 *Government exhibit No. 97*

1925, Dec. 29—Report of General Taylor, C. of E. to Executive Secretary on declaration for project No. 739.

3225

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 29, 1925.

Refer to File No. 7495. (New River Developt. Co.) 18.

The EXECUTIVE SECRETARY,
Federal Power Commission, Washington, D. C.

DEAR SIR: 1. Under date of October 28, 1925, you transmitted to this office a memorandum from the New River Development Company by their attorneys, Messrs. Curtis, Mallet-Prevost, Colt & Mosle, in which request is made that the Chief of Engineers reconsider his report of August 20, 1925, to the Federal Power Commission on the Declaration of Intention of the New River Development Company.

2. In that report the Chief of Engineers stated that "while the navigable capacity of the stream is limited this office must report that no sufficient reason is seen why the Federal Power Commission should not exercise jurisdiction over the proposed project."

3. The declarant now requests reconsideration of those portions of this report relating to:

A. The navigability of New River.

B. The effect of the proposed project upon the navigable capacity of the Kanawha River.

A careful study has been made of all the data presented by the declarant and a further study has been made of all available data and records bearing on the questions at issue which are available in this office, or which could be obtained from other government bureaus. The following report is the result of the additional studies which have been made and the additional information which has been obtained since the date of my previous report:

A. As to the navigability of New River.

What constitutes a navigable water of the United States within the meaning of the commerce clause of the Constitu-
3226 tion and the acts of Congress based thereon, including the Federal Power Act, has been defined in numerous decisions of the Supreme Court and from these decisions the following rule is deduced:

A stream is navigable in law when it is navigable in fact, and it is navigable in fact when, in its natural or improved condition, it affords a channel for useful commerce of a substantial and permanent character, conducted in the customary modes of trade and travel on water. A theoretical or potential navigability, or one that is temporary, precarious and unprofitable, is not sufficient, but to be navigable in fact a watercourse must have practical usefulness to the public as a highway for transportation. A stream navigable in fact, as thus defined, is a navigable water of the United States when it forms by itself, or by uniting with other waters, a continuous highway over which commerce may be conducted between the States.

Having this rule in mind, I am of the opinion that the data and information disclosed in the Department's records and reports do not support the conclusion that New River affords a channel for useful commerce or that it is navigable in fact. That section of the river between its mouth and the town of Hinton, having a fall of about 735 feet in a distance of less than 60 miles, may be dismissed from discussion. This Department has reported that the whole section is unfavorable for navigation and that it could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount.

Surveys have been made in accordance with the direction of Congress of the stretch of river extending from Hinton, W. Va., at the mouth of Greenbrier River, upstream to the mouth of Wilson Creek in Virginia, a distance of about 190 miles. The lower 24 miles only of this stretch is in West Virginia, the remainder being in the State of Virginia and embracing practically all of the stream in that State. Survey of 128 miles, from Greenbrier River to the "Lead Mines," was made in 1872, and of the 62 miles from "Lead Mines" to Wilson Creek, in 1878, the results being printed in the annual reports of the Chief of Engineers,
3227 for 1873, pages 842 et seq., and 1879, pages 538 et seq. These surveys are very detailed, covering the river mile by mile throughout the 190-mile stretch, and the reports thereon afford the only reliable information on record of original conditions. From the survey report of 1872 on the 128-mile section below "Lead Mines," the following is quoted:

"The river in its present condition presents the usual features of mountain streams, reaches of comparatively still and deep water separated by rapids and shoals. In the upper portion for 85 or 40 miles the pools are generally very short, whole miles being composed of ledges of slate or limestone, 200 or 300 feet apart, with small pools between. In the lower portion, though the rapids are more concentrated, yet even then the pools will hardly average more than one mile in length. The total fall from Lead Mines to Greenbrier is 531 feet, or about 4¼ feet per mile."

The survey report of 1879, on the 62-mile section above Lead Mines, contains the following:

"As is usual with mountain streams, this river presents pools of comparatively deep and still water, separated by rapids, shoals and falls. The water flows in the pools at about the rate of 1 mile per hour; over the rapids at the rate of 3 miles per hour, and over the falls at about the rate of 5 miles per hour. The depth usually over the falls is from 9 to 12 inches; frequently however, obstructions are formed below by bowlders, which increased this depth to 2 feet. Throughout this survey the pools are very short, whole miles being composed of ledges of gray and blue granite or slate, a few hundred feet apart, with very short pools between. Only five pools of a mile in length in this portion of the river. The total fall in the river from the mouth of Wilson to the Lead Mines is 507 feet, or about 8½ per mile."

The detailed, mile by mile, data given in the reports fully
justify these concrete statements, and it seems unquestion-
3228 able that the river was not navigable in fact in its original
natural condition.

It is my opinion that these natural conditions were not changed by subsequent improvements, to the extent of making the river a highway for commerce.

It appears from the annual reports of the Chief of Engineers that the work of improvement accomplished up to the time it was finally discontinued is as follows:

1. From Hinton Landing to Wiley's Falls, a distance of 26 miles, a channel 50 feet wide and 2 feet deep was obtained, practically all of which is in West Virginia, less than 2 miles extending into Virginia. The fall in this distance is 104 feet. From Wiley's Shoals to New River Bridge, a distance of about 60 miles, a succession of falls, shoals and rapids, no improvement work was undertaken.

2. Above New River Bridge and between that point and the Lead Mines, 29½ miles of channel was deepened to 2 feet, 12 miles of which was widened to 30 feet, 2½ miles to 20 feet, and 15 miles to 10 feet. On account of the existence of Fosters Falls, the fall being 18 feet in less than half a mile, improvement work was carried no farther on this stretch.

3. Above Lead Mines, on a reach of 62 miles, about 5 miles of channel was improved to a depth of 2 feet and width of 20 feet.

Of the 190 miles of river embraced in the adopted projects, work was carried on only on about 60 miles, and this 60 miles was divided into 3 widely separated stretches with long unnavigable reaches between them. Work was limited to the most easily improved places and effort made to so ameliorate conditions as to permit local navigation. The results were not satisfactory or important and Congress discontinued appropriations after 1886, less than one-third of the funds required for any effective improvement having been provided. In 1899, the Chief of Engineers dropped the work from his annual report, and in the river and harbor act of 1902, Congress repealed all previous 3229 provisions of law providing for the prosecution of work on the river and directed the return to the Treasury of the unexpended balance of funds pertaining thereto. The river was not thereafter considered an authorized project for improvement.

It is evident that the work executed by the Government during the years 1877–1882, did not materially change the natural nonnavigable conditions of the river. The improvement effected was at most slight and fragmentary, and the small channels worked over are reported to have deteriorated due to the natural action of ice and the current. Continuous navigation on the river has never been possible, and whatever commerce has existed has been altogether local apparently confined to the 25-mile section in West Virginia ending at Hinton.

The District and Division Engineers have reported that there is no commerce and that the river is not now navigable in fact, but they assume that it is legally navigable for the reason that money has been expended on it for channel improvement by authority of Congress. It is well settled by judicial decisions that acts of Congress appropriating money for the improvement of a stream are not to be construed as declarations express or implied that the stream is actually navigable. Congress may authorize the improvement of a nonnavigable stream with a view to creating navigability, yet unless the improvement is accomplished the natural state of the stream is not changed. Whether or not it is navigable is still a question of fact unaffected by the consideration that money has been appropriated and expended in an effort to improve it.

I, therefore, conclude that New River is not at the present time a navigable water of the United States within the meaning of the Constitution and laws of Congress including section 3 of the Federal Power Act.

B. As to the effect of the proposed project upon the navigable capacity of the Kanawha River.

The site of the proposed dam is 155 miles above the head of navigation on the Kanawha River. The New River between this site and the Kanawha River is a series of pools of compara-
3230 tively still and deep water separated by rapids and shoals.
There is no known method of computing with any degree of accuracy the effect of fluctuations in flow at the dam on the stage of the river at various distances below the dam. The pools would act as a series of storage reservoirs, the effect of which would be to equalize the flow. I am of the opinion that any periodic fluctuations in flow due to normal operation of the project works would be so attenuated by the time they had reached the Kanawha 155 miles distant as to preclude the probability of any adverse effect upon navigation on that river.

It may be assumed as a possibility that the plant might be closed down completely for an indefinite period of time during a dry season and at a time when the storage above the dam had been drawn down. In the event of such a combination of circumstances all water from the drainage area above the dam would be shut off until the reservoir filled or until operations were resumed.

The drainage area above Dam No. 2, the upper dam in the Kanawha River, is 8,470 square miles. The drainage area above the site of the proposed dam is 2,396 square miles. The drainage area between the proposed dam and Dam No. 2 is therefore 6,074 square miles. Records of the measured flow for the years 1909–1916 are available for streams which drain a total of 3,714 square miles of this intermediate area. From these records the total flow of the drainage area below the proposed dam has been computed for each month of the years for which records are available. It is found from these computations that the run-off from this drainage area below the proposed dam is sufficient to supply the necessary water for navigation on the Kanawha River under the existing project.

Therefore, so far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project.

I, therefore, report that in my opinion New River in its present condition is not a navigable stream and that navigation on 3231 the Kanawha River will not be adversely affected by the proposed power development.

Very respectfully,

H. TAYLOR,
Major General, Chief of Engineers.

3232 *Government exhibit No. 98*

1927, Apr. 12—Report of General Deakyne, C. of E.; 1926 Dec. 22—Report of Major Trippe, Dist. Eng.; 1927, Jan. 13—1st. Endorsement Col. Kutz, Division Engr. In dealing with application for license for project #739.

3233 WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, April 12, 1927

Address Reply to Chief of Enginners, U. S. Army, Washington, D. C.

Refer to File No. 7495 (Appalachian Elec. Pow. Co.)-3.

The EXECUTIVE SECRETARY,
Federal Power Commission, Washington, D. C.

DEAR SIR: 1. The letter of the Acting Chief Engineer in the absence of the Executive Secretary, dated September 9, 1926, referred to this office for investigation and report the application of the Appalachian Electric Power Company, (Proj. #739, Va.) for a license for a power development on the New River near Radford, Va.

2. The investigation has been made by the District Engineer at Huntington, W. Va., and his report dated December 22, 1926, is herewith.

3. The New River is formed by the junction of the north and south Forks near the town of Weaversford in Ashe Co., N. C. It flows first generally northeasterly to near Radford, Va., then makes about a 90 degree turn and flows generally northwesterly to just above Kanawha Falls where it joins the Gauley River forming the Kanawha River. The Kanawha River has been improved for slack water navigation by the Federal Government from its mouth to 7 miles below Kanawha Falls, a distance of about 89 miles. The navigation improvements on the New River have been covered in the various reports from this office on the declaration of intention of the New River Development Company.

4. The applicant proposes to build one dam about 6 miles above Radford, Va., and 155 miles above the head of navigation in the Kanawha River. The dam will create a navigable pool about 19

miles long extending from the dam up to about 2 miles above Clarks Ferry.

5. The principal data regarding the project are as follow:

Location, Near Radford, Va.

Project Area	acres	5,800
Height of dam	feet	110
Draw down	feet	10
Useful storage	acre feet	40,000
Open river flow:		
Minimum	second feet	560
Average	second feet	3,770
Maximum	second feet	138,000
Regulated flow—90% of time	second feet	1,200
Average static head	feet	106
Power capacity	horsepower	10,176
Probable installed capacity	horsepower	80,000

3233–A 6. For the effect of the project on the navigable portion of the Kanawha River see the report from this office, on the declaration of intention of the New River Development Company, 7495 (New River Development Co.)—25, dated July 23, 1926.

7. A public hearing was held at Radford, Va., on October 28, 1926, at which demands were made that the flow of the river be regulated in the interest of navigation and power production as follows:

The Great Kanawha River Improvement Association—to protect navigation in the Kanawha River.

The Virginia Railway Co.—to provide condensing water for the steam plant at the Narrows.

The Electro Metallurgical Co.—to provide ample water for the hydro-electric plant at Kanawha Falls.

The Public Service Commission of West Virginia, in the interests of navigation and power in general.

It is believed that the conditions recommended to be inserted in the license, if issued, will protect all the above protestants and furnish sufficient water to provide for the requirements of navigation in the Kanawha River and for power production on the lower reaches of the New River.

8. The design of the dam has been checked and has been found to be satisfactory so far as the requirements of navigation are concerned. Attention is called to the recommendations of the District Engineer (Par. 18) that the intake of one of the penstocks be lowered so that advantage may be taken of the storage below the proposed 10-foot draw down during periods of low flow. It is believed this point should be given further study.

9. The applicant and subsidiary companies at present operate thirteen plants with an installed capacity of about 298,000 K. W. and an extensive transmission system. The present project will

be operated as a peak load plant and no trouble should be found in utilizing the additional power under these conditions.

3234 10. The applicant is controlled by the American Gas and Electric Company which is believed to possess ample funds to finance the present project.

11. It is recommended that the licensee be required to begin construction within one year and to complete the construction of the project within 4 years from the date of the license.

12. I concur in the recommendation of the District Engineer that a license be granted the applicant provided it is subject to the following conditions, articles 3, 4, 5, 7, 8, 9, 10, 11, 12, 15, 16, 19, 22, 23, 24, 25, 26, 27, 28, 29, 30 of license No. 432 and to the following condition:

The licensee shall at all times discharge a minimum of 8,050 acre-feet per week over or through the dam. Whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 second feet the licensee, when so directed by the Secretary of War, shall discharge in each 24 hours the minimum flow of the river during that period up to a discharge of 1,150 acre-feet. The above discharge shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent interference with navigation on the Kanawha River.

Herbert Deakyne,
Brigadier General,
Acting Chief of Engineers.

12 inclos., viz:
- Sub. 1—Application.
- Serial 10—Report.
- Subs. 1 & 2 of Ser. 10—Notice of public hearing.
- Sub. 3 of Ser. 10—Public hearing.
- Subs. 4 to 9 of Serial 10—Correspondence.
- Sub. 10 of Ser. 10—Statement by applicant.

3235

War Department,
United States Engineer Office,
13th Floor, Coal Exchange Building,
Huntington, West Virginia, December 22, 1926.

Address Reply to U. S. Engineer Office, Huntington, W. Va.
Refer to file no. M669/2.

Subject: Report on Application for License for Proposed Power Development in the New River in Pulaski County, Virginia, by the Appalachian Electric Power Co., Project No. 739, Virginia

To: The Chief of Engineers, U. S. Army, Washington, D. C. (Through the Division Engineer, Central Division, Cincinnati, Ohio).

1. Complying with the request of the Federal Power Commission dated September 9, 1926, there is submitted herewith a report

on the application for license filed by the Appalachian Electr
Power Co. of Richmond, Virginia, for a power development in t
New River in Pulaski County, Virginia (Federal Power Proje
No. 739 Virginia).

RESUMÉ

Project Number: 739 Virginia.

Applicant: Appalachian Electric Power Co. of Virginia.

Stream: New River, tributary to Kanawha River.

Project Works: Dam: Concrete 110 feet high across New Rive
Reservoir: 19 miles long with surface of approximately 4000 acr
Conduits: 4 steel penstocks imbedded in dam. Powerhouse: Bri
and steel containing 4, 15,000 k. w. alternating current generato
Transmission lines: Power to be generated at 13,200 volts, 60 cycl
and conducted into transmission system 500 feet outside of th
project.

Project area: 5,800 acres.

Public lands: None involved.

Storage capacity: 40,000 acre-feet with a 10-foot drawdown.

Stream flow: Minimum 560 second-feet. Average 3,770 secon
feet. Maximum 138,000 second-feet. Regulated minimum 9
second-feet.

Average static head: 106 feet.

3236 Power capacity: 10,176 h. p.

Proposed Installed Capacity: 60,000 k. w. or 80,000 h.

Modification recommended: None.

Special condition: Licensee shall: Furnish detail plans; mai
tain stream gaging station; clear reservoir; pass continuously th
minimum natural flow; be governed by rules of the Secretary
War and the Federal Power Commission.

Important recommendations: License be granted.

2. Watershed

The sources of New River lie in the Appalachian Mountai
among the high ridges that form the divide between the Peed
and Santee Rivers, which drain eastward into the Atlantic Ocea
and the streams which drain westward through the Tennesse
Ohio and Mississippi Rivers into the Gulf of Mexico. It may b
said that the river rises in the central part of Watauga County, i
the extreme northwest corner of North Carolina, at an elevatio
of about 3700 feet. Thence it flows northeasterly into Virginia t
a point a short distance below Radford where it makes almost
90-degree turn and flows northwesterly through a gap in the All
gheny Mountains into West Virginia. It joins the Gauley Rive
a short distance above Kanawha Falls, forming the Kanawh

River. The Kanawha in turn flows northwesterly into the Ohio River at Point Pleasant, West Virginia.

The complete system of the New-Kanawha is 429 miles long and drains 800 square miles in North Carolina, 3,000 square miles in Virginia and 8,400 square miles in West Virginia.

The New River flows down a steep gradient from its source to the vicinity of Ivanhoe, Va. (mile 147 from source). From Ivanhoe to a point about 10 miles below Hinton, W. Va. (point at mile 280), the gradient is flatter. Through this reach the river bed is a series of pools connected by short rapids.

At a point about 10 miles below Hinton the river enters a gorge, the channel being narrow and the gradient steep for about 50 miles. The river abruptly leaves the gorge and merges with the Gauley River to form the Kanawha River a short distance above Kanawha Falls (mile 334). The falls here are about 27 feet high. From Kanawha Falls the gradient averages about 3 feet per mile for 7 miles and then is very flat to the mouth.

The Kanawha is improved for slack water navigation from a point 7 miles below Kanawha Falls to its mouth at Point Pleasant, a distance of 89 miles. This improvement is maintained by two fixed dams (furthest upstream) and eight movable dams. The valley of the Kanawha abounds in a vast amount of natural wealth and the river affords a valuable transportation outlet for these resources.

3237 The elevation of New River at the proposed development is 1,725 feet. The watershed above this point is largely timbered, the river flowing through sparsely-settled, rugged mountain country. Being in the Appalachian region the basin is subject to storms from the Atlantic Ocean as well as from the Gulf of Mexico. Owing to this the valley is not immune to high water or floods in any month of the year.

The following table gives distances, elevations, and slopes for several points along the New-Kanawha River.

	Elevation	Distance	Fall between points	Distance between points	Average fall per mile
	Feet	*Miles*	*Feet*	*Miles*	*Feet*
Sources	3,700	0			
Junction of North and South Forks	2,500	86	1,200	86	14.0
Oldtown, Va	2,220	126	280	40	7.0
Radford, Va	1,720	192	500	66	7.6
Va.-W. Va. State Line	1,490	245	280	53	4.3
Hinton, W. Va	1,365	270	125	25	5.0
Kanawha Falls Head	650	334	715	64	11.2
Kanawha Falls Foot	623	334		0	
Head of Navigation	595	340	28	6	4.7
Mouth	510	429	85	89	1.0

Geology

The great topographic feature of the region is a peneplain of Tertiary age which stands at 2,000 to 2,100 feet elevation. After the upraise the New River and its immediate tributaries cut down some 300 feet through the peneplain. Where the formation was hard the gorge is 500 to 1,000 feet wide. In softer formation the gorge is rounded to a valley several thousand feet wide.

Structurally the region is characterized by folds and thrust faults. In the mountain section, where stiff sandstones are present, the structures are on a large scale. Structures are generally easily determinable since easily recognizable formations are also present. In the limestone valley structures are less easily recognizable. Here structural units vary from hundreds of miles down to miles or even rods, and satisfactory determination of the true relations of the various units is not a simple matter. The forces which produced these structures acted at various times, some of which were separated from others by long erosion periods which cut many thousands of feet into these strata. While it is known that certain movements took place at certain times with reference to other movements the sequence of events is not known in detail and even the periods of geologic time in which these took place are not certainly known.

The dominant structure of the region is a broad thrust fault. This great thrust took place late in a series of thrusts. The greater part of the folding and faulting of the region had taken place before this thrusting occurred. The underlaying material contains folds and faults which are certainly older than the thrust fault.

Some of the folds and faults of the overthrust, and probably
3238 most of them, antedate the overthrust but their date is not
so easily established. It seems quite certain that there was
some folding after the overthrust.

The rocks of the region are well consolidated sediments. The Sandstones are all well cemented but only occasionally quartzitic. The shales are platy but never slates. The dolomites and limestones are generally compact to finely crystalline. There, acutely folded, the dolomite is sometimes much recrystallized. Where mild shattering has taken place there is recementation with the vein material either calcite or dolomite, or there may have been two periods of vein formation with one set of veins, usually the older, of dolomite and another set of calcite.

3. References

The following public documents and reports contain information concerning the water resources of the New River:

Survey from the mouth of the Greenbrier River to Kanawha Falls in the Kanawha River, made in 1819 by Moore and Briggs under the auspices of the Board of Public Works of the State of Virginia. (Erroneously mentioned in previous reports as between Sinking Creek and Greenbrier River.) The survey was made with the view of connecting the waters of the James and Kanawha Rivers by a canal.

"Examination and Survey of New River from the mouth of Greenbrier, West Virginia, to the lead mines in Wythe County, Virginia." (Senate Ex. Doc. No. 25, 2d Congress, 3d Session, Annual Report, Chief of Engineers, 1873, pages 78 and 842.) This report treats of navigation features only.

"Examination of New River, from the lead mines, in Wythe County, to the "Mouth of Wilson," in Grayson County, Virginia." (Annual Report, Chief of Engineers, 1875, part 2, page 133). This report treats of navigation features only.

"Survey of New River, Virginia, from the lead mines, in Wythe County, to the mouth of Wilson Creek in Grayson County." (Senate Ex. Doc. No. 41, 45th Congress, 3d Session, Annual Report, Chief of Engineers, 1879, part 1, page 538.) This report treats of navigation features only.

"Examination of New River at its confluence with the Greenbrier River, West Virginia." (House Doc. No. 176, 58th Congress, 2d Session, Annual Report, Chief of Engineers, 1904, part 3, page 2617.) This report treats of navigation features only.

Report by Captain F. W. Altstaetter, Corps of Engineers, to the Chief of Engineers, Nov. 21, 1908, with remarks on circular No. 143, Forest Service, U. S. Dept. of Agriculture entitled "The Relation of the Southern Appalachian Mountains to Inland Water Navigation." (E. D. 62315/21.) This circular and report defend opposing views of the possibilities of improving navigation on the Kanawha River by a system of storage reservoirs.

"Examination of New River from Radford, Va., to Hinton, W. Va." (House Doc. No. 1410, 62d Congress, 3d Session.) This report treats of navigation features only.)

Report on Water power dams, New River, Nov. 23, 1912, and
4th indorsement thereon, July 15, 1913, by the District
3239 Engineer, Wheeling, W. Va., to the Chief of Engineers
(E. D. 67022/13). These reports describe the water-power developments of the Appalachian Power Co. constructed without authority from Congress and proposed to be constructed in the New River.

"Dams or Reservoirs, Cheat and New Rivers, Va. and W. Va." (Senate Doc. No. 15, 63d Congress, 1st Session.) This document contains papers, correspondence, permits, etc., pertaining to the construction of dams or reservoirs by private parties in New River.

Preliminary examination of Cheat, Tygarts, West Fork, and Kanawha Rivers, Pa. and W. Va. (House Doc. No. 1792, 64th Congress, 2d Session, page 17.) This report describes possible means of flood prevention in the New-Kanawha valley.

Report of Nitrate Plant Investigation, Feb. 15, 1917, and 2d indorsement thereon Feb. 17, 1917, by the District Engineer, Wheeling, W. Va., to the Chief of Engineers. (E. D. 99516 and E. D. 99516/537.) Also contains briefs submitted by A. D. Preston and the Virginian Power Co. These reports describe the possible waterpower developments in New River with relation to the construction of nitrate plants.

Report on application of Chas. B. Hawley for preliminary permit for proposed power development on the New River at Sandstone Falls near Hinton, W. Va., 2d indorsement, Sept. 14, 1921, by the District Engineer, Wheeling, W. Va., to the Chief of Engineers. (E. D. 131895.)

Report on application of the Virginian Power Co. for preliminary permit for proposed power development on New River, Bluestone River, and Indian Creek, near Hinton, W. Va., Proj. No. 379, 2d indorsement, June 13, 1923, by the District Engineer, Huntington, W. Va., to the Chief of Engineers. (E. D. 136057.)

Report on application of the Central Power Co. for preliminary permit for proposed diversion of New River waters and development of power on the New and Reddies Rivers in North Carolina, Proj. No. 542, 2d indorsement, June 13, 1925, by the District Engineer, Huntington, W. Va., to the Chief of Engineers. (E. D. 7495, Cen. Power Co.)

Report on application of the Eastern States Development Co. for preliminary permit for proposed diversion of New River waters and development of power on the New River in Va., and the Fisher River in N. C., Proj. No. 575, 2d indorsement, June 13, 1925, by the District Engineer, Huntington, W. Va., to the Chief of Engineers. (E. D. 7495, Est. Stat. Dev. Co.)

Report on declaration of intention of the New River Development Co. for proposed power development in the New River near Radford, Va., 2d indorsement, July 23, 1925, by the District Engineer, Huntington, W. Va., to the Chief of Engineers. (E. D. 7495, New Riv. Dev. Co.) This project is the subject of this report on application for license.

Statement of the "Effect on navigation of proposed New River Development Co. project on New River near Radford, Va.," made by the District Engineer, Huntington, W. Va., to the Chief Engineer, Federal Power Commission, Oct. 15, 1925. This project is the subject of this report on application for license.

"Report on the waves caused in the New River by the intermittent operation of the Appalachian Electric Power Co.'s hydropower plant near Ivanhoe, Va.," by the District Engineer, Huntington, W. Va., to the Chief of Engineers under 1st indorsement, June 9, 1926. (E. D. 7495, New Riv. Dev. Co. 33.)

3240 U. S. Geological Survey Water Supply Papers as follows:

No. 536, contains summary with all discharge records in the New-Kanawha drainage basin, 1898 to 1918.

No. 503, Part III, contains discharge data on New River for 1919 and 1920.

No. 523, Part III, contains discharge data on New River for 1921.

No. 543, Part III, contains discharge data on New River for 1922.

4. Development in New River

The Federal Government has done work in New River for the improvement of navigation. This consisted of building channel chutes or sluiceways across the bars. These chutes were about 50 feet wide and 2 feet deep at extreme low water and were improved by cutting out rock, where necessary, and piling up stones along the sides of the chutes in order to direct the water through them. This work extended from Hinton upstream a distance of about 25 miles. About $100,000 was expended on the work previous to 1883, and $10,000 since that time. These chutes have deteriorated from the natural action of the current and ice.

Work done by private parties in the development of the watershed has been the construction of the following water-power plants:

Location	Owner	Date operation commenced	Head (feet)	Type of dam	Horsepower	
					Max.	Aver.
Fries, Va	Washington Mills	1901	40	Fixed	2,800	1,300
Byllesby, Va	Appalachian Power Co. No. 2 Dev.	1912	52	Fixed with movable crest.	24,000	[1] 4,840
Buck, Va	Do. No. 4 Dev	1912	41	Do	12,000	[1] 3,380
Kanawha Falls, W. Va.	Electro Metallurgical Co.	1899	28	Fixed	6,000	5,090

[1] For years 1922 to 1924.

At Fries, Va., the operation of the plant is on a ten-hour basis, but by means of hourly storage the entire low-water discharge is used.

The plants of the Appalachian Power Co. are installed for a capacity of 4,800 second-feet, which is maintained about 5.5 percent of the time. They have hourly storage and are used as daily peak load carriers during most of the time.

The Kanawha Falls plant is used in a metallurgical process which requires a continuous 24-hour load. A permit was issued February 27, 1899, by the Secretary of War for the dam on the crest of the falls.

3241 The plant at Fries was authorized by Act of Congress approved June 4, 1900 (34 Stats., L, 264). However, the dam is probably an illegal structure since the plans were not presented to or approved by the War Department in accordance with Sect. 8 of the Act of March 3, 1899. (See par. 3, page 30, Sen. Doc. No. 15, 63d Congress, 1st Session.)

5. Rainfall and run-off data

The average annual precipitation in the basin above the proposed project is between 40 and 50 inches with an average run-off of 20 inches.

The U. S. Geological Survey have maintained a number of stream gaging stations in the basin of the New-Kanawha River. From the following pertinent stations the discharge and run-off have been computed for the proposed project:

Station	Drainage, area (sq. mi.)	Maintained
Copper Valley on Little River, 13 miles above mouth.	195	Aug. 1908 to Sept. 1915.
Radford on New River, 6 miles below project	2720	Aug. 1898 to Jul. 1906. May 1907 to Sept. 1915.
Eggleston on New River, 30 miles below project	2920	Oct. 1914 to date.
Kanawha Falls on Kanawha River, 149 miles below project.	8300	Apr. 1877 to date.

The drainage area at the proposed dam site is 2,400 square miles. Of the 320 square miles of drainage area between the dam site and the Radford gage, 195 square miles of this are above the Copper Valley gage on Little River. On the assumption that the run-off per square mile for the whole of the 320 square mile area was the same as the run-off per square mile for the area above Copper Valley, the run-off at the dam site was computed by subtracting from the Radford run-off the inflow between the dam site and Radford. With this, and the assumption that between August 1906 and April 1907 the relation between the Radford and

Kanawha Falls run-off was the same as the average relation for the periods five years before and five years after, the run-off was computed for the water years 1899 to 1915. On the assumption that the run-off per square mile above Radford was the same as that above Eggleston and the above relation between the 3242 dam site and Radford, the run-off was computed for the water years 1916 to 1926. Thus a complete record of monthly mean flow from 1898 to 1926 was determined.

Water Supply Paper No. 536 states on page 24 that the minimum flow at Radford is probably between 500 and 700 second-feet. The flood of September 15, 1878, reached a stage of about 37.4 on the U. S. G. S. gage. The highest stage recorded was 30.2 feet on May 22, 1901, discharge roughly 138,000 second-feet.

The applicant has submitted duration curves as Exhibit I-A. These have been computed on the assumption that the flow at their dam site was 84 percent of that at Eggleston, which is regarded as sufficiently accurate for the purposes of the studies. The average value used in the estimate of the monthly mean flow was 82.22 percent.

Using the duration curve the discharge available 90 percent of the time is 1,200 second-feet which is regarded as the available water supply.

6. Storage reservoirs

Several storage reservoir sites are available in the New River (a) to (i) of table in Section 7. The seven sites of the Central Power Co. were proposed in connection with their application for preliminary permit to divert water from the New River through the Appalachian divide into the Yadkin River drainage on the Atlantic slope. The Oldtown reservoir site was proposed by the Eastern States Development Co. in application for preliminary permit for a similar diversion project. The Federal Power Commission has refused these permits and it is not known if they intend to use them for regulation of flow in New River or that such is feasible.

It is not known whether the Appalachian Electric Power Co. intends to develop their proposed site or not.

The climatic conditions in the headwaters of New River are such that it is very difficult, if not impossible, to predict flow conditions with any reliable degree of accuracy. The following table and Exhibit A show this very forcefully. This table and diagram were made from the computed 28-year record of monthly mean flow mentioned in Section 5, page 9.

TABLE SHOWING IRREGULAR OCCURRENCE OF LOW AND HIGH WATER FLOW IN NEW RIVER

Each month was among the three lowest, two lowest, or was the lowest month during the year the number of times shown; likewise the highest the number of times shown.

	Among 3 lowest months	Among 2 lowest months	Lowest month	Among 3 highest months	Among 2 highest months	Highest month
	Times	*Times*	*Times*	*Times*	*Times*	*Times*
Jan	2	1	1	11	11	6
Feb				14	10	6
Mar				18	13	8
Apr				13	7	2
3243 May	3	2		9	6	1
June	[illegible]			6	2	1
July	6	4	2	3	2	2
Aug	15	11	5	3	1	1
Sept	15	11	5			
Oct	14	9	8	2	1	0
Nov	19	14	5			
Dec	5	4	2	5	3	1

The above table shows that the prediction of low or high water is never greater than 68 percent and that in occasional years high water will come when low water is generally expected. Likewise, low water will come when high water is generally expected. The fact that the chances are about the same that December may be a low or high water month shows that the low water season may be of long duration. The duration curves of monthly flow (Exhibit A) show that the prediction of the amount of flow is also uncertain. While the curves for August, September, October, and November are fairly close together and regular the curves for the other months, and particularly the months that would be used for filling a reservoir, are very irregular and cover a wide range in flow for a good percentage of time.

The reservoir sites in the upper part of the river are in reaches where steep gradients control. From this and the above facts it might be found that unreasonably large and expensive reservoirs might be necessary for a small or even fair amount of regulation.

The proposed reservoir of the project applied for has heretofore been regarded as a storage possibility. The applicant proposes using only 40,000 acre-feet of the total reservoir contents as storage water. This is a small amount and is likely to be most used in leveling or increasing the hourly and daily fluctuations during any month. Its principal use will probably be in increasing the monthly and seasonal flow in extremely low water periods. The use of storage from this site decreases the head very fast and consequently the amount of power from a given amount of flow decreases as the demand for power increases.

The Oldtown reservoir site of the Eastern States Development Co. will develop 329,900 acre-feet of storage and a uniform draft of 1775 second-feet.

No topographical surveys have been made of the other sites and definite quantities cannot be given.

7. Power sites

New River with its high run-off and steep gradient possesses a great wealth of water power. The development of this power is retarded on account of the proximity to the Appalachian coal fields and almost prohibited in some reaches because of railroads on the river bank. Due to these it is only under the most favorable conditions that a waterpower development is feasible.

3244 No complete survey has been made to determine all the favorable locations of power sites. Those sites known from available data are as follows:

Table of Dam Sites on New River

Site	Distance from sources	Approx. head	Drainage area	Remarks
	Mi.	*Ft.*	*Sq. mi.*	
(a) Central Power Co. No. 3, Plan G-1, So. Fk., New Riv.	66.5	120	900	
(b) Cen. Pow. Co., No. 3, Plan G-2, So. Fk., New Riv.	86	220	325	
(c) Cen. Pr. Co., No. 6, Plan G-2, No. Fk., New Riv.	86	220	279	
(d) Cen. Pr. Co., No. 4, Plan G-1	97	160	620	
(e) Cen. Pr. Co., No. 4, Plan G-2	107	270	808	Lies in pool of (i).
(f) Cen. Pr. Co., No. 5, Plan G-1	111	100	825	Do.
(g) Cen. Pr. Co., No. 5, Plan G-2	119	80	1,010	Do.
(h) App. Pr. Co., Site "A"	124.5	50	900	Do.
(i) Oldtown Res	129	180	1,140	
(j) Washington Mills	135.5	40	1,150	Existing and in operation.
(k) App. Pr. Co. No. 1	140	60	1,200	
(l) App. Pr. Co. No. 2	143	52	1,310	Existing and in operation.
(m) Do. No. 3	144.5	21	1,310	
(n) Do. No. 4	145.5	40	1,310	
(o) Ivanhoe Furnace	149	20	1,500	
(p) Foster Falls	158	40	1,600	
(q) App. Pr. Co. No. 5	183.5	50	2,400	Lies in pool of (r).
(r) Do. No. 6	186	110	2,400	
(s) Ingles Falls	188.5	----------	----------	Conflicts with (r).
(t) App. Pr. Co., No. 8	250.5	75	3,930	Lies in pool of (v).
(u) Do. No. 9	263.5	42	----------	Do.
(v) Bluestone Res	265.5	140	4,400	Proj. No. 379, Prelim. Permit expired Oct. 25, 1926.
(w) Brook Falls	276	22	6,140	
(x) Sandstone Falls	281	30	----------	Proj. No. [illegible]23, Prelim. Permit expired Nov. 5, 1924.
(y) Slater	302	50	----------	
(z) Nuttalburg	315	50	----------	
(z1) Michigan	318	50	----------	
(z2) Hawks Nest	322	98	6,800	
(z3) Gauley Junction	330	28	----------	

The Central Power Co., Project No. 542 N. C., applied for preliminary permit to construct power and diversion dams, diverting the water through the divide into the Reddies River on the Atlantic slope. The permit was refused by the Federal Power Commission September 15, 1926.

3245 The Eastern States Development Co., Project No. 575, Va., N. C., applied for preliminary permit to construct a dam at the Oldtown site and divert water through the divide into the Fisher River on the Atlantic slope. The permit was refused by the Federal Power Commission September 15, 1926.

The Virginian Power Co. originally made preliminary locations of seven proposed developments (u to z). These sites were located after a general reconnaissance of the river but the surveys were not carried to the point of determining the most feasible locations. This company has now been absorbed by the Appalachian Electric Power Co.

8. Power capacity

From the duration curve submitted by the applicant, a discharge of 1,200 second-feet is available 90 percent of the time. With this and an average static head of 106 feet the power capacity of the project equals $0.08 \times 106. \times 1200. = 10{,}176$ h. p.

The development will probably be operated as a peak-load carrier in order to operate steam plants at a higher load factor. Under this condition the annual load factor of this plant may be as low as 35 or 40 percent while the annual load factor of the connected system is about 50 percent.

It is estimated that an average of 94.4 percent of the head available at full plant capacity will be utilized per annum. With this head the full plant capacity of 60,000 k. w. will require a discharge of

$$Q = \frac{60{,}000}{.678 \times 100} = 8{,}850 \text{ second-feet at } 80\% \text{ efficiency.}$$

The duration curve shows that this discharge is available 3.8 percent of the time. Thus 96.2 percent of the total flow can be used. The utilization factor is then equal to the product of head and flow used.

$$0.944 \times 0.962 = 0.908 \text{ or } 90.8\% = \text{utilization factor.}$$

9. Power market

The Appalachian Power Co., the basic company from which the Appalachian Electric Power Co. was formed on March 4, 1926, has supplied southwestern Virginia and southern West Virginia with power since 1912. With a total output of 40 million kilowatt-hours in 1913, the company has had a growth averaging 20 million kilowatt-hours a year to 1925 and 27 million kilowatt-hours since 1920. The interconnected system of the Appalachian Electric Power Co. serves 266 communities with electric light and power in rapidly-growing and prosperous industrial, agricultural and coal-mining regions of Virginia, West Virginia and eastern Kentucky. The total population served is estimated to exceed 658,000.

It is believed that the territory served by the applicant through its interconnected system offers a good market for the power which will be developed at the proposed site.

The low production cost in this region of power from steam-electric plants prohibits the development of hydroelectric power at
anything except plants whose economic feasibility cannot be
3246 questioned. It is probable that a company with such a
large percentage of its capacity installed in steam generation would find it feasible to install hydroelectric capacity at a higher unit cost per kilowatt in order to operate its steam stations at a higher load factor, the hydroelectric plant being used as a peak-load carrier.

The applicant's financial ability is believed sufficiently strong to carry out the proposed development. A financial statement is given on page 16 of the application. The Appalachian Electric Power Co. is controlled by the American Gas and Electric Co. which is regarded as a sound corporation.

10. Accuracy of data

The data submitted with the application agrees with the facts found in the locality.

11. Additional data

The data submitted are sufficient for the consideration of the application. It is believed that the applicant should be required to furnish detail plans when they are completed

12. Time for completing project

The applicant has asked for one year from date of license to begin construction and four years from date of license to complete construction of the project works. This is believed to be a reasonable time and is recommended to be in the terms of a license.

13. Navigable stream

This office in its report on declaration of intention, July 23, 1925, for this project, stated in par. 6:

"It is the opinion of this office that the New River is a navigable stream as defined by the Federal Power Act and that the proposed water-power project of the New River Development Company should be considered as coming under the jurisdiction of the Federal Power Commission."

The Division Engineer under 1st indorsement, July 25, 1925, stated,

"The Division Engineer concurs in the opinion of the District Engineer that the reach of New River under consideration comes under the jurisdiction of the Federal Waterpower Commission. This opinion is based primarily upon the fact that this reach of river was recommended to Congress for improvement after investigation under its authority, though not actually improved."

The Chief of Engineers subsequently in letter to the Executive Secretary, Federal Power Commission, August 20, 1925, stated,

"The fact that navigation does not exist at present is not understood to change the legal status of the stream. Congress has in the past signified its intention to assert jurisdiction of the New River by appropriating money for its improvement with a view to making the stream navigable, and it is not seen that the fact that the reversion to the Treasury of unexpended funds was later ordered alters its status."

3247 The Chief of Engineers later in letter to the Executive Secretary December 29, 1925, stated,

"I, therefore, conclude that New River is not at the present time a navigable water of the United States within the meaning of the Constitution and laws of Congress including Section 3 of the Federal Power Act."

Effect of navigation

The proposed project might effect the navigable capacity of the Kanawha River in the following cases:

"The flow through the applicant's dam may be stopped or reduced while allowing the reservoir to fill at a time that the inflow from the basin below the dam was insufficient to maintain the pools at the various navigation dams.

"If the waves caused from the intermittent operation of the power plant continue downstream in large-enough size and duration they might cause,

'the raising and lowering of the Kanawha movable dams with each wave,

'extremely hazardous navigation through the chutes of the Kanawha due to the unnatural change in the river stage.'"

An incomplete study of the persistence of waves caused by the operation of the power plant at Ivanhoe, Va. (40 miles above the proposed site) indicates that these waves persist for long distances downstream. It is probable that the larger waves from the proposed plant will have an adverse effect on navigation in the Kanawha River unless regulated at critical times.

14. Protection of navigation

The following requirements are regarded as necessary for the protection of navigation and it is recommended that they become a part of the license:

That the licensee shall pass continuously through its dam during and after construction a flow not less than the minimum natural flow as determined from a gaging station to be established by them in New River above and sufficiently close to the reservoir created by the project works.

That the operations of the licensee, so far as they effect the use, storage and discharge from storage of the waters of New River, shall at all times be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation and as the Federal Power Commission may prescribe in the interests of flood control, damage to other interests and for the fullest practicable utilization of the waters of the said river for power purposes.

15. Public lands

The project does not contemplate the use of public lands or other Government property.

3248

16. Government reservation

The project is not on a Government reservation.

17. Government dam

The project does not contemplate the use of a Government dam.

18. Utilization of resources

The plan submitted is believed to be the best adapted to develop, conserve, and utilize in the public interest the navigation and water resources of the region.

A dam site exists at Ingles Falls 2½ miles below the proposed location. The use of this site would give the advantage of more head and an increase in discharge due to the addition of 285 square miles of drainage area from the Little River. This is manifestly infeasible since the pool created would submerge the towns of

Graysonton and Snowville and the Radford municipal power plant on Little River and destroy a valuable limestone quarry and crusher plant on New River immediately above the mouth of Little River. A value of $700,000 has been placed on this property.

The Appalachian Electric Power Co. has several power sites along New River and since they have acquired the properties of the Virginian Power Co., permittees for Project No. 379, Va., W. Va., (v) in Section 7 of this report, they will in all probability be the most extensive developers of the power resources of New River. In view of these facts the company is more interested in the best plan of development of the power resources of New River than would otherwise seem.

The applicant proposes a drawdown in their reservoir of 10 feet. This provides a storage of 40,000 acre-feet which is a small part of the contents of the reservoir. The maintenance of a head as high as possible is necessary for a high utilization of the resources. However, the wisdom in placing the intake of the lowest power penstock 10 feet below the normal pool surface is doubtful. It is therefore recommended that the applicant be required to place at least one of the power penstock intakes sufficiently low so that the reservoir may be drawn down considerably more in the event of a very long and extended drought, when it would be desirable to use more than the water stored in the top 10 feet of the pool.

19. Safety of structures

Analysis of the designs submitted as Exhibit "L" in the application shows adequate provision for safety in design for the dam and spillway. With the flashboards removed the spillway and flood gate section will pass a flood of 62.5 second-feet per square mile of drainage area with the pool 2 feet above normal. The estimated maximum discharge for the 1916 flood was 42 second-feet per square mile and the 1,878 flood (the highest of record), 60 second-feet per square mile. It is therefore concluded that adequate spillway capacity has been provided in the designs submitted.

The applicant has made extensive exploration of the foundation at the dam site. The District Engineer in company with consulting engineers, inspected the site during these explorations. The strata show clear evidence of the cementation by the intrusion of calcite. (See Section 2.)

3249 Consideration of the geology of the region and examination of the foundation show no inherent reason that the foundation will be unsafe for a dam such as proposed.

The firm Viele, Blackwell and Buck is acting as engineer for the project, and Colonel F. W. Scheidenhelm of Mead and Scheidenhelm is being retained as consulting engineer. These firms have a national reputation and their approval of the foundation and structure is regarded as good evidence of the safety of the project works.

20. Development by the United States

The development should not be undertaken by the United States.

21. Rental of Government dam

None. See Sections 16 and 17.

22. Headwater benefits

There is at present no storage project in New River above the proposed project. The licensee may at some future date benefit from the construction of a storage reservoir. The applicant proposes to install hydraulic and electrical machinery that will enable them to utilize upwards of 96 percent of the flow of New River at their plant. In the event that such a reservoir was constructed by other parties the principal benefits to the applicant would be those of a higher utilization of the annual flow and the utilization in the low water season of a larger percentage of the annual flow than could be made without such storage. The latter benefit would be difficult of determination owing to the fact that the Appalachian Electric Power Co. have a relatively high percentage of steam capacity and would likely figure a kilowatt-hour developed from storage water during low water season of no greater value than a kilowatt-hour developed from the natural flow of the river in high-water season.

The proposed project provides a storage of 40,000 acre-feet which is the equivalent of 667 second-feet flowing for one month. The very irregular occurrence of the low-water season with its irregular amount of flow precludes any appreciable benefit from this amount of storage other than in a season of extremely low flow of considerable duration.

The plant of the Electro-Metallurgical Co. at Kanawha Falls (about 150 miles downstream), might be benefited by the release of storage from the applicant's pool. On the other hand, it might be damaged by the applicant's holding back water from the natural run of the stream. The Kanawha Falls plant is a legal structure but does not hold a Federal Power license. Under such condition it is doubtful if they could be charged for benefits received from the applicant's project. This company has protested the granting of license to the applicant unless the applicant's plant be operated so as not to damage them. It is believed that the recommended provisions of the license will minimize the possibility of such damage. In any case the Electro-Metallurgical Co. has redress in the civil courts for any damage suffered.

23. Desirability of project

The project is desirable and justifiable in the public interest for the purpose of improving the New-Kanawha River for the benefit of interstate commerce, to the extent that any increase of low-water flow will favorably affect navigation. The project is also justifiable to the extent that in creating a pool 19 miles long
3250 it renders this reach susceptible of navigation.

24. Protests

Protests to the granting of a license have been received from the following:

1. Public Service Commission of West Virginia (inclosure No. 7 with letter of transmittal).
2. Norfolk and Western Railway Co. (pages 7 to 9 in minutes of public hearing).
3. Virginian Railway Co. (pages 9 to 11 minutes of public hearing).
4. Electro-Metallurgical Co. (pages 12 to 14 in minutes of public hearing).
5. Oren F. Dodds (inclosure No. 11 with letter of transmittal).
6. Kanawha River Improvement Association (inclosure No. 12 with letter of transmittal).

All of the protestants request protection from damage by the operation of the applicant's project works. The rights of the protestants in this respect are governed and protected under State and Federal laws. It is believed that the recommended provisions of the license will minimize the possibility of damage from the operation of the project works.

The protest of the Kanawha River Improvement Association is on the grounds of protection to navigation. It is believed that the provisions that the licensee pass continuously the minimum natural flow and that the operations of the licensee shall be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation, protect all navigation interests.

25. Recommendation

It is recommended that the license be granted.

26. Special conditions

It is recommended that the following provisions be inserted in the license.

1. The licensee shall furnish detail plans of all structures when such plans are completed for approval by the Federal Power Commission.

2. The licensee shall establish and maintain a stream gaging station with automatic recording gage in New River above the reservoir created by the project works.

3. The licensee shall clear the reservoir area of all trees and brush between elevations 1830 and 1841 to the satisfaction of the Secretary of War and the Federal Power Commission.

3251 4. The licensee shall pass continuously through its dam during and after construction a flow not less than the minimum natural flow as determined from a gaging station to be established by them in New River above and sufficiently close to the reservoir created by project works.

5. The operations of the licensee so far as they effect the use, storage and discharge from storage of the waters of New River, shall at all times be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation and as the Federal Power Commission may prescribe in the interests of flood control, damage to other interests and for the fullest practicable utilization of the waters of the said river for power purposes.

(Sgn) H. M. Trippe.
H. M. Trippe,
Major, Corps of Engineers,
District Engineer.

Attached hereto are the following:
Exhibit "A."
Summary of contents.
Index.

3253

Summary of Contents

Section	Page No.
1. Resume	1
2. Watershed	2
3. References	5
4. Development in New River	8
5. Rainfall and run-off data	9
6. Storage reservoirs	10
7. Power sites	12

Section — Page No.
8. Power capacity — 13
9. Power market — 14
10. Accuracy of data — 15
11. Additional data — 15
12. Time for completing project — 15
13. Navigable stream — 15
14. Protection of navigation — 16
15. Public lands — 17
16. Government reservation — 17
17. Government dam — 17
18. Utilization of resources — 17
19. Safety of structures — 18
20. Development by the United States — 18
21. Rental of Government Dam — 18
22. Headwater Benefits — 18
23. Desirability of Project — 19
24. Protests — 19
25. Recommendation — 20
26. Special Conditions — 20
Exhibit A — 22
Summary of contents — 23
Index — 24–25

3254

Index

Page No.
Accuracy of data — 15
Benefits, headwater — 18
Clearing reservoir — 20
Completion of project — 15
Conditions of license — 2, 20–21
Consulting engineers — 18
Damages to power plants — 19
Dam site explorations — 18
Data, accuracy of — 15
Description of watershed — 2, 5
Desirability of project — 19
Detail plans — 20
Development of New River — 8, 9
Drainage areas — 8, 9
Duration curves:
  Daily basis, computed from Eggleston — 10
  Monthly — 11, 22
Engineers — 18
Examination and Survey Reports on New-Kanawha River — 5–6
Explorations of dam site — 18
Financial ability of applicant — 14
Floods — 10, 18
Gaging Station — 9, 20
Geology — 4–5
Government:
  Dam — 17
  Reservation — 17
  Work done in New River — 8
Headwater benefits — 18
Ingles Falls power site — 17
Low water flow — 10, 16, 21
Minimum flow — 10, 16, 20
Monthly mean flow — 10
  Duration curves of — 22
Navigable stream — 15, 16

Page No.
Navigation
  Effect on 16
  Protection of 16–17
New-Kanawha River:
  Drainage area 3
  Length 3
Penstock intake 17
Plans, detail 15, 20
Power: Capacity 13–14
Power:
  Market 14
  Output 14
  Sites 12–13, 17
  System 14
Power plant damages 19
Project desirability 19
Protests 19–20
Public:
  Documents 5–7
  Lands 17
3255 Rainfall 9
  Recommendation 2, 20
Recommended provisions of license 20–21
References 5–7
Reports on New-Kanawha River 5–7
Reservoirs 10–12
Reservoir area, clearing of 20
Resume 1–2
Rules of Secretary of War and Fed. Pow. Com 16–17–21
Run-off 9–10
Safety of structures 18
Storage:
  Benefits 18
  Reservoirs 10–12
Stream gaging stations 9, 20
Structures, safety of 18
Survey reports of New-Kanawha River 5–6
Tables of:
  Dam sites 12–13
  Distances, elevations and slopes along New-Kanawha River 4
  Irregular occurrence of low and high water 11
  Stream gaging stations, drainage areas and dates maintained 9
  Water-power plants constructed in New-Kanawha Riv 8
Utilization:
  Factor 14
  Resources, of 17
Water-power plants 8
Watershed 2–5
Water supply 10
  Papers 7
Waves 16
  Report on 7

3256 (Views of the Division Engineer on report of District Engineer, Huntington, W. Va. dated Dec. 22, 1926, on Application for License for Proposed Power Development in the New River in Pulaski County, Virginia, by the Appalachian Electric Power Co., Project No. 739, Virginia.)

1st Ind. CWK/a.

Office Div. Engr., Cent. Div., Jan. 13, 1927,

To the Chief of Engineers:

1. This report has been carefully examined in this office and the Division Engineer concurs in the conclusions and recommendations of the District Engineer.

(Sgn) C. W. Kutz.
C. W. Kutz,
Col., Corps of Engineers,
Division Engineer.

Incls.
Exhibit A;
Summary;
Index.

3257 *Government exhibit No. 99*

LIST OF AFFIDAVITS SUBMITTED BY NEW RIVER DEVELOPMENT CO. TO FEDERAL POWER COMMISSION FOR CONSIDERATION UPON ITS DECLARATION OF INTENTION

Affiant	Status	Summary of Affidavit
K. E. Harman	President, Pulaski National Bank; Chairman, Board of Supervisors of Pulaski County.	"Port Barrel" nature of appropriations; unsuccessful attempts at navigation abandoned before construction of railroads; two-thirds of course of river consists of riffles, falls and rapids; no navigation.
E. W. Calfee	Mayor, Town of Pulaski, Va.	Uusuccessful attempts at navigation; channel made by Government now filled up, of no value to navigation.
Dr. J. W. Holmes	Farmer, Pulaski County, Va.	Intimately familiar with conditions on river; for two-thirds of distance through Wythe and Pulaski Counties consisting of swift shoal water; personal recollection of improvements by Federal Government, unsuccessful attempt at navigation; no remaining evidence of improvements except notches cut through ledges.
J. F. Wysor	Treasurer, Pulaski County	Attempt at navigation after Federal improvements abandoned because of impracticability.
E. T. Pratt	Manager, Rex Milling Co., Draper, Va.	Attempt at navigation abandoned; improvement of no benefit.
W. C. Jennings	Farmer, Pulaski Co.	Attempt at navigation unsuccessful; channel deteriorated; river impracticable for navigation.
3258 J. R. Linkous	Farmer operating ferry on New River, Pulaski Co., Va.	Navigation by gasoline launch from Radford to Linkous Ferry abandoned as impracticable, river not navigable; no need for navigation; navigation in interstate commerce impossible.
J. L. Ingles	Farmer, Montgomery Co., Va.	Reviews conditions on river disclosed by canoe trips from Foster's Falls, Wythe County, to Hinton, W. Va., showing navigation entirely impracticable.
William Ingles	Cashier, 1st National Bank, Radford, Va.	Same experience on New River.
J. G. Osborne	Former Superintendent Pulaski Division, Norfolk & Western Railway; Director People's Bank of Radford.	No freight hauled over river except small tonnage of lead and iron attempted to be transported to New River Depot soon after improvements; further attempts abandoned.
W. H. Painter	Council Member, City of Radford.	No navigation.

Government exhibit No. 99—Continued

Affiant	Status	Summary of Affidavit
William Adair	Resident, Narrows, Giles Co., Va.	In 81 years has seen no interstate commerce by New River between Virginia and West Virginia; navigation on river not practicable, nor beneficial since mountainous country precludes bringing products to river.
John A. Adair	Resident, Lurich, Giles Co., Va.	In 74 years saw no freight transported between Virginia and West Virginia by river; impracticable because of swiftness of river; no expenditure of Federal funds in Giles County, Va.
J. L. Boggess	Merchant, Narrows, Giles Co., Va.	Series of falls makes navigation impossible.
W. W. Walker	Treasurer, Giles County, Va.	Rapids and great fall of river preclude use for navigation.
J. H. Wyse	Engineer Superintendent of Roads, Giles Co., Va.	Falls preclude navigation.
3259 W. P. Bowling	Merchant, Tophet, Summers Co., West Virginia; Deputy Sheriff of County.	Reviews unsuccessful attempt at navigation from Hinton upstream; navigation even by batteaux now impracticable.
R. C. Haynes	Mayor, City of Avis, Summers County, W. Va.	Channel attempted to be made zigzags across river between heavy ledges; not successful, now filled up and of no benefit; timber now removed from section and no necessity for navigation; navigation below Hinton entirely impossible.
J. G. Fredeking	Manager various industries at Hinton, W. Va.	Owing to interest in navigation on Kanawha, is familiar with flowage conditions; any operation of hydroelectric plant in Pulaski County could not possible affect navigability of Kanawha.
Joseph M. Meador	Former County Clerk; now in business.	Falls prevent navigation.
C. A. Templeton	President, Chamber of Commerce of Hinton, W. Va.	No local navigation above Hinton on account of shoals, rapids and falls; no evidence remaining of Government improvement except few notches or sluices in Falls; improvement of river for navigation would not create any freight due to mountainous character of adjacent country.

3260 STATE OF VIRGINIA,
County of Pulaski, to wit:

I, K. E. Harman, being duly sworn says as follows: I am sixty-two years of age, and was born and raised in Pulaski County, Virginia. I have resided for the past twenty (20) years in the Town of Pulaski. I am President of the Pulaski National Bank, and Chairman of the Board of Supervisors of Pulaski County, Virginia, and have been Chairman of the Board of Supervisors for the past fourteen (14) years;

I further state that my duties as Chairman of the Board of Supervisors and my private business as a farmer and stock man have frequently taken me along the course of New River in the County of Pulaski, Virginia, and that I intimately know New River where the same flows through the Counties of Wythe, Pulaski, and Giles in the State of Virginia; and that New River through said Counties has a great deal of fall, and that at least two-thirds of its course is riffles, falls, and rapids, and that I personally know that there is no local navigation of the River in these Counties and that during my recollection covering a period of forty-five (45) years, that there has been no commerce or navigation on New River between Virginia and West Virginia; that I personally remember the Government expending money on the River between the years 1873 and 1884 or 1885, and that soon after the completion of this Government work a small quantity of lead was boated from Austinville, or the Lead Mines in Wythe County to New River Depot in Pulaski County; and that a small tonnage of charcoal iron was hauled from the mouth of Max Creek in Pulaski County, to New River Depot, in keel bottom boats, but the Cripple Creek or North Carolina branch of the Norfolk & Western Railroad was built in 1884, and that even before the building of this road the hauling of iron 3261 and lead on the River was abandoned on account of it being practically impossible to pole the keel bottom boats back up the River; and that since then there has been no local navigation of the River whatever.

I further state that General W. T. Terry, who then represented this District in Congress, joked about securing this appropriation for the River and too heard him admit that there was no necessity for it, but that other sections were getting appropriations and he thought he would get this appropriation for his people, too.

I further state that the development of New River as a navigable stream, even if it was possible so to do, would not develop any new freight in this section, and the territory traversed by New River has adequate freight facilities over the Norfolk & Western and Virginian Railroads, and that in my opinion that any development of New River for purposes of traffic, would be an absolutely useless and foolish expenditure of money.

Given under my hand this 10th day of October, 1925.

(Signed) K. E. Harman.

Virginia,

Pulaski County, to wit:

Taken, subscribed and sworn to before me this 10th day of October, 1925.

Given under my hand and official seal.

(Signed) Aline Stuart, N. P.

My Commission Expires July 25, 1928.

3262 Virginia,

County of Pulaski, to wit:

I, Aline Stuart, a Notary Public in and for the County and State aforesaid do hereby certify that E. W. Calfee, this day personally appeared before me in my county aforesaid and made affidavit that he is thirty-five years of age; that he has been Mayor of the Town of Pulaski, Virginia, for the past twelve (12) years, and that the Town of Pulaski is situate in the County of Pulaski, and is the terminus of the North Carolina extension of the Norfolk & Western Railroad, sometimes called the Cripple Creek Railroad; and that the Town of Pulaski is eight (8) miles west of New River; that he is familiar with New River where the same flows through the Counties of Wythe, Pulaski, Montgomery and Giles, and that there is a series of falls, riffles or shoals in the River along its entire course through the aforesaid counties; and that the only navigation the affiant has ever heard of was a futile attempt made to transport lead from the Wytheville Lead & Zinc Mines in Wythe County, Virginia, to New River Depot, in Pulaski County, Virginia, and a similar attempt to transport pig-iron from the mouth of Max Creek in Pulaski County to New River. Both of these attempts being made about 1882, but being abandoned within a short time as impracticable; that below New River Depot, there is a series of falls and riffles in the Counties of Montgomery and Giles, and that interstate commerce on New River on account of the above stated conditions is impossible; that there has been no local navigation on the River except those that have been abandoned as above set forth.

The affiant states that the channel cut in the River by the Government between the years of 1873 and 1889 has filled up on account of ice freshets and other freshets in the River
3263 and is no longer of any value to navigation.

The affiant further states that the Cripple Creek Railroad as shown on the Dublin sheet of the United States Geological Survey, parallels New River from a point near Allisonia and has been extended since the issuance of said map to Galax in the County of Grayson; and that the Norfolk & Western Railroad as shown on said map parallels said River from Radford to Walton Junction in the County of Montgomery, and that since the issuance of said map that the River is parallel by the present main line of the Norfolk & Western from Walton Junction to Glen Lyn, near the West Virginia line on the north side of the River; and that the Virginian Railroad parallels the River on the south side thereof.

The affiant is familiar with the creation and shipment of freight in this section, and that the commercial needs of the section are adequately filled by Railroad transportation facilities; and that there is no need or demand for the improvement of the River of the type which could be affected at a reasonable expense commensurate with the results to be obtained.

Given under my hand and Notarial Seal this 6th day of October, 1925.

(Signed) Aline Stuart, N. P.

My Commission Expires July 25, 1928.

3264 Virginia,
Pulaski County, to wit:

I, Aline Stuart, a Notary Public in and for the County and State aforesaid do hereby certify that Dr. J. W. Holmes, this day personally appeared before me in my County aforesaid and made affidavit that he is seventy-seven years of age; that he owns a farm on New River in Pulaski County, Virginia, at what is known as Calfee's Ford; that he has lived in Pulaski County since 1854, and that he is familiar with New River through the counties of Wythe and Pulaski, Virginia; and that in his practice he has crossed said River in the Counties of Wythe and Pulaski, thousands of times; and that the River through the counties of Wythe and Pulaski is full of shoals, riffles, and falls with only about one-third of the distance pool or still water, and the remaining two-thirds swift shoal water; that he remembers distinctly an attempt to improve the River which was in charge of a Col. Smith. This improvement being done in the seventies and early eighties; and that the channel was cut through the riffles and falls in an attempt to give the keel bottom boats a draft of two feet;

The affiant states that from the Austinville Lead Mines in Wythe County to the Kanawha Falls, it is a distance of one hundred and fifty-nine (159) miles, and five hundred nineteen feet (519) fall in that distance.

The affiant further states that after the above channel was cut that an attempt was made to transport lead from Austinville in Wythe County in keel bottom boats to New River Depot in Pulaski County; and that several trips were made with these keel bottom boats but owing to the fact that the boats continually wrecked in going over the falls and through the rapids and also due to
3265 the fact that it was almost impossible to get the boats back up the River, this project was discontinued in less than a year from the time it began, and with this exception, the affiant has seen no navigation on the River in the Counties of Wythe and Pulaski, with the exception of an attempt to haul pig-iron from the ~~Radford Furnace in Pulaski County~~, shown on the map attached to this affidavit, to New River Depot, ~~which is also shown~~ on said map; but that this effort proved impracticable for the same reason that the transportation of lead as aforesaid failed.

The affiant remembers that several boats and a great deal of iron was lost in the River in Pulaski County between the Radford Furnace and New River Depot; and that a good deal of pig-iron is still in the River at a point in the River known as Wygal's-Notch, at a locality on said River in the neighborhood of Haw's Branch as shown on the map; and that this project was also abandoned in a few months as impracticable.

The affiant states that the Cripple Creek road, shown on the map, was built in 1884, and that after building of said road, that there was no necessity whatever for the transportation of any freight by way of the River; and that all previous attempts to transport freight on the River was abandoned as impracticable.

The affiant further states that due to ice freshets and floods in the River, that the channel cut by the Government is practically filled up through the counties of Wythe and Pulaski; and that no evidence remains of it except a few notches cut through ledges where the water was very swift.

The affiant further states that for the above reasons that interstate commerce between Virginia and West Virginia on said River is impossible, and the affiant further states that even if said River was improved for navigation, that owing to the fact that the 3266 River is parallel by railroads, that the improvement of it would not develop any new freight; and that the cost of transportation of any freight on the River would be far out of proportion to the enormous expenditures which would be necessary to improve the River for navigation.

Given under my hand and Notarial Seal this the 6th day of October, 1925.

(Signed) **Aline Stuart**, *N. P.*

My Commission Expires July 25, 1928.

3267 Virginia,

County of Pulaski, to wit:

I, Aline Stuart, a Notary Public in and for the County and State aforesaid do hereby certify that E. T. Pratt this day personally appeared before me in my county aforesaid and made affidavit that he is fifty years of age; that he was born and raised in Pulaski County, Virginia, near New River, and that he is Manager of the Rex Milling Company at Draper, Virginia; and that he is familiar with the course of New River through the counties of Wythe, Pulaski and Giles; and that there has been no navigation or attempt of navigation on New River in his recollection covering the past forty years; and that the only navigation he ever heard of on said River was an attempt to transport lead from Austinville and iron from Radford Furnace to New River Depot; and that he is reliably informed that this was abandoned in a short time on account of being impracticable.

The affiant states that the old channel which was cut in the River by the Government years ago has entirely filled up with the exception of a few notches in falls.

The affiant further states that he is familiar with the creation and transportation of freight in this section, and that owing to Railroad facilities that there is no occasion for New River ever being navigated, in event that it should be improved, and that owing to the tremendous fall that in the affiant's opinion that any sum spent to make the River navigable would be a useless expenditure of money and would not create any new freight or aid in the transportation or existing freight.

The affiant further states that interstate navigation on said River is impossible, and that there is absolutely no local navigation of the River.

3268 The affiant further states that for the above reasons that there is no local navigation of the River, and that interstate commerce on the River through said counties to West Virginia, is impossible.

The affiant states that he is familiar with the creation and transportation of freight in this section, and that owing to the River being practically paralleled by the Norfolk & Western and Virginian Railroads in said counties, that there is no necessity or reason for improving the River for navigation, even if practicable; that owing to the great fall in the River that the immense sum which would have to be spent to make said River navigable, if possible, would render prohibitive any such project.

Given under my hand and Notarial Seal this the 7th day of October, 1925.

(Signed) ALINE STUART, *N. P.*

My Commission Expires July 25, 1928.

3269 VIRGINIA,

County of Pulaski, to wit:

I, Aline Stuart, a Notary Public in and for the County and State aforesaid do hereby certify that J. F. Wysor this day personally appeared before me in my County aforesaid and made oath that he is forty-four years of age; that he is Treasurer of the County of Pulaski, Virginia, and has been for the past nineteen (19) years; and that he has always resided in the County of Pulaski, and that his duties as Treasurer and general business activities has made him familiar with the courses of New River through the Counties of Wythe, Pulaski and Giles, and that New River in breaking through the mountains in these counties has a great deal of fall, and that at frequent intervals and practically every mile of the River through said counties, there are falls, riffles and shoals; that there is no local navigation of said River in said counties; and that the only freight that the affiant has ever heard of being transported on the River in these counties was lead from the Wythe Lead & Zinc Mines in Wythe County, Virginia, and pig-iron from the mouth of Max Creek in Pulaski County, Virginia, to New River Depot. This being done over forty (40) years ago before the Cripple Creek road was built and for a short time after the Government dredged a channel in New River for keel bottom boats of light draft.

The affiant further states that he has always heard that this was abandoned on account of being impracticable before the North Carolina branch of the Norfolk & Western Railroad was built, and that after said branch line was built, that no attempt whatever was made to transport freight on the River.

The affiant further states that the channel cut by the Government in said River has long since filled up with rock and other debris, and it is impossible to locate same except a
3270 few notches cut through riffles or falls.

Given under my hand and Notarial Seal this the 7th day of October 1925.

(Signed) **Aline Stuart**, *N. P.*

My Commission Expires July 25, 1928.

3271 **Virginia,**

County of Pulaski, to wit:

I, Aline Stuart, a Notary Public in and for the County and State aforesaid do hereby certify that W. C. Jennings, this day personally appeared before me in my county aforesaid and made affidavit that he is fifty-three years of age; that he is a farmer by occupation, and owns a farm containing 333 acres, situate on New River in the County of Pulaski, about four (4) miles down stream from the bridge across said River at Hiwassie, Virginia; that he has lived on said farm for the past thirty (30) years; that his house is in plain view of New River, and that he is familiar with New River where the same flows through the counties of Wythe, Pulaski, Montgomery and Giles, and that there are a number of falls or riffles at short intervals all through said counties, and that opposite his house said River falls five (5) feet within one-half a mile; and that there has never been any navigation on New River since the affiant has lived on it for the past thirty (30) years; and that the only navigation he ever heard of on said River was an unsuccessful attempt to boat lead from the Wytheville Lead & Zinc Mines, and iron from the mouth of Max Creek in Pulaski County, to New River Depot in said County. This being done shortly after a channel was cut in said River about the year 1880, but that the attempt was given up on account of the rapid shoal water wrecking the boats, and it being almost impossible to get the boats back up the River.

The affiant further states that this old channel has entirely filled up with rock, gravel and other debris, and is not perceptible at all in the River except where the same has cut through solid rock in the falls or riffles.

3272 The affiant states that for the above stated reasons that New River is impracticable for local navigation in the counties of Wythe, Pulaski, Montgomery and Giles, and that for the same reasons, it is impossible to conduct interstate commerce or navigation on the River..

The affiant further states that he is familiar with the creation and transportation of farm products and other freight originating in this section, and that any Government expenditure on New River which would make the same navigable would not develop any additional freight, and that the cost of the same would in the affiant's opinion be prohibited.

Given under my hand and Notarial Seal this the 6th day of October, 1925.

(Signed) **Aline Stuart**, *N. P.*

My Commission Expires July 25, 1928.

3273 **Virginia,**

Pulaski County, to wit:

I, Aline Stuart, a Notary Public in and for the County and State aforesaid do hereby certify that J. R. Linkous, this day personally appeared before me in my County aforesaid, and made affidavit that he is forty-five (45) years of age; that he is a farmer by occupation, and that he has resided for the past thirty (30) years at Linkous' Ferry on New River, In Pulaski County, Virginia, at a point on said River about eight (8) miles southwest of the Town of Pulaski, Virginia; that he has personally operated a ferry across New River known as Linkous' Ferry for the past nine (9) years; and that he helped his father operate said ferry for twenty-one (21) years prior to that time; that he lived in sight of said River and is familiar with the courses of the same through the counties of Grayson, Carroll, Wythe, Pulaski, Montgomery, Giles and to Glen Lyn at the West Virginia line; and that during that period, that the affiant has never seen any navigation of any kind on said River with the exception of a futile attempt made by a man named Dudley to run a gasoline launch from Radford to Linkous' Ferry in the County of Pulaski; Dudley only making two trips with his launch and giving up the project on account of the River not being navigable for even a small launch.

The affiant states that the River is not navigable on account of numerous falls, shoals, and riffles. The affiant states that he was informed that a small quantity of iron was boated in keel bottom boats from the Radford Furnace in Pulaski to New River Depot many years ago but this project was abandoned as impracticable on account of the River not being navigable.

3274 The affiant further states that the North Carolina branch of the Norfolk & Western Railroad was built in 1884 or 1885, and that there is no need for navigation on the River, even if it was possible to improve the River for this purpose.

The affiant further states that he, in boating and fishing on the River through the County of Pulaski, is familiar with the channel cut in the River by the Government, and that this old channel has been entirely filled up, and that the only evidence of it now in the River is where the channel was cut through shoals or falls, and that the improvements made by the Government is no longer of any value to navigation.

The affiant further states that through navigation on New River in interstate commerce is impossible, and to make it possible would require large expenditures of money far out of proportion to any benefit that might be derived therefrom; that the commercial needs of the country through which the River runs is adequately filled by railroad transportation facilities, and that there is no need or demand for improvement of the River.

Given under my hand and Notarial Seal this the 5th day of October, 1925.

ALINE STUART, N. P.

My Commission Expires July 25, 1928.

3275 STATE OF VIRGINIA,
City of Radford, to wit:

I, J. L. Ingles, do solemly swear that I am forty-nine years of age, that I reside in sight of and about a quarter of a mile from New River at Ingles Ferry, Montgomery County, Virginia; that I own a farm of 300 acres bordering on the river a distance of approximately one and one-half miles, that I was born and raised where I now reside; that I am President of the Peoples Bank of Radford, and that I am a farmer by occupation, and that I was twelve years Superintendent of the Virginia Iron, Coal & Coke Company Blast Furnace, Radford, Virginia, which is located on New River. I further state that I know New River from Foster's Falls in Wythe County, Virginia, to Hinton, in Summers County, West Virginia, and that I have fished along the

course of the river and gone down the river on several occasions in small canoes as far as Hinton. That at least two thirds of the course of the river is very swift with frequent falls, shoals and rapids. That between Foster's Fall and Ingles Ferry that there is scarcely a half a mile of the stretch of the river without a fall which is impassable for even a canoe of light draft, and that Ingles Falls, at Ingles Ferry, there is a six ft. drop in a quarter of a mile, and that the river is a series of rapids to Radford with a 20 feet drop. That from Radford to Pepper's Tunnell on the Norfolk & Western Ry., there is a series of rapids and falls all the way; and that at Parrott in Pulaski County, Virginia, at a place called Broad Shoals, that the river is over one-half mile wide and very shallow and filled with ledges of rock and that at the Pulaski-Giles line there is a fall of approximately six feet to seven feet, and that other shoals and falls occur at Burton & Pembroke, between Pembroke and Pearisburg and at what is called the Narrows in Giles County and that between Glenn
Lynn in Virginia and Hinton in West Virginia, there is
3276 Shumate Fall, the Anderson Falls, and numerous other
falls of considerable elevation, which makes it impossible for local navigation of the river. That during my residence on New River there has been no local or interstate navigation on the stream. That the Government did expend some money between the years 1873 and 1884 or 1885 on New River in an attempt to dredge a channel and make it navigable for boats of light draft, and that a small quantity of lead and pig-iron was hauled down the river after this channel was completed, but nothing up the river, and this was soon abandoned as impracticable and a great many of the boats were wrecked in this attempt, and that no attempt has been made at local navigation for the past 40 years. I further state that along about 1890 that I went to Minton, West Virginia, in a canoe about 30 feet long and about 2½ feet wide with a draft of about 6 inches, during a normal stage of the river and that I had great difficulty in getting down the river and had to get out in the water and force the boat over the rocks and had to leave my boat at Hinton on account of it being impossible to get it back. I further state that I am familiar with the shipment of freight in this section and that the section traversed by the Norfolk & Western Ry. between Hinton in West Virginia and Foster's Falls in Wythe County, Virginia, is amply taken care of by the Norfolk & Western Ry., the Virginian, and the C. & O. Railroads, and that no necessity exists for making New River navigable even if it could be made navigable, and that any sum of money appropriated for digging out the old channel or putting locks in the river on dredging it

would be for the reasons above stated an entirely useless expenditure of money and would develop no new freight; and from my observation, the river would have to be locked and dammed at least every two miles, which would render any project of this nature entirely unfeasible and impracticable.

Given under my hand this 12th day of October, 1925.

J. L. INGLES.

3277 STATE OF VIRGINIA,
City of Radford, to wit:

I, Mary Turner, a Notary Public in and for the City and State aforesaid, do hereby certify that J. L. Ingles, this day personally appeared before me in my City aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and notarial seal this 12th day of October 1925.

MARY TURNER, *Notary Public.*

My commission expires September 21, 1928.

3278 STATE OF VIRGINIA,
City of Radford, to wit:

I, William Ingles, after first being duly sworn, do say that I am forty-eight years of age, that I was born at Ingles Ferry on New River, and that Ingles Ferry was owned and operated by my father, A. L. Ingles, now deceased, that I lived within a few feet of the River until I was thirty years of age, and then moved down the River a few miles to the City of Radford, and have lived right on the banks of the river every since. That I am Cashier of the First National Bank of Radford, Virginia, and have been for a period of Five Years; that before I was cashier, I was Assistant Cashier for fifteen years, that I am familiar with the course of New River from Foster's Falls in Wythe County through Pulaski, Montgomery and Giles Counties and to Crump's Bottom in Monroe County. That during my life on the river that there has been no local navigation of the river in the past thirty years. That before my recollection I am informed that a small quantity of lead was boated in keel bottom boats from the lead mines at Austinville in Wythe County to New River Depot in Pulaski County, Virginia. That about the same time small quantities of iron was boated in similar boats from the mouth of Mack Creek in Pulaski County to New River Depot, and that the United States Government between the years 1873 and 1884 spent some money in dredging out a channel through shoals and making cuts in falls, in order to make the river navigable for small boats, but I am informed that the transportation of this iron and lead was soon abandoned and I have seen a great deal of the iron in the river where the boats wrecked in coming down the river. I further state that there is a great number of falls in the river and that at least two-thirds of the river is rapids, shoals, and falls and that for the above reasons, there is no local navigation or traffic 3279 on the river and no interstate navigation between the States of Virginia and West Virginia. I have personally gone in a small canoe from Ingles Ferry in Pulaski County, Virginia to Crump's Bottom in Monroe County, West Virginia, in about 1892, in company with J. L. Ingles. We went when the river was about a normal stage and we encountered heavy falls at the Cloyd Place in Montgomery County and a fall at the drop of 7 or 8 feet at the Pulaski Giles County Line, and a series of falls through the County of Giles, and a very decided fall just below Narrows in Giles County, and a number in the County of Monroe above Crump's Bottom, these falls being known as Shumate's Falls. That we had a canoe about 25 feet long and 3½ feet wide, which drew about six inches of water, and we had great difficulty in many places in getting this boat down the river and were unable to get it back up the river at all, and had to leave it. I further state that in my opinion it would be thoroughly impracticable to canal and lock and dam New River on account of its falls and that even if this were practical, that the making of the river navigable would not create any new freight or be a practical route for the transportation of freight as the rivers through the Counties of Wythe, Pulaski, Montgomery and Giles in Virginia and Monroe and Summer Counties in West Virginia are practically parallel by the Norfolk & Western, Virginian, and the C. & O. Railroads, which furnish ample freight facilities for this section.

Given under my hand this the 12th day of October, 1925.

WM. INGLES.

3280 STATE OF VIRGINIA,
City of Radford, to wit:

I, Mary Turner, a Notary Public in and for the City and State aforesaid, do hereby certify that William Ingles this day personally appeared before me in my City aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and notarial seal this 12th day of October, 1925.

MARY TURNER, *Notary Public.*

My commission expires September 21, 1928.

3281 STATE OF VIRGINIA,
City of Radford, to wit:

I, J. G. Osborne, after first being duly sworn, do say that I am 71 years of age, that I have resided at Radford on New River, Virginia, for the past forty-two years, or since 1883. That I was for nine years Division Supt. of the Norfolk & Western Ry. Company of its Pulaski Division, which Division included the Norfolk & Western Ry. from Radford, Virginia to Bristol, Virginia, and the North Carolina Branch, sometimes known as Cripple Creek Road from Pulaski to Chestnut Yards. I was Supt. of the above road from May 15th, 1888 to May 1st, 1897. Prior to which time I was Division Engineer in the construction of the New River Branch of the Norfolk & Western Ry. from New River to Pocahontas. I am now retired from active business, but I am a director in the People's Bank of Radford and own real estate in the City of Radford.

I further state that my business in the past forty-two years has familiarized me with New River from Glenn-Lynn near the West Virginia line in the County of Giles up stream to Chestnut Yards in the County of Carroll, Virginia, and that I am more or less familiar with the River from Glenn-Lynn to Hinton, West Virginia, I further State that there is a tremendous fall in the river through the Counties of Grayson, Carrol, Wythe, Pulaski, Montgomery and Giles in the State of Virginia, and through Monroe and Summer Counties from Glenn-Lynn to Hinton and that at least two-thirds of the course of New River is falls, ripples, rapids, and shoal water. I further state that I remember that the government expended an appropriation on New River between New River Bridge and Ivanhoe, about 1882, dredging out a channel through various ripples for keel bottom boats of light draft, but practically no freight was hauled over the River after the improvement,
3282 except a small tonnage of lead, which I am informed was hauled down the river, and a small quantity of iron from the mouth of Mack's Creek in Pulaski County to New River Depot near the City of Radford on the line between Montgomery and Pulaski Counties, but that this was soon abandoned, and that during all of my intimate acquaintance with the river there has been no local navigation of the river or the hauling of freight thereon, and that there has been no interstate commerce between Virginia and West Virginia on the river and that the old channel cut by the Government has long since been filed up with rock and other debris, and that there is no possibility of local or interstate commerce on the river in its present condition, and that from my engineering experience and knowledge of the river, I am of the opinion that the expenditure of an amount necessary to lock and canal the river would be prohibitive for practical purpose, and in the event that the expenditure be made necessary to do this, that there would be absolutely no need as no new freight would be developed there by, and owing to the fact that the river in Southwest Virginia and West Virginia is practically parallel with the Norfolk & Western Ry.,

Virginian, and the C. & O. Railroads, this section has adequate freight facilities for the movement of all freight created therein. I further state that owing to the narrow vallies and gorges through which the river runs, and the high mountains adjacent thereto, that any attempt to bring freight to the river for transportation would be defeated by the topography of the country.

Given under my hand this 12th day of October 1925.

Jno. G. Osborne.

3283 State of Virginia,
City of Radford, to wit:

I, Mary Turner, a Notary Public in and for the City and State aforesaid, do hereby certify that J. G. Osborne, this day personally appeared before me in my City aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and notarial seal this 12th day of October 1925.

Mary Turner, *Notary Public.*

My commission expires September 21st, 1928.

3284 State of Virginia,
City of Radford, to wit:

I, W. H. Painter, having been duly sworn, state that I am 55 years of age, and that I reside in the City of Radford, Virginia, and have for the past 15 years, that I am a member of the Council of the City of Radford, and that I am a builder and contractor and owner of real estate in the City of Radford; that I am a director in the Radford Real Estate & Insurance Company, and that I was born at Ivanhoe, Wythe County, Virginia, on New River, where I resided for 28 years, and that I am intimately acquainted with New River where the same flows through the Counties of Grayson, Carroll, Wythe, Pulaski, and Giles in the State of Virginia, and owing to the fall of New River through these counties where it breaks through the dividing mountains and ridges between the Allegheny and Blue Ridge Mountains, that at least two-thirds of the course of the river is rapids, falls, and shoals. I further state that on account of the above reasons, that there is no local navigation or the hauling of freight on the river in the above mentioned counties. That I remember as a boy the expenditure of the Government of an appropriation in an attempt to make the River navigable for keel bottom boats of light draft, and after the Government expended this money, a small quantity of lead was boated from Austinville in Wythe County to New River Depot near the City of Radford, and a small quantity of iron was also hauled by boats to the same point from the mouth of Mack's Creek, but that this was abandoned as impracticable and that the channel which was dredged through falls and ripples, has long since filled up on account of ice-freshets and high water with rock and gravel and very few traces, if any, remain of the old channel, and that there has been no attempt to navigate the river since the old channel filled up. I further state that since the dredging of the old channel that the Cripple Creek Road on the North Carolina Branch of the 3285 Norfolk & Western Railroad, extending from Pulaski, Pulaski County, Virginia, to Galax in Grayson County, Virginia, has been constructed a distance of 52 miles; 40 miles of which road practically parallels the river, and that since 1880 the present main line of the Norfolk & Western Ry. has been projected from Walton; three miles down stream from Radford, practically parallel with the river, to Glenn-Lynn, a distance of approximately 40 miles and that the Virginian Railroad was built about twenty years or more ago, which parallels on said river practically it's entire distance through the Counties of Giles and Montgomery, and that these railroads furnish ample facilities for the handling of all freight in this section, and that if any money is spent to dredge out the old channel, or to lock and canal the river, would be a useless expenditure even if it were practical to make the river navigable as New River runs through narrow gorges and valleys, and owing to the height of the mountains on either side of it, it would be impracticable to bring any freight to it as a water way, even if the railroad transportation along the river was not, as in my opinion it is, quicker and cheaper transportation.

Given under my hand this 12th day of October 1925.

(Signed) W. H. PAINTER.

STATE OF VIRGINIA,
City of Radford, to wit:

I, Mary Turner, a Notary Public in and for the City and State aforesaid, do certify that W. H. Painter, this day personally appeared before me in my City aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and notarial seal this 12th day of October 1925.

(Signed) MARY TURNER, *Notary Public.*

My commission expires Spt. 21, 1928.

3286 VIRGINIA,
Giles County, to wit:

I, Wm. Adair, after having been duly sworn state that I am 81 years of age; that I reside at Narrows in Giles County, Virginia; and that I was born at Lurich in Giles County, Virginia, and that

I am now 81 years of age and have spent the entire 81 years on New River, and am familiar with the River the entire length of Pulaski, Giles and Summers counties; that in all my residence on the River I have never seen any local navigation in the county of Giles and have never seen any freight transported from Virginia down the River into West Virginia; and that it is impossible to do so on account of the swiftness of the River, the numerous falls across it, and the shoals and rapids where the River breaks through the numerous mountains and hills in Virginia and West Virginia. I further state that owing to the River being parallel with the Norfolk & Western and Virginian Railroads through Giles county that this section has ample freight facilities, and that making New River navigable would not develop any new or additional freight, and that owing to the River flowing through deep gorges and narrow vallies that it would not be practicable to bring any agricultural products for transportation by water; that the counties of Giles, Pulaski and the county of Summers in West Virginia, are principally grazing counties and produces very little surplus agricultural products that could not be as economically handled by rail.

Given under my hand this 13th day of October 1925.

(Signed) Wm. Adair.

Virginia,

County of Giles, to wit:

I, C. R. Adair, a Notary Public in and for the county and state aforesaid do hereby certify that William Adair this day personally appeared before me in my county aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and Notarial Seal this 13th day of October 1925.

(Signed) C. R. Adair, *N. P.*

My commission expires May 8th, 1928.

3287 Virginia,

County of Giles, to wit:

I, John A. Adair, after having been first duly sworn state that I am 74 years of age; that I was born and raised at Lurich on New River in Giles County, and lived at Lurich for 72 years in sight of the River, and was in 300 yards of it; that I know the length of New River through Giles County and down through West Virginia to Hinton, West Virginia; that Lurich is by River 9 miles from the West Virginia line, and 2 miles by turnpike; that in all my residence on the River I have never seen any local navigation in the county of Giles, and have never seen any freight transported from Virginia down the River into West Virginia; and that it is impossible to do so on account of the swiftness of the

River; the numerous falls across it, and the shoals and rapids where the River breaks through the numerous mountains and hills in Virginia and West Virginia. I further state that the Government has never expended any money in the improvement of the River to my knowledge between the Bulls falls above Hinton and the Pulaski county line, and that any expenditure of money on the River in this section in my opinion would be absolutely useless on account of the tremendous sum which would be necessary to make the River navigable, if it could be made navigable at all.

Given under my hand this 13th day of October 1925.

(Signed) JOHN A. ADAIR.

STATE OF VIRGINIA,
County of Giles, to wit:

I, C. R. Adair, a Notary Public in and for the county and state aforesaid do hereby certify that John A. Adair this day personally appeared before me in my county aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and Notarial Seal this 13th day of October 1925.

(Signed) C. R. ADAIR, *N. P.*

My commission expires May 8th 1928

3288 VIRGINIA,
County of Giles, to wit:

I, J. L. Boggess, after having been first duly sworn state that I am sixty-eight years of age; that I reside on New River at Narrows in Giles County, Virginia, Narrows being thirteen (13) miles up stream from the West Virginia line; that I have resided at Narrows for the past 39 years; that I am now engaged in the retail hardware business and have been for the past fifteen years, and have been in the general mercantile business as long as I have resided at Narrows; and that my business has made me familiar with the entire course of New River where the same flows through the County of Giles; that there has never during my acquaint*en*ance with the River been any local navigation or hauling of freight on it, and that there has never been any interstate navigation between Virginia and West Virginia; that at least two-thirds of the distance through Giles County is composed of falls, shoals and rapids, with a very occasional short stretch of eddy water; and that just below the Town of Narrows the falls in the Narrows between East River Mountain and Peters Mountain have a drop of at least six or seven feet, and that there are a series of falls down the River past Glenn Lynn through the County of Summers in West Virginia, the principal ones being Shumate, Anderson and Bulls falls; and that in my opinion that owing to the River

breaking through a series of mountains and high ridges and over frequent falls, it would be wholly impracticable, if not impossible, to dam and canal the River to make it navigable, and that even if this were practicable that owing to the River being parallel with the Norfolk and Western and Virginian Railroads through Giles counties, that this section has ample freight carrying facilities, and that making New River navigable would not develop any new or additional freight, and that owing to the River flowing through deep forges and narrow vall*ies* that it would not be practicable to bring any agricultural products for transportation by water; that the Counties of Giles and Pulaski, and the County of Sum-
3289 mers in West Virginia, are principally grazing counties and produce very little surplus agricultural products that could not be as economically handled by rail.

Given under my hand this 13th day of October 1925.

(Signed) Jno L. Boggess.

State of Virginia,
County of Giles, to wit:

I, C. R. Adair, a notary public in and for the county and state aforesaid do hereby certify that J. L. Boggess this day personally appeared before me in my county aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and Notarial Seal this the 13th day of October 1925.

(Signed) C. R. Adair, *N. P.*

My Commission expires May 8th, 1928.

3290 Virginia,
County of Giles, to wit:

I, W. W. Walker, after having been first duly sworn state that I am 52 years of age; that I was born and raised in Giles County on New River at Eggleston, Virginia; that I am now Treasurer of the county of Giles, and have been for a period of six (6) years; that I am also a farmer, and that I have lived my entire life within one (1) mile of New River and that I am intimately acquainted with New River where the same runs from Radford to Glen Lyn; that New River breaks through Cloyds Mountain on the Giles-Pulaski line and then through Peters Mountain, Buckeye Mountain, and East River Mountain in the county of Giles, and that just above the Giles County line at Parrott in Pulaski County, there is what is known as broad shoals where the River for a considerable distance is very wide and shallow, running over ledges of rock, to the Big or Macoy Falls and then there is a series of rapids and riffles below Burton on the Norfolk & Western Railroad, and that there are rapids from Goodwin's Ferry to Eggleston, a distance of about two (2) miles; and that there is a long stretch of rapids from Pembroke Station and then a series of rapids and falls on to Glen Lyn at the West Virginia line, with an occasional short stretch of eddy water.

I further state that owing to the tremendous fall of New River through Giles County that there is no local navigation on the River, and that the only boats on the River are ferry boats crossing the River and an occasional small canoe; and that there is no evidence in the River of any improvement or channel being cut in it.

I further state that the River is parallel with railroads on each side practically through the entire length of the county, and that there is no necessity for any attempt navigable, and that this in my opinion would be impossible owing to the fall in the River, and that any dams placed crossing the River for control could not make the River navigable on account of the fall
3291 and swiftness of the current, and that there is no necessity even if it could be navigable to do so on account of our present railroad freight facilities, and that the making of the River navigable would not create any new freight and that practically all timber along the River has been cut, and that there are no minerals adjacent to the River which could be transported.

I further state that the only use being made of the River through the county of Giles is as a water supply for tanneries at Pearisburg and Narrows; a steam rock crusher at Pembroke and Klots, and for the large Appalachian steam plant at Glen Lyn, and for the recently constructed Virginian Steam Plant at Narrows; and that no control of the River which would affect the intakes of these plants could be had during dry or extremely low water periods.

Given under my hand this 13th day of October 1925.

(Signed) W. W. Walker.

Virginia,

County of Giles, to wit:

I, Walker Williams, a notary public in and for the county and state aforesaid do hereby certify that W. W. Walker this day personally appeared before me in my county aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and Notarial Seal this the 13th day of October 1925.

(seal) (Signed) Walker R. Williams, N. P.

My commission expires March 19, 1922.

3292 VIRGINIA,

County of Giles, to wit:

I, J. H. Wyse, after having been first duly sworn state that I am 44 years of age; that I have resided in Giles County for the past twenty years; that I am Engineer Superintendent of Roads for the County of Giles and have been for the past five (5) years; that I am by profession a civil engineer, and a graduate of Clemson A. & M. College of South Carolina, but I did engineering work for the Virginian Railroad in the County of Giles from 1904 until the fall of 1907; that the Virginian Railroad runs along New River from the Giles-Pulaski line to Glen Lyn on New River, a distance of approximately thirty-five (35) miles, the road being located about one foot above high water mark along the south side of the River.

I further state that my engineering work on the Virginian and my road work has thoroughly famil'arized me with the course of New River through the county of Giles; that there is a series of falls, riffles and rapids where the River breaks through Peter's Mountain, Butte Mountain, Big Walkers Mountain, and East River Mountain, and various ridges flanking the River on both sides; that there is an average fall of at least six (6) feet through the county, and that these falls occur with such frequency that navigation on the River is impossible; that I have never seen any local or interstate navigation on the River, and that in my opinion as an engineer it would be wholly impracticable to lock and canal the River for navigation as locks or dams would have to be placed so close together that the cost thereof would be prohibitive; and that a dam placed in the River for the purpose of flood or flowa*d*ge control would not aid navigation on account of frequent rapids which could not be negotiated by boats of any draft without great danger, it being practically impossible to get the boats back up stream.

I remember on one occasion while working for the Virginian that an attempt was made to bring a flat boat down the River when the River was at its normal state, and that this flat boat wrecked near Pembroke by plunging over a fall and had to be abandoned. This was the only attempt that I have ever seen to bring a boat down the River and I understand
3293 there was an attempt to take this boat to Hinton where it was to be sold.

I further state that even if it were practicable to lock and canal New River through the county of Giles that there would be no necessity for this being done as the River is practically parallel through Giles by both the Norfolk & Western and Virginian Railroads, and that no new freight would be developed by making the River navigable, and that owing to the River breaking through the mountains in narrow gorges with high mountains on each side, that it would be impracticable to take farm products or freight from the adjacent territory to the River for transportation; that the county has ample railroad freight facilities and that all of the state highways and public road system is adapted to our present railroad transportation facilities; and that any expenditure of money on New River for the purpose of making it navigable would in my opinion be entirely useless and wholly impracticable.

Given under my hand this 13th day of October 1925.

(Signed) J. H. WYSE.

VIRGINIA,

County of Giles, to wit:

I, Walker Williams, a notary public in and for the county and state aforesaid do hereby certify that J. H. Wyse, this day personally appeared before me in my county aforesaid and subscribed and made oath to the foregoing affidavit.

Given under my hand and Notarial Seal this the 13th day of October 1925.

(Signed) WALKER A. WILLIAMS, *N. P.*

My commission expires March 19, 1927.

3294 STATE OF WEST VIRGINIA,

Summers County, to wit:

I, W. P. Bowling, on my oath state that I am fifty-eight years of age; that I was born in Mercer County, West Virginia; that for twenty-two years I resided at Tophet Post Office, Summers County, West Virginia and within two miles of New River, the nearest point being the mouth of Island Creek, during which time I was a merchant at Tophet and also owned a farm bordering on New River twenty-five miles south of Hinton and near the point locally known as "Shanklin's Gravel," and still own a tract of five hundred (500) acres bordering on New River in that locality; that I was Deputy Sheriff of Summers County from January 1, 1905, to December 31, 1908; that I was County Clerk of the same county from January 1, 1909, until December 31, 1914; that I was Mayor of Avis from 1918 to 1920, and that I am now Deputy Sheriff of Summers County; that on the 3rd day of March, 1909, I moved to the City of Hinton on New River where I have since resided and have been in the mercantile business, and for a time was manager of the New River Hardware Company, wholesale hardware, from April 16, 1916, until it was destroyed by fire February 7, 1918; and that since 1921 I have been in the retail hardware business.

I further state that my business, both as an official and in private life and private enterprises have brought me into thorough touch with all of the activities on New River from the Virginia line to Hinton all of my life. I moved to New River in 1887 and am familiar with the government work done on the river between Hinton and Glen Lynn and know that when it was first completed that it was not a success as a commercial enterprise; that a number of the citizens of Hinton constructed a boat to be operated on the river and after making a strenuous effort were only able to take the boat ten miles up the river to what is known as "Bulls Shoals," and after repeated efforts it could not be forced through the channel and the boat was returned to the landing at Hinton and permitted to lie idle and rot away; and that at that time none of the lumber had
3295 been removed along the river and a great deal of tobacco was raised and this was forced to be brought to Hinton in small bateaux owing to the shallowness of the channel and impassable roads, but that more than twenty years ago the people ceased to raise tobacco and that all of the commercial lumber has been removed except one small tract that is now being operated by J. G. Anderson above Bulls Falls which will be completely worked out in a few months and that the same is being brought to the railroad by wagons and trucks, it being impossible and impracticable to attempt to bring it by bateau or down New River.

I further state that the high waters and ice floes have caused the old channel to be filled up and that its present condition makes it as useless for navigation as it was before any improvements were made. I know that there is not a bateau or any means of bringing the products from that section by river to any market and there has not been any for years.

I also state that the river cuts through the high mountains, passes through a narrow gorge with very narrow strips of bottom land on either side on which nothing is produced that requires transportation and this applies to the entire territory from the Virginia line to Hinton.

My entire recollection is, and I am distinct in that, that there has been no interstate commerce between Virginia and West Virginia on New River since 1887, the length of time that I have known it, and I further state that interstate navigation has at all times been impossible and is now. The high mountains on either side of New River make it inaccessable to the country back of the same and all of the merchandise coming in and products going out from

the territory on top of the mountain go to the Virginia, Norfolk & Western or Chesapeake & Ohio Rail Way and especially in has been development of the state highways, and New River from Glen Lynn, Virginia, to Hinton, West Virginia is entirely useless and impracticable as a means of transportation or exchange of interstate commerce and that if improved by locks or canals, no new freight would be developed along its course and that owing to the tremendous fall in the river that the cost of making
3296 it navigable would make the hauling of freight on it prohibitive from a practical business standpoint.

I further state that there is no variation in the daily tides of the river caused by any dam up stream from this place.

Given under my hand and seal this the 9th day of October 1925.

[SEAL] (Signed) W. P. BOWLING.

Taken, subscribed, and sworn to before me this the 9th day of October 1925, and given under my hand and official seal.

(Signed) SALLY B. SAUNDUS,
Notary Public.

My commission expires on the 2nd day of November 1932.

3297 STATE OF WEST VIRGINIA,
Summers County, to wit:

I, R. C. Haynes, on my oath state that I am forty years of age and have resided on New River in Summers County, West Virginia, for thirty-two years; that I am the present Mayor of the City of Avis, and have known intimately the waters of New River from Hinton to the Virginia line all of the time which I have resided in Summers County; that I have been over the channel attempted to be constructed by the United States Government about fifty years ago and know that it never has been fit for practical use. It zigzags across the river between the heavier ledges in an attempt to secure sufficient water during normal tides for the passage of keel bottom boats, but when it was first built it was not a success and since then it has been filled with large stones brought in by freshets until its present condition so far as use is concerned is no better than before any improvement was made.

Before the state roads were improved or the Virginian Railway built about twenty years ago and while the timber was still on the watersheds bordering New River between Hinton and Glen Lynn, bateaux were used to carry lumber, staves, and a few farm products down the river to Hinton but this has long since been abandoned and there are no longer boats of this character on the river and no attempt to use the river for transportation.

The timber has all been removed and there is no necessity or demand for these boats and such as now exists is taken care of by trucks. The river has never been used for carrying merchandise to or from Virginia on the New River waters. It cannot now be so used nor can it be used from any point in Virginia to Hinton, West Virginia and from that point on to the west, navigation is entirely impossible until a point below Kanawha Falls where locks and dams are in existence. The territory between Hinton and Kanawha Falls is through mountainous gorges with the C & O Railway Company as close to the water's edge as is practical on account of high water and for many reasons, it would be impossible to attempt navigation of this river by locks and dams through this section.

3298 I have been over the river in all kinds of skiffs, flat-bottom boats and bateaux and know that from Harvey's Ledge near Anderson's Falls to Hinton that the waters of the river pass through shallow channels, rapids, between ledges of rock and over falls continuously and is of that character that no reasonable investment could convert into any system of transportation and one that would not be sanctioned by business men of any section.

The productive lands adjacent to the river are narrow bottoms and all facilities for handling the harvests are adequately taken care of by public roads and none of the adjacent territory is more than fifteen miles from a railroad.

Given under my hand and seal this the 9th day of October 1925.

[SEAL] (Signed) R. C. HAYES.

Taken, subscribed, and sworn to before me and given under my hand and official seal this the 9th day of October 1925.

(Signed) SALLY B. SAUNDERS,
Notary Public.

My commission expires on the 2nd day of November 1932.

3299 STATE OF WEST VIRGINIA,
County of Summers, to wit:

J. G. Fredeking, being sworn, says as follows:

I am twenty-nine years of age and at present I am General Manager of the Hinton Water, Light & Supply Company, Hinton Insurance Agency, Quinnimont Ice Company, Alderson Ice Company, and City Ice Company of Hinton, West Virginia; that in 1923, I was General Manager of the West Virginia Sand & Gravel Company at Charleston, West Virginia, which had its plant located on the banks of Elk River; that it also had a dredging boat and pump boat in the Ohio River near Point Pleasant, West Virginia, and that they continuously operated the steam boat ("Mary Jane") between Charleston, West Virginia, and eight miles above Point Pleasant, West Virginia, and that in addition to operating the steamer owned by the company in towing barges, they also employed a steamer ("Western") owned by the Western Rivers Sand Company; that by reason of the operation of this plant and towing from near Point Pleasant to the plant at Charleston that I constantly studied the stages of the waters of New, Elk, and Kanawha Rivers; that there was ample water for navigation in the Kanawha and Ohio Rivers between the points above indicated; and that in my opinion any operation of a hydro-electric plant on New River in the County of Pulaski, Virginia, could not possibly affect the navigability of the river where I was familiar with.

I am informed that only twenty-eight (28) percent of the drainage area of New River is above the proposed project of the New River Development Company in the County of Pulaski, Virginia; that in my opinion the remaining seventy-two (72) percent of drainage would be amply sufficient for all purposes of navigation below Kanawha Falls in the Kanawha River. My observation of the different stages of water in the Elk, Kanawha, Ohio, and New Rivers was such that I found the flow of water in New River to be about normal with that from the other rivers.

I further state that the water plant which I now operate in Hinton, West Virginia, is at the point where the government improvement was made in the river many years ago 3300 and that I am familiar with the course of New River through the County of Summers to Anderson's Falls in said county and that the old channel cut in the river by the government has filled up and that there is no local navigation of the river in the County of Summers, and that no freight of any kind is delivered at the old Hinton landing at the beginning of said channel and that there is no interstate commerce between Virginia and West Virginia on said river, and that the river flows through a section which has no mineral or coal and produces no freight which could be taken care of by river navigation in the event of the improvement of the river and that this section has ample railroad freight facilities over the Virginian and C. & O. Railroads and that any improvement to the river for navigation would, in my opinion, be entirely useless and at a cost which would make it prohibitive.

I further state that there is no variance in the flow of the river except that caused by rainfall.

Given under my hand and seal this the 9th day of October 1925.

[SEAL] (Signed) J. G. FREDEKING.

Taken, subscribed, and sworn to before me this the 9th day of October 1925, and given under my hand and official seal.

(Signed) SALLY B. SAUNDERS,
Notary Public.

My commission expires on the 2nd day of November 1932.

3301 STATE OF WEST VIRGINIA,
Summers County, to wit:

I, Joseph M. Meador, on my oath state that I am sixty years of age, was born and raised in Summers County, West Virginia, near Pipestem, and resided for a number of years at Mercer Salt Works on the banks of New River where for seven years, from 1890 to 1897, I conducted a mercantile business; that thereafter I became Deputy County Clerk of Summers County remaining as such until January, 1903, when I became the County Clerk by election and held this position until 1909. Thereafter, I have been in various business occupations in the City of Hinton and am now in charge of an insurance agency.

I have known intimately the territory through which New River runs in West Virginia, and was familiar with the attempt of the government to develop a channel from Hinton to the Virginia line, an entirely useless expenditure being made by the government for this purpose between the years 1873 and 1889. This channel, which was then cut, has practically filled up with stone and other debris and very few traces of it now remain.

The fall of the river through Summers County is very great, beginning at Wylie's Falls about three miles below Glen Lynn in Virginia, and thence through Shanklin's Gravel with a wide, shallow stream to Anderson's Falls about one half mile below Mercer Salt Works, then in a continuation of shoals and rapids to Bull Falls about eight miles below Mercer Salt Works, and from thence to Bluestone Shoals, which is rapid in flow and shallow in depth, and from thence to Hinton it is practically the same way.

From the point of development in Hinton, by Hinton, it flows through channels of rocks with shallow depth and passes on through rapids to Brooks Falls about four miles west of Hinton, thence with a continuous increase in flow, it reaches Sandstone Falls eight miles west of Hinton and from thence down New River it empties into a gorge tortuous, swift, around boulders and

impossible of any navigation to Gauley Bridge, the entire territory in Summers County adjacent to the river being mountainous and there being no minerals, including coal, contiguous
3302 to the river and the timber resources accessible to the river being almost entirely exhausted.

I further state that for the above reasons there is no local navigation of the river and that there has never been any interstate navigation and that owing to the location of the railroads that this section has adequate freight facilities and that the improvement to New River so as to make the same navigable, if possible, would not develop any freight which could not be transported on the railroads at a cheaper rate and a greater saving in time.

I further state that in my opinion locking and canalling of the river would seriously interfere with the Chesapeake & Ohio Railway from Hinton west and that any further money spent in an attempt to make the river navigable or to restore the old channel would be absolute waste.

I further state that in my opinion in the event hydro-electric dams are placed on the river above Hinton that the flood control, if any, as had by said dams would be very beneficial to the riparian owners along New River on account of impounding flood waters during flood periods and preventing the rapid rise of the river and the damage resulting therefrom.

Given under my hand and seal this the 12th day of October 1925.

[SEAL] (Signed) J. M. MEADOR.

Taken, subscribed, and sworn to, and given under my hand and official seal this the 12th day of October 1925.

(Signed) SALLY B. SAUNDERS,
Notary Public.

My commission expires on the 2nd day of November 1932.

3303 STATE OF WEST VIRGINIA,
Summers County, to wit:

C. A. Templeton, being duly sworn says as follows:

I am forty-four years of age and have resided at Hinton in Summers County, West Virginia, continuously for thirty-two years; that I have been in the mercantile business since sixteen years of age and was manager of the department store of Plumley-Hulme Company until their sale to the Midland Stores; that I am now and have been for two years president of the Chamber of Commerce of Hinton; that I am thoroughly familiar with New River in the County of Summers, West Virginia, and also with the river from Hinton to Charleston; that no improvements have been made or no attempt has been made to navigate the river from Hinton to Kanawha Falls on account of the rapid fall in the river, which falls include Brooks, Sandstone, and other falls, and the rapids in the river from Thurmond to Gauley Bridge, this stretch of the river being entirely impracticable for navigation even with improvement by locks or dams without interfering seriously with the Chesapeake & Ohio Railroad, which parallels it for that distance and creating a water way where transportation would be much faster and more economical by rail.

As to the river above Hinton, there is no local navigation on it on account of shoals, rapids, and falls. Between the years 1873 and 1889, the government, as I am informed, for some reason expended money in trying to make the river navigable for small boats and this was attempted but found to be entirely impracticable and was abandoned soon after its completion. I have been over this stretch of the river repeatedly in light boats and there is no evidence now remaining of the government improvement except a few notches or sluices in falls.

I further state that no freight is created between Hinton and the Virginia line which is not adequately taken care of by County Roads and trucks and by the Virginian and C & O Railroads; that there are no minerals or coal between these two points and that the mountains rise very abruptly and to a great height
3304 on each side of the river leaving a narrow gorge or valley with an occasional small bottom and that even if the river was made navigable that it would be impracticable to secure any freight from the contiguous territory on account of the conditions above stated.

I further state that there has never been any interstate commerce along the river between Virginia and West Virginia.

Given under my hand and seal this the 9th day of October 1925.

[SEAL] (Signed) C. A. TEMPLETON.

Taken, subscribed, and sworn to before me, and given under my hand and official seal this the 9th day of October 1925.

(Signed) SALLY B. SAUNDERS,
Notary Public.

My commission expires on the 2nd day of November 1932.

3305 *Government exhibit 100*

HEARING BEFORE FEDERAL POWER COMMISSION

In re New River Development Company Declaration of Intention. March 2, 1926. Douglas O. Morgan, Columbian Building, Washington, D. C.

3306 INDEX

Name of speaker:
For the New River Development Company: Page
Walter L. Worral, Esq. 3
Robert E. Scott, Esq. 23
For the State of Virginia:
Hon. John R. Saunders 35
C. M. Chichester, Esq. 42

3307 New Rier (Virginia)—Federal Power Commission

Hearing relative to Declaration of Intention of the New River Development Company, affecting the New River, in Virginia.

WASHINGTON, D. C., *Tuesday, March 2, 1926.*

A hearing was held by the Federal Power Commission in the office of the Secretary of War, relative to the declaration of intention under the Federal Water Power Act filed by the New River Development Company, affecting the New River in Virginia.

Present: Hon. Dwight F. Davis, Secretary of War; Hon. Hubert Work, Secretary of the Interior; Hon. W. M. Jardine, Secretary of Agriculture; and Hon. O. C. Merrill, Executive Secretary of the Commission.

Appearances: For the New River Development Company: Walter L. Worrall, Esq.; Robert E. Scott, Esq.; C. M. Micou, Esq.; H. W. Buck, Esq. For the State of Virginia: Hon. John R. Saunders, Attorney General of Virginia; C. M. Chichester, Esq., representing State Corporation Commission of Virginia.

3308 Secretary DAVIS. Dr. Work is detained for a few minutes; but we will not keep you gentlemen waiting any longer, but will proceed.

This is a hearing on the declaration of intention of the New River Development Company.

ARGUMENT OF WALTER L. WORRALL, ESQ., ATTORNEY FOR THE NEW RIVER DEVELOPMENT COMPANY

Mr. WORRALL. Mr. Chairman and gentlemen: This is a hearing on the declaration of intention to construct a dam and water power project in the New River in Virginia.

We have made it in accordance with the provisions of the second paragraph of Section 23 of the Federal Water Power Act, which reads as follows:

"That any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States, may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws."

3309 Now, the Federal Water Power Act originally arose out of two bills which were before Congress, one affecting water power projects on the public lands, and the other to authorize some responsible body to give the consent of Congress to the erection of dams in navigable waters. The two were more or less joined in the act creating the Federal Power Commission. From the time when the United States originally took over jurisdiction of navigation, the regulation of navigation had been confined to the War Department.

There was confided to the Department of the Interior the public lands, and to the Department of Agriculture the forests.

Now, those were the three things that would have been affected by the development of water powers. The one principally affected here, and the only one, I think, is that in regard to navigation. In Virginia there are no Government lands and no forests reserves that I know of.

And I wish to state here that, in the jurisdiction of the Commission in non-navigable streams, it can not go beyond the Constitutional limitations imposed on Congress in regard to non-navigable streams, as construed by the decisions of the courts, that is, that the interference should not adversely affect the interests of interstate or foreign commerce.

Now, pursuant to the terms of the act, the Commission has had this matter investigated through the Department which has been charged with the jurisdiction over questions of navigation and navigable waters, that is, the War Department.

Originally, the War Department in an investigation said that they could see no reason why jurisdiction should not be taken. A re-hearing was requested on the question of the jurisdiction of the United States over non-navigable streams; and a further investigation and report was made by the Chief of Engineers of the War Department. I should like to read that report; it is dated December 29, 1925, and is as follows:

3310 "The Executive Secretary,
Federal Power Commission, Washington, D. C.

"Dear Sir:

"1. Under date of October 28, 1925, you transmitted to this office a memorandum from the New River Development Company by their attorneys, Messrs. Curtis, Millet-Prevost, Colt & Mosle, in which request is made that the Chief of Engineers reconsider his report of August 20, 1925, to the Federal Power Commission on the Declaration of Intention of the New River Development Company.

"2. In that report the Chief of Engineers stated that 'while the navigable capacity of the stream is limited this office must report that no sufficient reason is seen why the Federal Power Commission should not exercise jurisdiction over the proposed project.'

"3. The declarant now requests reconsideration of those portions of this report relating to:

"A. The navigability of New River.

"B. The effect of the proposed project upon the navigable capacity of the Kanawha River.

"A careful study has been made of all the data presented by the declarant and a further study has been made of all available data and records bearing on the questions at issue which are available in this office, or which could be obtained from other government bureaus. The following report is the result of the additional studies which have been made and the additional information which has been obtained since the date of my previous report:

"A. As to the navigability of New River

"What constitutes a navigable water of the United States within the meaning of the commerce clause of the Constitution and the acts of Congress based thereon, including the Federal Power Act, has been defined in numerous decisions of the Supreme Court and from these decisions the following rule is deduced:

3310–A "'A stream is navigable in law when it is navigable in fact, and it is navigable in fact when, in its natural or improved condition, it affords a channel for useful commerce of a substantial and permanent character, conducted in the customary modes of trade and travel on water. A theoretical or potential navigability, or one that is temporary, precarious and unprofitable, is not sufficient, but to be navigable in fact a watercourse must have practical usefulness to the public as a highway for transportation. A stream navigable in fact, as thus defined, is a navigable water of the United States when it forms by itself, or by uniting with other waters, a continuous highway over which commerce may be conducted between the States.'"

"Having this rule in mind, I am of the opinion that the data and information disclosed in the Department's records and reports do not support the conclusion that New River affords a channel for useful commerce or that it is navigable in fact. That section of the river between its mouth and the town of Hinton, having a fall of about 735 feet in a distance of less than 60 miles, may be dismissed from discussion. This Department has reported that the whole section is unfavorable for navigation and that it could not be connected with navigation in the Kanawha by the expenditure of any reasonable amount.

"Surveys have been made in accordance with the direction of Congress of the stretch of river extending from Hinton, W. Va., at the mouth of Greenbrier River, upstream to the mouth of Wilson Creek in Virginia, a distance of about 190 miles. The lower 24 miles only of this stretch is in West Virginia, the remainder being in the State of Virginia and embracing practically all of the stream in that State. Survey of 128 miles, from Greenbrier River to the "Lead Mines," was made in 1872, and of the 62 miles from "Lead Mines" to Wilson Creek, in 1878, the results being printed in the annual reports of the Chief of Engineers, for 1873, pages 842 et seq., and 1879, pages 538 et seq. These surveys are very detailed, covering the river mile by mile throughout the 190 mile stretch, and the reports thereon afford the only reliable information on record of original conditions. From the survey report of 1872 on the 128-mile section below "Lead Mines," the following is quoted:

" 'The river in its present condition presents the usual features of mountain streams, reaches of comparatively still and 3310-B deep water separated by rapids and shoals. In the upper portion of 35 or 40 miles the pools are generally very short, whole miles being composed of ledges of slate or limestone, 200 or 300 feet apart, with small pools between. In the lower portion, though the rapids are more concentrated, yet even then the pools will hardly average more than one mile in length. The total fall from Lead Mines to Greenbrier is 531 feet, or about 4¼ feet per mile.'

"The survey report of 1879, on the 62-mile section above Lead Mines, contains the following:

“‘As is usual with mountain streams, this river presents pools of comparatively deep and still water, separated by rapids, shoals and falls. The water flows in the pools at about the rate of 1 mile per hour; over the rapids at the rate of 3 miles per hour, and over the falls at about the rate of 5 miles per hour. The depth usually over the falls is from 9 to 12 inches; frequently however, obstructions are formed below by bowlders, which increased this depth to 2 feet. Throughout this survey the pools are very short, whole miles being composed of ledges of gray and blue granite or slate, a few hundred feet apart, with very short pools between. Only five pools of a mile in length in this portion of the river. The total fall in the river from the mouth of Wilson to the Lead Mines is 507 feet, or about 8½ per mile.’

“The detailed, mile by mile, data given in the reports fully justify these concrete statements, and it seems unquestionable that the river was not navigable in fact in its original natural condition.

“It is my opinion that these natural conditions were not changed by subsequent improvements, to the extent of making the river a highway for commerce.

“It appears from the annual reports of the Chief of Engineers that the work of improvement accomplished up to the time it was finally discontinued is as follows:

“‘1. From Hinton Landing to Wiley's Falls, a distance
3310–C of 26 miles, a channel 50 feet wide and 2 feet deep was obtained, practically all of which is in West Virginia, less than 2 miles extending into Virginia. The fall in this distance is 104 feet. From Wiley's shoals to New River Bridge, a distance of about 60 miles, a succession of falls, shoals and rapids, no improvement work was undertaken.

“‘2. Above New River Bridge and between that point and the Lead Mines, 29½ miles of channel was deepened to 2 feet, 12 miles of which was widened to 30 feet, 2½ miles to 20 feet, and 15 miles to 10 feet. On account of the existence of Fosters Falls, the fall being 18 feet in less than half a mile, improvement work was carried no farther on this stretch.

“‘3. Above Lead Mines, on a reach of 62 miles, about 5 miles of channel was improved to a depth of 2 feet and width of 20 feet.’

“Of the 190 miles of river embraced in the adopted projects, work was carried on only on about 60 miles, and this 60 miles was divided into 3 widely separated stretches with long unnavigable reaches between them. Work was limited to the most easily improved places and effort made to so ameliorate conditions as to permit local navigation. The results were not satisfactory or important and Congress discontinued appropriations after 1886, less than one-third of the funds required for any effective improvement having been provided. In 1899, the Chief of Engineers dropped the work from his annual report, and in the river and harbor act of 1902, Congress repealed all previous provisions of law providing for the prosecution of work on the river and directed the return to the Treasury of the unexpended balance of funds pertaining thereto. The river was not thereafter considered an authorized project for improvement.

"It is evident that the work executed by the Government during the years 1877–1882, did not materially change the natural non-navigable conditions of the river. The improvement effected was at most slight and fragmentary, and the small channels worked over are reported to have deteriorated due to the natural action of ice and the current. Continuous navigation on the river has never been possible, and whatever commerce has existed has been *has been* altogether local 3310-D apparently confined to the 25-mile section in West Virginia ending at Hinton.

"The District and Division Engineers have reported that there is no commerce and that the river is not now navigable in fact, but they assume that it is legally navigable for the reason that money has been expended on it for channel improvement by authority of Congress. It is well settled by judicial decisions that acts of Congress appropriating money for the improvement of a stream are not to be construed as declarations express or implied that the stream is actually navigable. Congress may authorize the improvement of a non-navigable stream with a view to creating navigability, yet unless the improvement is accomplished the natural state of the stream is not changed. Whether or not it is navigable is still a question of fact unaffected by the consideration that money has been appropriated and expended in an effort to improve it.

"I, therefore, conclude that New River is not at the present time a navigable water of the United States within the meaning of the Constitution and laws of Congress including section 3 of the Federal Power Act.

"B. As to the effect of the proposed project upon the navigable capacity of the Kanawha River.

"The site of the proposed dam is 155 miles above the head of navigation on the Kanawha River. The New River between this site and the Kanawha River is a series of pools of comparatively still and deep water separated by rapids and shoals. There is no known method of computing with any degree of accuracy the effect of fluctuations in flow at the dam on the stage of the river at various distances below the dam. The pools would act as a series of storage reservoirs, the effect of which would be to equalize the flow. I am of the opinion that any periodic fluctuations in flow due to normal operation of the project works would be so attenuated by the time they had reached the Kanawha 155 miles distant as to preclude the probability of any adverse effect upon navigation on that river.

"It may be assumed as a possibility that the plant might be closed down completely for an indefinite period of time during a dry season and at a time when the storage above the dam had been drawn down. In the event of such a combination of circumstances all water from the drainage area above the dam would be shut off until the reservoir filled or until operations were resumed.

3310–E "The drainage area above Dam No. 2, the upper dam in the Kanawha River, is 8,470 square miles. The drainage area above the site of the proposed dam is 2,396 square miles. The drainage area between the proposed dam and Dam No. 2 is therefore 6,074 square miles. Records of the measured flow for the years 1909–1916 are available for streams which drain a total of 3,714 square miles of this intermediate area. From these records the total flow of the drainage area below the proposed dam has been computed for each month of the years for which records are available. It is found from these computations that the run-off from this drainage area below the proposed dam is sufficient to supply the necessary water for navigation on the Kanawha River under the existing project.

"Therefore, so far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project.

"I, therefore, report that in my opinion New River in its present condition is not a navigable stream and that navigation on the Kanawha River will not be adversely affected by the proposed power development.

"Very respectfully,

"(Signed) H. TAYLOR,
"Major General, Chief of Engineers."

Now that is the report of General Taylor, Chief of Engineers of the War Department, on an investigation made by him for this Commission. The War Department is the proper authority to report on this matter. The Federal Water Power Act provides that the work of the Commission shall be performed "by and through the Departments of War, Interior and Agriculture, and their engineering, technical, clerical, and other personnel, except as may be otherwise provided by law.

3311 And in the first report of the Commission it is said:

"The Commission has no field force, assigned or otherwise, but is required to depend exclusively on the field forces of the three departments for making examinations of the projects applied for; for preparing the reports upon which the Commission bases its action; and for supervising the performance by licensees and permittees of the conditions of licenses and permits issued."

You have therefore a report by the Department charged with the investigation for the Commission in which it is stated, first, that the New River is not a navigable stream; and second, that the proposed project would not affect navigation in the Kanawha River, which is the head of navigation, or where navigation starts in that system of water courses.

Under the present legislation, the Act of 1899, in the event that this dam was erected, the only authority under the statute who could determine whether that dam was an interference with interstate commerce or navigation would be the War Department; and any injunction brought by the Attorney General would be on reports furnished to him by the War Department; and it seems to me that, under this report of the Chief of Engineers of the War Department, as far as the War Department is concerned, it says that this project would not interfere with any jurisdiction which the United States has in the waters of New River; that being a non-navigable stream.

Now, the effect of not following that would be to disregard the reports of the Commission's own engineers, acting in connection with navigation.

In this connection, the report of the Chief of Engineers has been borne out by the studies of the engineers of the declarant. Some of them are here now, in the event you want any corroboration of the report of the Chief of Engineers.

3312 I wish to say further that the reason for the company filing this declaration was not that it believed that any time it was subject to the jurisdiction of the Federal Power Commission; but so much talk has been going on as to the Federal Power Commission that it had to do something one way or the other for the sale of its bonds; if it made the application and the Commission did not find that it affected navigation, or interstate or foreign commerce, it would then be in a position to say that it had been to the Federal Power Commission. In selling bonds, we have to sell other people's money. We did this out of an excess of caution, and not from any thought that the development of this project would be subject to the jurisdiction of the Commission.

The company has acquired rights in the land. It owns the damsite. It owns the power house site. It is a corporation organized and transacting a public utility business in Virginia, and as such has the right of eminent domain; and it has acquired vested rights in there, which, if it were required to take a license, it would be deprived of to a certain extent; because the terms of the license under the act are such that the Supreme Court has held in certain cases that they are not proper methods in determining valuations under the exercise of the right of eminent domain.

In the second annual report of the Commission as to its policy, I would like to call your attention to this extract:

"The question of navigability is not one of mathematical formulas, and there is no more probability that it can be removed from the domain of individual judgment than that our laws in general can be drawn with such precision that the services of the courts in their interpretation can be dispensed with. The decisions of the commission in the individual cases presented to it will establish precedents which will gradually clear the situation. Three recent cases on interstate streams, the Saco River, running from New Hampshire into Maine, the Connecticut, a boundary between New Hampshire and Vermont, and the Menominee, a boundary between Wisconsin and Michigan, are indicative
3313 of the policy the commission is pursuing.

"The first two are actually carrying property in interstate commerce in considerable quantities in the form of logs and pulp wood, and the third is suitable for such use. All three are, therefore, technically navigable; but due to the fact that in each instance the laws of the State afford full protection to such commerce, and that the proposed dams would not obstruct it, the commission made formal finding that the streams were not 'navigable waters' within the definition of the act, that the proposed dams would not affect the interests of interstate commerce, and that, therefore, no Federal license was required for their construction. The commission does not propose to extend its jurisdiction in this respect beyond the point where some substantial interest of interstate or foreign commerce is involved."

Now, that I take to be a declaration of the policy of the Commission; and as applied to this case, to this declaration, as shown by the report of the Chief of Engineers, not only is there no substantial interference with the interests of interstate or foreign commerce, but under his report there is no interference whatever.

Now, we feel in this matter that, if there is any other evidence which the Commission might have, we are entitled to meet that evidence. Unless the Commission so requires, we do not see the present necessity of having further evidence submitted by our engineers, which would only be in substantiation of the report of the Chief of Engineers of the War Department, on which, ordinarily, the Commission would act.

The State of Virginia is interested in this proposition, as it has certain rights in the waters of its own State. The Attorney General of Virginia has filed a protest in this particular instance against any declaration that this project is subject to the Federal Power Commission, and is filing a brief, and would like to be heard on the matter.

I will introduce Attorney General Saunders.

3314 ARGUMENT OF ROBERT E. SCOTT, ESQ., RICHMOND, VA., ATTORNEY FOR NEW RIVER DEVELOPMENT COMPANY

Mr. SCOTT. Mr. Chairman and gentlemen: As one of counsel for the New River Development Company, before the Attorney General of Virginia arises, I pray your indulgence while I add just a word or two to what has been so clearly and well said by my associate, Mr. Worrall.

In the first place, I would like to call your attention to a decision of the Supreme Court of the United States on this subject which, as I read the act, is the foundation of the section under which we are proceeding.

I refer to the case of Kansas v. Rio Grande Dam and Irrigation Company, 174 U. S. 690, decided in 1899.

As you are not lawyers, it may be well for me to tell you what that case was. In that case the Rio Grande Dam and Irrigation Company proposed to build a dam across the Colorado River for the purpose of diverting the waters of that stream entirely to irrigation.

The United States, through its proper officers, intervened and filed a bill to enjoin the construction of the dam, on the ground that the navigable capacity of the Rio Grande River (the Colorado being a tributary of that river) would be impaired. The court below held that, inasmuch as the Colorado River was a non-navigable stream, the Federal Government had no right to interfere.

Upon appeal to the United States Supreme Court, that court held that the Federal Government, as the guardian of the navigable capacity of its navigable waters, had a right to inquire as to whether or not the proposed project would interfere with the navigable capacity of the stream below. It therefore reversed the action of the lower court, and remanded the case to that court, for the inquiry as to whether or not the navigable capacity of the Rio Grande River would be affected by the construction of the proposed dam.

3315 In doing that, the court used this language—and as I will point out to you in a moment, the act here is practically a transcript of what the court there said:

> "The case is remanded with instructions to set aside the decree of dismissal"—

which was the act of the lower court,

> "and to order an inquiry into the question whether the intended acts of the defendants in the construction of the dam, and in appropriating the waters of the Rio Grande will substantially diminish the navigability of that stream, within the limits of present navigability, and if so, to enter a decree restraining those acts to the extent that they will so diminish it."

Conversely, the proposition was also true that, if the answer was in the negative, the bill would be dismissed. In the course of its opinion on the subject, the court said that, of course, when such proceedings are instituted it becomes a question of fact whether the act sought to be enjoined is one which fairly and directly tends to obstruct the navigability of a stream.

You will see at once the point that I am approaching. Now, when you come to examine the section under which we are proceeding, which is the last paragraph of section 23 of the Federal Water Power Act, you will find the thought there, and the principle there embodied.

It says that, wherever a corporation proposes to erect a dam in a stream such as the New River, about which there may be some question about the effect on navigability, it shall file a declaration of intention with the Commission. Now, mark the duty of the Commission. It is so clear that the wayfaring man may easily read it:

> "whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or 3316 foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws."

Under that section, we have proceeded; and we come to this Commission for the answer to that question.

The question is a narrow one. It lies within exceedingly narrow limits. We ask this Commission to determine it, in order that we may market out bonds, without the shadow of a cloud upon our authority to erect this dam. We are here to clear the cloud as it may be, upon our rights to erect this dam and to market our securities; and we come and ask the Commission for the answer to that question.

We do not come, if your Honors please, without an invitation. I find in your second annual report that this question has heretofore been considered by this Commission. It was upon this invitation, largely, that I came and advised the institution of this proceeding.

The Commission said in that report, as Mr. Worrall has read to you, that the question of navigability is not one of easy determination; but that in each case the Commission will consider it upon its merits; and if there is no public need, no public requirement, for the exercise of its powers, it will refrain from exercising them.

The Commission cited three cases, which are referred to on page 3 of that report; and it said—and I ask you to mark what this Commission has said in that report:

"The decisions of the commission in the individual cases presented to it will establish precedents which will gradually clear the situation. Three recent cases on interstate streams, the Saco
River, running from New Hampshire into Maine, the
3317 Connecticut, a boundary between New Hampshire and
Vermont, and the Menominee, a boundary between Wisconsin and Michigan, are indicative of the policy the commission is pursuing."

And I refer to the precedents there for my appearance here, if any precedent be needed.

Continuing, the report said:

"The first two are actually carrying property in interstate commerce in considerable quantities in the form of logs and pulp wood, and the third is suitable for such use. All three are, therefore, technically navigable; but due to the fact that in each instance the laws of the State afford full protection to such commerce, and that the proposed dams would not obstruct it."

Now, mark this language, if you please—

"the commission made formal finding that the streams were not 'navigable waters' within the definition of the act, that the proposed dams would not affect the interests of interstate commerce, and that, therefore, no Federal license was required for their construction."

Now, I ask you again to mark the ground; because, said the Commission—

"The proposed dam would not affect the interests of interstate commerce, and therefore, no Federal license was required for their construction."

I came too, because I felt, if the Commission please, that I was not before a hostile tribunal, avaricious of power and stretching out its hands for jurisdiction where there was no substantial foundation for it; because I find that that paragraph which I have just been reading closed with these words:

> "The commission does not propose to extend its jurisdic-
> 3318 tion in this respect beyond the point where some substantial
> interest of interstate or foreign commerce is involved."

Let me read that to you again: because it is an answer to any criticism that there may be, or as to any inquiry as to why I am here and why I confidently look to this Commission for a negative answer to the single question which I have propounded to it:

"The commission does not propose to extend its jurisdiction in this respect beyond the point where some substantial interest of interstate or foreign commerce is involved."

I find in this same book, at page 117, that this Commission has acted heretofore on that theory. There it is said:

"In the matter of the declaration of intention of the Caddo River Power & Irrigation Co., of Little Rock, Ark., to construct two dams across and in Caddo Creek, a branch of Ouachita River, in Clark County, Ark., the Commission having caused the matter to be investigated and it appearing from the report of such investigation that Caddo Creek is not a navigable water of the United States and that the proposed construction will not affect interstate or foreign commerce, it was noted that the Commission finds that the interests of interstate or foreign commerce would not be affected by such proposed construction."

And that is all that we ask to be done in this proceeding. Now, let us come for a moment—and I shall not detain you long—to the merits of the proposition:

This declaration of intention, you will find when you come to examine it, was filed some months ago—last June, thereupon, a careful, painstaking and exhaustive examination of the subject was made, with a view of ascertaining definitely whether the interests of interstate or foreign commerce would be affected. It was not done haphazard. It was not done by unauthorized people.

If you will turn to the act to which I have had reference, you
will find that there is a provision in section 2 of the act to
3319 which I ask your particular attention:

"The work of the commission"—

That is you gentlemen—

"shall be performed by and through the Departments of War, Interior and Agriculture and their engineering, technical, clerical, and other personnel, except as may be otherwise provided by law."

Investigation of this matter is to be performed by and through the Department of War. The report of that investigation—and they made a most careful, thorough, exhaustive and painstaking one—is before you.

And bearing in mind, now, that the one question to be answered is, as you answered it in the Caddo Case. whether the interests of interstate or foreign commerce would be affected by this, we find that it has been directly answered in terms too clear to admit of doubt—and not by any unauthorized person; but by the agency appointed to do it by the statute—the War Department; and by the report of the Chief of Engineers of that Department, after investigation by men highly skilled in their duties; men whose opinions this Commission must rely upon; men whose report, I submit, this Commission must follow.

And they say two things which are conslusive of the proposition now before the Commission. They said that they had careful and exhaustive computations in reference to the matter, with this result:

"It is found from these computations that the runoff from this drainage area below the proposed dam is sufficient to supply the necessary water for navigation in the Kanawha River under the existing projects."

Having first said before that that the New River at this point was a non-navigable stream, the only question left open was whether or not the interests of interstate or foreign commerce would be affected by this dam.

Their first promise is that the run-off from the main area below the dam is sufficient to supply the necessary water for navigation on the Kanawha River under the existing contract.

3320 One other question that naturally suggested itself was: Could the existing project, if carried to completion, be so operated as to be detrimental to navigation of the stream below? And mark the answer:

"Therefore, so far as can be treated from available data and records, it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project."

May I take the liberty of just calling your attention to that finding?

Therefore, says Gen. Taylor, Chief of Engineers—a Major General of the United States Army—therefore, so far as can be predicted from available data and records, it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project.

May I submit, then, that the matter must necessarily be concluded, unless there be some countervailing evidence, of which I have heard none! If there be anybody to question that finding, we would like to hear him.

We ask the right at the hands of this Commission to be present when the testimony shall be produced and to be allowed to cross examine the witnesses and to introduce countervailing evidence.

I have here, if the Commission please, some of the most distinguished hydraulic engineers of my acquaintance—men who have made a study of this thing for years. I myself have been operating on this stream for years, since 1912. I come from the State of Virginia, and I know whereof I speak. And I am prepared to say to the Commission, upon my own responsibility, that those findings of Gen. Taylor are true, and they will stand the test, without the fear of successful contradiction.

Coming back, then, to my original proposition, if the Commission please, that is as to your duty under the act; I have read the act to you, which says that you shall answer the question, and
the question alone, whether or not the proposed project
3321 will affect the navigable capacity of the stream below.

And I submit, without the fear of successful contradiction, that that answer must be in the negative; and I ask for that answer at your hands.

If the Commission please, there is one other aspect of this case which is in the hands of others.

This dam is proposed to be built in the State of Virginia by one of its public service corporations—a corporation which serves the most important industrial area in that State; and when the Governor of Virginia heard, or was advised of this pending application, he did two things: He called in his Attorney General, and told him to investigate it, and if it should be found that the stream is not a navigable stream, to enter the protest of the State against the assumption of jurisdiction here.

There is another branch of the State Government which has supervision over these matters, and that is the State Corporation Commission. It is a regulatory body, charged by law with the regulation of public utilities and public service corporations of the State. Its duties are to supervise the acts and practices, the rates and the conduct of those companies. And that body has sent its attorney here to make known its wishes or its views of the situation.

I shall therefore ask the privilege, if the Commission please, of presenting to this body, Hon. John R. Saunders, Attorney General of Virginia, who will present the protest of the State in this matter, together with a brief statement of the reasons underlying that protest.

ARGUMENT OF HON. JOHN R. SAUNDERS, ATTORNEY GENERAL OF VIRGINIA

Mr. SAUNDERS. If the Commission please: I hold in my hand some copies of the brief which was filed on behalf of the State of Virginia, and also on behalf of the State Corporation Commission.

3322 In making this appearance on behalf of the State, I also desire to file this paper, which I will read:

"Before the Federal Power Commission. In Re New River Development. Declaration of Intention Project # ——.

"The State of Virginia by its Attorney General, by direction of the Governor thereof, hereby makes known to the Commission that it protests against the assumption of jurisdiction by it of the project above referred to.

"The grounds upon which this protest is based are set out in part in a brief herewith filed.

"(Signed) JNO. R. SAUNDERS,
"*Attorney General of Virginia.*"

Now, if the Commission please, I shall be very brief in the statement which I am going to make to the Commission, due to the fact that the reasons why the state of Virginia is protesting against the assumption of power on the part of the Federal Power Commission have been fully set forth in the brief which has been filed.

We believe, if the Commission please, that those reasons which we have assigned are fully substantiated and maintained by the decisions of the United States Supreme Court.

As this Commission doubtless knows, Virginia, unlike many other States in this Union, has still maintained and reserved to itself, for the benefit of all citizens of that Commonwealth, the beds and shoals of the rivers and streams which go through that State. She has done that for reasons which were best known to herself; and it has been a source of gratification to her citizens, and in many instances, it is a source of revenue, particularly in the Eastern section of the State, where I am from, where the oysters and the fish are mainly produced to supply surrounding territory.

This great Government of ours, as you all know, is formed of two great systems, dual in its capacity—the Federal and the State Governments.

3323 For more than a century and a half, or nearly a century and a half, as has been said by one of the learned judges of the Supreme Court, that that has endured, our country has prospered and things have moved on smoothly.

Virginia is very proud of the part which she played in the framing and making of this great constitution, the Federal Constitution, for which she has great respect, and which our citizens cling to as a Magna Charta of our civilization. If I mistake not, history records the fact that it was hung in the balance, eight states having ratified it, and North Caroline and Rhode Island having voted against it. The Convention waited with breathless suspense on that occasion to see what Virginia would do—she was the largest State in the Union—and what her attitude would be. It was then that Mr. Madison, who is familiarly known to all citizens as the Father of The Constitution, took his stand and took his position in that great Convention, and Virginia voted for ratification and the Constitution was preserved and saved.

And yet with all of the admiration which she holds for that Constitution, and with all the obeisance which she pays to the Federal Government and the Bureau's thereof, Virginia still maintains that there are certain inalienable rights which are guaranteed to her by that Constitution, and to the citizens of Virginia by her own constitution; and we believe that the Federal Government has no right to usurp certain powers over which the State exercises its control.

The Tenth Amendment to the Constitution says that powers not delegated to the United States by the Constitution, nor prohibited by it to the States are reserved to the States, respectively, or to the people.

The power of the Federal Government in navigable waters is limited to the regulation of navigation in interstate or foreign commerce.

Second, navigation is only one of the uses of which navigable waters are suspectible.

And third, in all other respects, internal or riparian
3324 waters are fully reserved to State control, as in the regulation of fisheries, in the control of the shores, and the ownership of submerged lands.

Mr. Chief Justice Taft, in delivering the opinion in the Child Labor Tax Case, used this language:

"It is the high duty and function of this court in cases regularly brought to its bar to decline to recognize or enforce seeming laws of Congress, dealing with subjects not entrusted to Congress, but left or committed by the supreme law of the land to the control of the States. We cannot avoid the duty, even though it require us to refuse to give effect to legislation designed to promote the highest good. The good sought in unconstitutional legislation is an insidious feature because it leads citizens and legislators of good purpose to promote it without thought of the serious breach it will make in the ark of our covenant or the harm which will come from breaking down recognized standards. In the maintenance of local self-government, on the one hand, and the national power, on the other, our country has been able to endure and prosper for near a century and a half."

Now, if the Commission please, the question which confronts this Commission today is, first, Is the New River a navigable stream? If it is not a navigable stream; if the rights of the Federal Government, so far as interstate or foreign commerce are concerned are not impeded, are not hindered, are not infringed upon, by the construction of this dam; then, if the Commission please, it becomes a matter for the State of Virginia to control as to how, under what conditions, and the manner in which this dam shall be constructed by one of its citizens.

As has been said by the gentlemen who have preceded me, Gen. Taylor has been delegated as the authority to make an investigation in this matter. He has reported in the negative, namely, that this river is not a navigable stream.

And the report goes further: That under no circumstances
could the erection of this dam which is in contemplation
3325 by the New River Development Company in any manner
interfere with the navigability of the Kanawha River, into
which the New River flows.

Now, with that statement of facts before the Commission; and with the decisions of the courts based upon this dual form of Government, to which I have briefly referred, I cannot for a moment think but what this Commission will say that, having investigated the matter, it now becomes a matter for the State of Virginia to control the erection of this dam.

May I read the closing paragraph of this brief?

"This Commonwealth has in the past suffered no usurpation of its power, nor violation of property rights of its citizens protected by its laws, nor will such action be suffered in the future."

I trust the Commission will not construe that language to mean anything like a threat to this body; but simply that Virginia, believing that she has certain inherent powers which are guaranteed to her by the Federal Constitution, and which she has always sought to maintain and to preserve, through local self-government and by the provisions of her own constitution—believing that, we come in this manner and file our protest against the jurisdiction of the Commission, and say to the Commission that, having investigated the matter, the facts having been presented to the Commission, there can be but one answer, as was said by Mr. Scott.

Thank you, gentlemen.

Secretary DAVIS. Does that conclude the hearing?

Mr. **Scott**. Mr. Chairman, I would like to raise a point of inquiry as to your procedure.

The question before the Commission, as I have indicated, as I understand it, is one of fact. The fact has been investigated and reported upon by the Chief of Engineers of the Army, the officer of the Government intrusted with this inquiry.

I want to ask if the Commission wants to hear testimony in support of that report, or whether it will hear testimony
3326 against it, so that we know how to proceed?

Secretary **Davis**. Have you any briefs which you could file?

Mr. **Scott**. We have filed briefs.

Secretary **Davis**. I mean on the other feature?

Mr. **Scott**. On the facts?

Secretary **Davis**. Yes.

Mr. **Scott**. We have recited the report of the Army officer having that duty, and if that report is to be questioned, we would like to be heard on that.

Secretary **Davis**. I do not think that will be necessary.

Secretary **Work**. Is there anybody here to speak on the other side?

Secretary **Davis**. Yes; we would like to know if there is anybody here to speak on the other side.

Mr. **Scott**. I have not heard of anybody.

I would like to present to the Commission, at this stage, Mr. C. M. Chichester, of the office of the State Corporation Commission of Virginia, who desires to say a few words.

STATEMENT OF MR. C. M. CHICHESTER, REPRESENTING STATE CORPORATION COMMISSION OF VIRGINIA, RICHMOND, VIRGINIA

Mr. **Chichester**. May it please the Commission: I appear for the Corporation Commission of Virginia; and I concur with the Attorney General of Virginia in filing the brief and in presenting the protest to the taking of jurisdiction by the Federal Power Commission in this case.

The Corporation Commission in Virginia is that department of the government which has charge of public utilities; and we feel, upon the assumption that the report of the Chief of Engineers is correct, that this stream is not navigable; and that the project will not injuriously affect navigation on an interstate stream, that we are amply able to exercise such supervision as may be necessary in the performance of its public functions.

3327 I desire to file with the Commission the protest of the State Corporation Commission.

Secretary **Work**. You are the agent of the Governor of the State, are you?

Mr. CHICHESTER. I am the counsel of the State Corporation Commission.

Secretary DAVIS. And they have filed that statement of protest?

Mr. CHICHESTER. Yes.

(The statement referred to is as follows):

"Before the Federal Power Commission. In re New River Development Company. Declaration of Intention.

"STATEMENT BY THE STATE CORPORATION COMMISSION OF VIRGINIA

"The State Corporation Commission of Virginia, comes as amicus curiae, and not as a party to the proceedings, and prays leave as such to present its views in this matter to the Federal Power Commission, and to that end files herewith a brief, signed by its counsel on its behalf, in cooperation with the Attorney General of Virginia.

"It is therefore respectfully asked that the brief hereby and herewith tendered be received and considered by the Federal Power Commission as a brief filed by the State Corporation Commission of Virginia amicus curiae.

"STATE CORPORATION COMMISSION OF VIRGINIA,
"By BERKLEY D. ADAMS, *Chairman.*
"LESTER HOCKER, *Commr.*
"LOUIS S. EPES, *Commr.*"

3328 Mr. SCOTT. If this Commission does not desire to hear any evidence—and I imagine not—that is all we have to say.

Secretary DAVIS. I thank you very much, gentlemen; and we will give the matter consideration.

(Thereupon at 4:50 o'clock p. m., the Commission was adjourned.)

3329 *Government exhibit No. 101*

1926, Oct. 28; Sept. 28; Nov. 20—re: Application for license. Notice of public hearing at Radford Sept. 28, 1926. Mailing list of notices Sept. 28, 1926. Transcript of public hearing at Radford, Oct. 28, 1926. Statement filed on behalf of Appalachian Electric Power Co. regarding protests, Nov. 20, 1926.

3330 WAR DEPARTMENT,
U. S. Engineer Office,
Huntington, W. Va., September 28, 1926.

NOTICE OF PUBLIC HEARING

The application of The Appalachian Electric Power Co. of Richmond, Va., for license to construct a water power development and dam across New River at a point approximately one mile above the mouth of Little River and seven miles above the city of Radford, Virginia, will be considered at a public hearing on the subject, to be held by the undersigned at the city of Radford, Virginia, in the corporation court room at 1:00 p. m. October 28, 1926.

All interested parties are invited to be present or to be represented at the above time and place, particularly navigation interests and the officials of any county, city, town or local association, whose interests may be affected by the construction of the proposed work. They will be given an opportunity to express their views upon the suitability of the location and the adequacy of the plans in reference to navigation, and to suggest changes considered desirable in the interest if navigation.

Oral statements will be heard, but for accuracy of record all important facts and arguments should be submitted in writing, as the records of the hearing will be forwarded for consideration of the War Department. Written statements may be handed to the undersigned at the hearing or mailed to him beforehand.

The plans submitted by the applicants show a dam 110 feet high across New River, also a powerhouse adjacent to and below the south end of the dam. They propose to install four or possibly five—20,000 horsepower turbines and electric generating equipment. The reservoir created would be approximately 19 miles long and cover an area of approximately 4,000 acres.

A map showing the proposed project may be examined by those interested at:

U. S. Engineer Office, 13th floor Coal Exchange Bldg., Huntington, W. Va.

U. S. Engineer Office, 3d floor Post Office Bldg., Charleston, W. Va.

U. S. Post Office, Radford, Virginia.

H. M. Tripps,
Major, Corps of Engineers,
District Engineer.

3331

U. S. Engineer Office,
Huntington, W. Va., September 28, 1926.

Mailing list for Notice of Public Hearing at Radford, Va., on October 28th, on application of the Appalachian Electric Power Co., for license to construct a waterpower project on the New River near Radford, Va.

Copy sent to the following: Chamber of Commerce, Charleston, W. Va.; Chamber of Commerce, Huntington, W. Va.; Chamber of Commerce, Bluefield, W. Va.; Chamber of Commerce, Roanoke, Va.; Governor of the Commonwealth of Virginia (2 copies), Richmond, Va.; Governor of the State of North Carolina (2 copies), Raleigh, N. C.; Governor of the State of West Virginia (2 copies), Charleston, W. Va.; The State Corporation Commission, Richmond, Va.; The Public Service Commission of W. Va., Charleston, W. Va.; Mr. C. M. Chichester, Counsel for State of Va., Richmond, Va.; Mr. W. P. Wiltsee, Chief Engineer, Norfolk & Western Railway Co., Roanoke, Va.; Mr. H. Fernstrom, Chief Engineer, Virginian Railway Co., Norfolk, Va.; Mr. C. W. Johns, Chief Engineer, Chesapeake & Ohio Railway Co., Richmond, Va.; Norfolk & Western Railway Co., Bluefield, W. Va.; Appalachian Electric Power Co., 30 Church St., New York City; Appalachian Electric Power Co., Bluefield, W. Va.; Appalachian Electric Power Co., Richmond, Va.; Mr. Geo. M. Tidd, App. Elec. Pow. Co., 30 Church St., New York City; Mr. N. M. Argabrite, App. Elec. Pow. Co., 30 Church St., New York City; Mr. R. E. Breed, App. Elec. Pow. Co., 30 Church St., New York City; Mr. H. S. Reynolds, App. Elec. Pow. Co., 30 Church St., New York City; Viele, Blackwell and Buck, 49 Wall Street, New York City; Messrs. Curtis, Mallet-Prevost, Colt & Mosle, 30 Broad St., New York City; Mr. H. S. Slocum, Box 33, Bluefield, W. Va.; Mr. B. C. Ward, Byllesby, Va.; Mr F. W. Scheidenhelm, 50 Church Street, New York City; The West Virginia Power Co., Charleston, W. Va.; Mr. L. H. Davis, Room 2021 Carbide & Carbon Bldg., 30 East 42nd St., New York City; Mr. Geo. T. Lancaster, Supt. Electro-Metallurgical Co., Glen Ferris, W. Va.; The Central Power Company, 1132 Munsey Bldg., Washington, D. C.; Mr. J. E. S. Thorpe, 2312 California Street, Washington, D. C.; The Aluminum Company of America, Oliver Bldg., Pittsburgh, Pa.; Mr. G. B. Bebout, Eastern States Dev. Co., Box 437, Zanesville, Ohio; Mr. O. L. Stearnes, Salem, Va.; Mr. H. W. Markle, Appalachian Electric Power Co., Bluefield, W. Va.; Board of Supervisors, Pulaski County, Pulaski, Va.; Board of Supervisors, Giles County, Pearisburg, Va.; Board of Supervisors, Fayette County, Fayetteville, W. Va.; Board of Supervisors, Summers County, Hinton, W. Va.; Mr. A. W. Giles, Virginia Geological Survey, Charlottesville, Va.; Mr. E. D. Burchard, U. S. Geological Survey, Asheville, N. C.; Mr. A. H. Horton, U. S. Geological Survey, Washington, D. C.; Virginia Water Power & Development Commission, Richmond, Va.; The Ludlow Engineers, Winston Salem, N. C.; Mr. W. O. Borcherdt, Supt. Bertha Mineral Co., Austinville, Va.; Mr. Jas. S. Browning, 3332 Pocahontas, Va.; Mr. W. A. Williams, Pearisburg Va.; Mr. W. H. Kersey, Bluefield, W. Va.; Mr. R. W. Arthur, City Manager, Radford, Va. (3 copies); Mr. A. H. Chembley, Belspring, Pulaski County, Va.; Mr. A. H. Hearn, Bluefield, W. Va.; Secretary American Society of Civil Engineers, 33 W. 39th St., New York City; Chief of Engineers, U. S. Army, (6 copies with letter); Federal Power Commission, (6 copies with letter); The Division Engineer, 413 Customhouse, Cincinnati, Ohio (with letter); Postoffice, (with letter) Radford, Va.; U. S. Engineer Office, Charleston, W. Va.; S. L. Tone, 5305 Westminster St., Pittsburgh, Pa.

NOTE.—Newspapers and periodicals furnished copies of notice are listed on separate sheet, attached to copy of circular letter to publishers.

WAR DEPARTMENT,
U. S. ENGINEER OFFICE,
Huntington, W. Va., September 28, 1926.

Subject: Notice of Public Hearing.
To: The Publisher.

Inclosed herewith is a copy of notice of public hearing to be held at Radford, Virginia, on October 28, 1926, on the application of the Appalachian Electric Power Co., Richmond, Virginia, for a license to construct a water power development on the New River near Radford, Virginia.

This notice is sent you with the hope that you may be able to use it as a news item. Unfortunately, no funds are available for advertisement but the subject matter is of such general public interest that it is thought you will be glad to handle it as a news item.

H. M. TRIPPE,
H. M. Trippe,
Major, Corps of Engineers,
District Engineer.

1 inclosure—Public notice.

3333 U. S. ENGINEER OFFICE,
Huntington, W. Va., September 28, 1926.

Mailing list for circular letter to newspaper publishers, dated September 28, 1926, requesting that the matter of a public hearing at Radford, Virginia, October 28, 1926, concerning water power license application of the Appalachian Electric Power Co. be made a news item.

Copy sent to the following: The Bluefield Telegraph, Bluefield, W. Va.; The Post-Herald, Beckley, W. Va.; The Charleston Mail, Charleston, W. Va.; The Charleston Gasette, Charleston, W. Va.; The News, Hinton, W. Va.; The Independent Herald, Hinton, W.

Va.; The Advertiser, Huntington, W. Va.; The Herald-Dispatch, Huntington, W. Va.; The Daily Register, Point Pleasant, W. Va.; The Wheeling News, Wheeling, W. Va.; The Wheeling Register, Wheeling, W. Va.; The Wheeling Intelligencer, Wheeling, W. Va.; The Fayette Tribune, Fayetteville, W. Va.; The Greenbrier Independent, Lewisburg, W. Va.; The West Virginia News, Ronceverte, W. Va.; The Evening Press, Princeton, W. Va.; The Putman Democrat, Winfield, W. Va.; The Putman Leader, Winfield, W. Va.; The Watchman, Union, W. Va.; The Manufacturers Record, Baltimore, Md.; The Grayson Sun, Independence, Grayson County, Va.; The Gazette, Alexandria, Va.; The Herald-Courier, Bristol, Va.; The Ledger Dispatch, Norfolk, Va.; The Virginian-Pilot, Norfolk, Va.; The Times-Dispatch, Richmond, Va.; The News-Leader, Richmond, Va.; The Times, Roanoke, Va.; The World News, Roanoke, Va.; The Progress and Index, Petersburg, Va.; The Southwest Times, Pulaski, Va.; The Engineering and Contracting Pub. Co., 221 E. 20th St., Chicago, Ill.; The Engineering News-Record, 10th Ave. at 36th St., New York City.

Postmasters: Pearisburg, Va. (letter)—4 copies notice, 3 copies circular; Christiansburg, Va. (letter)—4 copies notice, 3 copies circular; Wytheville, Va. (letter)—4 copies notice, 3 copies circular; Richmond, Va., Radford, Va., Roanoke, Va., Bluefield, W. Va., letter (1 copy of notice).

3334

INDEX OF CONTENTS

Page

Those present at hearing 1–2
- Protest of F. M. Livezey, Atty. for Public Service Commission 7
- Protest of W. P. Wiltsee, Chief Engineer Norfolk & Western Railway Co 7–9
- Protest of Legal Dept. Vgn. Railway 9–11
- Protest of Electro Metallurgical Co 12–14

Witnesses

- R. E. Scott 14–16
- R. J. Noell 17
- A. H. Chumbley 17

INDEX OF EXHIBITS

Exhibit–A 7
Exhibit–B 7–9
Exhibit–C 9–11
Exhibit–D 12–14

Summary of proceedings at public hearing, held in the court room of the Corporation Court for the City of Radford, Virginia, on October 28th, 1926, in the matter of the application of Appalachian Electric Power Company for license under the Federal Power Act to construct a project of water power development on New River at a point one mile above the mouth of Little River and seven miles above the City of Radford, Va.

The meeting was called to order at 1:00 P. M. by Major H. M. Trippe.

3335 The following interested parties were present: H. M. Trippe, Major Corps of Engineers, U. S. Army, District Engineer, Huntington, W. Va.; H. C. Adams, Assistant Engineer, Virginian Railway Co., Norfolk, Va.; L. J. Bevan, Viele, Blackwell and Buck, Engineers Appalachian Electric Power Co., 49 Wall St., New York City; H. W. Buck, Appalachian Electric Power Co., 49 Wall St. New York City; A. H. Chumbley, Chairman Board of Supervisors, Pulaski County, Pulaski, Va.; John S. Draper, Appalachian Electric Power Co., Pulaski, Virginia; R. J. Holden, geologist, Appalachian Power Co., Blacksburg, Virginia; H. G. Hall, Attorney for Virginian Railway Co., Roanoke, Va.; C. A. Ferguson, Newport News Ship Building and Dry Dock Co., Newport News, Va.; Charles G. Harris, Engineer, Chesapeake & Potomac Telephone Co., Richmond, Va.; T. L. Einstein, East Radford, Virginia; Dr. W. P. Nye, East Radford, Virginia; H. C. Tyler, East Radford, Virginia; H. E. Sledd, Appalachian Electric Power Co., Bluefield, W. Va.; John Preston McConnell, President State Teachers College, E. Radford, Va.; W. H. Painter, Councilman, Radford, Va.; T. F. Turner, Norfolk and Western Railway Co., Roanoke, Va.; C. M. McCou, Counsel Appalachian Electric Power Co., 30 Broad St., New York City; R. W. Arthur, City Manager, Radford, Va.; Robt. E. Scott, Counsel Appalachian Electric Power Co.,
3336 Richmond, Va.; Major P. S. Reinecke, Asst. Chief Engineer, Federal Power, Washington, D. C.; Col. F. W. Scheidenhelm, Consulting Engineer for Appalachian Electric Power Co., 50 Church St., New York City; R. E. McKenzie, Assistant Engineer, U. S. Engineers Office, Huntington, W. Va.; R. S. Slocum, Appalachian Electric Power Company, Bluefield, W. Va.; L. H. Davis, Electro Metallurgical Co., 30 East 42nd St., New York City; Ben G. Smith, Electro Metallurgical Co., 30 East 42nd St., New York City; F. P. McConnell, Peoples Bank of Radford, Radford, Va.; R. J. Noell, City of Radford, East Radford, Va.

Major H. M. **Trippe**. This meeting has been called for the purpose of hearing evidence on the application made by the Appalachian Electric Power Company, Richmond, Virginia, to the

Federal Power Commission. The company has asked for a license for a project of water-power development on New River at a point approximately one mile above the mouth of Little River and seven miles above the City of Radford, Virginia. They have asked for a license allowing them one year from the date of such license to begin construction and four years for completing construction of the project works. The license, if granted, will authorize the construction, operation and maintenance of certain project works, the principal ones of which are designated as follows:

(a) Dam and reservoir.—Concrete dam, height 110 feet, across New River. Reservoir created by dam approximately 19 miles long. Surface area of reservoir approximately 4,000 acres.

3337 (b) Water conduits.—Turbines will be connected to intakes by stell penstocks embedded in retaining section of dam.

(c) Powerhouse.—Powerhouse will be of brick and steel construction containing 4 and possibly 5 15,000 k.w. alternating current generators.

(d) Transmission lines.—Power is to be generated at 13,200 volts, 60 cycles and is to be conducted into the transmission system already in operation located outside the project boundary, about 500 feet from the powerhouse.

It is desired to have a frank and full expression of the views of all interested parties and as complete a statement as possible of all information bearing upon the question at issue.

The Department will give full weight to all evidence and arguments presented at the hearing; and all pertinent material which the parties wish considered should be brought out at this hearing.

Later ex parte evidence and arguments are not desired by the reviewing authorities unless it is clearly shown that the matter is new and material and that there are good reasons why it could not have been presented at this hearing. Such matter will be called to the attention of opposing interests and they will be given an opportunity to reply if the decision of the Department is otherwise likely to differ from their wishes. Every interested person will be given a reasonable opportunity to be heard. If it is alleged by anyone present that important evidence exists which could be properly prepared in time for the hearing, action will be taken to give a reasonable period for its examination by the opposition and others interested. In any such case, a definite statement should be made as to the amount of time required.

The law applicable is the Federal Water Power Act approved June 10th, 1920:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a commis-

sion is hereby created and established, to be known as the Federal Power Commission, (hereinafter referred to as the commis-
3338 sion), which shall be composed of the Secretary of War, the Secretary of the Interior and the Secretary of Agriculture.

To issue licenses to citizens of the United States or to any corporation organized under the laws of the United States or any State thereof, or to any State or municipality for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, tranmission lines, or other project works necessary or convenient for the development and improvement of navigation, and for the development, transmission and utilization of power across, along, from or in any of the navigable waters of the United States, or upon any part of the public lands and reservations of the United States (including the Territories) or for the purpose of utilizing the surplus water or water power from any Government dam, except as herein provided: Provided, That licenses shall be issued within any reservation only after a finding by the commission that the license will not interfere or be inconsistent with the purpose for which such reservation was created or acquired, and shall be subject to and contain such conditions as the Secretary of the department under whose supervision such reservation falls shall deem necessary for the adequate protection and utilization of such reservation: Provided further, That no license affecting the navigable capacity of any navigable waters of the United States shall be issued until the plans of the dam or other structures affecting navigation have been approved by the Chief of Engineers and the Secretary of War. Whenever the contemplated improvement is, in the judgment of the commission, desirable and justified in the public interest for the purpose of improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, a finding to that effect shall be made by the commission and shall become a part of the records of the commission: Provided, further, That in case the commission shall find that any Government dam may be advantageously used by the United States for public purposes in addition to navigation, no license therefor shall be issued until two years after it shall have reported to Congress the facts and conditions relating thereto, except that this provision shall not apply
3339 to any Government dam constructed prior to the passage of this act: and provided further, That upon the filing of any application for a license which has not been preceding by a preliminary permit under subsection (3) of this section, notice shall be given and published as required by the proviso of said subsection.

That licenses under the act shall be issued for a period not exceeding fifty years. Each such license shall be conditioned upon acceptance by the license of all the terms and conditions of this act and such further conditions, if any, as the Commission shall prescribe in conformity with this act, which said terms and conditions and the acceptance thereof shall be expressed in said license. Licenses may be revoked only for the reasons and in the manner prescribed under the provisions of this act, and may be altered or surrendered only upon mutual agreement between the licensee and the commission after ninety days' public notice.

Each licensee hereunder shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works or of the works appurtenant or accessary thereto constructed under the license and in no event shall the United States be liable therefor.

That wherever any licensee hereunder is directly benefited by the construction work of another licensee, a permittee, or of the United States of a storage reservoir or other headwater improvement, the commission shall require as a condition of the license that the licensee so benefited shall reimburse the owner of such reservoir or other improvements for such part of the annual charges for interest, maintenance and depreciation thereon as the commission may deed equitable. The proportion of such charges to be paid by any licensee shall be determined by the commission.

That nothing herein contained shall be construed as affecting or intending to affect or in any way to interfere with the laws of the respective States relating to the control, appropriation, use, or distribution of water used in irrigation or for municipal or other uses, or any vested right acquired therein.

The following protests have been received and will be read:

Exhibit A.—Telegram from F. M. Livezey, Atty. for
3340 Public Service Commission of West Virginia.

Exhibit B.—Letter from W. P. Wiltsee, Chief Engineer, N. & W. Ry. Co.

Exhibit C.—Letter from Legal Dept. Virginian Railway Co.

Exhibit D.—Petition Electro Metallurgical Co.

Exhibit "A"

Washington, D. C., *Oct. 28, 1926.*

H. M. Trippe,
Major, U. S. Engineers, Radford, Va.

Reference application Appalachian Electric Power Company for license for dam near Radford. The Public Service Commission of West Virginia objects to granting of license unless ample protection is made for present and future development of water power in West Virginia. Stop. Date of hearing called to my attention only yesterday. Impossible to attend because of engagement here. Stop. Further time is requested in which to present more formally the States position.

(Signed) F. M. LIVEZEY,
Atty. for the Public Service Commission of West Virginia.

Exhibit "B"

NORFOLK AND WESTERN RAILWAY CO.

ROANOKE, VA., *October 15, 1926.*

Major H. M. TRIPPE,
District Engineer, U. S. Engineer Office,
Huntington, West Virginia.

DEAR SIR: We have received a copy of the notice issued by your office, of a public hearing to be held at Radford, Virginia, on October 28th to consider the application of the Appalachian Electric Power Company for a license to construct a water power development and dam across New River about a mile above the mouth of little River.

On behalf of this Company I have caused to be examined
3341 the map Exhibit "J" on file at the Post Office at Radford,
Virginia. This map shows only the general location and the drainage area. No elevation or other detailed information, such as width of spillway, cross section of dam, etc., is given, but the map, together with the proposed height of 110 feet, indicates that the back water from this dam or the reservoir created thereby would extend just above our railroad bridge #1509 at Hiawassie, Virginia.

As near as we can determine with the information at hand, the proposed dam will raise the low water elevation under this bridge from one (1) to three (3) feet. Our records indicate that the high water of July 1916, was up so close to the steel work of this bridge that any addition to the height of the water would seriously threaten the safety of the bridge or wash it out entirely.

To raise the normal low water elevation would necessarily cause a raise in the high water elevation, especially since the reservoir created below this bridge would be at least 18 miles long with practically no fall in that distance.

In addition, we have to reckon with the fact that New River rises several feet to the mile above our bridge at Hiawassie, and a condition thus created at this point on account of ice, which must be considered from the standpoint of safety to the bridge. It is well known that ice freezes quicker, harder and thicker in a pool where the current is almost negligible, and after rains and melting snows have put in motion the ice in the higher reaches of the river above the pool, these masses will move in considerable velocity until they reach the upper end of the pool where the ice will for sometime remain solid, and thereby cause the moving mass to roll up and accumulate great weight and force.

This accumulation will be a constant menace to the existence of the bridge, which is liable to be taken out entirely.

A similar condition already exists on the same stream at Fries Junction, where the same power company has a dam at 3342 Byllesby. In January 1918, the main span of this Company's bridge across the river at that point was taken out as the result of accumulated ice pressure and moved down the stream more than 100 feet, and a new span had to be constructed and the bridge restored at a very heavy expense. The public service was annulled for more than a week. The same condition was threatened at that point last year, but disaster was fortunately avoided by timely efforts, which brought about relief from the ice jam.

In view of these facts and conditions, which are apparent, this company deems it necessary for its own protection and that of the Public to oppose the construction of such a dam, the effect of which would be reasonably certain to bring disastrous consequences to its railroad as well as to its transportation business and service to the public, and it, therefore, deems it proper to bring to your attention its purpose to oppose the application of the Power Company for the license applied for to construct a dam at the point mentioned to the height contemplated in the application.

Yours truly,

(Signed) W. P. WILTSEE,
Chief Engineer.

Exhibit "C"

THE VIRGINIAN RAILWAY COMPANY

NORFOLK, VA., *October 25th, 1926.*

IN RE APPLICATION OF APPALACHIAN POWER COMPANY TO CONSTRUCT DAM ON NEW RIVER, VIRGINIA

Major H. M. TRIPPE,
Corps of Engineers, U. S. A.,
Huntington, W. Va.

DEAR SIR: In connection with the application to the Federal Power Commission of the Appalachian Power Company for "a license to construct a water power development and dam across New River at a point approximately one mile above the mouth
of Little River and seven miles above the City of Radford,
3343 Virginia" a public hearing upon which will be held at the
City of Radford, Virginia, on October 28th, 1926, the
Virginian Railway Company hereby submits the following statement of its position in respect of said application:

The Virginian Railway Company does not object to the construction and operation of the proposed dam provided that the same shall be so constructed and operated as not to jeopardize or impede the operation of the Railway Company's property in respects hereinafter set forth.

The Virginian Railway between Mullens, West Virginia, and Roanoke, Virginia, a distance of 134 miles, is operated by electric locomotives. The current for operating said portion of the railway is supplied from a power house at Narrows, Virginia, containing four generators operated by steam with a capacity of fifty thousand kilowatts. It is contemplated as the demand for power for operating said portion of the railway increases, to add additional generators and the necessary boilers and machinery up to an ultimate capacity of above 80,000 kilowatts.

It is vitally important to the Railway Company that there shall be no interruption of the supply of power from said power station since unless such interruption was of very short duration the operation of the entire railroad would be paralyzed during such interruption.

Ninety per cent. of the business of the Railway Company is coal, nearly all of which originates west of the electrified portion of the railway, and the rest of which originates on the west end of such electrified portion of the railway, so that with the electrified portion of the railway out of operation it would be impossible to handle empty cars to or loaded cars from the mines and for such time as such interruption of service continued the portion of the railway operated by steam would be without any coal tonnage to handle.

The electrification of said portion of the railway with the present electrical equipment represents an expenditure of approximately $16,000,000.00 of which the power house at Narrows and the equipment thereof represents upwards of $4,000,000.00 In the operation of said power house large quantities of water are required for the condensers. New River at present 3344 affords an abundant supply and the necessary water is pumped from the river, passed through the condensers and discharged into New River with no appreciable loss of volume. The amount of water presently used is in excess of sixty thousand gallons per minute and the amount expected ultimately to be used will be in excess of one hundred and twenty thousand gallons per minute, which may be abundantly supplied from New River under normal conditions.

Accordingly The Virginian Railway Company prays that if a license be issued for the proposed dam it may be upon condition that said dam shall at all times be so operated as to pass through sufficient water, with the water entering New River below the dam, to afford all persons and property owners below the said dam, including said Railway Company, sufficient water for their needs.

A copy of this letter is being sent to the Federal Power Commission.

Yours very truly,

The Virginian Railway Company,
C. H. Hix, *President.*

Exhibit "D"

In the Matter of The Application of Appalachian Electric Power Company, a Virginia corporation, to Federal Power Commission, Project No. 739. For a license, Project No. 739, with respect to water power development on the New River at a point approximately one mile above the mouth of Little River and seven miles above the City of Radford, Virginia, upon which application a public hearing has been advertised to be held in the Corporation Court Room at the City of Radford, Virginia, on Thursday, October 28th, 1926, at 1:00 P. M.

Electro Metallurgical Company, a Corporation duly created, organized and doing business under the laws of the State 3345 of West Virginia, and having its general office at No. 30 East 42nd Street, New York, owns and operates on the

Kanawha River, at Glen Ferris, West Virginia, a hydro electric development and large industrial works in connection therewith and also owns other extensive and valuable river front lands and power sites on the New River, the value of which for water power development and other purposes may be harmfully affected by the operation of the project set forth in the aforementioned Application, and Electro Metallurgical Company is consequently an interested party in the above-entitled matter.

The dam for water storage and water power development proposed in the afore-mentioned Application has possibilities not only of greatly benefiting but also of greatly damaging present or potential water power developments situated lower down in the New River and Kanawha River drainage basins. But, on the other hand, such dam and the appurtenant works could be so operated as to cause no interference with the natural flow of the said river and consequently not to affect water power developments down stream. However, the resultant effect on water power developments down stream from such dam may range all the way from important improvement, through neutral effect, to great injury, depending upon the manner in which and the extent to which the natural flow of the stream may be modified through the impounding of water behind such dam and its release therefrom.

The present power plant and industrial works of Electro Metallurgical Company are constructed and proposed extensions thereof are designated with respect to continuous twenty-four (24) hour day operation and any interference with the natural flow of the New River, (except reasonable regulation of such flow to produce and to continue uniformity thereof) that would prevent or curtail such twenty-four (24) hour day operation of the said power plant and industrial works and proposed extensions thereof, will seriously injure the commercial operation of the said power plant and proposed extensions thereof and increase the cost of the production of power thereat, and will also be immensely harmful to the operation of the said industrial works, and dependent upon the 3346 extent of such interference, might render the operation of said industrial works impracticable and render nonfeasible the proposed extension of such industrial works.

Electro Metallurgical Company does not hereby protest against the granting of the License applied for in the said application provided that such license shall impose such conditions that shall require the operation of the said project in a manner that shall not be harmful to the land, property or rights useful in the development of water power and for other purposes of Electro Metallurgical Company and others similarly situated, but is of the opinion that the project described in the aforementioned application, if properly operated, may be beneficial rather than harmful to proposed and possible water power developments down stream from the site of said project.

Electro Metallurgical Company does hereby protest however against the granting by Federal Power Commission to the said Appalachian Electric Power Company of the License applied for in the aforementioned Application or any amendment thereof or any substitute therefor unless such License shall contain as a condition thereof a provision to the effect that no interference shall be permitted to be made in the flow past such dam as shall be authorized by or constructed in pursuance of such License, that may at any time restrict the natural flow of the said river or the continuous use thereof for power purposes at points down stream from such dam, in such manner that there would be through the operation of such dam or project, any diminution of the flow of the said river—

(1) either below the natural flow of the said river whenever its natural discharge is less than its mean natural discharge, or

(2) below the mean natural discharge of the said river whenever its natural discharge exceeds its mean natural discharge.

Respectfully submitted,

ELECTRO METALLURGICAL COMPANY,
By BEN J. SMITH, *Attorney.*

Major H. M. TRIPPE. I will now ask Judge Scott to present anything he desires for the Appalachian Electric Power Company.

Mr. SCOTT. Sometime ago the Appalachian Electric Power Company filed a declaration of intention under the last paragraph of Section 23 of the Water Power Act, which provides "that any person, association, corporation, State or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws."

I understand that the Commission has not yet passed upon that proposition. This proposition is made subsequent to that declaration of intention and subsequent to future action of the commission and in the event the commission decides to take jurisdiction then this application is to be considered. The plans and specifications of the proposed project are already on file for the inspection of anyone who may be interested. We, therefore, file this application under this statute as a whole, and submit the matter for the present to the consideration and determination of the commission.

I do not know that there is anything that I can add to what has already been done or to the proof that is already in. The nature
and character of the proposed project is well known, and
3347 the character and nature of the stream is well known,
and the navigation is a matter which is yet to be determined, and I do not understand whether that is expected to be gone into here or not.

Major Tripple. Have you anyone else that you care to present anything?

Mr. Scott. There is nothing further now. I may have to introduce someone later.

Major Tripple. I am now ready to hear anyone in opposition to the project.

Mr. Hall. I simply want to file a letter on behalf of the Virginian Railway Company, setting forth its position with reference to the construction of this dam. (Letter filed, marked "Exhibit–C.")

Major Tripple. Judge Scott, have you anything further you wish to say?

Mr. Scott. I just wish to state this in regard to the letters that have been read. I understand that those questions are not questions which are within the jurisdiction of the Federal Power Commission. The Federal Power authority is based upon the right to control navigable waters of the United States and to improve the navigable capacity of the stream below.

Major Tripple. Are there any further protests?

Mr. Scott. Mr. Chairman, I desire to state one thing further: I am requested by the Attorney General of the State of Virginia to state that his duties are such as to prevent his attendance here today, but he desires to preserve the right to file a petition against the commission asserting the jurisdiction of this project on two grounds, as I understand it, and they are as follows:

(1) That this stream is not a navigable stream within the County of Pulaski, it is not one of the navigable waters of the

United States and that this project cannot be so operated as to interfere with the navigable capacity of the stream, where it is navigable below Kanawha Falls.

(2) The State of Virginia desires to assert her rights to the control of this project both now and hereafter.

3348 That, as I understand, is the position of the Attorney-General and he will file in due time his position in writing.

Major **Trippe.** Are there any further protests to be heard?

As soon as the protests are all heard the meeting will be adjourned.

Major **Trippe.** Judge Scott have you anything further?

Mr. **Scott.** Nothing further.

Major **Trippe.** Anyone else?

Mr. R. J. **Noell.** Our people here are very much interested in the building of this foundation. We think it is along the lines of a development in Virginia and I think the citizenship of Radford stands with absolute uninamity with the purpose of aiding the foundation wherever they can.

General Terry a number of years ago, got a bill through Congress asking for an expenditure of fifty thousand dollars for opening a channel for New River. It did not extend to Pulaski up above the mouth of Little River to Ingles Falls. In that connection I will say that some of the citizens here asked me to write to the Federal Power Commission and I received a letter stating that they would be very glad to get rid of this matter but that they did not think that they really had jurisdiction. I turned that letter over to the gentlemen who requested that I write it and I heard nothing further from them, possible they did have some meeting I do not know.

I waited sometime for some of our citizens to say something regarding this matter, but I think I have voiced the sentiments of our people here, that we would like to see this development go on.

Major **Trippe.** Anyone else desire to be heard?

A. H. **Chumbley.** As Chairman of the Board of Supervisors of Pulaski County, I wish to state that Pulaski County is heartily in favor of this proposed project and the citizens as far as I have been able to ascertain are unanimous in desiring that permit be granted the Appalachian Power Company.

Major **Trippe.** Anyone else desire to be heard?

If not, the meeting will be adjourned, and is adjourned.

3349 **State of Virginia,**

City of Radford, to-wit:

I, Eugenia S. Herrick, a short-hand reporter do hereby certify that the foregoing is a full, true, and complete transcript of the proceedings at the public hearing held in the Corporation Court Room, East Radford, Va. on October 29th, 1926, in the matter of the Application of the Appalachian Electric Power Company of Richmond, Virginia, to the Federal Power Commission, as reported by me in short-hand.

Given under my hand this 24th day of November, 1926.

EUGENIA S. HERRICK,
Shorthand reporter.

3350 STATEMENT FILED ON BEHALF OF APPLICANT, APPALACHIAN ELECTRIC POWER COMPANY, REGARDING PROTESTS TO THE FEDERAL POWER COMMISSION IN RESPECT TO GRANTING LICENSE FOR DEVELOPMENT NO. 6.

Curtis, Mallet-Prevost, Colt & Mosle, Counsellors at Law, 30 Broad Street, New York

3351 5718-X.

STATEMENT ON BEHALF OF APPLICANT, APPALACHIAN ELECTRIC POWER COMPANY, REGARDING PROTESTS TO THE FEDERAL POWER COMMISSION IN RESPECT TO GRANTING LICENSE FOR DEVELOPMENT NO. 6

Protests have been received to date which, for convenience, will be referred to as follows:

1. By Public Service Commission of West Virginia, telegram dated October 28, 1926, supplemented by formal protest dated November 3, 1926;
2. By Electro-Metallurgical Company, undated;
3. By Norfolk & Western Railway Company, dated October 15, 1926;
4. By Virginian Railway Company, dated October 25, 1926;
5. By H. C. Quesenberry, dated November 11, 1926;
6. By Oren F. Dodds, dated October 26, 1926.

Protests Nos. 1 and 2 request protection of the flow below the proposed project, for purposes of power utilization and development. The rights of the protestants in this respect are governed by and protected under State laws.

The Federal Power Commission does not purport to grant, through the issuance of a license or otherwise, any rights to divert or change the flow of the stream, but only to regulate the flow as may strictly be required in the interests of navigation. By requiring that a licensee shall operate its project subject to such reasonable rules and regulations as may from time to time be imposed by the War Department in the interests of navigation the Commission confers upon the licensee no power or right to injure private property.

In respect of several licensees upon the same navigable 3352 stream the Federal Power Commission has jurisdiction to fix their respective rights, powers and duties to a certain extent, for example: to require, under the license terms prescribed in Section 10 (f) of the Water Power Act contribution from a lower licensee for headwater improvement by an upper licensee. However, neither protestant is a licensee under the Federal Water Power Act and it is submitted that the relative rights of the protestants and of the applicant are not to be determined by the Federal Power Commission, but are to be determined by and adjusted under the State laws.

As a practical matter, the plant of Electro-Metallurgical Company is so far below the applicant's proposed development, the intervening river contains such extensive storage from natural pools and gains such increases in flow from intervening tributaries, that any fluctuation will be absorbed and equalized by the time of reaching the Metallurgical Company's plant. The storage of water above the applicant's proposed dam and the use of such stored water in the economic manner required by applicant's extensive distribution service will benefit the Metallurgical Company and increase the annual K. W. H. output of its plant.

Protests 3, 4, and 5 are based upon property interests, entirely unrelated to the interests of navigation, and are accordingly subject to determination under State law or mutual adjustment between the respective protestants and the applicant.

Nevertheless, data is submitted regarding protests 3 and 4, which indicates that the property interests asserted by the respective protestants will not be adversely affected by the construction and operation of applicant's proposed project.

Protest No. 3, by the Norfolk & Western Railway Company, requests protection of the Company's railroad bridge at Hiwassie from injurious effects of floods and/or ice jams.

Attached, marked "Exhibit A," is profile of New River at and above location of proposed dam. Elevation 1841 intersects the present natural flood gradient some distance below Hiwassie 3353 Bridge and the retarding influence on flood flow at the bridge, if any would be so small as to be of no practical effect.

In the improbable event that a dangerous ice jam might form, the pond level of the proposed reservoir could quickly be drawn down by means of the flood gates in a manner to break up the ice jam as has been done in the pool levels above applicant's present dams Nos. 2 and 4.

Under protest No. 4 the Virginian Railway Company requests protection of its supply of condensing water for its steam power generating plant at Narrows, Virginia, about 85 miles below applicant's proposed development. The present capacity of the plant is stated to be 50,000 K. W. and the ultimate capacity 80,000 K. W.

Applicant owns and operates a steam plant at Glen Lyn, 5 miles below the plant of protestant, with a present installed capacity of 80,000 K. W. and a contemplated ultimate capacity of 160,000 K. W. The Railway Company's plant receives the water prior to the applicant's plant and the condensor operation of the Railway Company raises the temperature of the water. The applicant is therefore required to operate its proposed development so as to maintain a flow sufficient for its own condensing requirements with approximately double the generating capacity of the Railway Company, after such water has already served the lesser condensing requirements of the Railway Company.

The property right asserted under protest No. 5 is subject to the condemnation laws of the State of Virginia.

Protest No. 6 is in the nature of a suggestion to the Commission of the advisability of adopting a new location for the dam. The merits of the suggested location have been thoroughly considered by the applicant.

Under protest No. 6 Mr. Dodds requests that the dam site be moved down from the present proposed location to Ingles Ferry, about two miles below, in order to include the drainage area of approximately 300 square miles of Little River.

In the opinion of the applicant's engineers the property
3354 cost involved by such relocation of the dam site would
be excessive. The construction of a dam and reservoir at
the proposed location would:

(a) destroy a valuable limestone quarry and crusher plant located on New River immediately above the mouth of Little River, which has required twenty years for development, employs a large number of men and is a very desirable industry for the locality, being especially favorably located for producing rock for requirements of railroads established in the region; it is stated to be valued at $700,000;

(b) submerge about two miles of Norfolk & Western Railway tracks over which much valuable freight business originates; the value of such trackage and business is stated by the Railway Company to be $900,000;

(c) submerge valuable property bordering Little River for many miles, completely submerging the towns of Graysonton and Snowville; and

(d) submerge the Radford municipal water power plant on Little River.

To relocate the dam site as suggested would not only destro valuable local industry which it is the purpose of the applican to promote rather than to destroy, but the additional cost fo construction at such relocated dam site, in increased property expenditures, would make the new location one which appears a present to be economically prohibitive.

APPALACHIAN ELECTRIC POWER COMPANY,
By CURTIS, MALLET-PREVOST, COLT & MOSLE, *Counsel.*

Dated November 20, 1926.

3355 *Government exhibit No. 102*

5718–X

CURTIS, MALLET-PREVOST, COLT & MOSLE,
ATTORNEYS AND COUNSELLORS AT LAW,
30 Broad Street, New York, September 2, 1926.

FEDERAL POWER COMMISSION,
Washington, D. C.

Re Declaration of Intention of New River Development Company—Application for License, Appalachian Electric Powe Company

DEAR SIRS: We beg to advise that Appalachian Electric Powe Company, a Virginia public service corporation, has recentl acquired, among others, the properties heretofore held by Ne River Development Company for the proposed development o New River in Pulaski County, Virginia, which has been th subject of a Declaration of Intention on the part of that Company before your Commission.

We enclose an instrument, substantially in the form approve by your counsel as advised in Major Edgerton's letter to us o December 19, 1925, which has been executed by New Rive Development Company and Appalachian Electric Power Company, whereby the former transfers to the latter its rights an the latter assumes the obligations, under the Declaration o Intention of New River Development Company.

In order to expedite matters, Appalachian Electric Powe Company is adopting the suggestion made by you in your lette of July 1, 1925 and is submitting herewith an application fo a license for the proposed project, upon the understanding tha such application can be withdrawn if it should develop that Federal license is not required.

Under these circumstances we request that action on th Declaration of Intention, referred to in your letter of August 19

1926, addressed to New River Development Company, be deferred for consideration at the same time as the application for license by Appalachian Electric Power Company.

3355–A The application of Appalachian Electric Power Company, executed in triplicate, is enclosed herewith but maps and drawings submitted as exhibits go forward under separate cover, rolled.

We should appreciate your early advice regarding arrangements for the publication of the required notice of application of Appalachian Electric Power Company for a license, which we should like to have commenced as soon as possible.

Very truly yours,

CURTIS, MALLET-PREVOST, COLT & MOSLE.
C. M. M.

Encl.

3356 *Government exhibit No. 103*

1925—Dec. 9—Telegram to Mr. Merrill, Executive Secretary, from Mr. Kramer re Pitt River.

3357 Western Union Telegram

Received at DA63 349 Collect Govt. NL 1/61, 1925 Dec 9 A. M. 5 14
San Francisco Calif 8.

O. C. MERRILL,
FEDERAL POWER COMMISSION,
Washington, D. C.

Refer your wire December three stop The following hourly fluctuations in second-feet fairly typical stop Pit three August nine at six A. M. to midnight two thousand seventy five then dropping sharply to fifteen fifteen then same to six A. M. August ten then increasing sharply to twenty one twenty five remaining same to midnight August ten then dropping sharply to fourteen forty and continuing at same to six A. M. August eleven stop Pit River at Henderson or Big Ben twenty sixty from eleven A. M. August nine to two thirty A. M. August ten then decreasing to fifteen sixty by five A. M. then continuing same to ten A. M. then increasing to twenty one fifty by ten thirty A. M. continuing same to four A. M. August eleven then dropping to fifteen sixty by six A. M. then decreasing at fourteen fifty by ten A. M. then increasing sharply stop Pit River at Ydalpom twenty three twenty August nine five P. M. continuing same to August ten seven A. M. then decreasing to seventeen eighty at eleven A. M. continuing about same to two P. M. then increasing to twenty three seventy at four thirty P. M. then about same to August eleven eight A. M. then decreasing to eight-

een fifty by ten thirty A. M. then decreasing to seventeen forty by
two P. M. then increasing sharply stop Sacramento River at Red
Bluff August eleven one A. M. top rather flat peak thirty seven
eighty at ten thirty A. M. bottom through thirty four hundred at
eleven P. M. top flat peak thirty eight ten August twelve ten thirty
A. M. bottom through thirty four hundred at eight P. M. thirty
eight thirty August thirteen ten thirty A. M. thirty three twenty
stop Peaks on Sacramento rather flat lasting about eighteen hours
troughs rather narrow lasting about three or four hours stop
3358 For discharge of twenty four sixty four Pit River at Big
Bend has cross section nine hundred seventy square feet
width one hundred fifty hydraulic radius five and eight tenths feet
stop Can send hourly hydrograph for three points if desired wire
stop The flow at Red Bluff was uniform prior to operation of Pit
three

KRAMER.

3359 *Government exhibit No. 104*

1925—Dec. 15—Letter to Mr. Merrill from Mr. Kramer re Pitt River and enclosing hydrographs.

3360 UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE, CALIFORNIA DISTRICT
FERRY BUILDING
San Francisco, California, December 15, 1925.

EXECUTIVE SECRETARY, *Federal Power Commission.*

DEAR MR. MERRILL: In accordance with your telegraphic request of December 3, 1925, I am enclosing a blue print roll containing hourly hydrographs for the month of August, 1925, for the Pit River at Pit 3, at Henderson, and at Ydalpom, and for the Sacramento River at Red Bluff. In accordance with the notation on the hydrographs, it was necessary to add 75 second feet to the hydrograph for the Pit River at Pit 3, in order to obtain the discharge of the stream below the powerhouse. The curve shows the flow through the powerhouse, and it is estimated by the Power Company that there was 75 second feet in the stream above the powerhouse.

An error of 24 hours was made in the records of the Pit River at Ydalpom in my telegram to you of December 8, 1925. One day should be subtracted from the dates given for this station.

The Pacific Gas & Electric Company furnished a hydrograph for the three stations on the Pit River, and on this hydrograph they had made an error for the Pit at Ydalpom for the entire month. The error was noted in this office when an attempt was made to estimate the lag between the Pit at Henderson and the Pit at Ydalpom; the lag actually being about 6 or 7 hours.

I am enclosing also rating tables and cross sections taken immediately opposite the gage for the Pit River at Henderson and at Ydalpom, and for the Sacramento River at Red Bluff.

I believe this is all the data that you asked for. It took some time to gather the data in this office and to make the corrections required by the discovery of the error in the Ydalpom records.

Very sincerely yours,

F. E. Bonner, *District Engineer.*
By E. W. Kramer, *Acting.*

3361

Rating Table

PIT RIVER AT RED BLUFF GAGE

Gage Height feet	Discharge Sec. Ft.	Gage Height feet	Discharge Sec. Ft.
0.00	2640	1.00	4390
.05	2720	.05	4490
.10	2810	.10	4590
.15	2900	.15	4690
.20	2980	.20	4790
.25	3060	.25	4900
.30	3150	.30	5000
.35	3240	.35	5100
.40	3320	.40	5210
.45	3400	.45	5370
.50	3490	.50	5430
.55	3580	.60	5650
.60	3660	.70	5880
.65	3740	.80	6120
.70	3830	.90	6370
.75	3920	2.00	6630
.80	4010	.10	6900
.85	4100	.20	7160
.90	4200	.30	7430
.95	4300		

PIT RIVER AT YDALPOM GAGE

Gage Height feet	Discharge Sec. Ft.	Gage Height feet	Discharge Sec. Ft.
3.5	960	.3	1620
.6	1030	.4	1710
.7	1110	.5	1800
.8	1190	.6	1900
.9	1270	.7	2010
4.0	1350	.8	2130
.1	1440	.9	2250
.2	1530	5.0	2370

PIT RIVER AT HENDERSON GAGE (BIG BEND)

Gage Height feet	Discharge Sec. Ft.	Gage Height feet	Discharge Sec. Ft.
6.5	560	.2	2220
.6	650	.3	2370
.7	720	.4	2520
.8	790	.5	2680
.9	860	.6	2840
7.0	930	.7	3000
.1	1010	.8	3170
.2	1090	.9	3350
.3	1180	9.0	3530
.4	1270	.1	3720
.5	1360	.2	3910
.6	1460	.3	4110
.7	1570	.4	4310
.8	1690	9.5	4520
.9	1810	.6	4730
8.0	1940	11.6	9640
.1	2080	.7	9900

Gage Height feet	Discharge Sec. Ft.	Gage Height feet	Discharge Sec. Ft.
3363 .7	4940	.4	9120
.8	5160	.5	9380
.9	5390	.8	10160
10.0	5620	.9	10420
.1	5860	12.0	10680
.2	6100	.1	10940
.3	6340	.2	11200
.4	6590	.3	11470
.5	6840	.4	11740
.6	7090	.5	12010
.7	7340	.6	12280
.8	7590	.7	12550
.9	7840	.8	12820
11.0	8090	.9	13090
.1	8340	13.0	13360
.2	8600		
.3	8860		

3365 *Government exhibit No. 105*

1927—May 2—Letter from Mr. Bonner to Mr. Merrill enclosing copy of Kramer's report on Klamath River.

3366 UNITED STATES DEPARTMENT OF AGRICULTURE FOREST SERVICE, CALIFORNIA DISTRICT

FERRY BUILDING,
San Francisco, California, May 2, 1927.

EXECUTIVE SECRETARY,
Federal Power Commission, Washington, D. C.

DEAR MR. MERRILL: I am forwarding you herewith one copy of the "Report on Effect of Streamflow Regulation at the Copco Power Plants of the California Oregon Power Company on the Flow of the Klamath River", by E. W. Kramer, dated April 28 1927.

It is hoped that the data contained in this report will be of value to you in connection with your study of the New River Development Company project.

This office has given some consideration to the idea of working up a technical paper on this subject in case you have no objection. I will be glad to learn of your feelings in this regard.

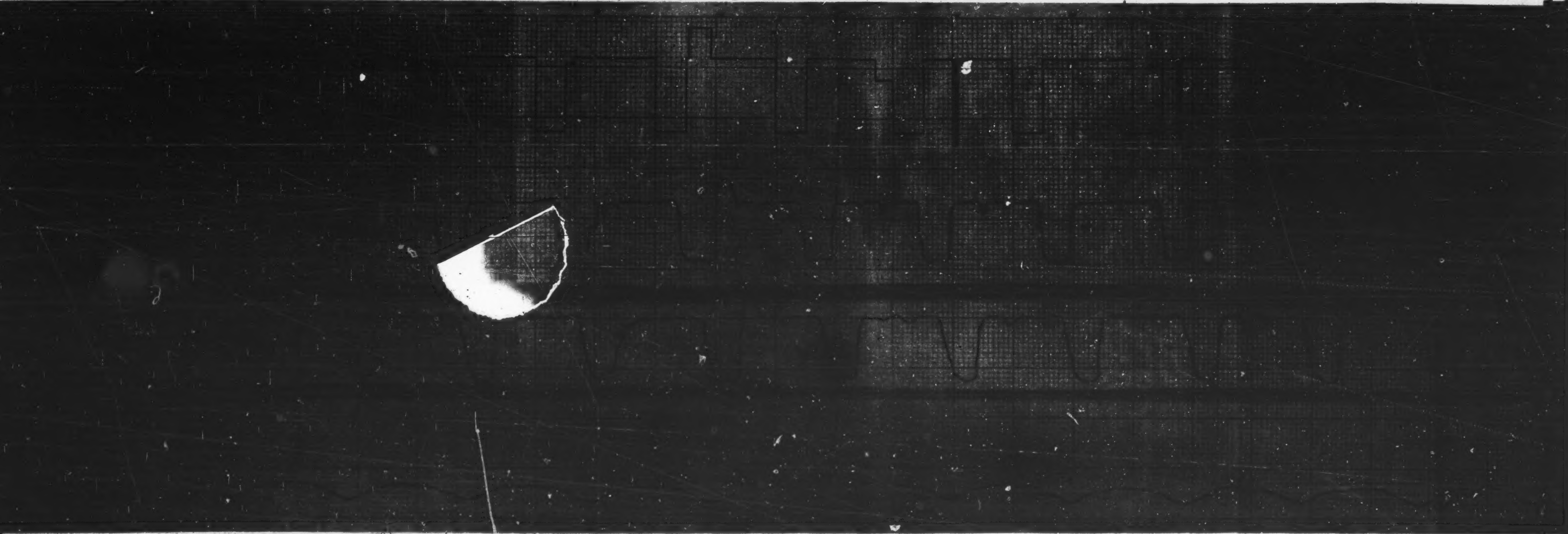
Yours very truly,

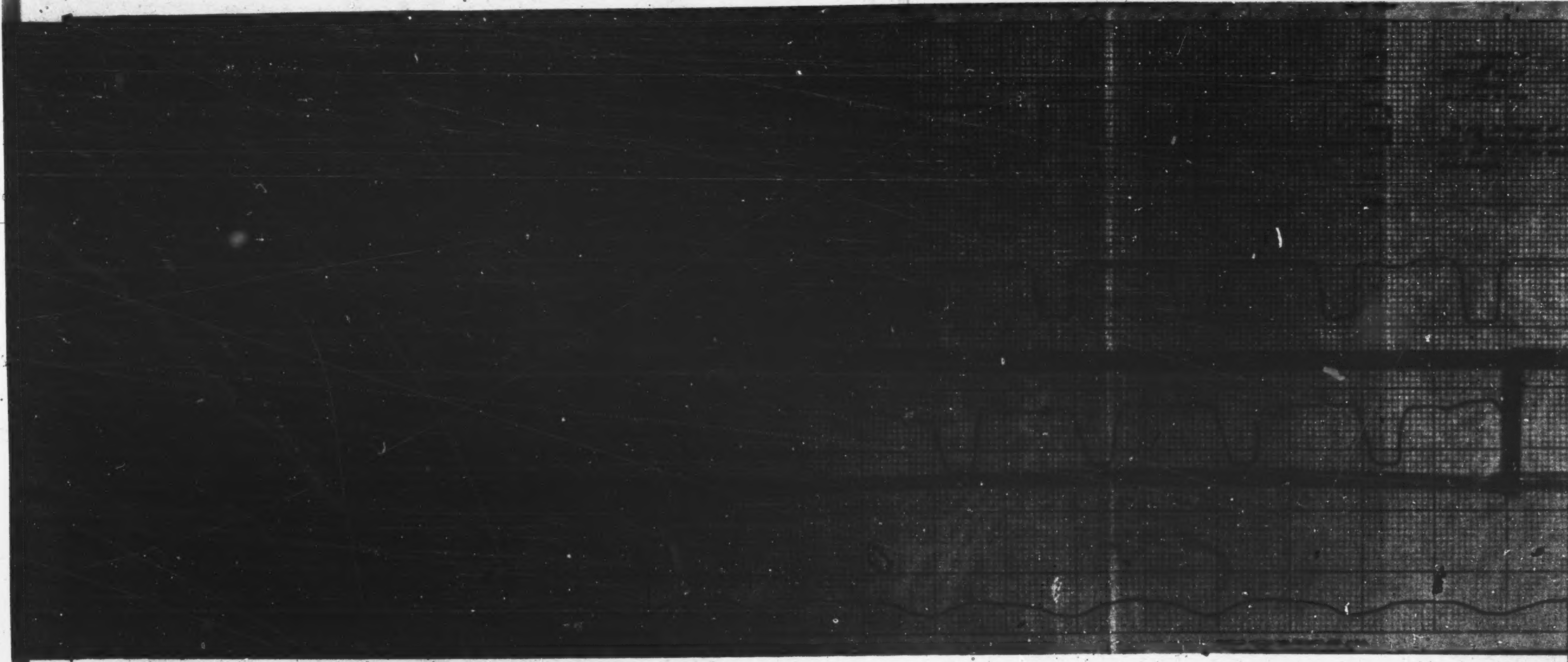
F. E. BONNER, *District Engineer.*

2623-B

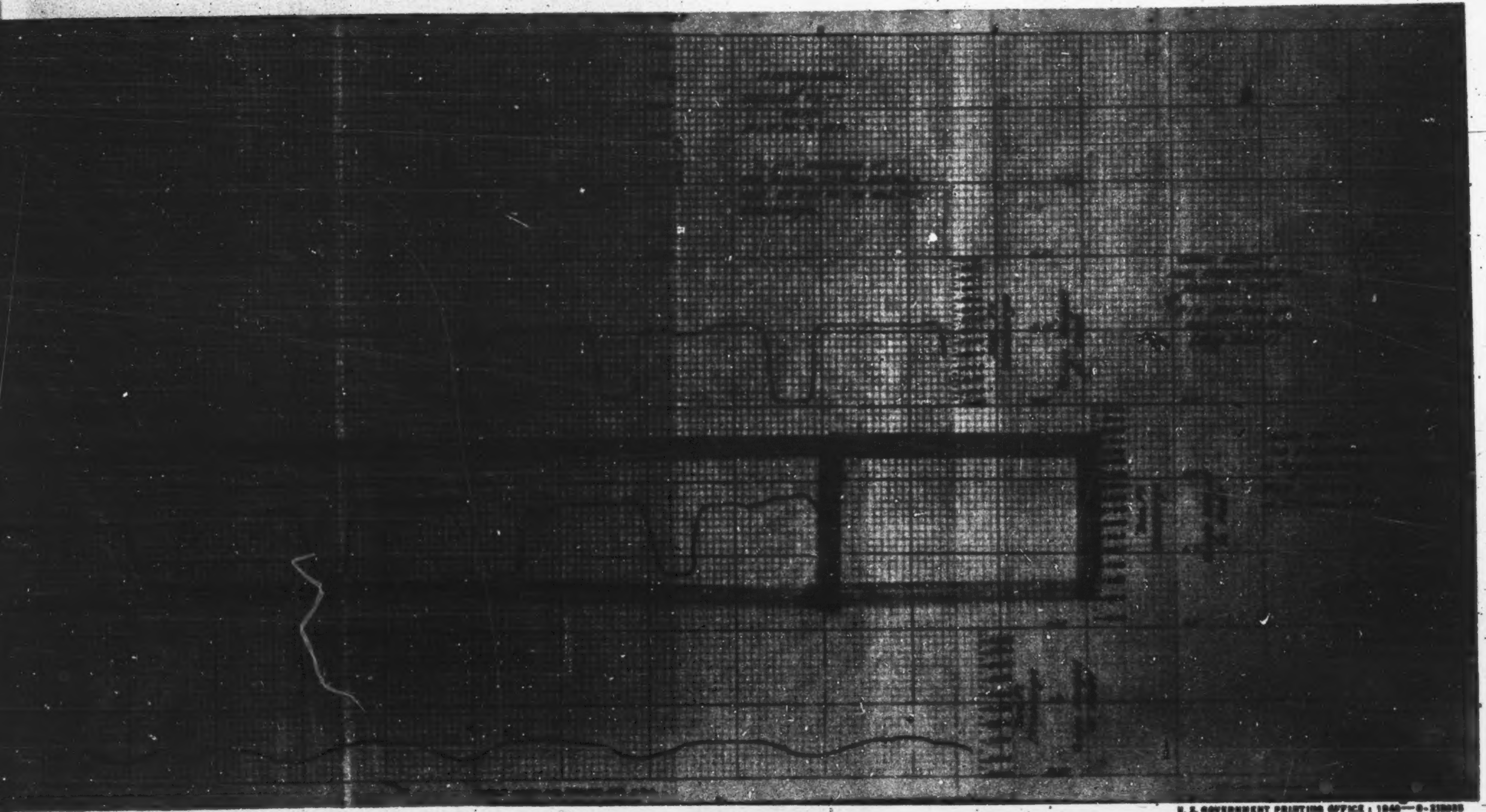
[redacted]

7





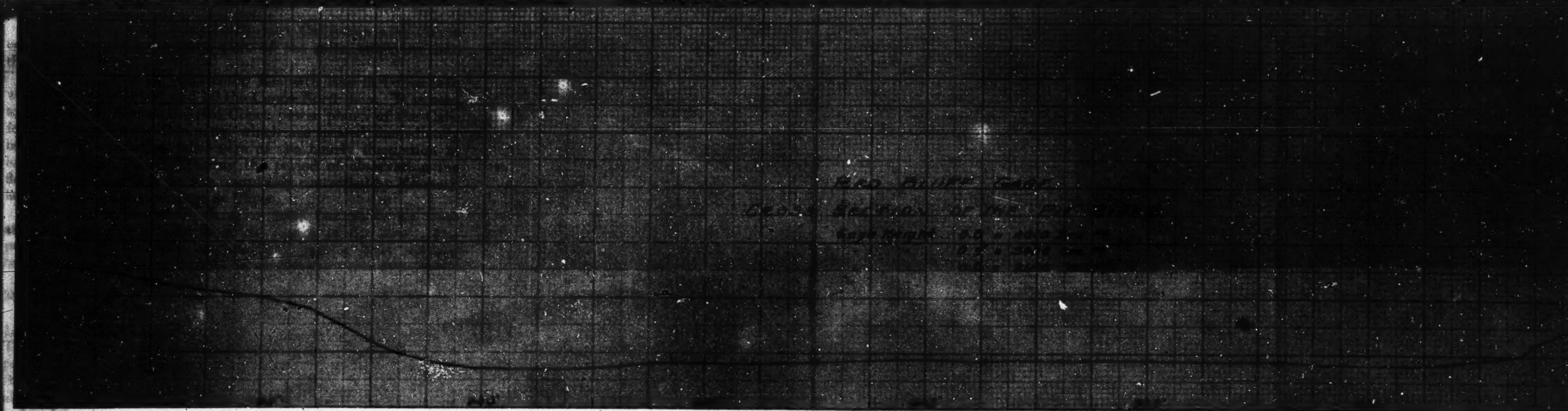
A-3693



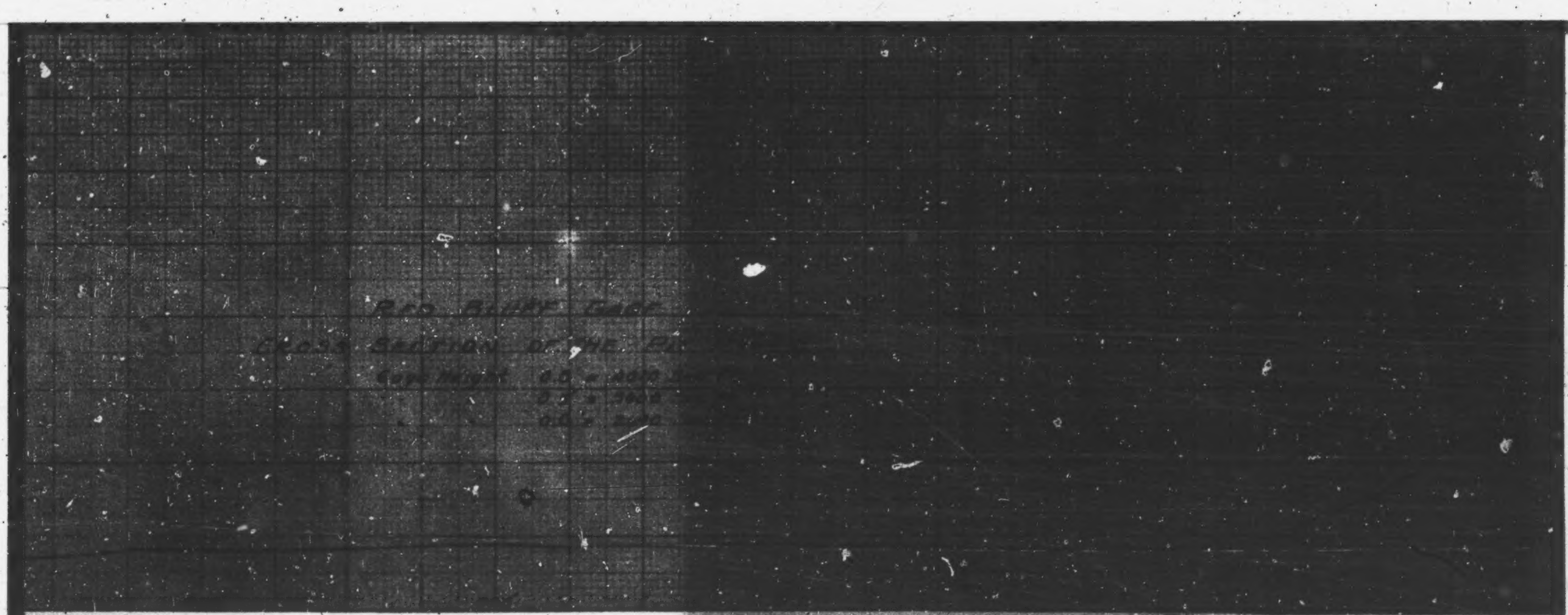
U. S. GOVERNMENT PRINTING OFFICE : 1940—O-[illegible]

GAGE
CROSS SECTION OF THE
RED BLUFF GAGE
CROSS SECTION OF THE

BLUFF GAGE
OF THE



U. S. GOVERNMENT PR


RED BLUFF GAGE
CROSS SECTION OF THE RI
Gage Height 0.0 = 2010
0.? = 3600
0.0 = 2?00

3367 REPORT ON EFFECT OF STREAMFLOW REGULATION AT THE COPCO POWER PLANTS OF THE CALIFORNIA-OREGON POWER COMPANY ON THE FLOW OF THE KLAMATH RIVER

By E. W. Kramer, Hydraulic Engineer, U. S. Forest Service, San Francisco, Calif.

3368 REPORT ON EFFECT OF STREAMFLOW REGULATION AT THE COPCO POWER PLANTS OF THE CALIFORNIA OREGON POWER COMPANY ON THE FLOW OF THE KLAMATH RIVER

During the period from February 11 to February 17, 1927, inclusive, Mr. John H. Lawrence, and the writer made an investigation of the wave effects in the Klamath river due to the regulation of the flow at the Copco reservoir of the California-Oregon Power Company. A very appreciable amount of assistance was rendered by the officials of the California Oregon Power Company and by Mr. Carl Langford of the Electro Metals Company, the latter company being interested in power developments in the lower reaches of the stream.

The Klamath river rises in southeastern Oregon in Upper Klamath lake. The lake has a very great area. The height of the water in the lake is controlled for power use by the California-Oregon Power Company.

The Klamath river flows south into California and thence eastward across the northern part of the state, emptying into the Pacific Ocean.

At a point about 51 miles below Klamath lake is Copco lake which is a reservoir created by the Copco No. 1 dam. It is used to regulate the flow at the two Copco power plants of the California-Oregon Power Company, which are located immediately below. The regulation takes care of the hourly fluctuation in load at the two plants. During the period of observation the flow of the Klamath river was completely controlled by Klamath lake storage and the pondage at Copco.

Copco lake is located at elevation 2,613 feet above sea level at a distance of 200 miles from the mouth of the river. The power company maintains an automatic gage a short distance below the Copco No. 2 tailrace at approximate elevation 2,320 feet.

3369 Located 64 miles below the Copco gage is the Seiad gage of the U. S. Geological Survey at approximate elevation 1,380 feet. The fall of the river in this distance totals 940 feet. The grade is very uniform amounting to a slope of about 14.7 feet per mile. For the most of this distance the river is flowing through the Siskiyou mountains. The width of the channel is about 200 feet. It is lined with boulders and sand, but in general is free from vegetation or debris such as logs.

Located 132 miles below the Copco gage is the Bedrock Island gage of the Electro Metals Company at elevation approximately 500 feet above and 66.5 miles from the sea. The channel of the river between the Seiad and the Bedrock Island gages, is wider, somewhat rockier and much more crooked than between the Copco and the Seiad gages. The total fall between the two gages is 880 feet, and is distributed very uniformly, the average fall being 13.0 feet per mile. The tributary drainage area between the two points is 838 square miles.

From the Bedrock Island gage to the mouth of the Trinity River, the most important tributary of the Klamath River, the distance is 24 miles. The fall per mile is 16.3 feet. This stretch of the stream is straighter than the stretch between the Seiad and Bedrock Island gages.

From the mouth of the Trinity River to the ocean is about 42.5 miles. The total drop is 110 feet or 2.58 feet per mile. This section of the stream is much wider, especially, for the last 18 miles above the mouth of the river.

The following table gives the drainage area at the three gages and at the mouth of the river.

3370

TABLE NO. 1

Station	Drainage area (square miles)
Copco gage	3,566
Seiad gage	5,845
Bedrock Island gage	6,683
Requa	11,060

The tributary drainage area between the Copco and the Seiad gages of 2,279 square miles ranges in elevation from 1,380 feet along the river to 14,380 feet at the crest of the highest peak (Mt. Shasta). Most of the mountains and ridges only reach an elevation of 6,000 feet. The snow line seemed to be approximately at about elevation 3,200 feet. With the exception of the Shasta valley which is about 25 miles long by 12 miles wide, this area is entirely mountainous.

The area tributary to the river between Seiad and Bedrock Island gages of 838 square miles is entirely mountainous, the ridges and slopes ranging from a minimum of 500 feet along the river to 7,451 feet at the highest peak (Black Mountain). Most of the ridges only reach an elevation of about 4,800 feet. During the period of observation, this area was receiving slightly more precipitation and the temperature was slightly warmer than for the area between Seiad and Copco. The run off per square mile was much greater.

At the beginning of the observations the roads and soil on both sides of the river from Copco down to the Seiad gage and for some distance below was frozen hard nights, but thawed out every day before noon. It is not known to exactly what elevation this thawing extended. The weather warmed up somewhat on February 14th and from then on the temperature varied but little throughout the twenty four hours except, of course, that it was considerably warmer in the sun when it shone. It did not freeze at night along the river. The following tables give the temperature and the condition of the weather throughout the period of the study of the nearest Weather Bureau stations.

3371 TABLE NO. 2—TEMPERATURE FEBRUARY 1927

Station	10		11		12		13		14		15		16		17		18	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Yreka, Cal.	46	21	51	30	47	20	49	20	52	32	51	34	48	27	47	31	53	35
	Clear		Clear		Clear		Clear		Pt. Cloudy		Cloudy		Cloudy		Cloudy		Pt. Cloudy	
Orleans, Cal.	60	30	60	31	60	32	60	31	57	35	48	38	50	43	48	42	51	43
	Clear		Clear		Clear		Pt. Cloudy		Cloudy		Cloudy		Cloudy		Cloudy		Cloudy	

NOTES.—Observations at Yreka are taken at 8 A. M. for the preceding 24 hours; observations at Orleans are taken at 7:30 A. M. for the preceding 24 hours.

3372 TABLE NO. 3.—PRECIPITATION, FEBRUARY, 1927

Station	10	11	12	13	14	15	16	17	18
Yreka, Cal.	0	0	0	T	0	T	.16	.92	.12
Scott's Bar, Cal.	0	0	0	0	0	.20	.20	.26	1.75
Happy Camp, Cal.	0	0	0	0	0	.53	.85	.58	0
Orleans, Cal.	0	0	0	0	.21	.45	.50	1.35	1.04

NOTES.—Observations at Yreka are taken at 8 A. M. for the preceding 24 hours. Observations at Orleans are taken at 7:30 A. M. for the preceding 24 hours. Observations at Scott's Bar are taken at 5 P. M. for the preceding 24 hours.

3373 The automatic gage at Copco was used to show the flow there and readings were made every half hour on the Seiad and Bedrock Island gages, which are located 64 and 132 miles below, respectively.

The volume of flow of the Klamath river from the mouth of the Trinity river to the mouth of the Klamath river at Requa and the great changes in daily flow between these points due to changing weather conditions in the watershed tributary to the Klamath river below the Bedrock Island gage make the effect of the Copco regulation almost negligible in this section of the stream at this time of the year. For instance, on February 18, 1927, at 6:30 P. M. the Requa gage read 20.9 feet and at 12 P. M. 21.9 feet, the corresponding flows being 7[illegible],500 and 88,900 second-feet. Therefore no attempt was made to trace the wave effects below the Trinity. The gage reader at the Requa gage at the mouth of the Klamath informed me that during the low flow period there was a daily rise and fall on the gage of from 0.5 feet to 0.7 feet due to the Copco regulation. The low flow at Requa ranges around 1,600 second-feet.

Observations were begun at 11 A. M. February 11th on the Copco gage, at 4 P. M. February 12th on the Seiad gage, and at 6 P. M. February 12th on the Bedrock Island gage. They were discontinued at midnight February 17th at the Copco gage, at midnight February 16th on the Seiad gage, and at 4:30 P. M. February 17th on the Bedrock Island gage.

It is not believed that there was sufficient precipitation falling during this period to affect the results. It is probable that the daily variation of temperature on the snow caused some hourly fluctuation in the run off. This, however, was as little as could be expected from any stream running from a watershed partly snow covered. It will be noted from Table 2 that the weather was cloudy for a very considerable period. There was very little hourly variation of temperature during the cloudy days.

3374 The Copco gage is an automatic gage. It was inspected each day to make sure that it was operating properly during the period of experiment. The California-Oregon Power Company was regulating the flow at the Copco plant daily during this period from a minimum of 255 second feet to a maximum of about 2,600 second feet, the actual maximum during the period being about 2,800 second feet.

The change in flow at the Copco gage is very rapid as will be noted by inspection of Plate 3. Ordinarily the flow through the plants from about midnight to about 6 A. M. is only 255 second feet. At 6 A. M. the flow is usually increased suddenly about 2,000 second feet, and it then increases more gradually to a daily maximum of from 2,600 to 2,800 second feet, which it reaches about noon. It then decreases to about 2,400 second feet at about 10 or 11 P. M. when it is shut off again to about 255 second feet. A study of plate 3 shows that the flow is much less for Sunday than for other days. On this account the study was begun on Friday in order to make sure a Sunday would be included. The low Sunday flow can be easily identified at the two points of observation below.

The Seiad gage is a staff gage. This station has been accurately rated by the U. S. Geological Survey.

Plate 3 indicates that it took the front of the wave created by suddenly increasing the flow 2,000 second feet at Copco, about thirteen hours to travel from Copco to the Seiad gage which is at the rate of 7.22 feet per second or about five miles per hour. The rise seems to be almost as rapid at Seiad as at Copco gage.

The amplitude of the wave front at Seiad seems to be almost exactly the same as at the Copco gage, the flow varying from 3,000 second-feet to 5,600 second-feet. The rear of the wave caused by decreasing the flow at the Copco gage is not abrupt as is the wave front. The back of the wave seems to lag, making a sloping profile, which, however, reaches a sharp valley at the minimum
3375 flow. The maximum amplitude from the lowest valley to the crest of the wave is as great at Seiad as at Copco.

A study of plate 3 indicates that the wave front caused by suddenly increasing the flow at Copco requires about 11 to 11½ hours to travel the 68 miles from Seiad to Bedrock Island, which is at the rate of about 9.07 feet per second. The wave front is somewhat less steep and the rise less sudden at Bedrock Island that it is at Seiad. As at Seiad, the valley is considerably filled by the water lagging from the rear of the wave. The amplitude of the waves at Bedrock Island seems to be about 75% of the Copco and Seiad amplitudes.

The average flow for corresponding 24 hour periods was computed by averaging the flows observed for each half hour reading. Allowances of 13 hours and 11 hours, respectively, were made in selecting these periods for the water to travel from Copco to Seiad and from Seiad to Bedrock Island (See Table 4).

The average flow at the gages for the four day period beginning 3 A. M., February 12, 1927, at the Copco gage and for the corresponding periods at the two lower gages, making the above described allowances, was 1,525 second feet at Copco, 4,264 second feet at Seiad and 9,804 second feet at Bedrock Island.

The increase or decrease for each day over the preceding day at any gage is also shown on Table 4. There was no great change in streamflow during the period. For instance, for the first day at Copco the mean flow was 1,634 second feet, and for the last day 1,784 second feet; for Seiad 4,445 second feet and 4,462 second feet; and for Bedrock Island 10,414 second feet and 9,952 second feet.

It will be noted that the daily differences are very nearly the same for Copco and Seiad, but are quite different for Bedrock Island.

The conclusion reached by the writer is that in a stream of this character the wave front travels downstream faster than
3376 the low valley preceding it, the water in the front constantly overtaking the water ahead of it on account of the greater slope of the water surface at the wave front and the greater hydraulic radius. This tends to make the wave front very steep, and to make a sharp trough or valley, immediately ahead of the front.

The lagging of the water in the rear of the wave, which tends to fill the valley is less easy to understand. It is apparent, however, that this lagging occurs. On the other hand the extreme amplitude of the wave seems in this case to be unaffected as far as the Seiad gage, and to not be greatly affected as far as the Bedrock Island gage or for a distance of 132 miles. However, it is probable that the valley or trough would be entirely filled ultimately at a sufficient distance below by the lagging of the rear of the wave and the gaining of the wave front on the water traveling in the trough.

E. W. Kramer, *Hydraulic Engineer.*

Approved:

F. E. Bonner, *District Engineer.*

April 28, 1927.

3377 Table No. 4.—AVERAGE DAILY RUN OFF KLAMATH RIVER, FEBRUARY 1927

Copco gage			Seiad gage			Bedrock Island gage		
24-hour periods ending	Mean flow	Difference from preceding day	24-hour periods ending	Mean flow	Difference from preceding day	24-hour periods ending	Mean flow	Difference from preceding day
	Sec. ft.	*Sec. ft.*		*Sec. ft.*	*Sec. ft.*		*Sec. ft.*	*Sec. ft.*
3:00 A. M. 2/13/27	1,634	------	4:00 P.M. 2/13/27	4,445	------	3:00 A.M. 2/14/27	10,414	------
3:00 A.M. 2/14/27	1,143	−491	4:00 P.M. 2/14/27	3,862	−583	3:00 A.M. 2/15/27	9,298	−1,116
3:00 A.M. 2/15/27	1,540	+397	4:00 P.M. 2/15/27	4,285	+423	3:00 A.M. 2/16/27	9,551	+253
3:00 A.M. 2/16/27	1,784	+244	4:00 P.M. 2/16/27	4,462	+177	3:00 A.M. 2/17/27	9,952	+401
Mean for period	1,525			4,264			9,804	

Note.—Thirteen hours is allowed for water to flow from Copco to Seiad and 11 hours from Seiad to Bedrock Island.

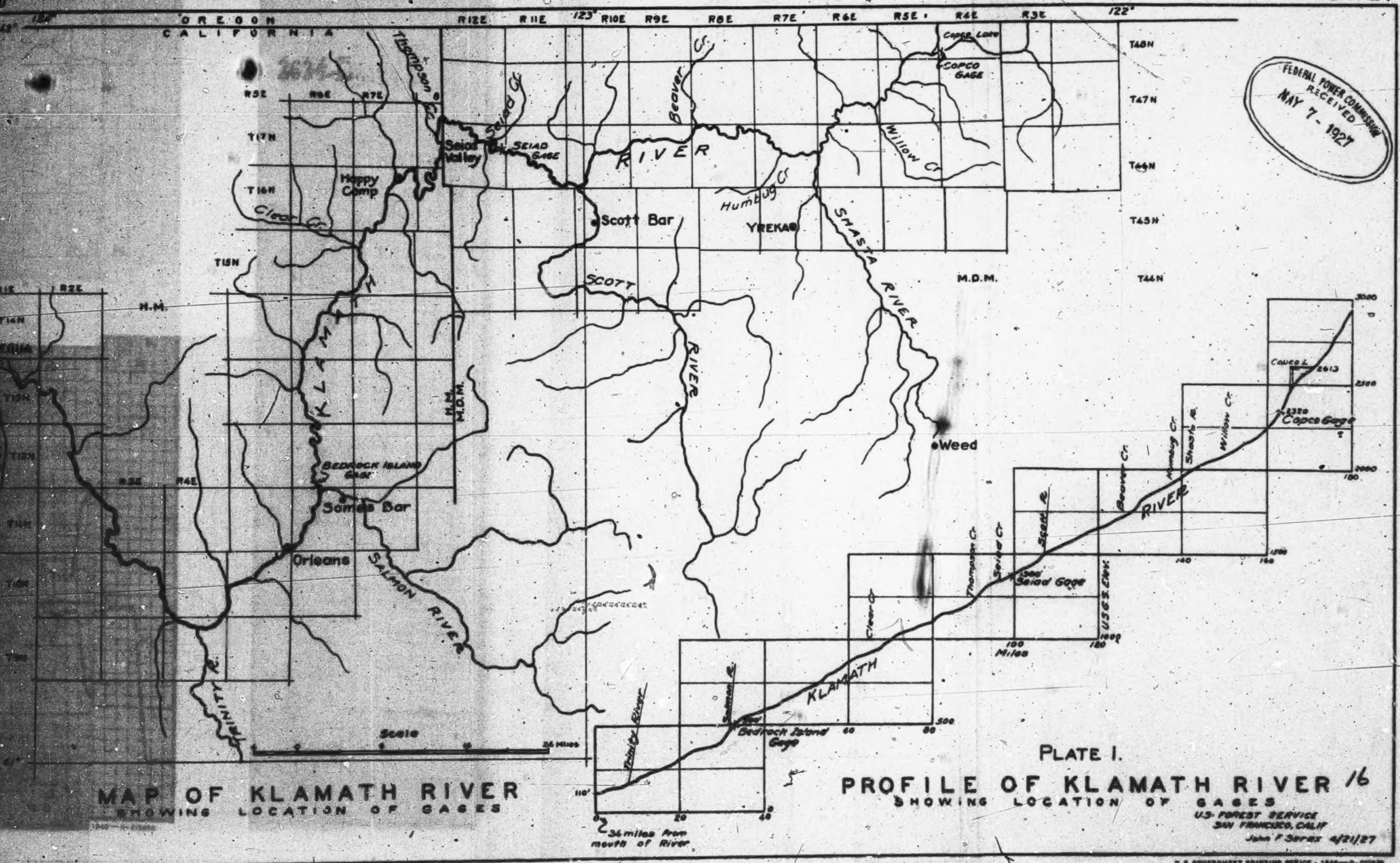
3378 Table No. 5.—RATING TABLE FOR KLAMATH RIVER, SEIAD VALLEY, CALIF., FROM OCT. 1, 1923, TO JUNE 30, 1925

Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
Ft.	Sec. ft.	Ft.	Sec. ft.	Ft.	Sec. ft.	Ft.	Sec. ft.	Ft.	Sec. ft.
2.00	435	4.00	2,120	6.00	5,550	8.00	10,000	10.00	15,300
.10	480	.10	2,260	.10	5,750	.10	10,240	.10	
.20	530	.20	2,400	.20	5,960	.20	10,480	.20	
.30	585	.30	2,540	.30	6,170	.30	10,730	.30	
.40	640	.40	2,690	.40	6,380	.40	10,980	.40	
.50	700	.50	2,840	.50	6,590	.50	11,230	.50	
.60	760	.60	2,990	.60	6,810	.60	11,480	.60	
.70	825	.70	3,150	.70	7,030	.70	11,740	.70	
.80	895	.80	3,310	.80	7,250	.80	12,000	.80	
.90	965	.90	3,480	.90	7,470	.90	12,260	.90	
3.00	1,040	5.00	3,650	7.00	7,690	9.00	12,520	11.00	18,300
.10	1,120	.10	3,830	.10	7,910	.10	12,780	.10	
.20	1,200	.20	4,010	.20	8,140	.20	13,050	.20	
.30	1,290	.30	4,200	.30	8,370	.30	13,320	.30	
.40	1,390	.40	4,390	.40	8,600	.40	13,590	.40	
.50	1,500	.50	4,580	.50	8,830	.50	13,870	.50	
.60	1,610	.60	4,770	.60	9,060	.60	14,150	.60	
.70	1,730	.70	4,960	.70	9,290	.70	14,430	.70	
.80	1,860	.80	5,150	.80	9,520	.80	14,720	.80	
.90	1,990	.90	5,350	.90	9,760	.90	15,010	.90	
4.00		6.00		8.00		10.00		12.00	

2634-A

PLATE I

FEDERAL POWER COMMISSION
RECEIVED
MAY 7 - 1927


OREGON
CALIFORNIA
R12E
R11E
123°
R10E
R9E
R8E
R7E
R6E
R5E
R4E
R3E
122°
T48N
T47N
T46N
T45N
T44N
T17N
T16N
T15N
T14N
R5E
R6E
R7E
R2E
H.M.
M.D.M.
Thompson Cr
Seiad Cr
Seiad Valley
Seiad Gage
Happy Camp
Clear Cr
Beaver Cr
RIVER
Humbug Cr
Copco Lake
Copco Gage
Willow Cr
Scott Bar
YREKA
SHASTA RIVER
SCOTT
RIVER
Weed
KLAMATH
Bedrock Island Gage
Somes Bar
Orleans
SALMON RIVER
TRINITY R.
R3E
R4E
Scale
0
6
12
24 Miles
Copco L.
2613
2520
Copco Gage
Willow Cr
Shasta R.
Humbug Cr
Beaver Cr
RIVER
Scott R.
Seiad Cr
Thompson Cr
Seiad Gage
U.S.G.S. Elev.
Clear Cr
KLAMATH
Salmon R.
Trinity River
Bedrock Island Gage
110'
0
20
40
60
80
100
120
140
160
180
Miles
500
1000
1500
2000
2500
3000
34 miles from mouth of River

MAP OF KLAMATH RIVER
SHOWING LOCATION OF GAGES

PLATE I.

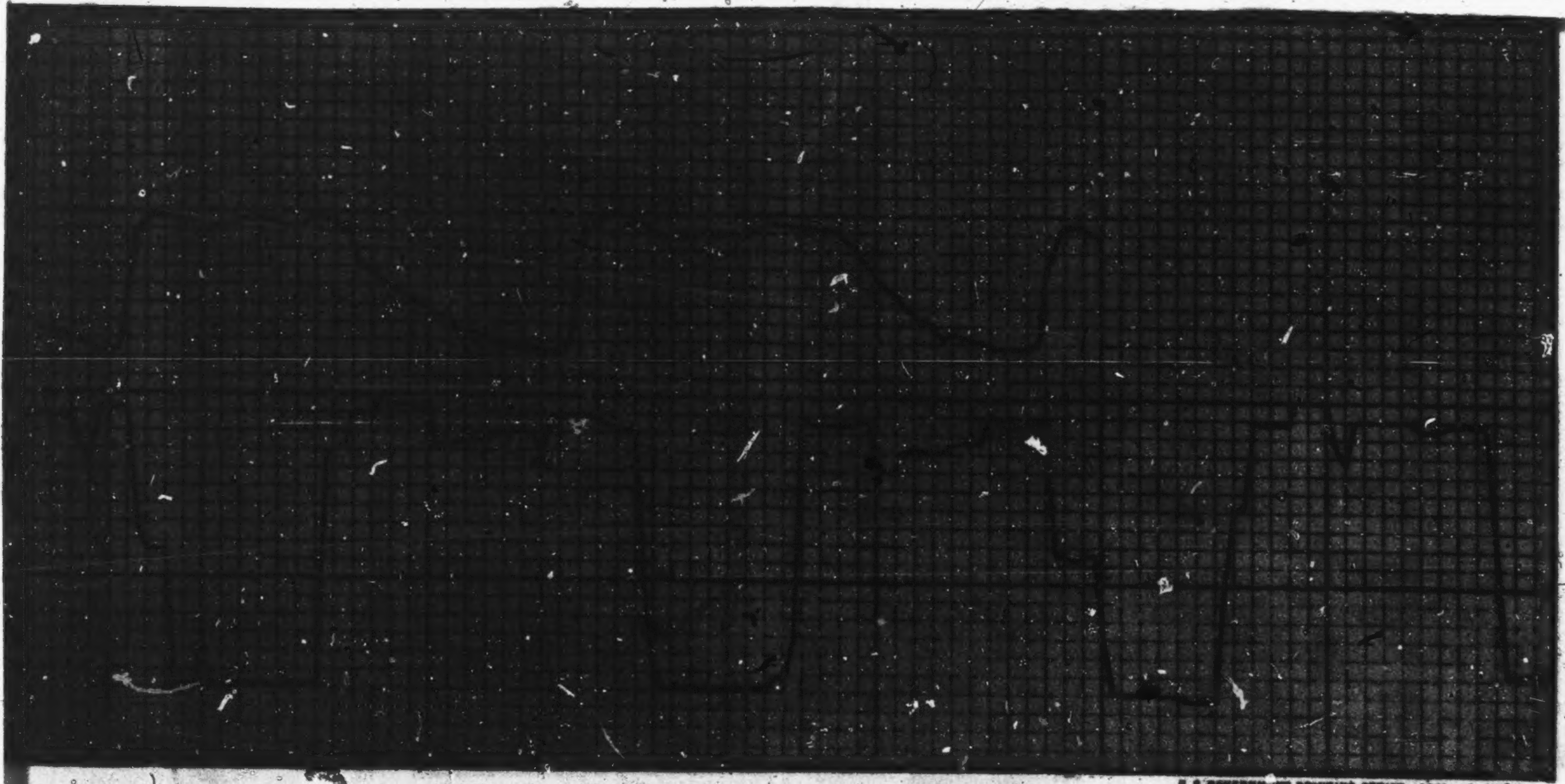
PROFILE OF KLAMATH RIVER
SHOWING LOCATION OF GAGES

16

U.S. FOREST SERVICE
SAN FRANCISCO, CALIF.
John F Sorez 4/21/27

U.S. GOVERNMENT PRINTING OFFICE

PLATE 2.



U. S. GOVERNMENT PRINTING OFFICE :

PLATE 3.

U. S. GOVERNMENT PRINTING OFFICE : 1940—O-210880

3383 *Government exhibit No. 106*

1926, Oct. 24—"Memorandum to Federal Power Commission re Declaration of Intention of New River Development Company," prepared by Curtis, Mallet-Prevost, Colt & Mosle. (Original Exhibit.)

Government exhibit No. 106–A

1925, Oct. 23—Letter from L. J. Bevan to C. M. Micou, re drainage areas and runoff. (Original Exhibit.)

3384 *Government exhibit 106–B*

Memorandum of Request of New River Development Company in regard to Report of Chief of Engineers dated August 20, 1925, upon the proposed project of the company for a water power development on New River, in Virginia, with respect to which declaration of intention has been filed by the company with the Federal Power Commission.

On behalf of New River Development Company it is respectfully requested that the Chief of Engineers take under reconsideration the report of August 20, 1925 above-mentioned and consider making findings as follows:

A. As to navigability of New River

1. That New River is not navigable in fact in Virginia.

It is felt that such a finding is warranted by—

(a) Consideration of the War Department reports setting forth the conditions disclosed in and the results obtained by the attempted improvement of the river. Particular reference is made to the following:

For general conditions and nature of improvements required, Report of W. P. Smith, Engr., to Major Wm. P. Craighill, dated Jan. 10, 1879, An. R., C. of E. 1879, pg. 540 et seq.; also An. R., C. of E. 1878, pg. 498. For isolation of work in three sections, Rept. of Lieut. Col. Wm. P. Craighill, An. R., C. of E., 1883, pg. 702. For necessity of appropriation for maintenance, if improvement completed, Report of Capt. Jas. W. Cuyler to Major Wm. P. Craighill, July 3, 1879, An. R., C. of E. 1879, pg. 531.

(b) The specific finding dated June 18, 1910, by the Chief of Engineers, General W. H. Bixby, that New River is not navigable at Ivanhoe, Virginia, distant some 40 miles above the proposed project. (See report on pending bill, H. R. 26411 (61st
3385 Cong., 3rd Sess.), annexed hereto and marked "A");

(c) The reports published in House Document 1410, 62nd Congress, 3rd Session, upon a reexamination of New River from Radford, Virginia, to Hinton, W. Va., pursuant to River & Harbor Act approved July 25, 1912, the report of the Chief of Engineers stating "this whole section is unfavorable for navigation";

(d) Reports of District Engineer and endorsements thereon by Division Engineer, with reference to the present proposed project of New River Development Company. (The Company has not obtained copies of such reports but has been informed that their clear purport is that the river is not navigable in fact in Virginia.)

(e) Affidavits of persons authoritatively representing the interests of commerce on New River in Virginia and West Virginia attached hereto and marked "B."

2. That New River, i. e., above the Kanawha, has never been used or susceptible of use in interstate commerce of a substantial nature.

It is felt this finding is justified upon an examination of the War Department reports showing the nature of the improvement work attempted to be carried on from Hinton, W. Va., upstream. This improvement work never reached the Virginia line and several falls and rapids, Bulls, Wylie's, and Shumate's are mentioned as being impassable.

The commerce on New River referred to in the War Department Reports of 1882, as given in a table of railroad loadings and unloadings for the cities of Hinton, on the New River, and Lowell, on the Greenbrier, is apparently restricted to local commerce of river products. This is especially apparent from the table showing the extent and nature of commerce at Hinton in 1879, An. R., C. of E. 1880, pg. 681.

Paragraph 9 of the report of Major F. W. Alstaetter to the Chief of Engineers, dated November 21, 1912 (House Doc. 1410, 62nd Cong., 3rd Sess., p. 6), shows clearly the nature of the commerce as being local and insignificant.

See also affidavits annexed, marked "B."

3386 3. The head of recognized navigation is on the Kanawha, at Deepwater near Loup Shoals, some six miles below Kanawha Falls.

Reference is made to the reports of the War Department upon the operation of the locks and dams on the Kanawha River over a series of years, e. g., An. Rept., C. of E. 1923, p. 1252.

4. That federal improvements on New River, if deemed important, be treated separately from the question of navigability in fact and referred to for such importance as the Commission may

attach thereto; if mention be made of the improvements it is respectfully requested that a statement be made of the results accomplished by the improvements, the War Department's recommendations and attitude with respect thereto and the repeal of the provisions for the prosecution of the work, with the result that the work is no longer considered by the War Department as an authorized project for improvement.

In this connection reference is made to:

Reports referred to under "A 1 (a)" above;

Reports contained in House Document 1410, 62nd Cong., 3rd Sess.;

Sec. 7, River and Harbor Act of June 13, 1902;

Sec. 4, River and Harbor Act of August 8, 1917.

(The question of navigability based upon authorization by Congress for improvement has been taken up with the Power Commission and their Counsel. We feel that this question may satisfactorily be disposed of by the repeal of the provisions for prosecution of the work when no substantial results in creating actual navigability had been attained—aside from the fact, as we believe, that such a basis of navigability would constitute an unconstitutional basis of federal jurisdiction to compel a declarant to obtain a license and is not supported by the express terms of the Federal Water Power Act. In case a detailed exposition of our position in such matter is of interest a copy of a memorandum heretofore filed with the Commission is appended, marked "X" and attention is respectfully invited to section C thereof, pages 38 to 50 and section D, pages 51 to 72, inclusive.)

3387 B. As to effect of the proposed project upon navigable capacity of the Kanawha river:

That the effect of the proposed project of New River Development Company, located 155 miles by river above the head of recognized navigation, will, in general, be beneficial and it is not probable that there will be any substantial adverse effect upon the interest of interstate or foreign commerce.

Reference is made to:

(a) Endorsement by Colonel Kutz, Division Engineer, dated June 18, 1925, upon the report of Major H. M. Trippe, District Engineer, upon the proposed project.

(b) Letter of H. W. Buck, Esq., Engineer, Vice-President of Viele, Blackwell & Buck, to Hon. O. C. Merrill, Executive Secretary of Federal Power Commission, dated October 19, 1925, signed copy of which is attached hereto, marked "C".

Respectfully submitted.

CURTIS, MALLET-PREVOST, COLT & MOSLE.

3388 *Government exhibit No. 106–C*

1925, Oct. 1, 1925—"Supplemented Memorandum re Declaration of Intention of New River Development Co. (Original Exhibit.)

Government exhibit No. 107

1926, Feb. 20—Letter from Mr. Merrill, Executive Secretary, to Bascom Slemp giving notification of public hearing of March 2, 1926. (Original Exhibit.)

Government exhibit No. 108

1930, Oct. 16—Letter from C. M. P. C. M. to Federal Power Commission enclosing new drawings for minor part license to be substituted for certain drawings filed with original application for license. (Original Exhibit.)

Government exhibit No. 109

1926, April 15—Charge sheet pertaining to removal of General Taylor's report dated December 29, 1925, from files of F. P. C. (Original Exhibit.)

Government exhibit No. 110

"Record of the daily gage readings at Lock No. 24, Ohio River." (Original Exhibit.)

Government exhibit No. 111

"Record of daily gage readings at Lock No. 25, Ohio River. (Original Exhibit.)

Government exhibit No. 112

4 sheets being "gage readings of Locks Nos. 2, 3, and 4, Kanawha River, and Locks Nos. 26, 27, and 28, Ohio River, during low water periods of 1921, 1925, 1930, and 1932. (Original Exhibit.)

Government exhibit No. 113

Diagram showing hydrographs at gaging stations (Kanawha and New Rivers) with published mean daily flows July and August, 1932. Prepared U. S. Engineers Office, Huntington, W. Va. Sept. 1935. (Original Exhibit.)

3389 *Government exhibit No. 114*

1930, July and August—Diagram showing hydrographs at gaging stations (Kanawha & New Rivers) for July and August, 1930. Prepared U. S. Engineer Office, Huntington, W. Va., Sept. 1935. (Original Exhibit.)

Government exhibit No. 115

1936, Jan.—Diagram. Kanawha & New Rivers, Discharge at gaging stations. Data compiled from Automatic Water Stage Recorder. U. S. Engineer Office, Huntington, W. Va., Jan. 1936. (Original Exhibit.)

Government exhibit No. 116

1936, July 7.—Diagram. "Kanawha River Profile—Backwater studies. U. S. Engineer Office. Huntington, W. Va." (Original Exhibit.)

Government exhibit No. 117–A

1936, July 9—Diagram. "Rating Curve—Kanawha River, Lock No. 2, Mile 84.8; London Dam, Mile 82.81; and Lock No. 3, Mile 79.7. U. S. Engineer Office, Huntington, W. Va." (Original Exhibit.)

Government exhibit No. 117–B

1935, Dec. 10—Diagram. "U. S. Engineer Office, Huntington, W. Va., Rating Curves, Kanaw*ah* River, Locks Nos. 4 & 5, and Marmet." (Original Exhibit.)

Government exhibit No. 117–C

1935, Dec. 5—Diagram. "Rating Curves, Kanawha River, Locks Nos. 6, 7, 8." (Original Exhibit.)

Government exhibit No. 117–D

1936, July 8—Diagram. "Kanawha River—Rating Curves, Locks No. 9 and Winfield. U. S. Engineer Office, Huntington, W. Va." (Original Exhibit.)

Government exhibit No. 117–E

1935, Dec. 5—Diagram. "Rating Curves, Kanawha River, Locks Nos. 10 and 11." (Original Exhibit.)

Government exhibit No. 117-F

1935, Dec. 10—Diagram, "Rating Curves, Ohio River below Point Pleasant at Lock No. 26. U. S. Engineer Office, Huntington, W. Va." (Original Exhibit.)

Government exhibit No. 118

1935, Dec.—Diagram. "Kanawha River Profile, Six & Nine feet projects." U. S. Engineer Office, Huntington, W. Va. (Original Exhibit.)

Government exhibit No. 119

1935, Dec.—Diagram. "Kanawha River and Tributaries, proposed improvements." U. S. Engineer Office, Huntington, W. Va. (Original Exhibit.)

Government exhibit No. 120

1935, Dec.—Diagram. "Kanawha River and Tributaries, Proposed improvements, profiles." U. S. Engineer Office, Huntington, W. Va. (Original Exhibit.)

Government exhibit No. 121

July 4-21, 1936—Gage recorder chart for New River at Eggleston, Va. (Original Exhibit.)

Government exhibit No. 122

July 6-21, 1936—Gage recorder chart for New River at Hinton (Packs Ferry), W. Va. (Original Exhibit.)

Government exhibit No. 123

1919, Aug. 29—Request for permit for repairs and replacements by Electro Metallurgical Company with following enclosures: (1) 1919, Aug. 29; Letter from W. J. Knapp, V-P, Electro-Met. Co. to Secretary of War. (2) 1919, Sept. 15 and 17; 1st and 2nd Endorsements by Howell and Beach, C. of E. (3) 1919, Sept. 27; 3rd End. by Pillsbury, C. of E. (4) 1919, Oct. 4; 4th End. by Howell, C. of E. (5) Plan of proposed location of replacement dam. (6) 1899, Mar. 2; Letter from Chief of Engineers Office to Major Bixby, C. of E., enclosing permit. (7) 1899, Feb. 27—Permit to Wilson Aluminum Co. (Original Exhibit.)

3391 *Government exhibit No. 123–A*

1934, Oct. 24—Copies of correspondence and reports relating to the Kanawha Falls Plant of Elec-Met. Co. as follows: (1) 1934, Oct. 24; Letter from Capt. Clay, C. of E. to McNinch, Chairman, F. P. C. enclosing the following: (2) 1898, Nov. 12; Letter from Wilson Aluminum Co. to Secretary of War. (3) Part of handwritten letter to Brig. Gen'l John M. Wilson, Chief of Eng. dated January 26, 1899. (4) War Department memorandum. (5) 1899, Feb. 13; Letter from Major Bixby to Brig. Gen. John M. Wilson, Chief of Eng. (6) War Department memo. (7) 3 endorsements by War Department. (8) Copy of telegram dated Feb. 17, 1899, from Mr. Wilson, Chief of Engineers to Wilson Aluminum Co. (9) Letter dated Feb. 18, 1894, from Wilson Aluminum Co. to Mr. Wilson, Chief of Engineers. (10) Letter from Sec. of War, Feb. 27, 1899, to Wilson Alum. Co. (Original Exhibit.)

3392 *Government exhibit No. 124*

1926, Nov. 30—Protest of Great Kanawha River Imp. Ass'n to H. M. Trippe.

3393 *Government exhibit 124*

GREAT KANAWHA RIVER IMPROVEMENT ASSOCIATION

Representing River Shipping Via Great Kanawha and Ohio Rivers

J. T. Hatfield, President; R. P. Gillham, Vice-President; F. W. Leahy, Secretary; Ed. F. J. Bramlage, Treasurer.

Executive Committee: J. T. Hatfield, Chairman; F. W. Leahy, Cincinnati, O.; Ed. F. J. Bramlage, Covington, Ky.; E. M. Merrill, Charleston, W. Va.; Otto Reemelin, Raymond City, W. Va.; R. J. Heslop, Pt. Pleasant, W. Va.

918 UNION CENTRAL BLDG.,
Cincinnati, Ohio, November 30th, 1926.

Major H. M. TRIPPE, U. S. A.,
District Engineer, Huntington, W. Va.

SIR: In the interest of the shippers and users of the Great Kanawha River and the public served by and through them, we protest the action of the Appalachian Power Co. in filing with your office, application for permission to construct and operate one or more hydroelectric dams on the New River, and we strongly oppose the granting of such permission unless we are definitely and satisfactorily assured that the operation of suc dam or dams will under the administration, control and direc supervision of the War Department.

It is our understanding that the Appalachian Power Co. hav made application to your Office for permission to construct an operate a hydroelectric dam, at or near Radford, on the Ne River in the state of Virginia and that the proposed dam will b approximately 110 feet in height and will impound sufficien water to cover an area of more than 19 square miles.

It is further understood that a steam generating plant is to b constructed to carry the normal electric load and that a hydro electric plant is to be constructed to carry the peak load. If ou assumption is correct, we do not believe that this plan of operation will materially vary the pool level and the flow into th Great Kanawha River but in the event of the steam plant bein placed out of commission through a break-down or other causes we have no assurance that the hydro electric plant will not b forced to carry the entire load during the 24 hour period, unti the steam plant is again in service and should this occur durin the period of low water, the natural result would be the lowerin of the pool; and to be prepared for another emergency, it is expected that the pool would be re-filled with all dispatch, with th result that the normal flow would be shut off from the lower rive which would prove disastrous to navigation on the Grea Kanawha River.

The Hydroelectric operators have nothing in common with th Great Kanawha River operators and shippers and it is natural t assume that they would look to their own interests first.

For the protection of the capital now invested in plant an equipment on and along the Great Kanawha River and to safeguard future navigation upon this river it is imperative that th natural flow of the river to the head of navigation be unrestricte and the impoundment of the water in the Great Kanawha Rive
or its tributaries which will in any way cause a less flow
3394 or a fluctuating flow condition will be unalterably opposed
by this Association.

We further protest the awarding of a construction permit to the Appalachian Power Co. until such time as the U. S Engineer Department have determined by survey, that the fluctuating flow or wave effect caused by the water discharge a the dam will not interfere either with navigation or the operatio of the locks and dams on the Great Kanawha River.

It is our understanding that a recent but incomplete survey made by your office has proven that the wave effect made by the hydroelectric dam at Ivanhoe, Va., has been observed as far down the Great Kanawha River as Kanawha Falls, or at the headwaters of Navigation, and if such is the case, we are quite confident that the wave effect from the proposed dam at Radford will seriously affect both navigation and the operation of the movable dams in the upper Kanawha River. We base our opinion upon our understanding that the flow from the dam at Ivanhoe is approximately 2,500 second-feet and that the flow from the proposed dam will be approximately 6,000 second-feet.

As heretofore stated we wish to go on record with your office as opposed to the granting of any permit to the Appalachian Power Company or any other similar concern who contemplate the building of hydroelectric or other dams on either the Great Kanawha River or its tributaries that will in any way reduce or cause an intermittent flow in the Great Kanawha River that will affect navigation on said river.

We do not oppose the construction of any dam or dams providing the construction and operation of such dam or dams are under the supervision of the U. S. Engineer Department and that we receive satisfactory assurance from the said United States Engineer Department that the operation of such dam or dams will not be to the detriment of navigation or to the improvement of the great Kanawha River.

Very truly yours,

THE GREAT KANAWHA RIVER IMPROVEMENT ASSN.
F. W. LEAHY, *Secretary.*

Approved:
——— ———, *President,*
——— ———, *Chairman, Hydroelectric Committee.*

3395 *Government Exhibit No. 125*

1926, Nov.—Protest of Public Service Commission of W. Va.

3396 Project No. 739. In the matter of The Application of Appalachian Electric Power Company, a Virginia corporation, to Federal Power Commission for a License, Project No. 739, with respect to water power development on the New River at a point approximately one mile above the mouth of Little River and seven miles above the City of Radford, Virginia, upon which application a public hearing has been advertised to be held in the County Court Room, at the City of Radford, Virginia, on Thursday, October 28, 1926, at 1:00 P. M.

The Public Service Commission, of West Virginia, represents that the above mentioned project is proposed to be located on the New River, near Radford, Virginia; that the New River flows into the State of West Virginia and is tributary to the Kanawha River, which flows through the State of West Virginia and empties into the Ohio River at Point Pleasant, West Virginia; that there is now located and operated on the Kanawha River, at Glen Ferris, West Virginia, a short distance below the mouth of New River, a dam for hydroelectrical development, the power from which is used in industrial works at that point; that the New River and Kanawha River within the State of West Virginia, by reason of topography of the country traversed and other factors, 3397 are capable of producing a very large amount of water power; and that the Kanawha River is navigable below Montgomery, West Virginia.

That it has been represented to this Commission that the dam for water storage and water power development proposed in the application of the Appalachian Electric Power Company, Project No. 739, has the possibility of greatly benefiting and also greatly damaging present or potential water power developments, as well as navigation on the navigable portions, of the New River and Kanawha River, within the State of West Virginia, depending upon the manner in which and the extent to which the natural flow of the stream may be modified through the impounding of water by such dam and its release therefrom. This Commission, therefore, represents that the present and future water power development of the New River and the Kanawha River within the State of West Virginia may be harmfully affected by the operation of the project set forth in the application of the said Appalachian Electric Power Company, Project No. 739.

The Public Service Commission, of West Virginia, on behalf of the State of West Virginia, the citizens of said state, and especially those industries and individuals enjoying riparian rights and privileges on the New River and the Kanawha River, within the said state, hereby protests against the granting by the Federal Power Commission to the said Appalachian Electric Power Company of the license applied for in its said application, or 3398 any amendment thereof, or substitute thereof, unless such license shall contain as a condition thereof, a provision to the effect that no interference shall be permitted to be made in the flow past such dam as shall be authorized or constructed in pursuance of such license, that may at any time restrict the natural flow of the said river, or the continuous use thereof for power purposes or navigation at points downstream from such dam and within the State of West Virginia, in such manner that there would be through the operation of such dam or project, any diminution of the flow of said river, (1) either below the natural flow of the said river whenever its natural discharge is less than its mean natural discharge, or (2) below the mean natural discharge of the said river whenever its natural discharge exceeds its mean natural discharge.

Respectfully submitted.

PUBLIC SERVICE COMMISSION OF WEST VIRGINIA,
By (Signed) ——— ———, *Attorney.*
Dated November 3, 1926.

3399 *Government exhibit No. 126*

1925, May 28—Letter C. B. Slemp to General Taylor re letter from Mr. Buck.

3400 LAW OFFICES OF GOOD, CHILDS, BOBB & WESCOTT
Illinois Merchants Bank Building
231 South LaSalle Street, Chicago

James W. Good, Robert W. Childs, Dwight S. Bobb, James B. Wescott, C. Bascom Slemp, George B. McKibbin, William A. Bradford, Walter E. Beebe, Francis L. Harris, Esther A. Dunshee, F. M. Hartman, George D. Mills, I. L. Smith.

Washington office—C. Bascom Slemp, 818 Fifteenth St., NW., Washington, D. C.

WASHINGTON, D. C., *May 28, 1925.*

Major General H. TAYLOR,
War Department, Washington, D. C.

DEAR GENERAL TAYLOR: I am sending herewith letter from Mr. Buck which is in accordance with our conversation recently.

We will be glad to furnish any further information desired at any time.

Thanking you for your kindness and courtesy in the matter, I am,

Very truly yours,

(Signed) C. B. SLEMP,
C. B. Slemp.

3401 *Government exhibit No. 126-A*

1925, May 27—Letter Mr. Buck, of V. B. & B., to General Taylor, C. of E.

3402 F. O. Blackwell
H. W. Buck

Telephone
Hanover 2142

Viele, Blackwell & Buck, Engineers

49 Wall Street, New York

Cable Address: Hyroelec, New York

May 27, 1925.

Major General Harry Taylor,
Chief of Engineers, War Department, Washington, D. C.

Dear Sir: Supplementing our discussion in Washington on Monday on the subject of proposed dam on New River in Virginia I am sending you herewith at your request some further data in relation thereto.

Location: On New River in the State of Virginia near Radford at a point 4,970 feet above mouth of Little River.

Height of dam: Approximately 115 feet.

Installed capacity: 75,000 H. P.

Drainage area: At dam site 2,396 square miles. At head of navigation Kanawha River 8,470 square miles.

Distance above navigation: 155 miles via River.

3403 Elevation of river at dam site: 1,730 feet.

Elevation of river at head of navigation: 650 feet.

Storage above dam: 40,000 acre feet with 10′ draft of water.

It is the desire of the New River Development Company to construct this dam and hydroelectric development at once and to comply with the requirements of the War Department in respect to navigation on New River, if affected.

New River at the site of the proposed dam is not navigable in fact. The location is so far in elevation above the navigable portion of the river (Kanawha) 1080′ that the extension of navigation up to the proposed dam site would be an expensive proposition.

We believe that any fluctuations in discharge of water at the dam due to ordinary load variations would be entirely absorbed by the numerous pools which exist in the River in the 155 miles of river between the dam and the head of navigation and would not affect navigation in any way. 75% of the flow in the Kanawha River, which is the navigable portion of New River, enters the river below the proposed dam. Furthermore the Kanawha is a completely canalized river and the water levels upon which
3404 navigation is dependent therein are fixed by lock levels and back water from the Ohio and are more or less independent of flow in river above provided there is sufficient flow at all times to operate locks and supply lock and dam leakage.

The storage above the proposed dam will be sufficient when utilized during the low flow in the River to increase the minimum flow at the dam site by approximately 500 cubic feet per second in an average year. It will also serve to retard and reduce floods in the River below and to average the monthly flows. All of this will be for the benefit of the River below the dam.

We are enclosing herewith the following blueprints:

A-6836—Map showing general location of proposed dam.
R-7652—Showing storage reservoir above dam.
R-7656—Showing general plan of proposed development.

I hope the above information will be sufficient for your purpose and for Major Trippe at this time.

Very truly yours,

VIELE, BLACKWELL & BUCK,
By s/ H. W. Buck
Engineers for New River Development Company.

HWB/M.

3405 *Government exhibit No. 126-B*

Map. New River Development Co.—preliminary layout. Damsite above mouth of Little River.

3407 *Government exhibit No. 127*

1925, June 1—First Endorsement General Jadnin (C. of E.) to District Engineer, re Buck letter 5/27/25.
3408 7495 (New River Development Co.)—1.
Subject: \Project on New River, Va.

1st Ind.

Office, C. of E., June 1, 1925.—To the District Engineer, U. S. Engineer Office, Huntington, W. Va.

It is requested that the District Engineer submit report as to what effect, if any, the power development discussed in the inclosed communication will have on the navigability of the New River and its effluents, and whether, in his opinion, there is any objection to the construction of the project without Federal jurisdiction.

By order of the Chief of Engineers:

(Signed) EDGAR JADWI.
Edgar Jadwin,
Brig. Gen., C. of E.,
Assistant Chief of Engineers.
per JROM.

4 incls., viz: Sub. 1—Viele, Blackwell & Buck, 5/27/25. Subs. 2-4—Blueprints.

3409 *Government Exhibit No. 128*

1925, June 15—2nd End. Trippe to Chief of Engineers (Proje[illegible]on New River).

3410 7495 (New River Development Co.)—1.
Subject: Project on New River, Va. M668/1

2nd Ind.

U. S. Engr. Office, Huntington, W. Va., June 15, 1925.—To the Chief of Engineers, U. S. A. (through the Division Engineer, Central Division).

1. As requested in letter of June 10, 1925, O. C. of E. file 7495 (New River Development Co.)—1, a conference was held in this office on this date with a representative of the New River Development Co. who gave the following reasons for desiring to construct the proposed project without Federal jurisdiction:

The company desires to commence the construction as soon as possible and have an organization ready for the purpose.

Topographic surveys have been made, maps prepared and core drillings at the dam site are now under way.

Hydrographic data has been collected and gaging station has been established at the dam site.

Necessary land at the site has been acquired and have also purchased some land and acquired options on other tracts for the remaining land necessary.

Have plans in preparation and well under way for the powerhouse and other structures.

2. In view of the proposed increase by the construction of this power project of approximately 500 second feet of the low-water flow of the New River the proposed project would in no way interfere with navigation on the Kanawha River which is formed by the junction of the New and the Gauley Rivers and which is canalized for the greater part of its length by the construction of locks and dams. The said project would on the other hand be a benefit to navigation on the Kanawha River if the low-water flow be augmented as proposed.

3. As to the proposition of the New River Development Company that they be permitted to construct the proposed development without Federal jurisdiction, it is not seen how this can be permitted for two reasons: first, the New River while not navigable in fact is legally a navigable stream, the Government in the past having expended moneys on this stream for channel improvement; second, because of the fact as previously stated that the New River is considered a navigable stream it would be inconsistent with the policy that has prevailed in the past to require power developments on this stream to be under the

3411 jurisdiction of the Federal Power Commission and now permit the project here under consideration to be constructed without such jurisdiction. The following proposed developments for water power on the New River have been projected since the enactment of the Federal Water Power law and have been considered as coming within the jurisdiction of the Federal Power Commission:—

Project No. 223—West Virginia. Preliminary permit granted to Charles B. Hawley, Washington, D. C., for power development at Sandstone Falls. This permit expired November 5, 1924.

Project No. 379—West Virginia and Virginia. Preliminary permit granted to the West Virginia Power Company, Charleston, W. Va., for power development at the mouth of the Bluestone River. This permit is still in force.

Project No. 542—North Carolina. Application submitted and pending for preliminary permit for power development on the New and Reddies River in North Carolina.

Project No. 575—Virginia and North Carolina. Application submitted and pending by the Eastern States Development Company, Wheeling, W. Va., for power development on the New River in Virginia and the Fisher River in North Carolina.

4. It is, therefore, the opinion of this office that the proposed water-power project of the New River Development Company will be no obstruction to navigation but rather a benefit provided the low-water flow of the river be augmented as proposed and that there is no objection to proposed development from the standpoint of its influence on navigation.

5. In view of the past policy of considering the New River a navigable stream and of the fact that four previous applications for water-power development on this stream have been considered as coming under the jurisdiction of the Federal Power Commission it is not seen how the New River Development Company can consistently be permitted to construct their proposed project without Federal jurisdiction unless the stream now be declared not navigable and Federal jurisdiction over the four previously proposed water-power projects be cancelled and all applicants for such developments be placed on the same basis.

(Signed) H. M. TRIPPE.
H. M. Trippe,
Major, Corps of Engineers,
District Engineer.

4 inclosures: Sub. 1—Viele, Blackwell & Buck, 5/27/25. Subs. 2-4—Blueprints.

3412 *Government exhibit No. 129*

1925, June 18—3rd End. Col. Kutz to Chief of Engineers (Project on New River).

3413 7495 (New River Development Co.)—1.
Subject: Project on New River, Va.

3rd Ind.

CWK/a

Office Div. Engr., Cent. Div., June 18, 1925.—To the Chief of Engineers.

1. The effect of the proposed power development upon the navigability of New River and its effluents would be beneficial below the dam, and above the dam the river is apparently not navigable in fact.

2. The work heretofore done on New River, together with the improvements recommended but not actually undertaken, seem to bring this stream clearly under the jurisdiction of the Federal Power Commission. Considered only with respect to its influence on navigation, there is no objection to the construction of the project without Federal jurisdiction.

(Signed) C. W. Kutz,
C. W. Kutz,
Col., Corps of Engineers,
Division Engineer.

4 incls.: Sub. 1—Letter, 5/27/25. Subs 2-4—Blueprints.

3414 *Government exhibit No. 130*

July 1, 1927.

Messrs. Curtis, Mallet-Prevost, Colt & Mosle,
30 Broad Street, New York, N. Y.

Gentlemen: There are enclosed duplicate copies of the license which it is proposed to issue to the Appalachian Electric Power Company for a power project in the New River near Radford, Pulaski County, Virginia.

If the instruments are satisfactory, it is requested that both copies be signed and returned together with two certified copies of the resolution of the board of directors authorizing acceptance.

The Commission has not yet authorized the granting of this license, but it is expected that such authorization will be given at a future meeting, and in order to expedite matters the drafts are being sent you in advance for acceptance. As soon as the Commission has acted favorably and the accepted drafts have been returned both copies will be executed and the original will be forwarded for the files of the licensee.

A certified copy of that part of the minutes of the Commission's meeting on June 1, showing the action taken on the declaration of intention of the New River Development Company, is enclosed for your information.

It is understood that the company is contemplating modifying its plans. It is requested that with the acceptance of the license it submit the new plans so that they may be approved by the Chief of Engineers and the Secretary of War. The license will then be modified where necessary in order to site the new exhibits.

Very truly yours,

O. C. MERRILL,
Executive Secretary.

NBK*TL.

4 copies to C. of E.; 1 to Viele, Blackwell & Buck.

3414-A THE FEDERAL POWER COMMISSION

License on Navigable Waters—Project No. 739—Virginia

APPALACHIAN ELECTRIC POWER COMPANY

Whereas, by Act of Congress, approved June 10, 1920 (41 Stat., 1063) designated therein as "The Federal Water Power Act" and hereinafter called "the Act," the Federal Power Commission, hereinafter called "the Commission," is authorized and empowered, inter alia, to issue licenses for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, transmission lines, or other project works necessary or convenient for the development, transmission and utilization of power across, along, from or in any of the navigable waters of the United States, or upon any part of the public lands and reservations of the United States (including the Territories), or for the purpose of utilizing the surplus water or water power from any Government dam; and

Whereas, Appalachian Electric Power Company, hereinafter called "the Licensee," a corporation organized and existing under the laws of the State of Virginia and having its office and principal place of business in the city of Richmond in the State 3414-B of Virginia has made application in due and proper form to the Commission for a license for a power project designated as Project No. 739 on the records of the Commission, and for authority to construct, maintain and operate, in the New River, in the vicinity of Radford, in the County of Pulaski, State of Virginia, certain project works, as hereinafter described, necessary or convenient for the development and improvement of navigation and for the development, transmission and utilization of power; and

Whereas, the Commission on the 1st day of June 1927 found that the interests of interstate and foreign commerce would be affected by the proposed development; and

Whereas, the Licensee has submitted to the Commission satisfactory evidence of its compliance with the laws of the State of Virginia as required by Section 9, subsection (b) of the Act, and the Commission is satisfied as to the ability of the Licensee to carry out the plans for said project as filed with said application; and

Whereas, notice of said application has been given and published by the Commission, as required by Section 4 of the Act; full opportunity has been given to all interested parties to be heard, and no application for said project, or in conflict therewith, has been filed by any State or municipality; and

Whereas, the maps, plans and specifications of said project and of said project works, as hereinafter described, have been approved by the Commission, and the plans of the dam and other structures affecting navigation have been approved by the Chief of Engineers and the Secretary of War; and

Whereas, the Commission has found that said project, as hereinafter described, will be best adapted to a comprehensive scheme of improvement and utilization of said waterway for the purposes of navigation, of water power development and other beneficial public uses; and

Whereas, the Commission did on the day of find
that the contemplated improvement is desirable and
3414-C justified in the public interest for the purpose of improving or developing a waterway, namely, the Kanawha River, for the use or benefit of interstate and foreign commerce, a certified copy of the records of the Commission containing such finding being hereto attached; and

Whereas, the Licensee, on the day of pursuant to an authorization of its board of directors, a copy of the record thereof being hereto attached, accepted in writing all the terms and conditions of the Act and of this License;

Now, therefore, the Commission hereby issues this License to the Licensee for the purpose of constructing, operating and maintaining certain project works necessary or convenient for the development and improvement of navigation and for the development, transmission and utilization of power across, along, from or in said New River, and constituting a part of the project hereinafter described; said license, including the period thereof, being subject to all the terms and conditions of the Act and of the rules and regulations of the Commission pursuant thereto as amended and made effective on the first day of April, 1924, as though fully set forth herein, which said rules and regulations are attached hereto and made a part hereof, and being subject also to the following express conditions and limitations, to wit:

ARTICLE 1. This license is issued for a period of fifty (50) years from the date hereof, and in consideration of such license and the benefits and advantages accruing thereunder to the Licensee it is expressly agreed by the Licensee that the entire project, project area and project works as hereinafter designated and described, whether or not located in, on or along said New River or upon lands of the United States, shall be subject to all the terms and conditions of this license, including the terms and conditions of the Act and of the rules and regulations of the Commission pursuant thereto and made a part of this license.

ARTICLE 2. The project covered by and subject to this license consists of—

3414–D A. All lands constituting project area and inclosed, or the location of which is shown, by the project boundary, and/or interests in such lands necessary or useful for the purposes of the project, whether such lands or interests therein are owned or held by the Licensee or by the United States; such project area and project boundary being more fully shown and described by certain exhibits which accompanied said application for license and which are designated and described as follows:

Exhibit J—In one sheet with title "Development No. 6 above Little River, Virginia, Location Map and Drainage Area."

Exhibit K—In one sheet with title "Development No. 6 Above Little River, Virginia, Map Showing Project Boundary."

Each exhibit signed on August 30, 1926 by N. M. Argabrite, Vice President, Appalachian Electric Power Company.

B. All project works consisting of a concrete dam, an auxiliary earth dam, and a power house with appurtenant structures and equipment; the location, nature, and character of which project works are more fully shown and described by certain exhibits which accompanied said application for license and which are designated and described as follows:

Exhibit L—In two sheets with titles "Preliminary Layout Development No. 6, Dam Site Above Little River, Virginia" and "Preliminary Layout Development No. 6, Flood Gates."

Exhibit M—One typewritten sheet briefly describing the mechanical and electrical equipment.

Each exhibit signed on August 30, 1926 by N. M. Argabrite, Vice President, Appalachian Electric Power Company.

D. All other structures, fixtures, equipment, or facilities used or useful in the maintenance and operation of the project 3414–E and located upon the project area, including such portable property as may be used and useful in connection with the project or any part thereof, whether located on or off the project area, if and to the extent that the inclusion of such property as a part of the project works is approved or acquiesced in by the Commission; also all other rights, easements, or interests the ownership, use, occupancy or possession of which is necessary or appropriate in the maintenance and operation of the project or appurtenant to the project area.

ARTICLE 3. The maps, plans, specifications, and statements designated and described in Article 2 hereof as Exhibits J, K, L and M respectively, and approved by the Executive Secretary for the Commission in accordance with its authorization of   , are hereby made a part of this license, and no substantial change shall hereafter be made in said exhibits, or any of them, until such change shall have been approved by the Commission: Provided, however, that if the Licensee deems it necessary or desirable that said approved maps, plans, specifications and statements, or any of them, be changed there shall be submitted to the Commission for approval amended, supplemental, or additional maps, plans, specifications and statements covering the proposed changes, and upon approval by the Commission of such proposed changes such amended supplemental or additional maps, plans, specifications, and statements shall become a part of this license and shall supersede, in whole or in part, such map, plan, specification, or statement, or part thereof, theretofore made a part of this license as may be specified, respectively, in the order or endorsement of approval.

ARTICLE 4. Said project works shall be constructed in substantial conformity with the approved maps, plans and specifications thereof made a part of this license and designated and described in Articles 2 and 3 hereof or as changed in accordance with the provisions of said Article 3. Except when emergency shall require for the protection of navigation, life, health, or property, no substantial alteration or addition not in conformity with the approved plans shall be made to any dam or other project works constructed under this license without the prior approval of the Commission; and any emergency altera- 3414–F tion or addition so made shall thereafter be subject to such modification and change as the Commission shall direct. Minor changes in or divergence from such approved maps, plans, and specifications may be made in the course of construction, if such changes will not result in decrease in efficiency, in material increase in cost, or in impairment of the general scheme of development; but any such minor changes made without the prior approval of the Commission which in its judgment have produced or will produce any of such results shall be subject to such alteration as the Commission may direct.

ARTICLE 5. The work of construction under this license, whether or not conducted upon lands of the United States, shall be subject to the inspection and approval of the District Engineer, U. S. Engineer Office, Huntington, W. Va., or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall notify such representative of the date upon which work will begin, and as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of construction for a period of more than one week, and of its resumption and completion.

ARTICLE 6. Subject to the provision of Section 13 of the Act, the Licensee shall begin the construction of said project works within one year after date of issuance of this licensee, shall thereafter in good faith and with due diligence prosecute such construction, and shall complete the same within four years from said date.

ARTICLE 7. Upon the completion of the project works, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised maps, plans, specifications, and statements, in so far as necessary to show any divergence from or variations in the project area as finally located or in the project works as constructed when compared with the area shown and the works designated or described in this license or in the maps, plans, specifications, and statements approved by the Commission under the provisions of Article 3 hereof, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variations in or divergence from the approved maps, plans, specifications, and statements. Such revised maps, plans, specifications, and statements shall, if and when approved by the Commission, be made a part of this license and shall, to the extent and in the particulars set forth in the order or endorsement of approval, be substituted for the maps, plans, specifications and statements theretofore approved by the Commission under the provisions of Article 3 hereof. The maps finally approved by the Commission and made a part of this license under the provisions of Article 3 and/or 7 hereof shall show the project area to an adequate scale and the boundary thereof either by legal subdivisions, by metes and bounds survey, or by uniform offsets from center-line survey. Said project area shall include all lands without respect to ownership and whether or not the exact boundaries can be definitely fixed and determined, the use and occupancy of which are or will be valuable or serviceable in the maintenance and operation of the project; on which are located or to which are appurtenant the project works (other than portable property) and the rights, easements, or interests likewise valuable and serviceable; and the ownership or possession, or the right of use and occupancy, of which are subject to acquisition by the United States under the provisions of Section 14 of the Act. Said maps shall show the ownership of each parcel of land in said project area, and with respect to each parcel to which the Licensee has not the fee title, the character of the right of use and occupancy possessed by the Licensee together with the term of such right.

ARTICLE 8. In so far as any material is dredged or excavated in the prosecution of the work herein authorized, it shall be removed and deposited so it will not interfere with navigation and to the satisfaction of said District Engineer.

ARTICLE 9. For the purpose of determining the stage and flow of the stream or streams from which water is to be diverted for the operation of said project works and of the amount of water held in and drawn from storage, the Licensee shall install and thereafter maintain such stream gages and stream gaging stations as may be necessary to determine the flow of the New River available to the project, a standard gage in the
3414–H reservoir above the dam and an automatic recording
gage in the stream below the tailrace of the power plant, and shall provide for the required readings of such gages and for the adequate rating of said station or stations. The Licensee shall also install and maintain standard meters adequate for the determination of the amount of electric energy generated by said project works. The number, character, and location of gages, meters or other measuring devices, and the method of operation thereof may be altered from time to time if necessary to secure adequate determinations, but such alteration shall not be made except with the approval of the Commission or its authorized representative or upon the specific direction of the Commission. The installation of gages, the ratings of said stream or streams, and the determination of the flow thereof, shall be under the supervision of the District Engineer of the United States Geological Survey having charge of stream gaging operations in the region of said project, and the Licensee shall reimburse the said United States Geological Survey for costs incurred in such supervision or for such part thereof as said

District Engineer may deem equitable in the circumstances. The Licensee shall keep accurate and sufficient record of the foregoing determinations to the satisfaction of the Commission, shall make return of such records annually at such time and in such form as the Commission may prescribe.

ARTICLE 10. The Licensee shall be liable for all damages occasioned to the property of others by the construction, maintenance or operation of said project works, or of the works appurtenant or accessory thereto, and in no event shall the United States be liable therefor.

ARTICLE 11. In the construction and maintenance of the project works herein specified, the Licensee shall place and maintain suitable structures to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling and obstructing traffic and endangering life on highways, streets or railroads.

3414–I ARTICLE 12. The Licensee shall allow officers and employees of the United States free and unrestricted access in, through and across the said project and project works in the performance of their official duties.

ARTICLE 13. The operation of any navigation facilities which may be constructed as a part of or in connection with any dam or diversion structure built under the provisions of this license shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including the control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of War. Such rules and regulations may include the maintenance and operation by the Licensee at its own expense of such lights and signals as may be directed by the Secretary of War, and such fishways as may be prescribed by the Secretary of Commerce.

ARTICLE 14. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of War, as may be necessary for the purposes of navigation, and the operations of the Licensee so far as they affect the use, storage, and discharge from storage of waters affected by this license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation and as the Federal Power Commission may prescribe in the interests of flood control and of the fullest practicable use of said waters for power purposes; *Provided*, That the Licensee shall discharge at least 9,000 acre feet of water per week over or through the dam, and whenever the flow at lock No. 2, Kanawha River, falls below 1,400 cubic feet per second the Licensee shall, unless otherwise authorized by the Secretary of War, discharge in each twenty-four hours the natural flow of the river entering the reservoir during the same period, such weekly and daily discharges being subject to the reasonable rules and regulations hereinbefore mentioned.

Article 15. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection
with said project, the Licensee shall convey to the United
3414-J States, free of cost, such of its lands, and its rights of way,
and such right of passage through its dam or other structures and permit such control of pools as may be required to complete such navigation facilities.

Article 16. The Licensee shall construct and install such appliances as are necessary for furnishing power for the operation of navigation facilities, including lights and signals, whether constructed by the Licensee or by the United States; and shall furnish, free of cost to the United States, power for the operation of such navigation facilities.

Article 17. The Licensee shall cut and remove or destroy to the satisfaction of the District Engineer all brush and trees from that zone within and adjacent to the area to be submerged which is included between the contour of elevation 1,830 feet above mean sea level and a line 15 feet horizontally outside of the contour of elevation 1,841 feet above mean sea level, and shall remove or destroy all floatable refuse or material within said areas to be submerged. The Licensee shall also cut in such manner or so remove or destroy brush and trees within said area to be submerged that no part of such brush and trees shall project above said elevation of 1,830 feet.

Article 18. The Licensee hereby agrees as a condition of this license that the amount to be entered upon the fixed capital accounts of said project and reported to the Commission as representing the actual legitimate cost thereof and the actual legitimate investment therein up to the date of this license, whether consisting of expenditures actually made, of charges accrued, or of liabilities or obligations incurred, shall be determined by the Commission in accordance with the provisions of the Act and of the regulations established thereunder; and it is further agreed by the Licensee that upon completion of the construction of said project or of any addition to or betterment of said project the Licensee shall file with the Commission a statement, under oath in duplicate, in such detail as the Commission may require, showing the actual legitimate cost of construction thereof, together with the

price paid for water rights, rights-of way, lands or inter-
3414–K est in lands constituting any part of the project property
subject to the provisions of this license, all as specified
in regulation 20, section 2, of said rules and regulations. Such statement or statements shall include all proper and legitimate costs, whether incurred prior to the date of this license or on and after such date; and the licensee shall, if requested by the Commission, show separately on such statement or statements the items and amounts of cost incurred prior to the issuance of this license as determined by the Commission as hereinbefore in this article provided, with such other details with respect to the cost of the project or any part thereof as the Commission may require. Each and every item of cost included in such statements shall be supported by proper voucher or other record; and any such voucher or record, or certified copy thereof, in support of any item properly includible in said cost shall become a part of the permanent records of said project and shall be kept and retained by the Licensee in the manner required by the Commission.

Article 19. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or of the United States of a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of such reservoir or other improvement for such part of the annual charges for interest, maintenance and depreciation thereon as the Commission may deem equitable. The proportion of such charges to be paid by the Licensee shall be determined from time to time by the Commission. Whenever such reservoir or other improvement is constructed by the United States the Licensee shall pay similar charges into the Treasury of the United States upon bills rendered by the Commission.

Article 20. The Licensee shall pay to the United States reasonable annual charges for the purpose of reimbursing the United States for the costs of the administration of the Act and for recompensing it for the use, occupancy and enjoyment of its lands or other property hereinbefore described. The payment by the Licensee of such annual charges for any calendar year shall be made to the United States at the end of the year or
within thirty days thereafter, upon bills rendered or
3414–L approved by the Commission. Such charges shall be
determined in accordance with the provisions of Regulation 14 of said rules and regulations of the Commission, and for the purposes of such determination the power capacity shall be taken as 12,100 horsepower.

Article 21. After the first twenty years of operation of said project under this license, out of surplus earned thereafter, if any, accumulated in excess of a specified reasonable rate of return upon the actual, legitimate investment of the Licensee in said project, all as defined in and determined by the provisions of regulation 17 of said rules and regulations of the Commission, the Licensee shall establish and maintain amortization reserves, which reserves shall, in the discretion of the Commission, be held until the termination of the license or be applied from time to time in reduction of the net investment. Such specified rate of return shall, subject to the proviso of paragraph A, section 3 of said regulation, be one and one-half (1½) times the weighted average annual interest rate payable on the par value of the bona fide interest-bearing debt of the Licensee actually outstanding in whole or in part, on account of project property at the beginning of the period of amortization and of each calendar year thereafter; such weighted average annual interest rate being determined as provided in paragraphs B and C of section 3 of said regulation 17: Provided, That, if at the beginning of the period of amortization or of any calendar year thereafter, the outstanding interest-bearing debt of the Licensee on account of the project or projects under license, together with any other works or property operated in connection therewith, is less than 25 percent of the actual, legitimate investment of the Licensee in said project or projects, then and in such event for the calendar year next following the specified rate of return shall be two (2) times the legal rate of interest in the State in which the project or major part thereof is located.

Subject to the provisions of section 6 of said regulation, the following proportions of such surplus earnings shall be paid into and held in such amortization reserves: Of all surplus earnings up to and including 2 percent upon the actual, legitimate investment, 30 percent thereof shall be so paid; of all surplus 3414-M earnings in excess of 2 percent and not in excess of 4 percent upon such investment, 50 percent thereof shall be so paid; of all surplus earnings in excess of 4 percent and not in excess of 6 percent, 70 percent thereof shall be so paid, and of all surplus earnings in excess of 6 percent, 90 percent thereof shall be so paid; Provided, That if at the end of any calendar year of the amortization period the Commission shall find that the accumulated earnings of the Licensee during the period of operation, including the first twenty (20) years thereof, have not yielded a fair return upon the actual, legitimate investment in the project or projects under license, the proportion of such surplus earnings for such calendar year and for succeeding calendar years to be paid into such amortization reserves shall be ten (10) percent thereof until such time as the accumulated earnings of the Licensee represent, in the judgment of the Commission, a fair return upon such investment for such period of operation.

ARTICLE 22. No lease of said project or part thereof whereby the lessee is granted the exclusive occupancy, possession or use of project works for purposes of generating, transmitting or distributing power shall be made without the prior written approval of the Commission; and the Commission may, if in its judgment the situation warrants, require that all the conditions of this license, of the Act, and of said rules and regulations of the Commission shall be applicable to such lease and to such property so leased to the same extent as if the lessee were the Licensee hereunder; Provided, That the provisions of this article shall not apply to parts of the project or project works which may be used by another jointly with the Licensee under a contract or agreement whereby the Licensee retains the occupancy, possession, and control of the property so used and receives adequate consideration for such joint use, or to leases of land while not required for purposes of generating, transmitting, or distributing power, or to buildings or other property not built or used for said purposes, or to minor parts of the project or project works the leasing of which will not interfere with the usefulness or efficient operation of the project by the Licensee for said purposes.

3414–N ARTICLE 23. It is hereby understood and agreed that the Licensee, its successors and assigns will, during the period of this license, retain the possession of all project property covered by this license as issued or as hereafter amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and that none of such properties valuable and serviceable to the project and to the development, transmission, and distribution of power therefrom will be voluntarily sold, transferred, abandoned, or otherwise disposed of without the approval of the Commission: Provided, That a mortgage or trust deed or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article. The Licensee further agrees, on behalf of itself, its successors and assigns, that, in the event said project is taken over by the United States upon the termination of this license, as provided in Section 14 of the Act, or is transferred to a new Licensee under the provisions of Section 15 of the Act, it will be responsible for and will make good any defect of title to or of right of user in any such project property which is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and will pay and discharge or will assume responsibility for payment and discharge of all liens or incumbrances upon said project or project property created by said Licensee or created or incurred after the issuance of this license: Provided, That the provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear, or to require the Licensee for the purpose of transferring the project to the United States or to a new Licensee to acquire any different title or right of user in any such project property than was necessary to acquire for its own purposes as Licensee.

ARTICLE 24. The Licensee shall abide by such reasonable regulation of the services to be rendered to customers or consumers of power, and of rates and charges of payment therefor, as may from time to time be prescribed by any duly constituted agency of the State in which the service is rendered or the rate 3414–O charged; and in case of the development, transmission, distribution, sale or use of power in public service by the Licensee or by its customers engaged in public service within a State which has not authorized and empowered a commission or other agency or agencies within said State to regulate and control the services to be rendered by the Licensee or by its customers engaged in public service, or the rates and charges of payment therefor, or the amount or character of securities to be issued by any of said parties, it is agreed as a condition of this license that jurisdiction is hereby conferred upon the Commission, upon complaint of any person aggrieved or upon its own initiative, to exercise such regulation and control until such time as the State shall have provided a commission or other authority for such regulation and control: Provided, That the jurisdiction of the Commission shall cease and determine as to each specific matter of regulation and control prescribed in this Article as soon as the State shall have provided a commission or other authority for the regulation and control of that specific matter.

ARTICLE 25. With the written consent of the Licensee, the Commission may by order made under its seal, and after the public notice required by Section 6 of the Act, modify, alter, enlarge or omit, in so far as authorized by law, any one or more of the conditions or provisions of this license.

ARTICLE 26. The enumeration herein of any rights reserved to the United States or to any State or municipality under the Act, or of any requirement of the Act or of said rules and regulations of the Commission shall not be construed in any degree as impairing any other rights so reserved by the Act or as limiting the force of any other requirement of said Act or of said regulations.

In witness whereof, the Federal Power Commission has caused its name and seal to be hereto signed and affixed by its

FEDERAL POWER COMMISSION,
By ——— ———, *Executive Secretary.*

3414-P In testimony of acceptance of all the terms and conditions of the Federal water power act of June 10, 1920, and of the further conditions imposed in the foregoing license, the Licensee, this day of , has caused its name and corporate seal to be hereto signed and affixed by its pursuant to a resolution of its board of directors, passed on the day of , a certified copy of the record thereof being hereto attached.

APPALACHIAN ELECTRIC POWER CO.,
By ——— ———, *President*.

Attest:

——— ———, *Secretary*.

3414-Q *Government exhibit No. 131*

MAY 5, 1931.

APPALACHIAN ELECTRIC POWER COMPANY,
c/o Messrs. CURTIS, MALLET-PREVOST, COLT & MOSLE,
63 Wall Street, New York, N. Y.

GENTLEMEN: Pursuant to the action taken by the Commission on April 3, 1931, there are forwarded herewith for acceptance duplicate copies of the draft of license for project No. 739, together with a copy of the Opinion and Order of that date.

Upon return of the signed instruments, both copies will be executed in this office and the original forwarded for your files.

Very truly yours,

GEO. OTIS SMITH, *Chairman*.

3 incls. 4343, 44, 45.
4 copies to Chief of Engineers.

3414-R **FEDERAL POWER COMMISSION**

License—Project No. 739—Virginia

APPALACHIAN ELECTRIC POWER COMPANY

Whereas, by Act of Congress approved June 10, 1920 (41 Stat. 1063), and any acts amendatory thereof or supplemental thereto, designated therein as "the Federal Water Power Act" and hereinafter called the "the Act," the Federal Power Commission, hereinafter called "the Commission," is authorized and empowered, inter alia, to issue licenses for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, transmission lines, or other project works subject to the provisions, conditions, and requirements of said Act; and

Whereas, Appalachian Electric Power Company, hereinafter called "the Licensee," a corporation organized and existing under the laws of the State of Virginia and having its office and principal place of business in the city of Richmond, in the State of Virginia, has made application in due and proper form to the Commission for a license for a power project designated as project No. 739 on the records of the Commission, and for authority to construct, maintain, and operate in the New River, in the vicinity of Radford, in the County of Pulaski, State of Virginia, certain project works, as hereinafter described, for the development, transmission, and utilization of power; and

Whereas, on September 4, 1926, the Appalachian Electric Power Company presented evidence of succession to the rights under the Declaration of Intention filed June 26, 1925, by New River Development Company; and

3414-S Whereas, the Licensee submitted to the Commission satisfactory evidence of its compliance with the laws of the State of Virginia as required by section 9, subsection (b), of the Act, and the Commission is satisfied as to the ability of the Licensee to carry out the plans for said project as filed with said application; and

Whereas, notice of said application has been given and published by the Commission, as required by section 4 of the Act; full opportunity has been given to all interested parties to be heard, and no application for said project, or in conflict therewith, has been filed by any State or municipality; and

Whereas, the Commission on June 1, 1927, took action reciting that said project, unless operated in the interests of interstate or foreign commerce, would have an adverse effect on such interests, but if operated in accordance with such requirements would materially benefit such commerce; and

Whereas, on February 4, 1930, the Licensee, having previously rejected a standard-form license, requested the Commission to reconsider its finding as to the effect of said project upon the interests of interstate and foreign commerce, or, in the alternative, to issue a minor-part license for this project; and

Whereas, on April 3, 1931, the Commission denied said motion to reconsider, denied the application for a minor-part license, and issued its order that Licensee be tendered a standard-form license under the Act and that construction of the proposed project should not proceed until such license should be accepted; and

Whereas, the maps, plans, and specifications of said project and of said project works, as hereinafter described, have been approved by the Commission, and the plans of the dam and other structures affecting navigation have been approved by the Chief of Engineers and the Secretary of War; and

Whereas, in the judgment of the Commission said project, as hereinafter described, will be best adapted to a comprehensive scheme of improvement and utilization of said waters 3414–T for the purposes of navigation and interests of navigation and/or interstate or foreign commerce, of water-power development, and other beneficial public uses; and

Whereas, the Licensee on the day of , 1931 pursuant to an authorization of its board of directors, a copy of the record thereof being hereto attached, accepted in writing all the terms and conditions of the Act and of this license;

Now, therefore, the Commission hereby issues this license to the Licensee for the purpose of constructing, operating, and maintaining certain project works for the development, transmission, and utilization of power across, along, from, or in said New River and constituting the project hereinafter described; said license, including the period thereof, being subject to all the terms and conditions of the Act and of the rules and regulations of the Commission pursuant thereto as amended and made effective on the first day of May 1928, as though fully set forth herein, which said rules and regulations are attached hereto and made a part hereof, and being subject also to the following express conditions and limitations, to wit:

ARTICLE 1. This license is issued for a period of fifty (50) years from the date hereof, "and in consideration of such license and the benefits and advantages accruing thereunder to the Licensee it is expressly agreed by the Licensee that the entire project, project area, and project works as hereinafter designated and described shall be subject to all the terms and conditions of this license, including the terms and conditions of the Act and of the rules and regulations of the Commission pursuant thereto and made a part of this license."

ARTICLE 2. The project covered by and subject to this license consists of—

A. All lands constituting the project area and inclosed, or the location of which is shown, by the project boundary, and/or interests in such lands necessary or useful for the purposes 3414–U of the project, such project area and project boundary being more fully shown and described by certain exhibits which accompanied said application for license and which are designated and described as follows:

Exhibit J—Map (FPC No. 739–1) with title "Location Map and Drainage Area (A. E. P.—R. D.—3001)."

Exhibit K—Map (FPC No. 739–9) with title "General Map of Project (A. E. P.—R. D.—3002)."

B. All project works consisting of a dam and a power house with appurtenant structures and equipment; the location, nature, and character of which project works are more fully shown and described by certain exhibits which accompanied the applications for license and which are designated and described as follows:

Exhibit L—Maps and plans in two sheets (FPC Nos. 739–10, 13) with titles as follows: L–1 "Plan of Dam site (A. E. P.—R. D.—3003)."

L–4, "Elevation and Sections of Dam and Power Station (A. E. P.—R. D.—3005)."

Exhibit M—One typewritten sheet briefly describing the mechanical and electrical equipment;

Said exhibit signed on August 30, 1926, by N. M. Argabrite, Vice President, Appalachian Electric Power Company.

C. All other structures, fixtures, equipment, or facilities used or useful in the maintenance and operation of the project and located upon the project area, including such portable property as may be used and useful in connection with the project or any part thereof, whether located on or off the project area, if and to the extent that the inclusion of such property as a part of the project works is approved or acquiesced in by the Commission; also all other rights, easements, or interests, the ownership, use, occupancy, or possession of which is necessary or appropriate in the maintenance and operation of the project or appurtenant to the project area.

3414–V ARTICLE 3. The maps, plans, specifications, and statement designated and described in article 2 hereof as Exhibits J, K. L. and M, respectively, and approved by the Chairman for the Commission in accordance with its authorization of are hereby made a part of this license and no substantial change shall hereafter be made in said exhibits, or any of them, until such change shall have been approved by the Commission; provided, however, that if the Licensee deems it necessary or desirable that said approved maps, plans, specifications, and statements, or any of them, be changed there shall be submitted to the Commission for approval amended, supplemental, or additional maps, plans, specifications, and statements covering the proposed changes, and upon approval by the Commission of such proposed changes such amended, supplemental, or additional maps, plans, specifications, and statements shall become a part of this license and shall supersede, in whole or in part, such map, plan, specification, or statement, or part thereof, theretofore made a part of this license as may be specified, respectively, in the order or endorsement of approval.

ARTICLE 4. Said project works shall be constructed in substantial conformity with the approved maps, plans, and specifications thereof made a part of this license and designated and described in

articles 2 and 3 hereof or as changed in accordance with the provisions of said article 3. Except when emergency shall require for the protection of navigation, life, health, or property, no substantial alteration or addition not in conformity with the approved plans shall be made to any dam or other project works constructed under this license without the prior approval of the Commission; and any emergency alteration or addition so made shall thereafter be subject to such modification and change as the Commission shall direct. Minor changes in or divergence from such approved maps, plans, and specifications may be made in the course of construction, if such changes will not result in decrease in efficiency, in material increase in cost, or in impairment of the general scheme of development; but any such minor changes made without the prior approval of the Commission which in its judgment have
3414–W produced or will produce any of such results shall be subject to such alteration as the Commission may direct.

ARTICLE 5. The work of construction under this license shall be subject to the inspection and approval of the District Engineer, U. S. Engineer Office, Huntington, W. Va., or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall notify such representative of the date upon which work will begin, and as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of construction for a period of more than one week, and of its resumption and completion.

ARTICLE 6. Subject to the provisions of Section 13 of the Act, the Licensee shall begin the construction of said project works within one year after date of issuance of this license, shall thereafter in good faith and with due diligence prosecute such construction, and shall complete the same within four years from said date.

ARTICLE 7. Upon the completion of the project works, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised maps, plans, specifications, and statements, in so far as necessary to show any divergence from or variations in the project area as finally located or in the project works as constructed when compared with the area shown and the works designated or described in this license or in the maps, plans, specifications, and statements approved by the Commission under the provisions of article 3 hereof, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variations in or divergence from the approved maps, plans, specifications, and statements. Such revised maps, plans specifications, and statements shall, if and when approved by the Commission, be made a part of this license and shall, to the extent and in the particulars set forth in the order or endorsement of approval, be substituted for the maps, plans, specifications, and statements theretofore approved by the 3414-X Commission under the provisions of article 3 hereof.

The maps finally approved by the Commission and made a part of this license under the provisions of article 3 and/or 7 hereof shall show the project area to an adequate scale and the boundary thereof either by legal subdivisions, by metes and bounds survey, or by uniform offsets from centerline survey. Said project area shall include all lands without respect to ownership and whether or not the exact boundaries can be definitely fixed and determined, the use and occupancy of which are or will be valuable or serviceable in the maintenance and operation of the project; on which are located or to which are appurtenant the project works (other than portable property) and the rights, easements, or interests likewise valuable and serviceable; and the ownership or possession, or the right of use and occupancy, of which are subject to acquisition by the United States under the provisions of Section 14 of the Act. Said maps shall show the ownership of each parcel of land in said project area, and with respect to each parcel to which the Licensee has not the fee title, the character of the right of use and occupancy possessed by the Licensee together with the term of such right.

ARTICLE 8. In so far as any material is dredged or excavated in the prosecution of the work herein authorized, it shall be removed and deposited so it will not interfere with navigation and to the satisfaction of said District Engineer.

ARTICLE 9. For the purpose of determining the stage and flow of the stream or streams from which water is to be diverted for the operation of said project works and of the amount of water held in and drawn from storage, the Licensee shall install and thereafter maintain such stream gages and stream gaging stations as may be necessary to determine the flow of the New River available to the project, a standard gage in the reservoir above the dam and an automatic recording gage in the stream below the tailrace of the power plant, and shall provide for the required readings of such gages and for the adequate rating of said station or stations. The Licensee shall also install and maintain standard meters adequate for the determination of the amount of electric energy generated by said project works. The 3414-Y number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof may be altered from time to time if necessary to secure adequate determinations, but such alteration shall not be made except with the approval of the Commission or its authorized representative or upon the specific direction of the Commission. The installation of gages, the ratings of said stream or streams, and the determination of the flow thereof, shall be under the supervision of the District Engineer of the United States Geological Survey having charge of stream gaging operations in the region of said project, and the Licensee shall reimburse the said United States Geological Survey for costs incurred in such supervision or for such part thereof as said Engineer may deem equitable in the circumstances. The Licensee shall keep accurate and sufficient record of the foregoing determinations to the satisfaction of the Commission, shall make return of such records annually, at such time and in such form as the Commission may prescribe.

ARTICLE 10. The Licensee shall maintain the project works in a condition of repair adequate for the efficient operation of said works in the development and transmission of power, shall make all necessary renewals and replacements, shall establish and maintain adequate depreciation reserves for such purposes, shall so maintain and operate said works as not to impair the interests and/or development of navigation and/or the interests of interstate or foreign commerce and shall conform to such rules and regulations as the Commission may from time to time prescribe for the protection of life, health, and property. The Licensee shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto, constructed under the license and in no event shall the United States be liable therefor.

ARTICLE 11. In the construction and maintenance of the project works herein specified, the Licensee shall place and maintain suitable structures to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, 3414–Z telephone, and other signal wires or power transmission lines not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling and obstructing traffic and endangering life on highways, streets, or railroads.

ARTICLE 12. The Licensee shall allow officers and employees of the United States free and unrestricted access in, through, and across the said project and project works in the performance of their official duties.

ARTICLE 13. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of War, as may be necessary for the purposes of navigation.

ARTICLE 14. The operations of the Licensee so far as they affect the use, storage, and discharge from storage of waters affected by the New River shall at all times be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation and as the Federal Power Commission may prescribe in the interests of flood control and of the fullest practicable use of said waters for power purposes.

ARTICLE 15. Whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 second-feet, the Licensee shall, when so directed by the Secretary of War, discharge in each 24 hours the natural flow of the river at the dam site during that period up to a discharge of 1,150 acre-feet. The discharge from the project shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent undue interference with navigation on the Kanawha River.

ARTICLE 16. The Licensee shall cut and remove or destroy to the satisfaction of the District Engineer all brush and trees from that zone within and adjacent to the area to be submerged which is included between the contour of elevation 1,815 feet above mean sea level and a line 15 feet horizontally outside of the contour of elevation 1,846 feet above mean sea level, and shall remove or destroy all floatable refuse or material within said area to be submerged. The Licensee shall also cut in such manner or so remove or destroy brush and trees within said area to be submerged that no part of such brush and trees shall project above said elevation of 1,815 feet.

ARTICLE 17. The Licensee hereby agrees as a condition of this license that the amount to be entered upon the fixed capital accounts of said project and reported to the Commission as representing the actual legitimate cost thereof and the actual legitimate investment therein up to the date of this license, whether consisting of expenditures actually made, or charges accrued, or of liabilities or obligations incurred, shall be determined by the Commission in accordance with the provisions of the Act and of the regulations established thereunder; and it is further agreed by the Licensee that upon completion of the construction of said project or of any addition to or betterment of said project the Licensee shall file with the Commission a statement, under oath in duplicate, in such detail as the Commission may require, showing the actual legitimate cost of construction thereof, together with the price paid for water rights, rights of way, lands or interest in lands constituting any part of the project property subject to the provisions of this license, all as specified in regulation 20, section 2, of said rules and regulations. Such statement or statements shall include all proper and legitimate cost, whether incurred prior to the date of this license or on and after such date; and the Licensee shall, if requested by the Commission, show separately on such statement or statements the items and amounts of cost incurred prior to the issuance of this license as determined by the Commission as hereinbefore in this article provided, with such other details with respect to the cost of the project or any part thereof as the Commission may require. Each and every item of cost included in such statements shall be supported by proper voucher or other record; and any such voucher or record, or certified copy thereof, in support of any item properly includible in said cost shall become a part of the permanent records of said project and shall be kept and retained by the Licensee in the manner required by the Commission.

3414-BB **Article** 18. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or of the United States of a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of such reservoir or other improvement for such part of the annual charges for interest, maintenance, and depreciation thereon as the Commission may deem equitable. The proportion of such charges to be paid by the Licensee shall be determined from time to time by the Commission. Whenever such reservoir or other improvement is constructed by the United States, the Licensee shall pay similar charges into the Treasury of the United States upon bills rendered by the Commission.

Article 19. The Licensee shall pay to the United States reasonable annual charges for the purpose of reimbursing the United States for the cost of the administration of the Act. The payment by the Licensee of such annual charges for any calendar year shall be made to the United States at the end of the year, or within thirty days thereafter, upon bills rendered or approved by the Commission. Such charges shall be determined in accordance with the provisions of regulation 14 of said rules and regulations of the Commission, and for the purposes of such determination the power capacity shall be taken as 12,100 horsepower.

Article 20. After the first twenty years of operation of said project under this license, out of surplus earned thereafter, if any, accumulated in excess of a specified reasonable rate of return upon the actual, legitimate investment of the Licensee in said project, all as defined in and determined by the provisions of regulation 17 of said rules and regulations of the Commission, the Licensee shall establish and maintain amortization reserves, which reserves shall, in the discretion of the Commission, be held until the termination of the license or be applied from time to time in reduction of the net investment. Such specified rate of return shall, subject to the proviso of paragraph A, section 3 of said regulation, be one and one-half (1½) times the weighed average annual interest rate payable on the par value of the bona fide interest-bearing debt of the Licensee actually outstanding, in whole or in part, on account of project property 3414-CC at the beginning of the period of amortization and of each calendar year thereafter; such weighted average annual interest rate being determined as provided in paragraphs B and C of section 3 of said regulation 17; provided, that if at the beginning of the period of amortization or of any calendar year thereafter, the outstanding interest-bearing debt of the Licensee on account of the project or projects under license, together with any other works or property operated in connection therewith, is less than 25 percent of the actual, legitimate investment of the Licensee in said project or projects, then and in such event for the calendar year next following the specified rate of return shall be two (2) times the legal rate of interest in the State in which the project or major part thereof is located.

Subject to the provisions of section 6 of said regulation, the following proportions of such surplus earnings shall be paid into and held in such amortization reserves: Of all surplus earnings up to and including 2 percent upon the actual, legitimate investment, 30 percent thereof shall be so paid; of all surplus earnings in excess of 2 percent and not in excess of 4 percent upon such investment, 50 percent thereof shall be so paid; of all surplus earnings in excess of 4 percent and not in excess of 6 percent, 70 percent thereof shall be so paid; and of all surplus earnings in excess of 6 percent, 90 percent thereof shall be so paid; provided that if at the end of any calendar year of the amortization period the Commission shall find that the accumulated earnings of the Licensee during the period of operation, including the first twenty (20) years thereof, have not yielded a fair return upon the actual, legitimate investment in the project or projects under license, the proportion of such surplus earnings for such calendar year and for succeeding calendar years to be paid into such amortization reserves shall be ten (10) percent thereof until such time as the accumulated earnings of the Licensee represent in the judgment of the Commission, a fair return upon such investment for such period of operation.

Article 21. No lease of said project or part thereof whereby the lessee is granted the exclusive occupancy, possession, or use of the project works for purposes of generating transmitting, 3414–DD or distributing power shall be made without the prior written approval of the Commission; and the Commission, may if in its judgment the situation warrants, require that all the conditions of this license, of the Act, and of said rules and regulations of the Commission shall be applicable to such lease and to such property so leased to the same extent as if the lessee were the Licensee hereunder; provided that the provisions of this article shall not apply to parts of the project or project works which may be used by another jointly with the Licensee under a contract or agreement whereby the Licensee retains the occupancy, possession, and control of the property so used and receives adequate consideration for such joint use, or to leases of land while not required for purposes of generating, transmitting, or distributing power, or to buildings or other property not built or used for said purposes, or to minor parts of the project or project works, the leasing of which will not interfere with the usefulness or efficient operation of the project by the Licensee for said purposes.

Article 22. It is hereby understood and agreed that the Licensee, its successors, and assigns will, during the period of this license, retain the possession of all project property covered by this license as issued or as hereafter amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and that none of such properties valuable and serviceable to the project and to the development, transmission, and distribution of power therefrom will be voluntarily sold, transferred, abandoned, or otherwise disposed of without the approval of the Commission; provided, that a mortgage or trust deed or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article. The Licensee further agrees, on behalf of itself, its successors, and assigns, that, in the event said project is taken over by the United States upon the termination of this license, as provided in section 14 of the Act, or is transferred to a new licensee under the provisions of section 15 of the Act, it will be responsible for and will make good any defect of title to or of right of user in any such project property which is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and will pay and discharge or will 3414–EE assume responsibility for payment and discharge of all liens or incumbrances upon said project or project property created by said Licensee or created or incurred after the issuance of this license; provided, that the provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear, or to require the Licensee for the purpose of transferring the project to the United Etates or to a new licensee to acquire any different title or right of user in any such project property than was necessary to acquire for its own purposes as Licensee.

ARTICLE 23. The Licensee shall abide by such reasonable regulation of the services to be rendered to customers or consumers of power, and of rates and charges of payment therefor, as may from time to time be prescribed by any duly constituted agency of the State in which the service is rendered or the rate charged; and in case of the development, transmission, distribution, sale, or use of power in public service by the Licensee or by its customers engaged in public service within a State which has not authorized and empowered a commission or other agency or agencies within said State to regulate and control the services to be rendered by the Licensee or by its customers engaged in public service, or the rates and charges of payment therefor, or the amount or character of securities to be issued by any of said parties, it is agreed as a condition of this license that jurisdiction is hereby conferred upon the Commission, upon complaint of any person aggrieved or upon its own initiative, to exercise such regulation and control until such time as the State shall have provided a commission or other authority for such regulation and control; provided, that the jurisdiction of the Commission shall cease and determine as to each specific matter of regulation and control prescribed in this article as soon as the State shall have provided a commission or other authority for the regulation and control of that specific matter.

3414–FF

ARTICLE 24. Combinations, agreements, arrangements, or understandings, express or implied, to limit the output of electrical energy, to restrain trade, or to fix, maintain, or increase prices for electrical energy or service are hereby prohibited.

ARTICLE 25. With the written consent of the Licensee, the Commission may by order made under its seal, and after the public notice required by section 6 of the Act, modify, alter, enlarge, or omit, in so far as authorized by law, any one of more of the conditions or provisions of this license.

ARTICLE 26. The enumeration herein of any rights reserved to the United States or to any State or municipality under the Act, or of any requirement of the Act or of said rules and regulations of the Commission shall not be construed in any degree as impairing any other rights so reserved by the Act or as limiting the force of any other requirement of said Act or of said regulations.

In witness whereof, the Federal Power Commission has caused its name and seal to be hereto signed and affixed by

FEDERAL POWER COMMISSION.
By ——— ———.

In testimony of acceptance of all the terms and conditions of the Federal Water Power Act of June 10, 1920, and of the further conditions imposed in the foregoing license, the Licensee this day of , has caused its name and corporate seal to be hereto signed and affixed by , its , pursuant to a resolution of its board of directors passed on the day of , a certified copy of the record thereof being hereto attached.

APPALACHIAN ELECTRIC POWER COMPANY,
By ——— ———, *President*.

Attest:

——— ———, *Secretary*.

3414-GG *Government exhibit no. 132*

Plate 11.—Diagram showing change in wave as it passes downstream. (Original Exhibit.)

Government exhibit No. 133

March 1930—Discharge hydrograph wave study of New River at Allisonia, Va., from March 11, 1930–March 31, 1930. (Original Exhibit.)

Government exhibit No. 134

March 1930—Discharge hydrograph wave study New River at Eggleston, Va., from March 11, 1930–March 31, 1930. (Original Exhibit.)

Government exhibit No. 135

March 1930—"Discharge hydrograph wave study New River at Glen Lyn, Va., March 12, 1930–March 30, 1930. (Original Exhibit.)

Government exhibit No. 136

March 1930—"Discharge hydrograph wave study New River at Hinton, W. Va., March 13, 1930–March 30, 1930. (Original Exhibit.)

Government exhibit No. 137

March 1930—"Discharge hydrograph wave study New River at Caperton, W. Va.—March 12, 1930 to Apr. 3, 1930. (Original Exhibit.)

Government exhibit No. 138

1930 March—"Discharge hydrograph wave study New River at Damsite "A" near Radford, Va., March 11, 1930 to March 31, 1930." (Original Exhibit.)

3415 *Government exhibit No. 139*

1930, March—"Discharge hydrograph wave study at Kanawha River at Kanawha Falls, W. Va., March 12, 1930 to April 1, 1930." (Original Exhibit.)

Government exhibit No. 140

1930, March—"Discharge hydrograph wave study of New River at Ivanhoe, March 12, 1930 to March 31, 1930." (Original Exhibit.)

Government exhibit No. 141

1930, March—"Discharge hydrograph wave study of Kanawha River at Montgomer', W. Va. (Lock #2), March 14 to March 31, 1930." (Original Exhibit.)

3416 *Government exhibit No. 142*

1935—System Load Curve, A. E. P. Co. and Amer. Gas & Electric Co.—Week Day, Oct. 28, 1935, Sat. Nov. 2nd, 1935, and Sunday, Nov. 3rd, 1935.

3418 *Government exhibit No. 143*

1930—June 1, chart "New Kanawha River Power Waves 3/11/30 to 4/3/30." (Original Exhibit.)

Government exhibit No. 144

10 sheets—Plans of locks & dams, Nos. 2 to 11, incl. on Kanawha River, as follows:

(a) Kanawha River—Lock and Dam No. 2.
(b) Kanawha River—Lock and Dam No. 3.
(c) Kanawha River—Lock and Dam No. 4.
(d) Kanawha River—Lock and Dam No. 5.
(e) Kanawha River—Lock and Dam No. 6.
(f) Kanawha River—Lock and Dam No. 7.
(g) Kanawha River—Lock and Dam No. 8.
(h) Kanawha River—Lock and Dam No. 9.
(i) Kanawha River—Lock and Dam No. 10.
(j) Kanawha River—Lock and Dam No. 11.
(Original Exhibit.)

3417

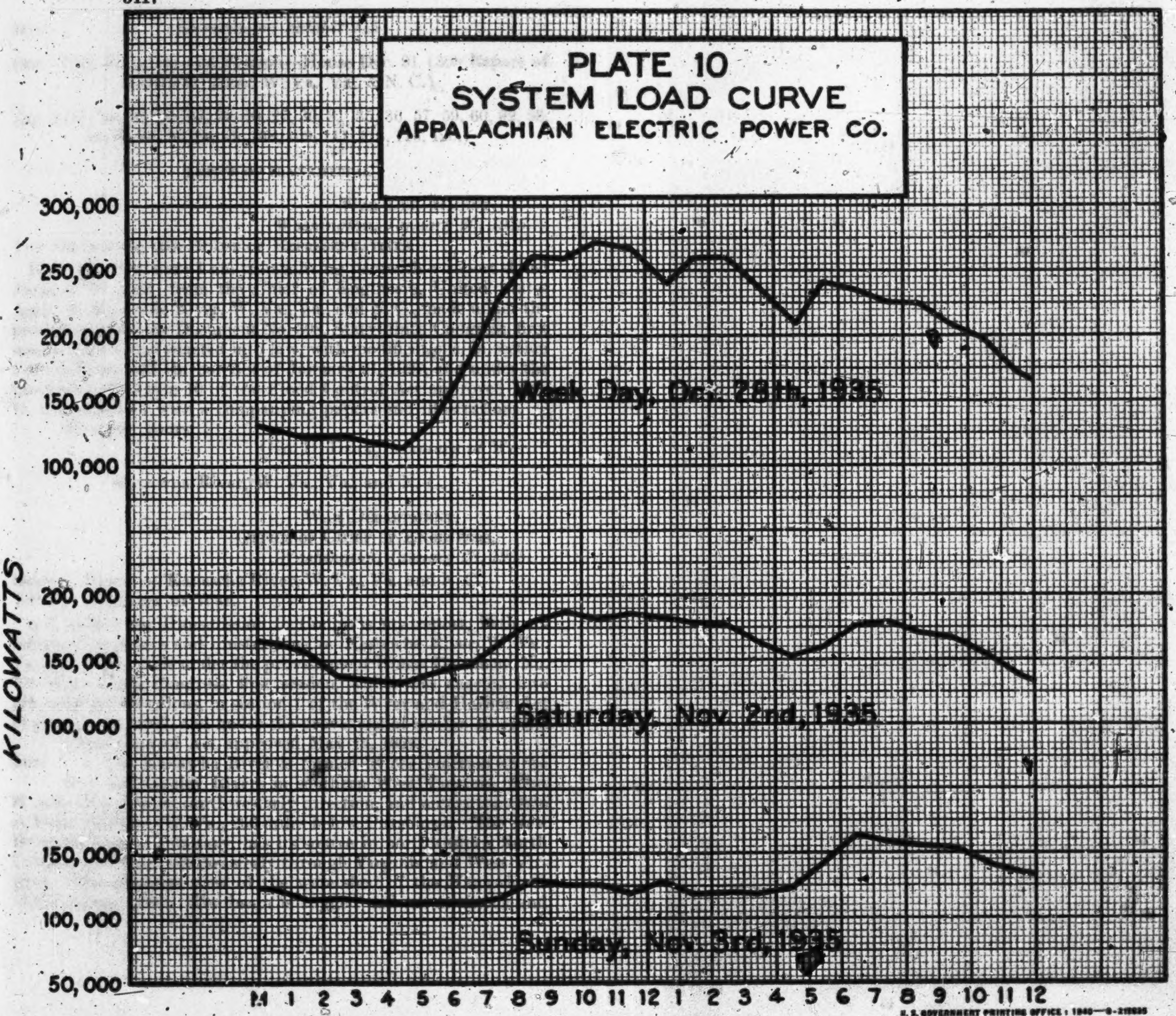


PLATE 10
SYSTEM LOAD CURVE
APPALACHIAN ELECTRIC POWER CO.

U. S. GOVERNMENT PRINTING OFFICE : 1940—O-219925

EXHIBIT

3419 *Government exhibit 145*

1935—74th Congress—1st Session—House Doc. 91 (308 Report of Kanawha River, W. Va., Va., & N. C.)

(pp. 1–17; 18, 20, 22, 23, 24, 26, 27, 30, 31, 35, 36, 57, 59, 60, 92, 93, 94, 95, 96, 97, 98, 99, 108, 109, 111, 113, 115, 120,)

LETTER OF TRANSMITTAL

WAR DEPARTMENT,
Washington, January 29, 1935.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a report dated January 28, 1935, from the Chief of Engineers, United States Army, on Kanawha River, W. Va., Va., and N. C., made under the provisions of House Document No. 308, Sixty-ninth Congress, first session, which was enacted into law, with modifications, in section 1 of the River and Harbor Act of January 21, 1927, and under the provisions of section 10 of the Flood Control Act approved May 15, 1928, together with accompanying papers and illustrations.

Sincerely yours,

GEO. H. DERN, *Secretary of War.*

Kanawha River, W. Va., Va., and N. C.

WAR DEPARTMENT,
OFFICE OF CHIEF OF ENGINEERS,
Washington, January 28, 1935.

Subject: Report on Kanawha River, W. Va., Va., and N. C.
To: The Secretary of War.

1. I submit for transmission to Congress my report, with accompanying papers and illustrations, on Kanawha River, W. Va., Va., and N. C., made under the provisions of House Document No. 308, Sixty-ninth Congress, first session, which was enacted into law, with modifications, in section 1 of the River and Harbor Act of January 21, 1927, and under the provisions of section 10 of the Flood Control Act approved May 15, 1928.

3420 2. The Kanawha River is formed by the junction of the New and Gauley Rivers in southern West Virginia, flows 97 miles in a general northwesterly direction, and enters the Ohio at Point Pleasant, W. Va., 266 miles below Pittsburgh. The New River, its largest tributary, has its source in northwestern North Carolina and flows northeasterly through Virginia and West Virginia. The drainage area of the watershed of the Kanawha is 12,300 square miles. The basin is rugged and mountainous and

the stream valleys are generally narrow with little level botto
land.

3. The Kanawha Basin has large natural resources in bituminou
coal, natural gas, petroleum and other minerals, and some timbe
The coal is of excellent quality. The principal industries are co
mining, agriculture, gas and petroleum productions, manufactu
ing, electrical metallurgy, and lumber. The population of th
basin is 725,000, the largest city being Charleston, W. Va., with
population of 60,000.

4. Navigation.—A project was completed in 1898 for slac
watering the main stem of the river by the construction of 10 loc
and dams to afford a channel 6 feet deep through the river to th
foot of Kanawha Falls at its head. This improvement is no
being modernized by the construction of 3 high-lift locks an
dams in the Kanawha River and 1 high-lift lock and dam in th
Ohio below the mouth of the Kanawha to replace the 10 old loc
and dams in the Kanawha and 3 in the Ohio and to afford
channel 9 feet deep with locks suitable for modern barge nav
gation. Two of the new locks and dams have been complete
and placed in operation.

5. The larger tributaries of the Kanawha River, and partic
larly the New River, were formerly used to a limited extent fo
trade and transportation, and improvements were made by th
United States on the New, Gauley, and Elk Rivers by removin
rocks and snags and by minor channel excavation. A special boar
reported on March 18, 1874, that it was entirely practicable to co
nect the waters of the James and Ohio Rivers by water navigation
. feet in depth. The canal route after crossing the divide b
3421 tween the watershed was to follow the Greenbrier, New, an
Kanawha Rivers. The River and Harbor Act of 1902 r
pealed the provisions of prior acts providing for the improveme
of New River. Commerce on these tributaries has practically di
appeared, and no substantial commerce upon them can be antic
pated in their present condition.

6. The larger tributaries of the Kanawha are susceptible of im
provement for navigation by the utilization of the pools forme
by the construction of high dams for power and flood-contr
purposes, if locks or other devices are constructed for passin
vessels from one pool to another. The large cost of providin
and operating such locks or other devices does not appear to b
justified by any commerce immediately in prospect, and no gener
plans are now presented for the utilization of these tributaries
routes for modern barge navigation. Reservoirs on the Ne
River for power and for the control of flood waters can be op
erated to afford some beneficial effect on navigation on the ma

stem of the Kanawha and on the Ohio, and will reduce the heights of destructive floods on these streams. General plans for such reservoirs are herein considered.

7. Power.—Because of the steep slopes of the tributaries of the Kanawha River and the abundant rainfall, the basin is especially suited to the development of water power. A small part of the potential power is now developed at 3 plants on the upper reaches of the New River and 1 plant at Kanawha Falls at the head of the Kanawha River. Another project known as the "Hawks Nest project" on the lower reaches of the New River is approaching completion. Two plants are being constructed, under license from the Federal Power Commission, to utilize the surplus water at the navigation dams recently completed in the upper part of the Kanawha River. The total installed capacity of the plants now in operation is 36,400 kilowatts and of the plants under construction about 160,000 kilowatts. The development of the surplus water on the third navigation dam to be constructed on the Kanawha River is anticipated under license from the Federal Power Commission.

8. The Federal Power Commission, in a resolution adopted October 12, 1932, found and declared that the New River from 3422 the mouth of Wilson Creek, Va., north is navigable water within the definition thereof as set forth in section 3 of the Federal Water Power Act. The Federal Power Commission is empowered to issue licenses for the constructing, operating, and maintaining dams, reservoirs, power houses, and appurtenant works on navigable waters of the United States, and to license the utilization of surplus water or water power from any Government dam. The construction and operation of dams by the Federal Government or by any other agency under license from the Federal Power Commission provides a procedure for the utilization of the water resources in a manner best serving the general public advantage.

9. The report of the district engineer contains plans for the comprehensive development of the water power on the Kanawha River and the New and Gauley Rivers. On the New River and its tributaries the plans provide for a series of dams with a storage reservoir capacity of nearly 1,400,000 acre-feet, the utilization of upward of 2,000 feet of head, and the development of 454,000 primary horse power or nearly 1,500,000 primary peak horsepower at 30 percent load factor. The estimated cost of the entire development is $151,000,000 and the cost per kilowatt-hour at the switchboards is estimated at 4½ mills. The regulated flow at the mouth of the river would be 4,160 second-feet. On the Gauley River Basin the comprehensive development would include a

series of dams with a storage capacity of 174,200 acre-feet, the utilization of 1,442 feet of head, and the development of 71,000 primary horsepower or nearly 237,000 primary peak horsepower, at 30 percent load factor, at an estimated cost of $33,328,000. The estimated cost per kilowatt-hour is 6⅓ mills at the switchboards. The regulated flow at the mouth of the river would be 720 second-feet.

10. On the main stem of the river the regulated flow of the tributaries would afford at the Kanawha Falls plant and the three navigation dams a total of 51,000 primary horsepower or about 123,000 primary peak horsepower at 41 percent load factor, at a cost of from 3.15 to 4.3 mills at the switchboards. The New and Gauley Rivers are the tributaries best suited to water-power development and flood-control purposes. Detailed
3423 investigations of the power resources of the lesser tributaries may be deferred until the development of the capacity of the major tributaries has taken definite form.

11. Flood control.—The Kanawha River is subject to occasional destructive floods. The district engineer estimates that the average annual flood damage in the basin is $1,000,000, of which $800,000 is in the main valley. He presents a plan for the construction of a system of four reservoirs at an estimated cost of $26,800,000 and with a capacity sufficient to reduce floods below the stage at which damage occurs. The estimated annual cost of such a system is $1,870,000 and the annual benefits $800,000. He, therefore, concludes that the construction of the entire system is not economically justified. The construction and operation of flood-control reservoirs to reduce floods in the lower Mississippi River is similarly found to be without economic justification.

12. Irrigation.—As the natural precipitation in the basin is ordinarily ample for all crops, irrigation is not needed.

13. Bluestone Reservoir.—The studies of the river basin showed that the most favorable site for a large reservoir is on the New River immediately above the town of Hinton, W. Va., designated as the Bluestone Reservoir. A dam 150 feet in height would afford a reservoir 36 miles in length lying in the States of Virginia and West Virginia with a gross capacity of 625,000 acre-feet and controlling the run-off in 4,565 square miles. The district engineer finds that this reservoir could be operated to reduce floods on the Kanawha and the Ohio Rivers, to increase the low-water discharge of the New River to 2,000 cubic feet per second; which is about three times the natural minimum discharge, and to produce power, the revenue from which he estimated at over $900,000 annually. At maximum draw-down a head of 66 feet would be available during a year of extreme low

flow. The primary power produced from this minimum flow at minimum head would be but a minor part of the computed power output of the reservoir, the remainder being secondary power which could be disposed of only into a system for
3424 the replacement of steam power. The district engineer
reports that the system of the American Gas & Electric Co. in this region could absorb all of the power that could be generated by the proposed project. The estimated cost of the dam, reservoir, and hydroelectric power plant is $13,000,000. The estimated annual cost of maintenance and operation is $208,000, and the interest on the construction cost at 4 percent is $520,000, giving a net carrying charge of $728,000. In addition to the return from the sale of power, the flood-control benefits are estimated at $250,000 annually for the Kanawha River and $120,000 annually for the Ohio River, these benefits being apparently derived by prorating the benefits from a complete system of flood protection. The district engineer considers that the Bluestone Reservoir project is economically justifiable and recommends its construction. The division engineer concurs in this recommendation.

14. The Mississippi River Commission finds that the effect of a complete system of storage reservoirs in the basin of the Kanawha River would reduce flood heights in the Mississippi River at Cairo by an amount only from 0.3 to 0.1 of a foot in the stages of a major flood. The Commission concludes that under present conditions the greatest benefits would be secured by the construction of the Bluestone Reservoir for the combined purpose of local flood control and water power as recommended by the reporting officers.

15. These reports have been referred, in accordance with law, to the Board of Engineers for Rivers and Harbors. The Board finds that the project now under way for modernizing the slack-water improvement of the Kanawha River to afford a 9-foot channel with locks of adequate dimensions, will provide a completely adequate improvement of the main stem of the river. It recommends the construction of the Bluestone Reservoir in the interest of flood control, navigation, and power production in accordance with plans prepared under the direction of the Chief of Engineers and approved by him at a total estimated cost of $12,942,000 provided that a definite agreement is entered into before construction is begun for the disposal of the power at prices and under conditions that in the opinion of the Secretary of
3425 War will fully protect the public interest.

16. After due consideration of these reports, I concur in the views and recommendations of the Board. The projects authorized by Congress and by the Public Works Administration for the modernization of the navigation works on the Kanawha

River, now well advanced toward completion, afford the most effective improvement of the main stem for the purposes of navigation and for the most efficient development of water power in combination with such improvement. The tributaries of the river and especially the New River, have large potential power resources which can be developed by water conservation in storage reservoirs and the utilization of the stored water at a series of dams and power houses. Under effective and unified control these reservoirs can be operated to reduce the height of destructive floods on the Kanawha and Ohio Rivers, to benefit navigation by reducing flash floods from these tributaries, and to increase the low-water flow of the river in the interest of sanitation and navigation. Such control can be effected by Federal construction and operation or by private construction and operation under license from the Federal Power Commission. A comprehensive plan for the complete development of the water resources is submitted with this report. It can best be accomplished in successive steps at a rate suitable for utilization of the power. The work of greatest immediate general public advantage is the construction of the Bluestone Reservoir, which can be operated to afford a large measure of flood control and water conservation and at the same time yield a substantial return from power production. I therefore recommend the construction by the Federal Government of the Bluestone Reservoir project for the purposes of power development, flood control, and navigation in accordance with the general plans set forth in this report with such modifications as may be approved by the Chief of Engineers, at an estimated cost of $13,000,000, provided that definite agreement is entered into before construction is begun for the disposal of the power at prices and under conditions that in the opinion of the Secretary of War will fully protect the public interest.

E. M. MARKHAM,
Major General, Chief of Engineers.

3426 REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

Syllabus

The Board of Engineers for Rivers and Harbors is of the opinion that the projects now under construction will provide adequately for navigation on the main stem of the Kanawha, and that no extension of navigation up the tributaries is justified at this time. The Board recommends the adoption of a project for the construction of a reservoir on the New River at the Bluestone site for flood control, power production, and navigation benefits, to be prosecuted under the direction of the Secretary of

War in accordance with plans prepared under the direction of the Chief of Engineers and approved by him, at a total estimated cost of $12,942,000, provided that definite agreement is entered into before construction is begun for the disposal of the power at prices and under conditions that, in the opinion of the Secretary of War, will fully protect the public interest.

(Second endorsement)

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., January 11, 1935.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

1. The following is in review of the report on Kanawha River, West Virginia, Virginia, and North Carolina, made under the provisions of House Document No. 308, sixty-ninth Congress, first session, which was enacted into law, with modifications in section 1 of the River and Harbor Act of January 21, 1927, and under the provisions of section 10 of the Flood Control Act of May 15, 1928.

2. The Kanawha River is formed by the junction of the New and Gauley Rivers in southern West Virginia, and flows in a generally northwesterly direction to empty into the Ohio at Point Pleasant, 266 miles below Pittsburgh. The length of the Kanawha itself is 97 miles and the drainage area of the watershed is 12,300 square miles, three-fourths of which lies above the head of the Kanawha. The basin is in general very rugged in character with elevations varying from 5,500 to 500 feet. The valleys through which the Kanawha and its tributaries flow are in general narrow, the level land in the basin being inconsiderable in amount.

3427 3. The Kanawha Valley has large natural resources, chief among which are bituminous coal, natural gas, petroleum, clay, stone, lime, and some timber. The coal, of which there are large reserves, is of excellent quality suitable for steam, metallurgical purposes and for the production of by-product coke. The principal industries of the area are coal mining, agriculture, gas and petoleum productions, manufacturing, electrometallurgy, and lumbering. The basin as a whole has a population of 725,000: Charleston, W. Va., with 60,000 being the largest city. The basin is well served in regard to communications by five large railroads, a number of improved highways, and a navigable channel in the main river.

4. Navigation.—The improvement of the Kanawha River for navigation was authorized in 1875 to provide the construction of locks and dams to afford a channel 6 feet deep to the foot of

Kanawha Falls, which lie at the head of the main stem of the river. The improvement was completed in 1898. Two fixed and eight movable dams were constructed with single locks varying in dimensions from 50 by 271 feet to 55 by 315 feet. In accordance with the provisions of the River and Harbor Act of 1930, the 4 upper locks and dams are being replaced by 2 new high-lift dams with twin locks of standard Monongahela dimensions, 56 by 360 feet, and with funds provided under the National Industrial Recovery Act the construction of 2 locks and dams has been undertaken, 1 in the Kanawha itself and one in the Ohio River at Gallipolis below the mouth of the Kanawha, to replace the remaining low-lift dams. The Kanawha River dam has twin locks of the standard Monongahela type and the Ohio River dam has twin locks, one 110 by 600 feet and the second 110 by 360 feet. When completed, this improvement will provide an excellent navigable channel 9 feet deep, and will provide adequately for the needs of the basin for water transportation. None of the tributaries, because of their unfavorable natural characteristics, are suitable for development for navigation, although prior to 1902 the United States expended funds intermittently on some of the tributaries to facilitate rafting and shallow-draft navigation.

5. Power.—Because of the steep slopes of the tributaries of the Kanawha River and the abundant rainfall, the basin
3428 is especially suited to the development of water power. A relatively small part of the potential water power is now developed at three plants on the upper reaches of the New River, and one plant at Kanawha Falls at the head of the Kanawha River. Another project, known as the "Hawks Nest project", on the lower reaches of the New River, is approaching completion. Two plants are being constructed under license from the Federal Power Commission, to utilize the surplus water at the navigation dams recently completed in the upper part of the Kanawha River. The total installed capacity of the plants now in operation is 36,400 kilowatts and of the plants under construction about 160,000 kilowatts. The development under license from the Federal Power Commission of the surplus water on the remaining navigation dam to be constructed on the Kanawha River is anticipated.

6. The district engineer presents plans for the comprehensive development of water power on the Kanawha River and its principal tributaries. The power installations now under construction at the two completed navigation dams on the Kanawha and that contemplated at the remaining modern navigation dam to be constructed will provide for the complete development of the poten-

tial power on the main stem of the river, except at the private development at Kanawha Falls, where additional generating capacity would be required to develop the full power that would be made available by the conservation of water in the tributaries. On the New River and its tributaries the comprehensive plan for power development includes the construction of a series of dams with a storage reservoir capacity of 1,376,300 acre-feet, the utilization of about 2,055 feet of head, and a development of nearly 1,500,000 primary peak horsepower. The estimated cost of the entire development is $151,000,000; and the cost per kilowatt-hour at the switchboards 4½ mills. The regulated flow at the mouth of the river would be 4,160 second-feet. On the Gauley River Basin the comprehensive development would include a series of dams with a storage capacity of 174,200 acre-feet, the utilization of
1,442 feet of head, and the development of 237,000 primary
3429 peak horsepower. The estimated cost of the development is
$33,328,000 and the cost per kilowatt-hour 6⅓ mills at the
switchboards. The regulated flow at the mouth of the river would be 720 second-feet. On the main stem of the river the regulated flow would afford at the Kanawha Falls plant and the three navigation dams a total of 123,000 primary peak horsepower, at a cost of 3.15 and 4.3 mills at the switchboard.

7. Flood control.—The estimated average annual flood damage in the Kanawha Basin is $1,000,000, of which $800,000 is in the main valley. Flood protection by levees appears impracticable due to the restricted widths in the valleys in the watershed. The district engineer's estimate of construction cost of a system of 4 reservoirs with a capacity sufficient to reduce floods below the "no damage line" is $26,800,000. He estimates the annual costs of this plan at $1,870,000 and the annual benefits to be $800,000.

8. The district engineer has investigated the feasibility of constructing and operating flood reservoirs for flood relief in the lower Mississippi Basin. His plan embraces four reservoirs, with a total capacity of about 1,600,000 acre-feet estimated to cost about $32,750,000. His studies indicate that if these reservoirs were operated primarily for the benefit of the Mississippi Basin, a reduction of 0.3 to 0.1 foot at the Cairo gage would have resulted, that the flood benefits in the Kanawha Basin would have been about $100,000 per annum, and that an increase in low flows of about 1,400 cubic feet per second could have been obtained. Also incidental benefits to power development and flood control in the Ohio River Valley would have resulted. He is of the opinion that the total benefits from this system would, however, not be commensurate with its costs.

9. Irrigation.—As the natural precipitation in the basin is ordinarily ample for all crops, irrigation is not practiced.

10. The most favorable site for a large reservoir developed in the studies of the river basin was on the New River immediately
above the town of Hinton, W. Va., designated as the
3430 "Bluestone Reservoir." This reservoir is more fully dis-
cussed in a supplementary report of the district and division engineers. At this site the foundations are excellent and the cost of lands and improvements overflowed are relatively small. A dam 150 feet in height would afford a reservoir 36 miles in length with a gross capacity of 625,000 acre-feet, controlling the run-off from 4,565 square miles. The district engineer finds that with an installed generating capacity of 90,000 kilowatts, power could be developed, in a year of average flow, to the amount of 268,000,000 kilowatt-hours of power salable at 3 mills as replacement for steam-generated power and 134,000,000 kilowatt-hours of dump power salable at 1 mill, the total revenue from which would amount to over $900,000. He finds that when operated to produce this power the reservoir would have reduced most floods that have occurred since 1897 to bank-full stage in the Kanawha, except for those floods which did not have their origin in the New River. He finds further that the operation of the reservoir for flood control only would not have provided much greater relief from flood damage than the proposed operation for flood control combined with power production. The operation of the reservoir for the two purposes as proposed would increase the low-water discharge of the New River to 2,000 cubic feet per second, the natural minimum being 600 cubic feet per second. At maximum draw-down a head of 66 feet would be available during the year of extreme low flow. The primary power produced from this minimum flow at minimum head would be but a minor part of the computed power output of the reservoir, the remainder being secondary power which could be disposed of only into a system for the replacement of steam power. The district engineer reports that the system of the American Gas & Electric Co. in the region could easily absorb all of the power that could be generated by the proposed project.

11. The estimated cost of the dam, reservoir, and hydroelectric power plant is $13,000,000. The estimated annual cost of maintenance and operation is $208,000, and the interest on the cost of
construction, at 4 percent, is $520,000, giving a net carrying
3431 charge of $728,000. The return from the sale of power is
estimated at $940,000 and the flood-control benefits are
estimated at $250,000 annually for the Kanawha Valley and $120,-

000 annually for the Ohio River; these benefits being apparently derived by prorating the benefits from a complete system of flood protection. The district engineer considers that the Bluestone project is economically justifiable and recommends the construction. The division engineer concurs in this recommendation.

12. The Mississippi River Commission, to whom the reports were referred, states that the effect of the construction of storage reservoirs in the basin of the Kanawha River on the flood heights of the Mississippi River at Cairo would be a possible average reduction varying from three-tenths to one-tenth of a foot in the stages of the major floods. However, the cost of this reduction would be relatively very high, and from a consideration of the supplemental report relative to the Bluestone Reservoir project in the Kanawha River Basin, the Commission concludes, that under present conditions, the greatest benefits would be secured by the construction of the Bluestone Reservoir for the combined purpose of flood control and water power, as recommended by the reporting officers.

Views and recommendations of the Board of Engineers for rivers and harbors

13. The project now under way for modernizing the slack-water improvement of the Kanawha River to afford a 9-foot channel with locks of adequate dimensions will provide a completely adequate improvement of the main stem of the river. Because of the steep slopes of the tributaries their improvement for navigation either as a separate undertaking or in combination with power development or flood control, is not economically practicable. These tributaries have large power potentialities comparatively little of which is yet developed. The general plan for the ultimate development of the power resources including the conservation of floods as presented by the district engineer, provides for the full utilization of these resources, but the complete accom-
3432 plishment of this plan cannot be forseen for a long period.
The construction of a comprehensive system of reservoirs for flood control only is not economically justifiable, and the potential reservoir capacity can be used to greater economic benefit for power production with incidental flood control benefits, rather than being reserved for flood control purposes only.

14. The construction of the Bluestone Reservoir will control ordinary floods in the New River, the largest tributary of the Kanawha, and the figures presented by the district engineer indicate that the power made available from the operation of the

reservoir to afford this measure of flood control could be sold to a distributing public utility corporation at prices which would render the project self-liquidating. This reservoir will not afford complete relief from flood hazards on the Kanawha, but will reduce materially the ordinary flood damages. It will have some beneficial effect on the floods of the Ohio. The amounts of the benefits for flood control on the Kanawha and on the Ohio are not, in the opinion of the Board, susceptible of definite evaluation, but are large. The operation of the reservoir will increase the low flow of the Kanawha River, improve sanitary conditions in the river, and enhance the value of the power developed at the Government dams on the Kanawha. The operation of the reservoir will be of some benefit also to navigation on the Kanawha and the Ohio below its mouth by reducing the flash rises which interfere with navigation and with the maintenance of the pools in the movable dams on the Ohio. The Board concurs with the division engineer and therefore recommends that the Bluestone Reservoir projects, combining flood control and water power development, with some benefits to navigation, be adopted and authorized to be prosecuted under the direction of the Secretary of War in accordance with plans prepared under the direction of the Chief of Engineers and approved by him, at a total estimated cost of $12,942,000, provided that definite agreement is entered into before construction is begun for the disposal of the power at prices and under conditions that, in the opinion of the
3433 Secretary of War, will fully protect the public interest.

For the Board:

G. B. PILLSBURY,
Brigadier General, Corps of Engineers,
Senior Member.

REPORT OF THE DIVISION ENGINEER

Syllabus

When previously authorized and recommended navigation structures in Kanawha River are completed, a first-class waterway will be available throughout practically the entire length of the stream and further navigation improvement need not now be considered. Economical development of hydroelectric power appears feasible at a large number of sites in Kanawha Basin. A reservoir system is presented for the primary benefit of Mississippi flood conditions. The benefits of this reservoir system would not be commensurate with its cost. Irrigation is not practiced in this region. A plan of development is presented for Kanawha

Basin involving the improvement of navigation in combination with water power and flood control. At present, Federal participation therein appears justified only in the case of proposed navigation structures which have either already been authorized or previously recommended. A reservoir plan for comprehensive flood relief in the Kanawha Valley is considered which, as a whole, does not appear to be economically justified. However, in the opinion of the division engineer, the Bluestone Reservoir project included in that plan and also in a tentative similar plan for the Ohio River, might be suitable for construction by the United States under the provisions of the National Recovery Act if found feasible from an engineering standpoint. With a view to determining the feasibility of this project, it is recommended that immediate authority be given to proceed with necessary further investigations at an estimated cost of $50,000.

3434 WAR DEPARTMENT,
OFFICE OF THE DIVISION ENGINEER,
UPPER MISSISSIPPI VALLEY DIVISION,
St. Louis, Mo., October 21, 1933.

Subject: Report of Kanawha River, W. Va., Va., and N. C.
To: The Chief Engineers, United States Army.

1. Authority.—This report on Kanawha River, W. Va., Va. and N. C., is submitted in compliance with the provisions of the River and Harbor Act of January 21, 1927, which authorized "Surveys in accordance with House Document No. 308, Sixty-ninth Congress, first session," and under the provisions of section 10 of the Flood Control Act of May 15, 1928.

2. Description.—Kanawha River is formed in southern West Virginia by the confluence of New and Gauley Rivers. It flows in a general northwesterly direction to empty into the Ohio River at Point Pleasant, W. Va., 266 miles below Pittsburgh, Pa., and 715 miles above Cairo, Ill. The principal characteristics of the stream are: Drainage area, 12,300 square miles; length of main stream, approximately 97 miles; average fall, about 1.4 feet per mile; and maximum, minimum, and mean discharges at Lock No. 2 (drainage area 8,470 square miles or 69 percent of the basin) 275,000,841, and 12,500 cubic feet per second, respectively. In general, the topography of the watershed is very rugged with only inconsiderable areas of flat land. The large tributaries (New, Greenbrier, Gauley, and Elk Rivers) have their sources in the Allegheny Mountains and, in consequence, have precipitous gradients.

Navigation

3. Existing project.—The existing navigation project fo Kanawha River, adopted in 1875, originally provided for the construction of 9 locks with movable dams and 3 locks with fixed dams to secure a 6-foot navigable depth from the mouth of the stream to a point about 90 miles above. This project was later modified so as to reduce the number of movable dams to 8, and after 2 of the 3 fixed dams had been constructed, the construction of the third (No. 1) was postponed until the necessity for it should become more apparent. The 2 fixed and 8 movable dams, with single locks varying in dimensions from 50 by 271 feet to 55 by 313 feet, were completed during the period 1880 to
3435 1898, thus practically securing the then authorized facilities. The River and Harbor Act of July 3, 1930, provided for replacement of existing Locks and Dams Nos. 2, 3, 4, and 5, with two locks and dams, and for dredging in the section of the river above Charleston, W. Va. (mile 58), with a view to securing a navigable channel 9 feet in depth and 200 feet in width to the upper limits of the project. This new work is now being prosecuted by the construction of a high-lift dam at Marmet (mile 68), provided with twin locks of Monongahela standard size (56 by 360 feet), and a similar dam and locks at London (mile 83).

4. Other navigation improvements.—The Coal River Navigation Co. constructed, in the middle of the nineteenth century, eight small wooden locks and dams on that stream which extended slackwater for a distance of 34 miles above the mouth. This navigation system was maintained until about 1882 but then became inactive and the works have now practically been destroyed. From 1878 to 1902, the United States intermittently expended funds on open-channel improvements in the New, Gauley, and Elk Rivers to facilitate rafting and shallow-draft navigation. As these rivers are no longer used for such purposes except to a very minor extent, improvements of this character are not now warranted.

5. Proposed navigation improvements.—Because of their unfavorable natural characteristics (steep slope and tortuous alignment) none of the tributaries of Kanawha River offer potentialities for development in the interest of modern navigation. Plans for improving the main stream below Charleston (Lock No. 5), which would enable commerce of the character which now plies the Ohio and which will soon be capable of navigating the upper Kanawha, to proceed through that section without reduction in draft have been investigated pursuant to an item included in the River and

Harbor Act of January 21, 1927. The reports on this investigation have now been transmitted to Congress (printed in House Doc. No. 31, 73d Cong., 1st sess.) and the Chief of Engineers recommended therein the provision of a channel depth of 9 feet throughout the lower river by the construction of a dam near Winfield, W. Va., in Kanawha River and a dam in the Ohio River near Gallipolis, 3436 Ohio. The total cost of these improvements (with twin locks 56 by 360 feet at the Winfield Dam and two locks, one 110 by 600 feet and the other 110 by 360 feet at the Gallipolis Dam) are estimated at $12,200,000, a part of which cost is chargeable to Ohio River improvement. When these recommended navigation structures are completed, first-class facilities will be available throughout practically the entire length of Kanawha River and no further navigation improvements therein need be considered at present. The possibilities of power development in connection with existing and proposed navigation dams is considered under the heading "Power development."

Power development

6. Water-power situation.—On account of the precipitous gradients of the stream and the abundant water supply, the water-power resources of Kanawha Basin rank among the foremost in the eastern United States. Much of this natural power is capable of economic development when legal difficulties can be overcome and a suitabile market exists. At present there are four existing developments of commercial importance in operation in the basin. These are the Kanawha Falls plant at the head of the main stream and the Buck, Byllesby, and Washington Mills plants on upper New River. These plants have a total installed capacity of about 45,000 horsepower. A hydroelectric project known as the "Hawks Nest development" is now under construction near the mouth of New River. This plant will have an initial installation of 140,000 horsepower and an ultimate capacity of 175,000 horsepower.

7. Plan of water-power development.—The district engineer has outlined a general plan for developing the water-power resources of the basin. This plan involves 24 existing and proposed straight waterpower projects and the development of run-of-stream power at 1 proposed and 2 existing navigation dams. The general features of this plan are summarized in the following table:

3437

Name of project or existing plant	Gross head (feet)	Usable storage at site (acre-feet)	Installation in horsepower	Annual output in million kilowatt-hours		Estimated cost of development	Cost prima energ (mil per k owat hour
				Primary	Secondary		
Moores Ferry	170	584, 300	99, 200	147. 9	14. 5	$11, 764, 000	[2] 6.
Washington Mills [3]	47. 5		24, 400	43. 8	7. 6	2, 494, 000	5.
Fries Junction	61		81, 200	56. 5	12. 7	2, 484, 000	3.
Byllesby [3]	117		58, 200	98. 3	27. 9	5, 377, 000	5.
Foster Falls	45		24, 000	43. 3	18. 0	2, 047, 000	4.
Sayer	110. 4	105, 000	27, 300	19. 1	5. 2	3, 848, 000	[2] 15.
Barren Springs	40		26, 000	46. 2	17. 7	1, 892, 000	4
Allisonia	190	190, 000	28, 200	42. 7	7. 6	7, 028, 000	[2] 12.
Radford	115	40, 000	120, 000	159. 3	62. 3	6, 865, 000	[2] 3.
Whitethorn	30		25, 500	45. 6	25. 2	2, 509, 000	5.
Series of low-head projects on New River	96		75, 000	136. 0	75. 0	7, 500, 000	5.
Pearisburg	150	290, 000	52, 500	34. 0	7. 8	4, 952, 000	[2] 11.
Series of low-head projects on New River	70		65, 000	116. 6	61. 3	6, 500, 000	5.
Bull Falls	115	146, 500	158, 800	219. 7	136. 6	9, 967, 000	[2] 4.
Hinton	40	20, 500	67, 500	81. 0	56. 8	5, 303, 000	[2] 5.
Sandstone	36		51, 200	87. 0	78. 7	3, 815, 000	3.
Series of low-head projects on New River	459		558, 000	1, 003. 2	970. 5	55, 800, 000	4.
Hawks Nest [3]	163		165, 000	381. 9	394. 8	10, 835, 000	2.
Gauley Mills	240	80, 000	25, 500	39. 4	3. 8	6, 054, 000	[2] 12.
Kree	165		17, 000	28. 0	7. 1	3, 298, 000	9.
Brocks Bridge	250	82, 600	59, 400	82. 7	45. 9	8, 995, 000	[2] 8.
Belmont	270		52, 800	88. 1	66. 9	6, 400, 000	6.
Gauley No. 1	517	11, 600	134, 400	194. 4	216. 0	8, 581, 000	[2] 3.
Kanawha Falls [3]	36. 4		43, 000	104. 4	112. 8	3, 600, 000	3.
London [4]	24		25, 600	66. 0	43. 7	2, 560, 000	4.
Marmet [4]	24		25, 600	63. 4	42. 4	2, 560, 000	4.
Winfield [4]	28		30, 000	76. 5	48. 5	3, 000, 000	4.
Total	3, 609. 3	1, 550, 500	2, 070, 100	3, 505. 0	2, 570. 2	196, 029, 000	4.

[1] At plant switchboard, 30-percent load factor, secondary power credited.

[2] Cost of energy at these plants would be reduced if an equitable charge for regulation were ma against downstream power plants. Conversely, the cost of energy at all other plants would be creased.

[3] Existing project or project under construction. (Byllesby includes Buck plant.)

[4] Power-navigation projects.

8. Economics of power development.—As shown in the abov table, the average unit cost of primary power at the switchboard of the plants included in this plan would be about 4.6 mills pe kilowatt-hour at 30 percent load factor. The district enginee estimates the cost of producing equivalent energy by stea 3438 generation at 7.5 mills per kilowatt-hour, which indicate that the plan as a whole would be economical of develop ment under the assumptions made. In my opinion many of thes power projects will be developed as the power market in the regio expands, if their installation is not hampered by too many lega restrictions. Because of the beneficial effect of storage powe projects on stream regulation, I believe that this type of develop ment should be encouraged by both local interests and the Feder Government.

Local flood control

9. Flood situation.—The Kanawha Basin is subject to destruc tive floods. Overflows in the valley of the main stream and th lower tributaries are the result of both backwater from the Ohi River and of heavy run-off in the basin. As these two types

floods are not generally coincident, the lower valley is more frequently subject to damage than the upper basin. After a consideration of all the various elements entering into the flood problem, the district engineer concludes that reasonable estimates of the average annual flood damage are $800,000 for the main valley and $200,000 for the tributary valleys.

10. Local flood-control plan.—Because of the narrowness of the affected bottom lands, flood protection by local measures appears impracticable in Kanawha Basin except possibly at a few isolated localities nor could substantial relief be secured through channel improvements. In consequence, the district engineer has presented a system of four reservoirs for local flood control. The principal features of this reservoir system are given in the following table:

Reservoir	Drainage area (square miles)	Stream	Capacity (acre-feet)	Estimated cost	Cost per acre-foot
Big Bend	1, 638	Greenbrier River	126, 500	$3, 670, 000	$29. 01
Bluestone	4, 565	New River	581, 400	7, 800, 000	13. 42
Clendenin	1, 152	Elk River	160, 640	6, 550, 000	40. 77
Summersville	686	Gauley River	315, 000	8, 840, 000	28. 07
Total	8, 041		1, 183, 540	26, 860, 000	22. 70

3439 The district engineer states that this reservoir system would have been capable of reducing all headwater floods which have occurred in the main Kanawha during the past 71 years below the "no damage line." However, those floods which have been occasioned by Ohio River backwater would have been but little affected. He estimates that the annual charge necessary to amortize the construction cost of this reservoir system in 30 years (with interest at 5 percent) plus the annual cost of operation and maintenance would amount to about $1,870,000. Inasmuch as the resulting benefits would be chiefly to the main valley and but a small part of the tributary flood damage would be alleviated, the district engineer does not believe that the average value of the reservoir plan would exceed $800,000 annually. As its annual cost would be more than twice that amount, he concludes that the plan would be uneconomical.

11. Views of the division engineer.—The flood problem in Kanawha Basin is more serious than is generally recognized by local interests. The greatest flood of record at Charleston occurred in 1861 when a stage of 47 feet was attained. Since that date there have been but three floods above 40 feet, and all of these occurred prior to 1900. Since these large overflows there has been much development along the streams and numerous encroachments in the nature of fills for railroads and industries so that the 1861 flood would, under present conditions, reach a much greater height. In my opinion, local interests should carefully consider this situation when constructing new improvements.

Flood-water reservoirs

12. **Suggested reservoir system.**—In compliance with the provisions of section 10 of the Flood Control Act of May 15, 1928, the district engineer has considered the possibilities offered for the use of reservoirs in the Kanawha Basin for the control of its flood waters with the primary purpose in view of alleviating floods on the lower Mississippi River. He suggests a system of four reservoirs for this purpose, the principal features of which are indicated in the following table:

3440

Reservoir	Stream	Miles from Mississippi River	Drainage area above dam	Gross capacity	Reservoir area	Estimated cost	Cost per acre-foot
			Square miles	*Acre-feet*	*Acres*		
Poca	Pocatalico River	757.3	345	202,000	6,300	$3,560,000	$17.64
Summersville	Gauley River	867.1	686	315,000	3,940	8,840,000	28.07
Bluestone	New River	877.3	4,565	918,700	10,500	13,800,000	15.02
Clendenin	Elk River	796.8	1,152	160,640	3,600	6,550,000	40.77
Total			6,748	1,596,340	24,340	32,750,000	20.50

13. **Effect of reservoir system.**—These reservoirs, if operated primarily for decreasing contributions to flood discharges in the Mississippi River during the danger period at Cairo, would have reduced such contributions on the average during past floods from 23,600 to 10,500 cubic feet per second, indicating an average stage reduction varying from about 0.3 to 0.1 of a foot. In addition, the district engineer states that they would result in local flood-control benefits, worth possibly $100,000 annually and would be capable of increasing the minimum flow of the lower Kanawha River by about 1,400 cubic feet per second. Incidental benefits to power development and to Ohio River flood relief would also be obtained. He is of the opinion, however, that the total benefits received from this reservoir system would be incommensurate with its cost. I concur in his opinion.

Irrigation

14. **Need for irrigation.**—There is ordinarily ample rainfall for all crops grown in Kanawha Basin, hence irrigation is not practiced.

Comprehensive plan of development

15. **Suggested plan.**—In compliance with the spirit of the laws authorizing these surveys and based on the studies outlined above, the district engineer presents a comprehensive plan for the development of navigation in the Kanawha Basin in combination with power and flood control. This plan consists of:

3441 (a) The development of navigation on the Kanawha River by construction of three locks and dams in that stream and one in the Ohio River as has been outlined above under the heading "Navigation."

(b) The development of 24 straight power projects (including 4 existing plants) and 3 navigation-power projects at existing and proposed navigation dams on Kanawha River all as outlined above under the heading "Power development."

16. Effects and benefits of plan.—The district engineer states that the effects and benefits of this comprehensive plan of development would be as follows:

(a) It would provide a dependable 9-foot navigable channel from the Ohio River to the vicinity of Kanawha Falls at the head of Kanawha River.

(b) It would produce economical hydroelectric power up to a maximum of over two million horsepower.

(c) It would increase the minimum low-water flow of Kanawha River by about 4,000 cubic feet per second with resultant benefits to water supply, navigation, and power development below.

(d) It would provide incidental benefits to local flood control on the New, Gauley, and Kanawha Rivers with an average value estimated at about $300,000 annually. It would also benefit flood conditions on the Ohio and Mississippi Rivers to a slight extent.

Conclusions and recommendations

17. District engineer's conclusions.—After giving due consideration to all the problems involved in Kanawha River Basin in connection with navigation, water power, flood control, and irrigation, the district engineer substantially reaches the following principal conclusions:

(a) That improvement of existing navigation facilities in Kanawha River as now authorized and recommended should be prosecuted to early completion.

(b) That development of large amounts of hydroelectric power in Kanawha Basin appears economically feasible when a suitable market exists.

(c) That a comprehensive plan for local flood control alone is not economically justified.

(d) That the control of the flood waters of the basin in the primary interest of Mississippi flood relief would not result in benefits commensurate with its cost.

(e) That irrigation is not practical nor needed in this region.

(f) That the best plan for the ultimate development of Kanawha Basin for the purpose of navigation in combination with power development and flood control is the plan outlined above under the heading "Comprehensive plan of development" but that Federal participation in this plan appears to be justified only in the case of proposed navigation structures.

18. District engineer's recommendation.—The district engineer recommends that the plans as set up in his report for 3442 navigation improvement and for power development be adopted as a general guide for the future development of Kanawha Basin for these purposes, subject to such later modification as may be found necessary.

19. Views of the division engineer.—The natural resources of the Kanawha watershed are varied and great. This abundance of raw materials coupled with cheap fuel and water power has already led to the establishment of a sizeable industrial district along the main stream and with improvement of navigation facilities therein as now authorized, it is certain that more manufactories will locate in this valley. Topographic conditions and the location of transportation facilities (both land and water) necessitate that any industrial development must take place in or adjacent to the flood plain of the stream with resulting serious encroachment on the natural floodway. Such development has and will greatly enhance the need for flood protection and stream regulation. In view of these facts I do not believe that the justification for flood control reservoirs in Kanawha Basin can be based on present potential damages and past flood stages. (See par. 11 above.) It is my view that some degree of flood protection and stream regulation is worthy of serious consideration.

20. The district engineer has proposed a system of reservoirs for local flood control which he states would have reduced all headwater floods of past record at Charleston below the "no-damage line." Of the four reservoirs he has included in this plan, the cheapest and most effective reservoir is one termed the "Bluestone Reservoir" located on New River immediately below the mouth of Bluestone River and above the junction of Greenbrier River. The pool formed by the proposed dam would be located in both the States of West Virginia and Virginia. This reservoir, as planned by the district engineer, would have a gross storage capacity of about 580,000 acre-feet and would control about 4,565 square miles of watershed, or one-half the total area above Charleston and over one-third of that of the entire Kanawha Basin. Its cost is roughly estimated at $7,800,000, 3443 or $13.42 per acre-foot of gross capacity. Based on figures given in the district engineer's report I estimate that the local flood control benefits of this reservoir alone would exceed $300,000 annually which, if capitalized at 5 percent, would amount to $6,000,000, or almost enough to justify the construction of the project.

21. The Louisville district of this division has been charged with the preparation of a comprehensive report on the Ohio River Basin as a whole which will be submitted at an early date. This report will present among other plans, a modified reservoir system for Ohio River flood relief, which, on the basis of preliminary figures, is on the borderline of feasibility. Bluestone Reservoir is included in this system and so may be expected to result in appreciable benefits to Ohio River flood control.

22. The ultimate plan of development outlined by the district engineer does not include any reservoir for local, Ohio, or Mississippi flood relief, but does include certain power reservoirs which are apparently feasible. Among these power reservoirs are two which he has termed the "Bull Falls" and "Hinton" developments. These projects would provide about 167,000 acre-feet of usable storage and would develop a total gross head of 185 feet. The proposed Bluestone flood-control reservoir would eliminate these two power developments, but I see no reason why this should be a drawback to the project considering the abundance of water power in this region and the fact that this reservoir could be constructed and operated in such a manner as to develop water power and provide stream regulation incidental to flood control. It is my opinion that the power privilege at the Bluestone Reservoir would be worth a considerable sum, thus reducing its cost to other interests.

23. In view of the magnitude of the benefits, both direct and indirect, which would apparently result from the construction of the Bluestone Reservoir, I regard it as an undertaking worthy of serious consideration. Because of the widespread character of these benefits and the interstate nature of the development, I believe that a project at this site might be suitable for construction by the United States under the provisions of the National Recovery Act if found feasible from an engineering standpoint.

3444 24. Recommendation.—With a view to determining its engineering feasibility I recommend that immediate authority be given to proceed with further investigation of the Bluestone Reservoir project including surveys, borings, and preparation of detail plans and estimates at an estimated cost of $50,000.

25. I further recommend that the report of the district engineer be accepted as a compliance with the acts authorizing these surveys, and that it be printed in order that the data contained therein, collected at Federal expense, may be made available to the general public.

Geo. R. Spalding,
Colonel, Corps of Engineers, Division Engineer.

(First indorsement)

OFFICE PRESIDENT MISSISSIPPI RIVER COMMISSION,
Vicksburg, Miss., December 9, 1933.

To CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. From a consideration of the report on the Kanawha River, W. Va., Va., and N. C., the Mississippi River Commission concludes that—

(a) The needs of present and prospective navigation will apparently be sufficiently provided for when the previously authorized and recommended navigation structures in the Kanawha River are completed.

(b) The general plan outlined by the district engineer for developing the water-power resources of the Kanawha River basin as a whole appears to provide for an economical development, under which it is believed many of the power projects will be developed by private interests as the power market in the region expands.

(c) There is no need for irrigation.

(d) The effect of the construction of storage reservoirs in the basin of the Kanawha River on the flood heights of the Mississippi River at Cairo would be a possible average stage reduction varying from three-tenths to one-tenth of a foot in the stages of the major floods. However, the cost of this reduction would be relatively very high.

(e) Flood control in the basin of the Kanawha River may best be accomplished by means of one or more reservoirs. Under present conditions it appears that the greatest benefits would accrue from the construction of the Bluestone Reservoir, if it should be found feasible from an engineering standpoint.

2. The Mississippi River Commission recommends that the report be published for the benefit of those interested.

For the Mississippi River Commission:

H. B. FERGUSON,
Brigadier General, Corps of Engineers, President.

3444–A REPORT OF THE DISTRICT ENGINEER

Syllabus

Navigation.—The existing project on the Kanawha River consists of 10 locks and dams and provides a 6-foot navigable depth. Four of these in the upper river above Charleston are being replaced by two new, high-lift locks and dams providing larger locks with a 9-foot navigable depth as authorized by the Rivers and Harbors Act of July 3, 1930. This modification should be extended to include the lower river from Charleston to its mouth, as the present navigation facilities are inadequate to serve an active and growing commerce. No navigation exists or can be expected on any of the tributaries.

Water power.—The two principal tributaries of the Kanawha River, the New and Gauley Rivers, rank high in national importance with regard to their water-power resources. A number of power developments have been proposed on those streams and their construction will probably be made when economic and legal conditions permit. Other tributaries of the Kanawha River offer little or no possibilities for feasible power developments of commercial importance. The proposed new navigation dams on the Kanawha River are suitable for economic water-power development in conjunction with their use for navigation.

Flood control.—The Kanawha River Basin is subject to destructive floods. The principal regions of damage are along the main stream and in the valleys of a number of the minor tributaries. Backwater from the Ohio River causes flood damage in the lower part of the basin and no economical measures of relief are possible to prevent this damage. A plan for local flood control is presented involving the construction of four reservoirs to protect the greater part of the Kanawha River main valley from destructive floods. This plan, which is considered the best obtainable, is not economically justified. A system of reservoirs is presented for the benefit of flood control on the lower Mississippi River.

Irrigation.—Irrigation is not practiced nor is there a need for it in the Kanawha River Basin.

General.—The improvement of existing navigation facilities by the United States appears justified. The development of large amounts of hydroelectric power on the headwater tributaries appears feasible but no Federal participation in such works would be justified. It would not now be economical for any agency to construct works solely for flood control, but some form of local cooperation appears justified in connection with power storage for its incidental flood relief benefits.

3444–B

War Department,
United States Engineer Office,
Huntington, W. Va., October 15, 1932.

Subject: Report on the Kanawha River, W. Va., Va., and N. C.
To: The division engineer, Upper Mississippi Valley division, St. Louis, Mo.

Reports

1. Authority.—This report on the Kanawha River, W. Va., Va., and N. C., is submitted in compliance with the provisions of House Document No. 308, Sixty-ninth Congress, first session, which was enacted into law with modifications, in Section I of the River and

Harbor Act approved January 21, 1927; and under the provisions of Section 10 of the Flood Control Act of May 15, 1928, for the control of floods on the Mississippi River and tributaries.

2. Scope and purpose.—This report on the Kanawha River and its tributaries embraces a study of the possibilities of improvement for the purposes of navigation, water power development, flood control, and irrigation; also the possibility of coordinating any or all of these various uses.

* * * * *

3444–C 4. Previous reports on New River.—A survey of 54 miles of the New River between Sinking Creek and Greenbrier River was made by Moore and Briggs in 1819 under the auspices of the Board of Public Works of the State of Virginia, with a view of connecting the waters of the James and Kanawha Rivers by that route. They reported:

The fall in this part of the river, considering the mountainous country it passes through, is comparatively moderate. The principal falls are the Bull Falls, McDaniels, Andersons, Wileys, Neilleys, and Peters Mountain Falls—none which has been improved in the least degree, yet we ascended them all with our boat, though in two or three instances with considerable difficulty, after taking out baggage, stores, etc. (Annual Report of the Chief of Engineers, p. 843, 1873.)

A report on the examination of New River from the mouth of Greenbrier River, W. Va., to the lead mines in Wythe County, Va. (H. Ex. Doc. 25, 42d Cong., 3d sess., or pp. 78, 842 to 854, Annual Report of the Chief of Engineers, 1873), was submitted in January 1873, to comply with the River and Harbor Act of June 10, 1872. This report recommended two plans of improvement for consideration—a 2-foot bateaux navigation project costing about $100,000 and a 3-foot steamboat navigation project costing about $1,000,000. An estimate of $2,500,000 was given as the approximate cost for 5½-foot steam navigation. The first plan of improvement was approved August 14, 1876. The extension of this improvement from the lead mines in Wythe County, Va., to the mouth of Wilson Creek, in Grayson County, Va., was provided by act of Congress of June 14, 1880 (pp. 133–139, pt. 2, Annual Report of the Chief of Engineers, 1875, and pp. 538–549, pt. 1, Annual Report of the Chief of Engineers, 1879, or S. Ex. Doc. 41, 45th Cong., 3d sess).

In 1891 it was reported that further improvement of the river was unnecessary, the conditions having changed in later years. A report was submitted on that part of the river near its confluence with the Greenbrier River, W. Va., which recommended that the river in that vicinity was "not worthy of improvement" by slack-water navigation (H. Doc. 176, 58th Cong., 2d sess., or

p. 477, pt. 1, and pp. 2617–2620, pt. 3 of the Annual Report of the Chief of Engineers, 1904). A report was also submitted on the section of the river between Radford, Va., and Hinton, W. Va., which recommended that it was "not worthy of improvement" by slack-water navigation (H. Doc. 1410, 62d Cong., 3d sess., or p. 1023, pt. 1, Annual Report of the Chief of Engineers, 1913). The sum of $109,691.06 was expended up to June 30, 1898, on the New River for open-river navigation. No work has been done on the stream since 1899, and it is probable that the channels have become obstructed considerably since they were last improved.

* * * * * * *

3444–D 7. Previous reports on Greenbrier River.—A report was submitted on the improvement of the Greenbrier River, based upon a preliminary examination made in 1884, and published as House Document No. 71, Forty-eighth Congress, Second session. The conclusion of this report was that, 'The river is not navigable and the portion of the New River below its mouth is also unnavigable.' The expressed opinion of the reporting officer was that the Greenbrier River 'is not worthy of improvement by the General Government.' This report also makes reference to a previous report appearing on page 675, part 1, Annual Report of the Chief of Engineers, 1877. This earlier report presents a lengthy discussion of the possible improvements of the Greenbrier River, or part of it, by a slack-water system from its mouth to the mouth of Howards Creek, with a view to its use as a link in the proposed Kanawha-
3444–E James River Canal Project. Twenty-nine dams and thirty locks with average lift of 10 feet to provide a 7-foot navigable depth, were recommended for this section of the river at a total cost of $6,251,290. The complete project contemplated the connection of "the waters of the James and the Ohio Rivers by a water-navigation of 7-foot depth" and, in a resolution of March 18, 1874, by the Board of Engineers, was declared to be, in its opinion, "entirely practicable." No record is available to show that the project was ever definitely recommended for adoption by Congress.

III. Physical characteristics and natural resources

8. General description of Kanawha River.—The Kanawha River is formed by the junction of the New and Gauley Rivers in southwestern West Virginia and flows in a northwesterly direction for its length of 97 miles to the Ohio River, which it joins at Point Pleasant, W. Va., 266 miles below Pittsburgh, Pa. The Kanawha River Basin lies between those of the Guyandot and Little Kanawha Rivers. The main stream is wholly in the State

of West Virginia but its total watershed area of about 12,300 square miles also drains considerable portions of Virginia and North Carolina. A general map of the watershed is shown on exhibit no. 1, facing page 92 of this document. From its source at elevation 652 to its mouth at elevation 514.7 (both low-water elevations), the Kanawha River has a total fall of 137.3 feet or an average slope of 1.41 feet per mile. About 1½ miles below the head of the river, at a point known as "Kanawha Falls", the river drops almost vertically about 15 feet. The average natural slopes of the Kanawha River are as follows:

	Feet per mile
From head of river to below Kanawha Falls (2 miles)	14.48
From below Kanawha Falls to Paint Creek (14.5 miles)	2.81
From Paint Creek to Lock No. 10 (61.3 miles)	.99
From Lock No. 10 to its mouth (19.2 miles)	.37

The river banks are fairly high, ranging from 40 to 55 feet above low water. The width of the river at normal stage is from 500 to 800 feet. The controlling depth of the river over the bar at Charleston during low water is 6 feet, at extremely high water is 42 feet, and at mean stage is approximately 20 feet. At Lock No. 2, at Montgomery, W. Va., 12 miles below the head of the river, the difference between high and low water is 31 feet. The minimum flow of record at this lock, which occurred in 1930, is 841 second-feet. The maximum flow is about 275,000 second-feet and the average flow about 12,500 second-feet. At the mouth of the Kanawha River the minimum flow is about 900 second-feet, the maximum about 255,000 second-feet and the average flow about 18,000 second-feet. Exhibit no. 2 contains a profile of the Kanawha River with the proposed and existing navigation improvements shown thereon. The principal tributaries of the Kanawha River, main stream, together with their drainage areas are listed in the following table:

3444-F

Stream	Point	Area	Mile
Kanawha River	At mouth	12,300	0
Pocatalico River	do	359	39.0
Coal River	do	880	46.0
Elk River	do	1,540	58.0
Kanawha River	Charleston (gaging station)	8,880	58.1
Do	Lock No. 2	8,470	84.8
Do	Junction New and Gauley Rivers	8,358	97.0
New River	At mouth	6,918	97.0
Gauley River	do	1,440	97.0

A general map of the Kanawha River Basin, showing the principal tributaries and their drainage areas, is given on exhibit no. 6.

9. *General description of the New River.*—The New River rises in northwestern North Carolina near the Tennessee line, flows northeasterly into Virginia through and between spurs of the

Blue Ridge Mountains, parallel to the main divides of this ridge and the Alleghenies, until it reaches a point known as the "Horseshoe" near Little River, whence it turns abruptly to the northwest, breaking through the five ranges into which the Allegheny Mountains are here divided, and keeping the same general direction to its mouth at the confluence with the Gauley River where the Kanawha River is formed. From its source at about elevation 3,800 to its mouth at elevation 652, the New River has a total fall of 3,148 feet in its length of about 341 miles, or an average slope of 9.2 feet per mile. The average natural slopes of the New River are as follows:

	Feet per mile
From the source of the South Fork to the junction of the forks (86.4 miles)	15.1
From the source of the North Fork to the junction of the forks (41.5 miles)	31.5
From the junction of the forks to Washington Mills (48.2 miles)	6.5
From Washington Mills to the Wythe-Carroll County line (13.8 miles)	15.2
From the Wythe-Carroll County line to the mouth of the Greenbrier River (128.9 miles)	4.8
From the mouth of the Greenbrier River to the mouth of the New River (64.1 miles)	11.1

Profiles of the New River and its principal tributaries are shown on exhibit no. 3, printed facing page 92 of this document. The channel of the New River is, in general, narrow and tortuous with numerous rapids and falls, since its course lies almost 3444-G entirely in a rugged mountainous region. The stream follows deep, narrow, valleys formed by the long parallel folds typical of the Allegheny Mountain system. Many steep bluffs frequently rise sheer from the river's edge. The river at a point about 10 miles below Hinton, W. Va., enters a gorge, the channel being narrow and the gradient steep for about 50 miles. The river abruptly leaves the gorge a short distance above its mouth. The width of the New River, main stream, varies from about 200 feet to 1,000 feet, averaging about 500 feet. At low water its depth varies from about 2 feet to about 6 feet. Innumerable ledges composed of slate, sandstone, or limestone cross the stream creating waterfalls varying in height from less than 1 foot to about 18 feet. Bars composed of sand, gravel, and bowlders also produce waterfalls or rapids at numerous points along the stream. Between these ledges and rapids there may be either rapids or short shallow pools, although in some instances there occur longer and deeper pools. The following are the approximate variations in stream discharge at the mouth of the New River:

	Cubic feet per second
Minimum flow	836
Maximum flow	280,000
Average flow	10,100

The principal tributaries of the New River together with their drainage areas are listed in the following table:

Stream	Point	Area	Mile
		Sq. mi.	
New River	At mouth	6,918	0
Greenbrier River	do	1,653	64.1
Bluestone River	do	452	67.4
Wolf Creek	do	239	100.4
Walker Creek	do	319	112.2
Little River	do	338	150.3
Big Reed Island Creek	do	356	173.6
Reed Creek	do	259	179.0
New River	At junction of North and South Forks	611	255.0
North Fork	At mouth	287	255.0
South Fork	do	[illegible]	255.0

* * * * *

3444–H 12. Topography and geology.— * * *

New River, the longest tributary of the Kanawha River, has its source in the Allepheny Mountain province and drains a large portion of the Great Valley. It is formed in the State of North Carolina and has a very steep and irregular gradient from source to mouth. Other principal tributary streams of the Kanawha River are likewise mountainous streams with precipitous courses. The Kanawha River, however, lies in the Ohio Valley and Cumberland Plateau provinces and consequently has a more uniform and flat gradient.

* * * * *

3444–I 25. Transportation facilities.—The industrial growth in the basin has been closely interwoven with the growth of its transportation facilities. In the early pioneer days when the valley was first settled, the only means of transportation were the rivers as no highways or railroads existed in that part of the country. The first commerce on the rivers was carried in keel boats, small hand-propelled barges, and on rafts. In 1823 the first steamboat, the "Eliza," operated on the Kanawha River. It was followed by the "Fairy Queen" in 1824, the "Paul Pry" in 1826, the "Kanawha" in 1828, the "O. H. Perry" and the "Enterprise" in 1830, the "Tiskelwah" in 1832, and many others after this latter date. By 1835 the Kanawha Valley was taking a prominent part in the great steamboat era. In 1831 the James River and Kanawha Turnpike was completed to the Ohio River with its river terminus at Guyandot (now a part of Huntington, W. Va.) where it connected with steamship lines on the Ohio River. A large part of this highway which started from Richmond, Va., had been in use in 1828 and before. For many years it was the most important post road between the Virginia seaboard and the West.

It entered the Kanawha Basin over the divide between the James and Greenbrier Rivers passing through White Sulphur Springs and Charleston.

Until the coming of the railroads in the early seventies, the rivers and highways were the only arteries of commerce. Open channel improvement of the Kanawha River to aid its growing traffic was made previous to 1875 when a project was adopted for the slack-watering of the river by means of 10 locks and dams. This project was completed in 1898 and provided a 6-foot navigable depth from the Ohio River to a point about 90 miles above. At the present time the Kanawha Basin is served by five large railroad systems, a number of improved highways, and the existing navigation project on the main stream. The railroads in the basin are the Chesapeake & Ohio, the New York Central, the Norfolk & Western, the Baltimore & Ohio, and the Virginian. These railroads and their numerous branches reach every point of industrial importance and gather an immense amount of traffic from the hundreds of coal mines of the basin.

* * * * *

40. History of the existing navigation improvement.— * * *

Funds were expended by the United States for open-channel improvement on the New, Gauley, and Elk Rivers in order to aid the bateaux navigation using those streams in the early days. These expenditures which commenced in 1878 were continued very intermittently to 1902 when they ceased, owing to the practical cessation of commerce by that date on the streams.

3444-J 41. Description of the existing navigation improvement.— * * * Difficulties and delays to navigation are caused also by sand deposits on the dams and in the channel in the lower section of the river, especially in the channel below Locks Nos. 10 and 11. These deposits occur suddenly during freshets and to such an extent that the resulting navigable depth in the channel below Lock No. 10 may be only 2 to 3 feet, while below Lock No. 11 the channel at times is filled completely for a considerable distance. As much as 50,000 cubic yards of deposit left during freshets have had to be removed in 1 year from the channel in the lower approach of Lock No. 11.

* * * * *

61. Proposed power projects.— * * * Of the various proposed projects the Radford and Bluestone projects of the Appalachian Electric Power Co. have received the greatest prominence. These projects are located on the New River some distance below the Buck and Byllesby water-power developments which are owned by the same applicant. This company applied to the

former Federal Power Commission for a license to build and operate a hydroelectric power plant near Radford, Va. (Federal Power Commission project no. 739). A full license was tendered, but the applicant refused to accept it and in turn applied for a minor part license. This the former Federal Power Commission refused to either issue or reject, with a view of having the issue taken to the Federal courts in order to have its jurisdiction over nonnavigable streams which flow into navigable ones determined. 3444-K However when the present Federal Power Commission came into office, it offered the applicant a standard form license and ordered it not to proceed with construction until it had received and accepted such license. The issue is now pending in the Federal courts to have the extent of the jurisdiction of the Commission over the New River determined.

* * * * *

62. Comprehensive scheme of power development of New River Basin.—A general plan is submitted for a comprehensive scheme of power development of the New River Basin. A summary of the projects embraced in this plan is given in table no. 2 of appendix C. Tabulations of the principal data of each project of the general plan are given in tables no. 5 to no. 19, inclusive, of appendix C. The locations of these projects are shown on the map of exhibit no. 32 and the profiles of exhibit no. 3.

As the existing water-power developments (with some necessary modifications) and most of the officially proposed power projects satisfactorily fit into plans for the best utilization of the stream's water-power resources, they are included in the scheme submitted herein. As previously mentioned, this scheme is not intended to include all possible projects in the basin or to be considered as final with regard to details of location, heads, installations, etc., but to formulate a plan as a general guide for the future development of the stream. The general features of the plan are:

1. The inclusion of a large amount of storage, reservoir capacity for stream-flow regulation.

2. The utilization of the regulated flow obtained from the reservoirs through the maximum available head of the river.

3. Sufficiently large installations to enable the development of primary peak power at low load factors.

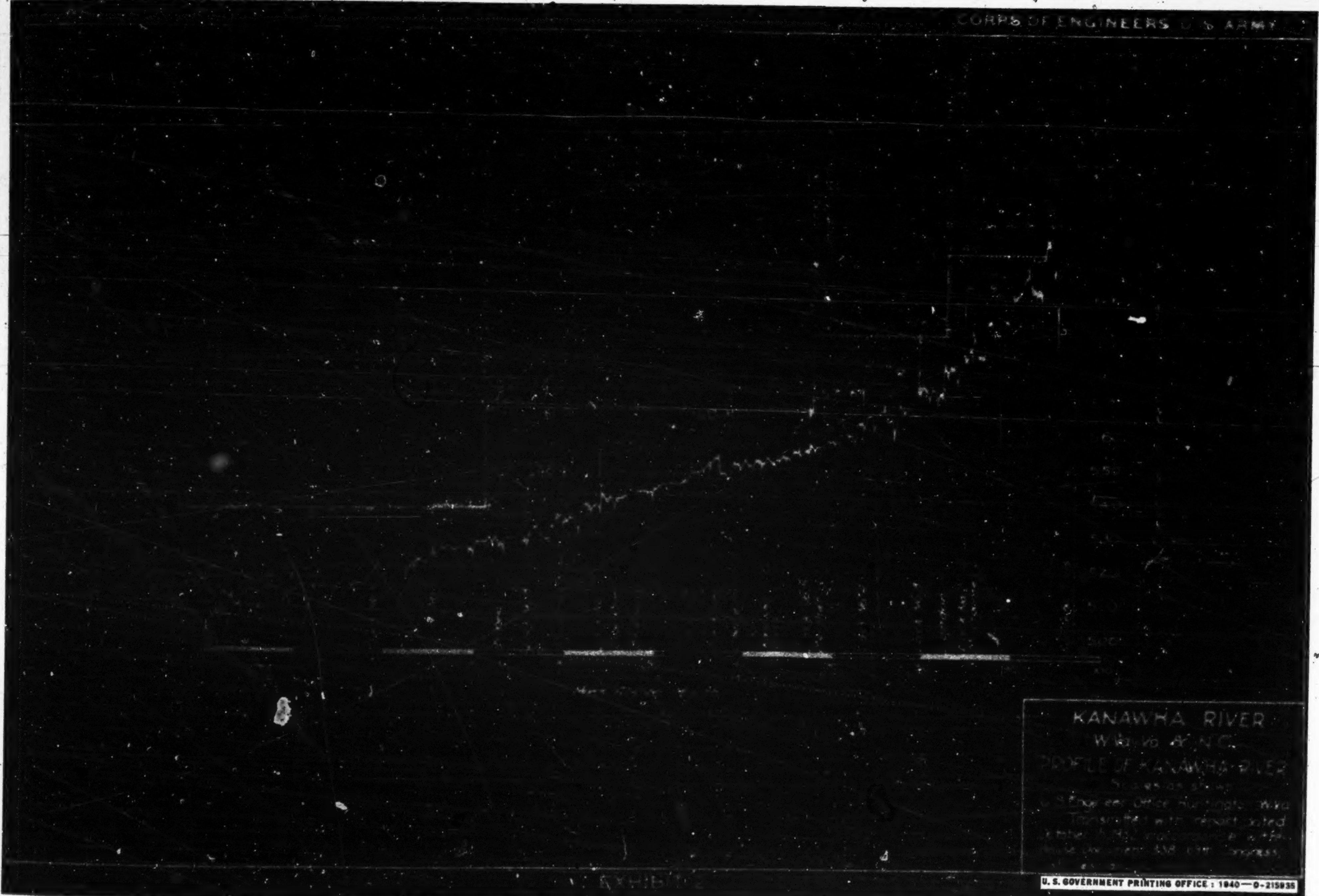
* * * * *

APPENDIX C, TABLE 2.—COMPREHENSIVE SCHEME OF POWER DEVELOPMENT OF NEW RIVER BASIN

ame of project or existing plant	Stream	Miles above mouth of Kanawha River	Drainage area	Normal elevation		Head		Usable storage at site	Cumulative storage	Primary flow at site	Primary power	Primary peak power	Primary output	Secondary output	Total output	Estimated cost of development	Installation in horsepower	Estimated cost per installed horsepower	Estimated cost of primary energy at switchboard	Estimated total annual cost of power	Estimated annual cost of primary energy [1]	Remarks
				Headwater	Tailwater	Gross	Net															
			Square miles			*Feet*	*Feet*	*Acre feet*	*Acre feet*	*Cubic feet per second*	*Horsepower*	*Horsepower*	*Kilowatt-hours*	*Kilowatt-hours*	*Kilowatt-hours*				*Mills per kilowatt-hour*			
e Ferry project	New River	314.4	1,022	2,400	2,230	170	159	584,300	584,300	1,530	24,327	81,090	147,908,000	14,500,000	162,408,000	$11,764,000	99,200	$118.50	6.65	$990,377	$983,127	A. E. P. Co. project.
hington Mills project	do	304	1,140	2,215	2,167.5	47.5	46.5		584,300	1,550	7,200	24,000	43,822,000	7,633,000	51,455,000	2,494,000	24,400	102.00	5.06	225,554	221,737	A redevelopment.
s Junction project	do	298	1,165	2,143	2,082	61	60		584,300	1,550	9,300	31,000	56,544,000	12,700,000	69,244,000	2,484,000	31,200	80.00	3.99	231,933	225,583	A. E. P. Co. no. 1 project.
esby project	do	295	1,310	2,082	1,965	117	102		584,300	1,585	16,167	53,890	98,295,000	27,900,000	126,195,000	5,377,000	58,200	92.70	5.12	517,314	503,364	Byllesby & Buck projects combine.
er Falls project	do	291.5	1,540	1,950	1,905	45	44		584,300	1,620	7,128	23,760	43,338,000	18,000,000	61,338,000	2,047,000	24,000	85.00	4.44	201,492	192,490	
r project	Reed Creek	276.5	258	2,015	1,904.6	110.4	95	105,000	105,000	330	3,135	10,470	19,061,000	5,200,000	24,261,000	3,848,000	27,300	141.00	15.45	297,000	294,400	
es Springs project	New River	275	1,806	1,905	1,865	40	39		689,300	1,950	7,605	25,350	46,238,000	17,700,000	63,938,000	1,893,000	26,000	73.00	4.03	195,120	186,270	
is project	Big Reed Island Creek	274	278	2,100	1,910	190	178	190,000	190,000	400	7,120	23,733	42,682,000	7,576,000	50,258,000	7,028,000	28,200	249.00	12.55	540,784	537,000	
ford project	New River	248	2,380	1,846	1,731	115	104	40,000	919,300	2,520	26,299	87,360	159,345,000	62,280,000	221,625,000	6,865,000	120,000	57.20	3.89	650,550	619,410	A. E. P. Co. project.
tethorn project	do	231	2,806	1,716	1,686	30	29		919,300	2,585	7,500	25,090	45,579,000	25,200,000	70,779,000	2,509,000	25,500	98.00	5.01	238,400	225,800	Howe project.
s of Low Head projects	do	231–209	2,936	1,686	1,590	96	86		919,300	2,600	22,150	73,830	136,000,000	75,000,000	211,000,000	7,500,000	75,000	100.00	5.00	717,500	680,000	
sbourg project	Walkers Creek	209.5	319	1,740	1,590	150	129	290,000	290,000	430	5,547	18,390	33,966,000	7,840,000	41,806,000	4,952,000	52,500	94.00	11.71	401,821	397,900	
y of Low Head projects	New River	209–197	3,360	1,590	1,520	70	63		1,209,300	3,045	19,200	64,000	116,600,000	61,300,000	177,900,000	6,500,000	65,000	100.00	5.00	613,650	523,000	
Falls project	do	170.5	4,100	1,520	1,405	115	104	146,500	1,355,800	3,475	36,140	120,470	219,731,000	136,580,000	356,311,000	9,967,000	158,800	63.00	4.13	976,845	908,555	A. E. P. Co. project.
on project	do	162	4,565	1,410	1,370	40	37	20,500	1,376,300	3,600	13,325	44,400	80,986,000	56,800,000	137,786,000	5,303,000	67,500	78.60	5.42	467,670	439,270	Do.
stone project	do	151	6,273	1,310	1,274	36	35		1,376,300	4,090	14,315	47,717	87,035,000	78,700,000	165,735,000	3,815,000	51,200	74.50	3.99	386,969	347,619	Elec.-Met. Co. project.
s of Low Head projects	do	151–108	6,565	1,274	815	459	400		1,376,300	4,125	165,000	550,000	1,063,200,000	970,584,000	1,973,784,000	55,800,000	558,000	100.00	4.00	4,498,392	4,013,100	
ks Nest project	do	103.6	6,850	815	652	163	151		1,376,300	4,160	52,816	165,000	381,921,000	394,770,000	776,691,000	10,835,000	165,000	65.70	2.30	1,076,070	878,685	Elec.-Met. Co. project; under construction.
Total (New River)			6,918			2,054.9	1,861.5	1,376,300	1,376,300	4,160	454,170	1,469,440	2,762,251,000	1,980,263,000	4,742,514,000	150,981,000	1,656,800	91.13	4.43	13,227,441	12,237,310	

3444-M

CORPS OF ENGINEERS U.S. ARMY



KANAWHA RIVER
W.Va., Va. & N.C.
PROFILE OF KANAWHA RIVER
Scale as shown
U.S. Engineer Office Huntington, W.Va.
Transmitted with report dated
[illegible]
House Document 538 [illegible] Congress.

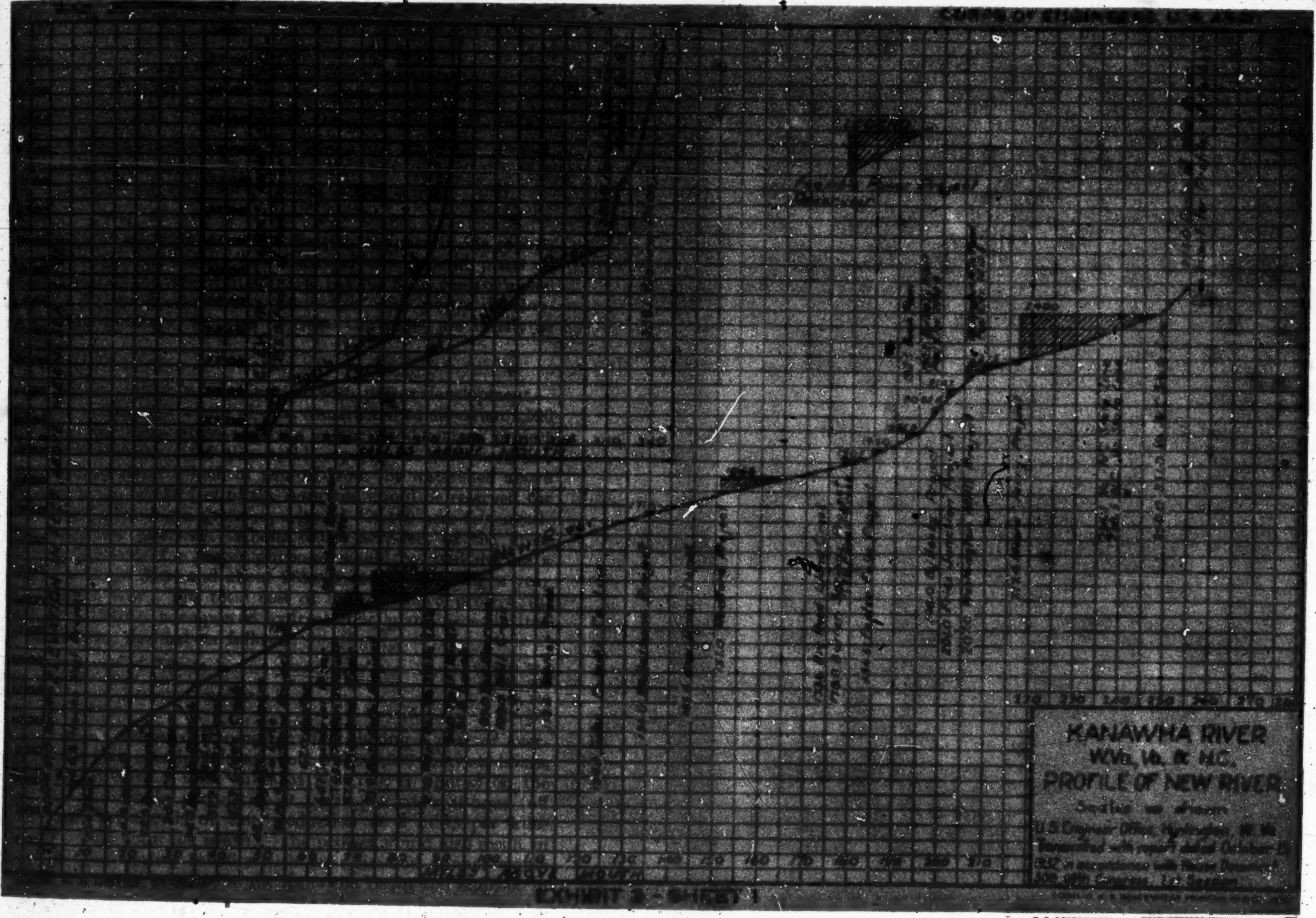
EXHIBIT 2

U. S. GOVERNMENT PRINTING OFFICE : 1940—O-215935

8444-M 1 SUPPLEMENTAL REPORT OF THE DIVISION ENGINEER

2706-C

CORPS OF ENGINEERS, U.S. ARMY



KANAWHA RIVER
W.Va., Va. & N.C.
PROFILE OF NEW RIVER
Scales as shown
U.S. Engineer Office, Huntington, W.Va.
Transmitted with report dated October [illegible]
1932 in accordance with House Document
308, 69th Congress, 1st Session

EXHIBIT 3 - SHEET 1

U. S. GOVERNMENT PRINTING OFFICE : 1940—O-210835

3444-N SUPPLEMENTAL REPORT OF THE DIVISION ENGINEER

* * * * *

WAR DEPARTMENT,
OFFICE OF THE DIVISION ENGINEER,
OHIO RIVER DIVISION,
Cincinnati, Ohio, November 21, 1934.

Subject: Supplemental report on Bluestone Reservoir project, Kanawha River Basin, W. Va. and Va.
To: The Chief of Engineers, United States Army.

* * * * *

4. Plans of development.—The district engineer in his report, which is appended hereto, has discussed two general plans of development of the reservoir site, i. e, (a) for flood control alone, and (b) for flood control in combination with power development. The principal features of these two plans are briefly as follows:

* * * * *

(b) Flood control in combination with power development.—The dam in this case would also be constructed to elevation 1,520 providing the same gross capacity as the flood-control project (625,600 acre-feet). Of this total capacity 235,500 acre-feet (representing about 1 inch of run-off from the watershed above the site) in the top 30 feet of the reservoir would be reserved for flood control, leaving a gross capacity of 390,100 acre-feet available for power purposes. About 65,000 acre-feet of the gross capacity available for power purposes would be used during a year of average flow, and about 268,000 acre-feet during a year of minimum flow. The total cost of this combined project, including a 120,000 horsepower hydroelectric plant, is estimated at $12,942,390, divided as follows:

Construction cost of dam	$8,004,750
Cost of power plant	3,680,000
Relocations and protection measures	349,140
Land and damages	908,500

The annual output of the power plant during a year of average stream flow is estimated at about 403,000,000 kilowatt-hours, which would have a total value of $939,750, if figured on the basis of one-third the production at 1 mill per kilowatt-hour (off peak) and two-thords of the production at 3 mills per kilowatt-hour (on peak). The project would also result in
3444-Q flood-control benefits with an estimated annual worth of about $250,000 in the Kanawha Basin and $120,000 in

the Ohio Valley. The flood-control benefits and power revenue accruing from this plan would therefore total approximately $1,309,750, which, when compared with an annual cost of $726,296 (including interest, operation, and maintenance but no provision for amortization of the expenditures made for the dam and reservoir) indicates a ratio of cost to benefits of 1 to 1.8.

* * * * *

8. The plan of development recommended by the district engineer proposes a combined flood control and power project in which the flood control capacity provided would be reduced from 581,400 acre-feet, proposed in the Ohio River flood-control plan, to 235,000 acre-feet. (In this connection it might be noted that neither plan contemplates provision of flood storage in the amount required to reduce the maximum probable flood at the dam site below the 'no damage' stage). This proposed reduction in flood storage capacity apparently would reduce the flood-control benefits of the plan by approximately one-half. However, to offset this, annual power revenues in the amount of over $900,000 would be realized from the project recommended by the district engineer. Capitalizing these annual power revenues at 8 percent indicates a justified contribution by power interests of approximately $11,250,000 to the project on the basis of its power value alone. This is exclusive of its indirect benefits to existing and potential water-power plants below, and the possibility of further increase in value of the Bluestone plant due to projects built above it. It thus appears that the flood-control benefits of the plan will ultimately, upon development of a suitable market for the power produced, accrue practically free of any cost. The combined development, therefore, appears the most attractive.

* * * * *

R. G. POWELL,
Lieutenant Colonel, Corps of Engineers,
Division Engineer,

* * * * *

3444-P SUPPLEMENTAL REPORT OF THE DISTRICT ENGINEER

Syllabus

Flood control.—The report on Kanawha River made under the provisions of House Document No. 308, Sixty-ninth Congress, first session, presented a reservoir plan for comprehensive flood relief in the Kanawha Valley. The plan consisted of a system of 4 reservoirs, 1 each on 4 tributaries of Kanawha River. The Bluestone Reservoir on New River appeared to have greater possibility of economic justification than any other in the system, in that it has practically the same storage capacity and controlled more drainage area than the other three combined and showed a much smaller cost per acre-foot. Bluestone Reservoir alone cannot provide the complete flood relief that the entire system would afford, but studies indicate that the measure of relief it would give makes it an economically justifiable project.

Water power.—For more than 30 years, the potential value of the water-power resources of the New River has been recognized by power companies. Three water-power plants are in operation on the stream and another of large capacity is approaching completion. A number of other power projects have been proposed, several of which will probably be constructed when legal and economic conditions permit. The Bluestone site occupies the most important position among the sites that have been proposed. A power company has made a thorough investigation of foundation conditions; has surveyed and mapped the reservoir area; and has acquired the dam site and a large part of the flowage in the reservoir.

Flood control and power development combined.—By the operation of Bluestone Reservoir alone, it is not practicable to reduce below danger stage all of the floods in Kanawha River. In some cases the New River contribution is not sufficient to reduce flood heights below the danger stage at Charleston; the lower Kanawha cannot be protected from backwater of Ohio River floods by reservoir control of New River floods. The inclusion of power development in the project will not seriously reduce the efficiency of the reservoir for controlling floods.

War Department, United States Engineers Office,
Huntington, W. Va., July 31, 1934.
(Revised Nov. 19, 1934.)

Subject: Supplemental report on the Kanawha River, W. Va., Va., and N. C. (Bluestone Reservoir project).
To: The division engineer, Ohio River Division, Cincinnati, Ohio.

* * * * *

3444–Q 4. Previous reports on New River—

	Congressional document				Annual Report of the Chief of Engineers	
	House or Senate	No.	Congress	Session	Year	Pages
1. Survey of 1819 by Moore and Briggs, Greenbrier River to Sinking Creek.						
2. Survey from Greenbrier River to lead mine in Wythe County, Va.	House	25	Forty-second	Third	1873	78, 842–854
3. Report recommending cessation of improvement.					1891	2431–2433
4. Report on New River in vicinity of mouth of Greenbrier River.	House	176	Fifty-eighth	Second	1904	2617–2620
5. Between Radford, Va., and Hinton, W. Va.	do	1410	Sixty-second	Third	1913	1023

* * * * *

3444–R 6. General description of New River.—The New River has its sources in the Blue Ridge Mountains of northwestern North Carolina near the Tennessee line. It flows northeasterly into Virginia until it reaches the Horseshoe near Radford Va., when it turns abruptly to the northwest and keeps that same general trend of flow into West Virginia and to its mouth where it joins the Gauley River to form the Kanawha River. Through almost its entire length the river flows through a rugged mountainous country. Its valley is narrow, the flood plain being very little wider than the low-water channel, which varies in width from about 200 to 1,000 feet. In many places the banks are sheer bluffs rising from the river's edge. Ledges of limestone, sandstone, and shale crossing the river at frequent intervals create rapids and waterfalls. The waterfalls vary in height up to about 18 feet. Between the ledges there are usually short pools of varying depths. The low-water depth in the channel varies from a few inches to more than 6 feet.

3444–S 7. Fall.—From its source at about elevation 3,800 to its mouth at elevation 652, the river has a total fall of 3,148 feet in its length of 341 miles or an average of 9.2 feet per mile. The slope of the river is distributed as follows:

	Feet per mile
From the source of the South Fork to the junction of the forks (86.4 miles)	15. 1
From the source of the North Fork to the junction of the forks (41.5 miles)	31. 5
From the junction of the forks to Washington Mills (48.2 miles)	6. 5
From Washington Mills to the Wythe-Carroll County line (13.8 miles)	15. 2
From the Wythe-Carroll County line to Narrows, Va. (93.0 miles)	4. 8
From Narrows, Va., to Bluestone dam site (35.0 miles)	4. 5
From Bluestone dam site to Hinton, W. Va. (2.4 miles)	6. 2
From Hinton, W. Va., to the mouth of the New River (62.6 miles)	11. 2

* * * * *

3444-T 36. Plants officially proposed.—

* * * * *

the Radford and Bluestone projects of the Appalachian Electric Power Co. have received the greatest prominence. The Bluestone project was set up as a single dam about 145 feet high at a site about 3 miles above Hinton. Later the plan was changed to substitute two dams in place of one. The power company applied for and received a permit from the Public Service Commission of the State of West Virginia. After this permit was issued, the power company withdrew its application with the Federal Power Commission and the project was dropped by the latter commission on January 17, 1931. No construction work has ever been done on the project and it is at present inactive. It may be of interest to note that applications for projects 542 and 575 were rejected by the Federal Power Commission for the reason that the applicants proposed to divert water from New River to the Atlantic watershed.

* * * * *

39. The site first selected by the power interests for a power dam was just below the mouth of Bluestone River. This was abandoned because of faulty foundation conditions and the choice of sites was transferred to the site considered in this report. The pool level adopted by the power company was at elevation 1515. It was proposed to operate the plant for the production of peak power. This was impracticable, because of the undesirable effect on power plants and navigation below caused by sending the water downstream in waves. Presumably to overcome this objection, the plan was changed to substitute two dams for the one. One of the dam sites would be at Bull Falls, 8.8 miles upstream from the Bluestone site; would be 125 feet high and the plant would be operated as a peak-power development. Another dam, 43 feet high at the Bluestone site, would operate continuously. The lower plant would thus re-regulate the flow of the stream. This would be an ideal arrangement for the production of power but it is not adaptable to the inclusion of flood control. 3444-U

* * * * *

44. Area and volume of reservoir.—The following table gives the reservoir area and capacity for the various elevations shown:

Contour, elevation	Area	Volume	Volume	Contour, elevation	Area	Volume	Volume
	Acres	*Acre-feet*	*Cubic feet*		*Acres*	*Acre-feet*	*Cubic feet*
1,520	9,040	625,600	27,252,000,000	1,485	6,375	357,400	15,556,000,000
1,515	8,636	581,400	25,337,000,000	1,480	6,051	326,400	14,223,000,000
1,510	8,233	539,200	23,502,000,000	1,475	5,750	296,600	12,933,000,000
1,505	7,819	499,000	21,753,000,000	1,450	4,574	168,400	7,336,000,000
1,500	7,446	460,800	20,092,000,000	1,400	1,225	23,200	1,012,000,000
1,495	7,072	424,500	18,511,000,000	1,375	216	540	24,000,000
1,490	6,698	390,100	17,012,000,000	1,370	0	0	0

* * * * *

Proposed Dam

53. Description.—The dam will be 1,851 feet long at pool level elevation (1,520) of which 867 feet will be nonoverflow section, 684 feet will be controlled spillway and 300 feet will be powerhouse space. For the passage of floods, 18 crest gates 30 by 30 feet and 6 conduits 10 by 12 feet are provided as shown in the plans (exhibit 12).[1] The crest of the spillway was placed at elevation 1,490 feet, which is as low as was deemed necessary and feasible for operation of the crest gates, in order to reduce the flood gradient in the vicinity of the limiting features near the head of the pool.

* * * * *

3444–V 63. A rule of operation was assumed as follows: Full wheel capacity, approximately 11,000 cubic feet per second to be used at times when water was wasting. At other times 10,000 cubic feet per second to be used to draw the pool down 5 feet, the top 5 feet of the reservoir being reserved for the reception of freshets. Assume the reservoir at 5-foot draw-down about June 1, after which date use natural flows to a minimum of 2,000 second-feet until the pool comes back to a 5-foot draw-down, then repeat the process. From January 1 to about April 15, use full wheel capacity above 5-foot draw-down; use 6,000 cubic feet per second between 5-foot and 10-foot draw-downs, then use natural flows to maximum of 6,000 cubic feet per second. After April 15, restore the pool level to 5-foot draw-down by use of 2,000 cubic feet per second or wheel capacity, then return to operation as of June 1.

* * * * *

3444–W 65. If the plant was operated under a 100-percent utilization factor, approximately half of the power would be generated during the hours of heavy demand for power and half during the low-demand period. For convenience these periods will be termed day and night, respectively. The unit value of power generated in the two sections of a 24-hour period is about in the ratio of 3 to 1 in favor of the day power. It is therefore advantageous to power development to generate as much power as practicable during the day period. After careful consideration it was decided that the plant can be operated to use during the day twice as much of the daily flow ~~as at night~~ without injurious effect on navigation or power developments downstream. Studies of waves produced by intermittent operation of power plants in the upper reaches of New River indicate that operation with moderate changes in daily flow such as proposed at Bluestone will not require reregulation for navigation and existing power plants downstream. However, further consideration should be given to existing and proposed developments, in the final plan of operation of the Bluestone project, to the end that maximum improvement in flow regulation will be made available for all projects downstream. Consideration should also be given to the fact that at Bluestone a minimum regulated flow of 2,000 cubic feet per second is proposed, whereas the natural flows are often smaller than that amount, the minimum being about 600 cubic feet per second.

* * * * *

3444–X Conclusions and recommendations

74. Conclusions.—(a) From an engineering standpoint the construction of a dam and the creation of a reservoir at the Bluestone site on New River is feasible.

(b) The proposed reservoir, operated for flood control only or for flood control and power combined, will effect savings from flood damages in ratios of costs to benefits that make the project economically justifiable.

(c) Interest of power companies in this section of the river as displayed by more than 30 years of investigation, litigation, and the acquisition of dam sites and flowage rights, indicate a value in the Bluestone project for power development.

(d) The potential power possibilities in an operation combining power production and flood control appears to be of sufficient value to warrant the power interest to bear the cost of some part of the dam in addition to the cost of the power features.

(e) The value of Bluestone power would be increased by the operation of prospective storage reservoirs upstream and by the construction of low-head projects downstream which would reregulate the flow from Bluestone and permit the latter to be operated as a peak-power plant.

75. Recommendations.—The Bluestone Reservoir project, combining flood control and power development, is recommended for construction under the provisions of the National Recovery Act at an estimated total cost of $12,942,000.

JOHN F. CONKLIN,
Major, Corps of Engineers, District Engineer.

3445 *Government exhibit No. 146*

Views of shoals and rapids on unimproved section of New River between Wiley Falls, mile 88.6 and Radford, mile 146.1—July 13–15, 1936. (Original Exhibit.)

Government exhibit No. 147

Views of shoals and rapids on unimproved sections of New River between Wiley Falls, mile 88.6 and Radford, mile 146.1 and between Allisonia, mile 173.3, and Austinville Lead Mine, mile 190.0—June 22–29, 1936. (Original Exhibit.)

Government exhibit No. 148

Photograph of stern of boat showing type of propeller guard in July, 1936. (Original Exhibit.)

Government exhibits Nos. 149 to 151 incl.

Photographs of Gerdes' Party at Bull Falls in July 1936. (Original Exhibits.)

Government exhibits Nos. 152 to 154 incl.

Photograph of negro at Bull Falls in a rowboat in July 1936. (Original Exhibits.)

Government exhibit No. 155

1926—House Doc. #308—69th Congress, 1st Session—Estimate of cost of examinations, etc., of streams where Power Development appears feasible. (Original Exhibit.)

Government exhibit No. 156

Record of hearing before State Corporation Commission containing application and copy of State License. (Original Exhibit.)

Government Exhibit No. 157

Pilot license of John R. Douglass (read into the record). (Omitted.)

Government exhibit No. 158

Map—"Parts of National Forests and Areas approved as National forests within the Kanawha River and New River watersheds." (Original Exhibit.)

Government exhibit No. 159

1922, June 12, letter from Geo. Otis Smith, Director U. S. G. S., including the Report #34 enclosed in said letter. (Excluded.)

Government exhibit No. 160

Map "Monongahela National Forest—West Virginia"—1936. (Excluded.)

3446 *Government exhibit No. 161*

"Graph of stream flow—storm of March 26, 1936—Bent Creek Experimental Forest." (Original Exhibit.)

Exhibit No. 161 was not offered in evidence, but, with the consent of the defendant, is treated as though it had been admitted over the objection of the defendant, as being immaterial, irrelevant, and incompetent.

Government exhibits 163 to 182 inc.

"Photos of dams and reservoirs on upper New River showing silt deposits." (Original Exhibits.)

Government exhibit No. 183

Views of pools, shoals, rapids, and dams of Kanawha River and New River between London Lock, West Virginia, and Hawks Nest, West Virginia—July 22, 1936. (Original Exhibit.)

3447 *Government exhibit No. 184*

Photograph entitled "State line in vicinity of Round Bottom Branch." (Original Exhibit.)

3449 *Government exhibit No. 185*

U. S. G. S.—"Peterstown Sheet." (Original Exhibit.)

3451 *Government exhibits Nos. 186 and 187*

Maps and deed descriptions, re Bluestone reservoir. (Original Exhibits.)

3452 *Government exhibit no. 188*

Key property map of A. E. P. Co. for Bluestone reservoir. (Original Exhibit.)

3454 *Government exhibit 189*

(pp. 3–4; 9–39)

Report of Commissioners appointed to view certain rivers within the Commonwealth of Virginia * * * accompanied by a map.

STATE OF VIRGINIA

INLAND NAVIGATION AND IMPROVEMENTS—PREAMBLE AND RESOLUTION

For reprinting the Report of the Commissioners on the Navigation of the Great Kanhawa, &c.

[Agreed to by both Houses of Assembly, February 14, 1814]

Whereas, it would greatly promote the welfare of this Commonwealth, and the prosperity of our sister States, to form a more intimate connexion between the Eastern and Western Waters of the United States; and, with a view to that object, the General Assembly of Virginia, at a former session, appointed Commissioners to survey the head waters of James-River and the Great Kanhawa, with instructions to ascertain the practicability of extending their navigation to the base of 3454–A the chain of mountains which divides them, and at the shortest and easiest portage across it; a trust which was accepted and fulfilled, by the Commissioners who acted therein, in a manner that entitles them to the thanks of their country: And, as the result of their labors has never been presented to the Legislature of the Union, nor to the governments of the several States, who cannot but feel an interest in the accomplishment of an enterprise so important to the arts, manufactures, and commerce of the United States—

Resolved, therefore, That the executive of this commonwealth be, and they are hereby empowered and requested, to cause the Report of the Commissioners to be reprinted, and the Map and References accompanying it to be reduced to a convenient scale, engraved, printed, and annexed to the Report; and, reserving two hundred and fifty copies thereof for the use of the General Assembly, to forward a copy to each of the Commissioners whose names are subscribed to the Report, to each Member of the Congress of the United States, and to the Executives of the several States and Territories.

3454-B Letter of Mr. Marshall, one of the commissioners.

A communication from the Governor, enclosing a Letter from the Honorable John Marshall, and a report from the Commissioners who executed the act of the last session, entitled "An act appointing Commissioners for the purpose of viewing certain Rivers within this Commonwealth," was laid before the house.

The said Letter and Report were read as follows:

RICHMOND, *December 26, 1812.*

SIR: I hasten to submit to your Excellency, for the purpose of being laid before the General Assembly, the Report of the Commissioners who executed the act of the last session, entitled "An act appointing Commissioners for the purpose of viewing certain Rivers within this Commonwealth."

To their distance from each other, and the consequent difficulties attending the interchange of sentiment, and the attainment of their respective signatures, is to be ascribed the delay which has taken place in the performance of this part of their duty.

The more detailed report, to which the enclosed refers, is not yet received, but it is expected in a few days, and will then be transmitted to your Excellency. It was not thought advisable longer to withhold the general report, for the purpose of accompanying it with that more in detail, to which it refers.

I have the honor to be, Sir, with great respect,

Your obedient servant,

J. MARSHALL.

His Excellency Governor BARBOUR.

3455 INLAND NAVIGATION

REPORT

To the Honorable the Speaker and Members of the General Assembly, the undersigned Commissioners, named, with others, in the act entitled "An act appointing Commissioners for the purpose of viewing certain Rivers within this Commonwealth," respectfully report—

That, supposing the autumn to be the season which afforded the fairest prospects for giving effect to the views of the Legislature,

as expressed in their act, your Commissioners agreed that a me
ing should be called on the first of September, at Lynchburg. T
number required by law, for the execution of the service they we
directed to perform, having assembled, and the necessary prepa
tions having been made, your Commissioners began at the Bri
at Lynchburg, to view James-river, and to take its level by sectio
to the mouth of Dunlop's-creek. Mr. Andrew Alexander, the su
veyor of Rockbridge county, had been engaged to execute this du
under their direction. To this report, which your Commissione
believe to be accurate, they beg leave to refer, as exhibiting,
minute detail, the information required by the law.

As an actual measurement of the whole river would have e
ployed so much time as to defer the completion of the work, un
high waters might defeat the object of the Legislature, and w
rendered the less necessary by previous surveys; distances were
general conjectured. The eye, aided by a time piece, and oc
sionally corrected by actual measurement, furnished informatio
which, though not perfectly exact, was believed not to vary mu
from the truth, and to be substantially sufficient. Those plac
which present serious obstacles were measured by the chain, a
the elevation was taken throughout by a spirit level.

On that part of the river which is comprised within the chart
already granted, your Commissioners presume that litt
3456 if any, information is expected from them, other than w
be found in the annexed report of Mr. Alexander.

From Beall's Bridge, or Crow's Ferry, to the mouth of the Co
Pasture, no difficulty presents itself, which may not be with ce
tainty surmounted. The falls are no where formidable; there a
long stretches of smooth water, and the shallows may be so deepe
as to afford water for boats bringing down from six to eight ton
and carrying up from four to six tons, if not throughout the yea
through all but a very inconsiderable portion of it. Your Com
missioners give the opinion, unanimously, and with great con
dence, that the navigation from Crow's Ferry to the mouth of t
Cow-Pasture, may, with improvements by no means expensive,
rendered as certain, as useful, and as permanent, as the navigati
from the same place to Lynchburg; and that it may be used at t
times when the navigation to Lynchburg can be used, with boa
carrying an equal burthen—indeed, that it may be rendered mo
safe and less laborious, than that from the mouth of the Nor
Fork to Lynchburg now is.

From the mouth of the Cow-Pasture to the mouth of Dunlop
creek, the difficulties become more considerable, and their remov
will require greater expenditures of money. The mass of wat
diminishes, and the elevation increases. The shoals become long
and shallower, and the intervals of smooth water shorter. Yo

this rugged navigation, though totally unimproved, is now used during high water. Boats, laden with the produce of the country, pass every year from the mouth of Dunlop's-creek to Richmond. It is, therefore, proved to be, even at this time, practicable for some portion of the year. This portion varies with the seasons. Most commonly, it commences in November, and terminates late in May, or early in June,

That, by the removal of rocks, now lying promiscuously and irregularly through the bed of the river, which it will be necessary in only a few instances to blow, and by the judicious application of labor, to the collection of water in narrower spaces than it now covers, this navigation may be rendered much more secure 3457 and beneficial, and the time during which it can be used may be considerably extended, will not admit of doubt. Whether this portion of the river may be rendered at all times boatable depends on the depth of water to be collected in particular channels by such means as are applicable to the object.

Some of your Commissioners have been personally engaged in opening the navigation of the North Fork of James river, through Rockbridge. They are decidedly of opinion, that the river denominated "Jackson's," contains as far as Dunlops creek, more water and less formidable obstructions than were found in the North Fork. Yet the North Fork, though its improvement is far from being complete, is now actually used to great advantage, and is not much inferior to the river below. Some experienced and judicious boatmen, who were employed on the expedition, who are well acquainted with the river and its navigation, unite in the declaration, that, if the means be taken which ought to be employed, that part of James river which is between the Cow-Pasture and Dunlop's creek, may be used by any boats which will be capable of continuing their voyage to Lynchburg.

Your Commissioners concur in this opinion; and they take occasion now to remark, that should it be deemed advisable still to adhere to the system of improvement heretofore used in the upper part of the river, the difficulties of this navigation would, they think, be much diminished by several facilities which might be given to it. They would particularly suggest chains, with buoys fastened in rocks or otherwise, or walls on which men may walk, of which boatmen might avail themselves to lessen the labor of ascending places of peculiar difficulty; and thus either to increase the load which may be carried up the river, or to diminish the number of persons necessary for carrying up a given load. They will also mention a fact deemed favorable to the object contemplated by the Legislature. It is this: although the cold may be more intense in the bosom of the mountains than below, this part of the river freezes over.

It will perhaps save the honorable the members of the Legislature some calculation, to observe, that the distance from
3458 Lynchburg to the commencement of the Blue Ridge i
stated, in the report of Mr. Alexander, to be twenty-fiv
miles one-fourth and thirty poles; the elevation to be one hundred and eleven feet eight inches; showing an average elevatio
of four and an half feet to the mile. The distance through th
mountain, that is from Racoon Island to the mouth of the Nort
Fork, is eight miles one-fourth and forty-nine poles, and th
elevation one hundred and one feet six inches, giving an averag
elevation of upwards of twelve feet to the mile. The distanc
from the mouth of the North Fork to Crow's Ferry, or Beall'
Bridge, the highest point to which navigation is to be carried b
the James River Company, is stated at twenty-six miles an
thirty-eight poles, and the elevation is one hundred and thirty-one feet four inches; making the average elevation five feet to
mile.

The distance from Beall's Bridge, or Crow's Ferry, to th
mouth of the Cow-Pasture, is stated at thirty-six miles fifty-nin
poles, and the elevation is one hundred and ninety feet thre
inches, making the average elevation five and an half feet nearl
to a mile. The distance from the mouth of the Cow-Pasture t
the mouth of Dunlop's creek, is stated at twenty-three miles thre
fourths and twenty poles, and the elevation is two hundred an
twenty-eight feet three inches, making the average elevation nin
and an half feet to the mile.

Having reached Dunlop's creek, your Commissioners proceede
to view and mark out what appeared to them to be the best and
most direct way for a turnpike road from the mouth of tha
creek to the most convenient navigable point on Greenbrier river
With some inconsiderable deviations, which will appear in the
report of Mr. Alexander, already referred to, and some other
which will be suggested, the road now leading from the mout
of Dunlop's creek, by Bowyer's Sulphur Spring, to Anderson'
Ford, over Greenbrier, at the mouth of Howard's creek, is believed to be the most eligible which can be made. To that par
of the road which passes from the mouth of Dunlop's cree
to the old Iron Works, a distance of about five miles
3459 there are considerable objections, which your Commissioners are inclined to believe may be diminished. The roa
crosses the creek eight times, and the ground, during the winte
and spring would, if much used and not well covered with ston
or gravel, be much cut and be very deep. The creek too is frequently so high as not to be fordable.

Should it be found practicable, which your Commissioners believe to be the fact, to render Dunlop's creek navigable up to it falls, some distance below the old Iron Works, these inconveniences would be in a great measure removed.

Should it be deemed unadvisable to carry navigation up Dunlop's creek, a direction, as is understood from some of the inhabitants of that neighborhood, may be given to the road, so as to avoid five crossings of the creek, and at the same time shorten the distance. No attempt to view this way was made, because guides could not readily be procured, and your Commissioners feared that, by devoting too much time to a minor object, on which complete information is attainable with ease and certainty through various channels, they might hazard the failure of others which were believed to be of much importance.

The road from the Sulphur Spring to Greenbrier crosses Howard's creek, which is often not fordable, six times, and is in a few places attended with some difficulty. A small improvement may be made in it, and the steepest part avoided, by returning it, near the river, to the ground over which it formerly passed, and from which it has been lately taken.

The road over the mountain has been attentively viewed, and the deviations recommended, from that now in use, carefully and plainly marked. Your Commissioners feel much satisfaction in stating, that the elevation of this part of the road may, in the most unfavorable places, be reduced to an angle of five degrees with the horison. By occasionally removing the earth, for small distances, this angle may be still further diminished. It is believed to be susceptible of improvement on as easy terms as any
other road, since the materials for a turnpike are every
3460 where convenient, and not more levelling will be necessary
than must be expected in passing through a mountainous
country.

Your commissioners proceeded down the Greenbrier river in the boat in which they ascended the James. The season had been remarkably dry, and the water was declared by the inhabitants to be as low as at any period within their recollection. It frequently spreads over a wide bed covered with large stone, and is, in its present unimproved state, and at the season when it was viewed, so very shallow for the greater part of its course, as not to swim an empty boat. The labor of removing stone, and of dragging the boat over those which could not be removed without implements provided for the purpose, was so great, that your Commissioners at one time were enabled to advance only three miles in two days, even with the assistance of a horse and of many additional laborers. In part of the river the shoals are frequent and long, and the falls, as the report of Mr. Alexander will shew, considerable. At the great falls, which is the most important of them, the descent is twelve feet i forty-eight poles. There is no perpendicular fall at this plac but one continued rapid, with large rocks, irregularly interspersed through the bed of the river. Near the mouth of th river there is a flat rock, which continues for about two hundre and forty poles, with many irregular apertures or fissures throug which the water passes. Although, in the usual state of th river, this rock is covered with water of sufficient depth fo navigation; yet, such was the drought of the last autumn, it w necessary to drag the boat over its whole extent.

These difficulties present obstacles to navigation during a season when the waters are remarkably low, which can be surmounted only at a considerable expense.

But, from the best information your Commissioners can obtain, and they believe it to be correct, the Greenbrier is seldo so low at any season as it was during the last autumn; and i
seldom if ever fails, for eight or nine months in the yea
3461 to be at least two feet higher than when viewed by you
Commissioners; a depth of water unquestionably sufficie for the purpose of navigation. The testimony given by the inhabitants to this fact, was corroborated by appearances on th river. The indications of a recent considerable diminution o water were not to be mistaken.

On an attentive consideration of the obstacles which wer found by your Commissioners to be great; while the river remains in the state in which they viewed it, they are unanimousl and decidedly of opinion, that its navigation may be rendere as safe, as certain, and as easy as that of the James, at all time except when the water is unusually low. The rocks are in general loose, and may be removed without extraordinary difficult so as to afford a tolerably smooth passage to boats; and, b collecting the water into narrow channels, a sufficient depth ma be obtained, with the exception of a short period in a very dr year, to swim any boat which can be brought at the same tim down James river. But so scanty is the supply of water in time of uncommon drought, that doubts are entertained whethe there may not be a short season of the year during which, unless a considerable expense be incurred, the navigation must b suspended. Though aided by men and horses, ten days of unremitting labor were consumed in passing from the mouth o Howard's creek to the mouth of Greenbrier river, a distance no much exceeding forty-eight miles. In the month of June, th same voyage, if not retarded by measuring the river, might hav been performed in a single day. Some of your Commissioner however, are of opinion, that the Greenbrier may, without grea additional expense, be rendered at all times passable for boats carrying half a load.

In addition to the shallowness of the water (an inconvenience which is common to all rivers as you approach their sources, and which disappears for eight or nine months in the year), and to the rocks which have been mentioned, the obstructions to the navigation of the Greenbrier consists in its falls, and in the general rapidity of its current.

3462 The great falls alone are of sufficient magnitude to merit particular attention. These unquestionably admit of being rendered navigable, either by opening a sluice judiciously through them, or by locks. The latter would be most expensive, but would leave the navigation less laborious.

The rapidity of the current may be estimated by observing that the descent in forty-eight miles and eighty-four poles, is three hundred and sixty-two feet ten inches, between seven and eight feet to the mile.

This current will present no difficulty to a boat descending the river. To one ascending it, the labor will be considerable, but not so considerable as in some parts of James river.

The night of the 28th of September, was passed among the islands in the mouth of Greenbrier; and on the morning of the 29th, your Commissioners entered New river.

The New river, or that part of the Great Kanawha which is above the mouth of Gauley, having to search its intricate way, and force a passage through a long chain of lofty and rugged mountains, whose feet it washes, exhibits an almost continued succession of shoals and falls, from which the navigator is sometimes, though rarely, relieved by a fine sheet of deep placid water.

The difficulties encountered in descending this river were of a character essentially different from those which were experienced in the Greenbrier. Uncommon as had been the drought, the supply of water was abundant. The boat sometimes, though rarely, rubbed upon a shoal; but in every such case it was apparent that a sufficient passage might be opened without much labor or expense. The velocity of the current and the enormous rocks which often interrupt it, the number and magnitude of the rapids and falls, the steepness, cragginess, and abruptness of the banks, constitute the great impediments which at present exist to navigation between the mouth of the Greenbrier and the Great Falls of Kanhawa.

3463 The distance from the mouth of Greenbrier to Bowyer's Ferry, is forty miles one quarter and forty-six poles, and the descent is four hundred and sixty-six feet seven inches; that is, eleven feet six inches in each mile. In general, there is much sameness in the appearance of this part of the river. Long rapids, frequently terminated by a fall of from five to ten feet, in a distance of ten, twenty, thirty, and sometimes a greater number of poles; an intervening space, sometimes more, sometimes less considerable, of swift or smooth water; rocks, sometimes above the surface, sometimes near it, so as to require great caution to save a boat from dashing on them; a copious stream, with a current commonly impetuous, constitute its leading characteristics.

Falls too great to come within this general description, will be particularly noticed.

Brook's Falls are about four miles and one-fourth below the mouth of Greenbrier. The water descends thirteen feet seven inches in fifty poles. In its most rapid part the descent is five feet ten inches in fourteen poles. The boat was navigated through this place.

A much more formidable obstruction is the falls at Richmond's Mill. These are designated in the neighborhood by the name of the "Great Falls of New river," but are generally called at a distance, "Lick-Creek Falls."

At this place the water may with propriety be said to fall perpendicularly twenty-three feet. For this distance, the sheet which dashes over the summit is intercepted only by huge fragments of broken rock, which, having been successively disjointed from the brink of the precipice, have fallen into the foaming basin below, where, piled on each other, they form one or two benches that break the cataract. A small distance lower down is another fall of three or four feet.

Here, for the first time, the boat was taken out of the water and let down by skids.

The ground along which a canal may be carried around these falls, pursuing the course of Richmond's mill-race, was measured, and the elevation taken. The descent was found to be twenty-two feet nine inches, in one hundred and eighty-one poles.
3464 This estimate excludes a part of the falls, between five and six feet of which are just above the head of Richmond's mill-race.

The bottom of the river for some distance above these falls, is a hard rock, often appearing above the surface, and much covered with moveable stones, some of which are very large. The bottom of the mill-race appears to be of the same description.

From Bowyer's Ferry to the Falls of the Great Kanawha, was estimated at nineteen miles and fifty-eight poles, in which distance the river falls three hundred and thirty-one feet; that is, seventeen feet to a mile. The honorable the legislature will perceive, that below the ferry the descent, in the same distance, is greater than above. For a part of this space, the scene is awful and discouraging. The vast volume of water which rolls down

New river, and which, far above the ferry, often spreads, without becoming shallow, over a bed three or four hundred yards wide; is seldom more than one hundred or one hundred and fifty yards wide. In some places, for a mile or more in continuation, it is compressed by the mountains on each side, into a channel of from twenty to sixty yards wide; and even these narrow limits are still more narrowed by enormous rocks which lie promiscuously in the bed of the river, through which it is often difficult to find a passage wide enough for the admission of a boat. In some places the bank is formed of rugged and perpendicular cliffs of entire rock, which appear to be twenty, thirty, and forty feet high; in others, enormous, but unconnected, rocks dip into the water.

There are unequivocal indications of the river's having risen, in these narrows, from thirty to forty feet perpendicularly

Immediately above the mouth of Gauley, the river opens and presents a beautiful sheet of deep smooth water, which is succeeded by the rocks over which it dashes, and forms the Great Falls of Kanawha. The height of these falls is twenty feet four inches. With its name, the river looses its wild and savage aspect. It is no longer confined by rugged cliff, by mountains barely separated from each other, nor interrupted by enormous masses of rocks which are scarcely to be avoided.

3465 Within a short distance above the falls, the current is not unmanageably swift, nor the rocks over which it passes uneven. Below, quite to the rocks which have fallen from the brink over which the cataract rushes, is a deep, smooth and beautiful basin. The river is so wide as to rise, in the greatest freshes, only six or seven feet. The falls themselves constitute the impediment, and the only impediment at this place.

Your Commissioners have deemed it proper to state in their full strength, the difficulties which are to be surmounted in opening the intercourse between this part of the state of Virginia and the western country; and to put the legislature, as far as is possible, in possession of the testimony on which their opinion is formed, as well as of their opinion. If, misguided by their conviction of the importance of the object, they are too sanguine in their hopes of its accomplishment, the facts now communicated will enable the General Assembly to correct the mistaken conclusions which have been drawn, and to determine on the course which will best promote the interests of the public.

The practicability of rendering the Greenbrier navigable has already been stated. The system which may be found best adapted for the improvement of James river, will be equally applicable to the Greenbrier, and will be equally successful. The one river and the other will be rendered more or less valuable as more or less labor and skill may be employed on them; but there can be no mistake in saying that, without incurring an expense which any would pronounce extravagant they are both capable of being brought into extensive use. Not only in descending, but in ascending also, these rivers may be navigated to great advantage.

With respect to New river, a judgment cannot be formed quite so decisively, nor pronounced quite so confidently. The difficulties are great, and deserve to be seriously considered.

The boat which conveyed your Commissioners, passed from the mouth of Greenbrier, to the place where their expedition terminated, without being taken out of the water, except at the
3466 Great Falls of New river, and at the Great Falls of the Kanhawa. It was navigated in the usual way through all the other difficult places which abound in New river, except two—both below Bowyer's Ferry. Through these it was conducted by ropes.

The boat was not laden, nor was it empty. In addition to the number of hands usually employed in navigation, it carried between two and three thousand weight. The greater part of this burthen was taken out in the most difficult places; but in many of considerable magnitude, it remained in the boat. Where the vessel was guided by ropes, the necessity of resorting to this expedient was occasioned solely by the intervention of rocks, which can be removed.

It is also worthy of notice, that this voyage was performed by boatmen, who, having never before seen the river, were reduced to the necessity of selecting their way at the moment, without the aid of previous information.

The only impediments to the descent of the boat, except at the two great falls already mentioned, were rocks lying so near the surface of the water as to strike the bottom while shooting over them. At the usual height of the river, these rocks would be entirely covered, and all danger from them be removed; but others would be placed in a situation to expose a boat to equal hazard. It is therefore necessary, even for the descending navigation, to open a plain and broad sluice through all the rapids and falls, so as to relieve boats navigating the river from all danger of being dashed against the rocks. This may be effected by removing some and blowing others. This sluice may be so conducted as to graduate the falls where they are most sudden, and thereby, in some degree, to diminish the impetuosity of the current.

Brook's Falls, the Great Falls of New river, and the Great Falls of Kanawha, will probably require and admit of a different course.

The first of these, which is the least formidable of the three, will present three alternatives to the election of those who may be engaged in improving the navigation.

First—One or more locks, which may unquestionably be
7 constructed at this place.

Second—A canal, which is already almost formed, on
north side of the river. Its completion would require that
e opened for a short distance, both where it would receive the
er at the head of the falls and where it would empty itself
w them.

o the eligibility of this canal, there can be but one objection.
re may be impracticable rock, now hidden by the earth, so
r the surface as to render this plan unadvisable.

hird—To open a sluice in the river, along its northern bank,
graduate the fall as far as may be compatible with that sys-
of operation.

he Great Falls of New river must be turned, by using a canal
be cut on the southern side, pursing nearly the tract of
hmond's mill race. Should locks be employed, it will most
bably be found advisable to place them in this canal. Should
s be dispensed with, there will be no difficulty in descending
ough this channel; but the toil of ascending, must, at this
ce, be considerable.

t the Great Falls of Kanhawa, there is, near Morris's mill,
ery eligible place for locks. If a canal be preferred, there is
y reason to believe that the ground will admit of one, which
be so extended, and the fall thereby so graduated, as to
rd a safe passage to loaded boats.

hese observations are formed on the state of the river when
ved by your Commissioners. It will readily occur, that they
not judge with certainty of the changes which may be brought
ut by a great rise of water.

would seem most probable, that by such rise the falls would
diminished, because the water at their feet would pass off
rapidly than at their head. But the apprehension cannot
ntirely discarded, that in the narrows, which have been men-
ed, the torrent would, in a flood, be too impetuous to be
ted. It is probable, that a moderate elevation of the
water would rather facilitate the passage of the boats;
3 at least of those descending the river; but that great floods
would suspend the navigation.

aving stated their view of this subject, your Commissioners
only add their opinion, that the New River may be relied on
certainty, for the transportation of articles from east to
.

n the practicability of using this channel of conveyance for
transportation of articles from the western country, towards
rivers which empty into the Atlantic, at least so much of it
es between Bowyer's Ferry and the Great Falls of Kanawha,

they must speak with less confidence. The great difficulty consists in the velocity of the current. For several miles, between Bowyer's Ferry and the Falls, it is believed that a canal would be impracticable. The river is suceptible of no other improvement than may be made in its channel, or on its banks. The current is often too rapid to be stemmed by a boat impelled by oars; and the water too deep to admit the use of poles. If a channel, sufficient for the safe passage of vessels, be opened, still some other means than oars or poles must be devised for impelling them up the stream.

Your Commissioners submit with diffidence the following proposition:

First—That boats impelled by steam may be employed successfully on New River.

With the capacities of this powerful agent they are too little acquainted to speak with confidence of the use which may be made of it in the waters of Virginia. Elsewhere, it has certainly been applied with great advantage to the purposes of navigation. Neither have they that intimate knowledge of the velocity of the currents, against which vessels have been propelled by it, to compare them with that of New River, and to hazard any decided opinion on the comparison. But they beg leave to say, that the currents of the Hudson, of the Mohawk, and of the Mississippi, are very strong; and that a practice so entirely novel as the use of steam in navigation, will probably receive great improvement, and the power itself be so diversified in its modifications, as to be applied in new and different situations, as their exigencies may
require. It is believed, that a sufficient depth of water is
3469 certainly obtainable, but whether sufficient employment
may be found, to justify the use of a vessel which must, in any state of things, be constructed at considerable expense, is a question your Commissioners cannot attempt to solve.

Second—Should it be found impracticable to apply steam with advantage to the navigation of the New river, it is respectfully suggested, that between the Great Falls of Kanawha and Bowyer's Ferry, resort may be had to horse labor.

To give this facility to the navigation, it will be necessary to construct a horse-way along the bank of the river at different heights, or at the most common height of the water. The objection that such way cannot be used at all times, will lose much of its force, when it shall be recollected that the navigation up the river will admit of being suspended for considerable intervals, with less injury to those who use ~~it, than that~~ which conveys to the western country articles imported for general consumption. The construction of this way, however, will require the blowing of a great quantity of rock, and will, consequently, be expensive.

Third—Should neither of these expedients be deemed eligible, it is respectfully suggested, that boats may be forced up the current, where it is too rapid for oars and too deep for poles, by the aid of chains fastened in the rocks on the bank.

Whatever doubts may be entertained respecting the navigation for boats ascending the river between the Great Falls of Kanawha and Bowyer's Ferry; your Commissioners are entirely persuaded of the practicability of using it advantageously between the ferry and the mouth of Greenbrier.

In obedience to the law under which they have acted, your Commissioners will now proceed to state their ideas of the sums of money which will probably be necessary to open the river and make the road they have viewed.

No part of their duty has been performed with less confidence than this.

3470 It will readily occur to the legislature, that no estimate of expense of executing so great a work as that which is to afford to the western parts of Virginia the means of conveying the produce of their lands to markets, and probably to connect Virginia commercially with her sister states in the west, can have just pretensions to exactness. Were the system of improvement, and the extent to which that system is to be carried, accurately defined; any calculations which could now be made, even by professional men, of the sum necessary for its execution, might be found to vary widely from that which would be actually expended. Still less precision can be looked for in the calculations of your Commissioners.

But it must be apparent that the expense of improvement will essentially depend on the object for which the improvement shall be made.

If the views of the legislature shall be limited to the conveyance of articles, the growth of the upper country, down James river, the cheapness of that conveyance will certainly depend much on the degree of perfection to which the improvement may be carried; but the river, being the only channel of conveyance, will, if merely practicable, be used to some extent.

If the views of the legislature shall extend to a free commercial intercourse with the western states, or any of them, the channel selected for that intercourse will come into competition with others which now exist or may be opened, and must recommend itself to a preference by the advantages it offers. With a view to the latter object, no improvement ought to be undertaken but with a determination to make it complete and effectual.

The estimates of expense were most particularly made by Mr. Caruthers, who has been personally engaged in opening the North Fork through Rockbridge. This gentleman made his calculations

on the plan which has been adopted by the James River Company, with such improvements as would better adapt that plan to steam navigation. According to his estimate, one hundred and ninety thousand dollers will be sufficient to accomplish the
3471 work from Beall's Bridge's or Crow's Ferry, to the Falls
of the Great Kanawha, including the road. This estimate is formed on a comparison of the impediments to be removed, with those he had himself encountered in opening the North Fork of James river. Some others of your Commissioners, who have too little knowledge of the labor necessary for the accomplishment of objects of this description, to confide themselves, in their own judgment, much less to recommend it to the confidence of others, are so impressed with the magnitude of the difficulties they have seen, as to be unable to persuade themselves that the work can be completed for the sum at which it has been estimated. That estimate does not appear to them to be extravagant, if the descending navigation alone be contemplated. To make the ascending navigation such as will entitle it to extensive use, and give this a preference over other routes, they submit, though with much diffidence, the opinion that at least a half a million, perhaps six hundred thousand, will be requisite

From the mouth of Dunlop's creek to the mouth of Howard's creek, is twenty-eight miles and forty-four poles. From the first mentioned place to the summit of Alleghany mountain, is sixteen miles and thirty-six poles, and the elevation is nine hundred and forty-eight feet, which makes an angle with the horison of less than three-quarters of a degree. From the summit of the mountain to the mouth of Howard's creek, the distance is twelve miles and eight poles, and the descent is eight hundred and thirty-eight feet seven inches, making with the horison an angle of about three-quarters of a degree. There are no peculiarities attending this route, which will render any plan the legislature may prefer for turnpiking it, more costly in its application to this road, than to others which have been constructed in various parts of the United States. It is now at least equal to, perhaps better, than any other of equal distance in the same part of the country.

In presenting to the honorable the legislature the advantages which, in the opinion of your Commissioners, will probably accrue to this state from executing the work to which their report
3472 relates, it will be necessary to divide this subject, and to
consider, separately—first, those which may reasonably be expected to result from executing it in part; next, those which are to be looked for from executing it in the whole.

Should the navigation of James river be carried up to the mouth of Dunlop's creek, and a turnpike road be made over the Alleghany mountain, although nothing further should be done, a considerable impulse will be given to the agriculture, and a valuable effect produced on the wealth and population of a considerable tract of country. It cannot reasonably be doubted, that Bath, a part of Botetourt, and a great part of Greenbrier, Monroe, and perhaps even Giles, would find a real interest in searching for a market on James river, for the produce of their soil, if such safe and cheap conveyance were afforded them as might be given by the improvements which have been stated. Agriculture would mingle more than heretofore with grazing; and industry would flourish, when the reward of industry should be attainable. Those more western countries, whose distance might forbid the attempt to transport grain manufactured into flour, or distilled into spirits, to the markets on James river, might still be encouraged to bring to those markets, salt, salted provisions, and various manufactures of hemp. An increase of population would result, not only from the check which this state of things would give to emigration, but also from its operation on the inhabitants, in other respects.

Other parts of the state would derive corresponding advantages from their intercourse with a section of the country which would have more to sell and more to purchase than at present. By the augmentation of the wealth and population of a part, not only would those belonging to that part be improved in their circumstances, but the whole would be more powerful, and the public burdens being more divided, might press less heavily on each individual.

These advantages would probably be extended by improving the navigation of the Greenbrier also.

3473 Should New river be rendered a safe and easy channel of communication, between the Ohio and the commercial towns on James river, the subject will assume a more important aspect, and the advantages may be estimated on a larger scale. Not only will that part of our own state which lies on the Kanawa and on the Ohio, receive their supplies and send much of their produce to market through James river, but an immense tract of fertile country, a great part of the states of Kentucky and Ohio, will most probably give their commerce the same direction. All that part of the state of Kentucky which lies above Louisville, and all that part of the state of Ohio whose trade would pass through the river of that name, might reasonably be expected to maintain a large portion of their commercial intercourse with the Atlantic states, through the James or the Potowmac. Certainly in a contest for this interesting prize, the states through which those rivers run have geographical advantages, the benefit of which they can lose only by supineness in themselves, or by extraordinary exertions in others. It is far from being impossible, that even the south-western parts of Pennsylvania may look dow one of these rivers for their supplies of goods, manufactured i Europe.

Let the importance attached by men best acquainted with th subject to the commerce of the west attest its value. The exertions which other states appear to be making to secure it, wil probably awaken the attention of Virginia to that part of i which should naturally belong to her.

There is still another aspect in which this subject deserve to be viewed.

That intimate connection which generally attends free commercial intercourse, the strong ties which are formed by mutua interest, and the interchange of good offices, bind together individuals of different counties, and are well calculated to cheris those friendly sentiments, those amicable dispositions, which a present unite Virginia to a considerable portion of the wester
people. At all times the cultivation of these disposition
3474 must be desirable but in the vicissitude of human affair
in that mysterious future which is in reserve, and is ye
hidden from us, events may occur to render their preservatio too valuable to be estimated in dollars and cents.

The advantages which may result to Virginia, from opening thi communication with the western country, will be shared in common with her by the states of Kentucky and Ohio.

Considering it as a medium for the introduction of foreig articles into those states, it has claims to their serious attentio

The proposition that a nation finds its true interest in multiplying its channels of importation, admitting them to be equally convenient, is believed to be incontrovertible. In addition to thos arguments in support of this proposition which belong to ever case, the situation of the western states suggests some which ar peculiar to themselves, and which well deserve their consideratio

The whole of that extensive and fertile country, a country increasing in wealth and population with a rapidity which baffl calculation, must make its importations up the Mississippi alon or through the Atlantic states. When we take into view th certain growth of the country, we can scarcely suppose it possib that any commercial city on the banks of that river can kee pace with that growth, and furnish a supply equal to the deman The unfriendliness of the climate to human life, will render th disparity between the commercial and agricultural capital st more sensible. It will tend still more to retard a population o that sound mercantile character, which would render some gre city on that majestic river, a safe emporium for the western worl

In times of profound peace, then, the states on the Ohio woul make sacrifices of no inconsiderable magnitude, by restricting the

importations to a single river. But, in time of war, their whole trade might be annihilated. When it is recollected that the Mississippi empties itself into the Gulph of Florida, which is surrounded by foreign territory; that the island of Cuba and the coast of East Florida completely guard the passage from its
3475 mouth to the ocean; that the immense commerce flowing down its stream, holds forth irresistible allurements to cruisers, the opinion seems well founded, that scarcely a vessel making for that place could reach its port of destination.

But the length of the voyage up the Mississippi and Ohio, must be attended with delay so inconvenient to persons engaged in commerce, as to render a shorter route, though not less expensive, more eligible. For importation of many articles, there is much reason to believe that a decided preference would always be given to the transportation through the United States, were that transportation rendered as easy as it is capable of being made.

The export trade during peace, so far as the articles exported were designed for a foreign market, would, more probably, pass exclusively down the Mississippi. But those articles which are consumed in the United States, as manufactures of hemp, would find their way to market through interior and shorter channels.

If the direct route through the Atlantic states would, for many purposes, be more eligible than that through the Gulph of Florida, which must be often connected with a coasting voyage to or from an Atlantic port, then the multiplication of those routes, if in themselves equal, by presenting a greater choice, and by accommodating more territory, must be desirable.

But your Commissioners are sanguine in the opinion, that the communication through the rivers they have viewed, if properly made, will possess advantages over every other, which cannot fail to recommend it to a large portion of the states of Kentucky and Ohio. All that part of the western country which draws its supplies and transports its produce through the river Ohio, and which lies east of Louisville and west of the Pennsylvania line, perhaps a part of the state of Pennsylvania itself, could probably use this route more advantageously than any other; unless, indeed, that through the Potowmac, connected with Monongehela, Cheat, or Yohaghena, should come into competition with it, for the eastern part of the country just mentioned.

3476 That it would, for the importation of articles from Europe, and from the east (with a few exceptions), and for the exportation of those which are consumed in the United States, be preferred to the voyage through the Mississippi, unless the introduction of steam boats should essentially vary the present state of things, may safely be assumed from the fact, that a land carriage between Pittsburg and Philadelphia or Baltimore, and a carriage up or down the Ohio, are now used for the purposes described, in preference to the route by New Orleans.

The present price for the transportation of goods from Philadelphia or Baltimore to Pittsburg, is understood to be from seven to ten dollars per hundred weight.

The price of transportation from Richmond, up James River, to the mouth of Dunlop's Creek, thence across the Alleghany to Greenbrier, and down to the mouth of the Great Kanhawa, will certainly depend on the goodness of the road and the degree of perfection to which the navigation may be carried. Your Commissioners believe that a sound national economy would dictate such improvements as would reduce the price of freight, although the labor employed in making them might be procured by an augmentation of toll, and some expenditure of public money.

Should the navigation of James River be rendered as safe and as easy as may be reasonably expected, and the Greenbrier and New River be improved, in such manner as the object will justify, your Commissioners believe they hazard nothing in saying, that the expense of transporting one hundred weight from Richmond to the mouth of the Great Kanhawa, will not exceed half the price of transporting the same weight from Baltimore or Philadelphia, to the same place.

The immense works meditated in New York, will certainly, if executed, give to that state great advantages in a competition for the trade of the lakes. But if other convenient and more direct channels be opened, it is not probable that the commerce of the Ohio will take the circuitous route by the lakes.

3477 The expense of transportation from New York through the canal contemplated, can only be conjectured. The character of the rivers which would be used, is not well understood, but they must possess many advantages to give them a preference over the direct way through Virginia to the Ohio.

Your Commissioners, however, take the liberty to repeat, that the success of any attempt to obtain that share of the commerce of the west, to which this state, from her geographical situation and her rivers, would seem to be entitled, must depend entirely on the safety and cheapness of her navigation. A mode of transportation by water in itself insecure, or so laborious as to be little less expensive than carriage by land, will never change the channels in which this trade already flows.

The advantages to accrue to the United States, from opening this new channel of intercourse between the eastern and the western states, are those which necessarily result to the whole body from whatever benefits its members, and those which must result to the United States, particularly from every measure which tends to cement more closely the union of the eastern with the western states.

In those operations, too, which the exigencies of government may often require, this central channel of communication by water may be of great value. For the want of it, in the course of the last autumn, government was reduced to the necessity of transporting arms in waggons from Richmond to the falls of the great Kanhawa. A similar necessity may often recur.

All which is respectfully submitted to the General Assembly, by

JOHN MARSHALL,
JAMES BRECKENRIDGE,
WILLIAM LEWIS,
JAMES M'DOWELL,
WILLIAM CARUTHERS,
ANDREW ALEXANDER.

3478 *Government exhibit No. 189-A*

Map accompanying Exhibit No. 189. (Original Exhibit.)

Government exhibit No. 190

Series of maps entitled "New River Survey, 1872 and 1878. (Original Exhibit.)

Government exhibit No. 191

Kanawha Valley Power Company license for project #1175, W. Va., including London and Marmet dams. (Original Exhibit.)

Government exhibit No. 192

Views of pools, shoals, and rapids on New River between Hinton, West Virginia and Narrows, Virginia—July 19-20, 1936. (Original Exhibit.)

Government exhibit No. 193

Views of pools, shoals, and rapids on New River between Narrows, mile 101.0, and Allisonia, mile 172.0—July 9-13, 1936. (Original Exhibit.)

Government exhibit No. 194

Photostat of the chart from automatic gage, at Caperton, W. Va., for period August 8 to August 21, inclusive. (Original Exhibit.)

Government exhibit No. 195

Blueprint of the recording gage chart at Kanawha Falls, for period July 30 to August 24, inclusive, 1930. (Original Exhibit.)

3479 *Government exhibit No. 196*

Profile of New River, N. C., W. Va. and Va. (Original Exhibit.)

3481 *Government exhibit No. 197*

Map styled "Railroads." (Original Exhibit.)

3482 *Government exhibit No. 198*

Map entitled "New River, Va. and W. Va., Navigation improvements between Hinton and Wilson Creek, 1877 to 1889." (Original Exhibit.)

3484 *Government exhibit No. 199*

Load Curve of the Appalachian Electric Power Co. for week ending November 3, 1935. (Original Exhibit.)

Exhibit No. 199 was not offered in evidence, but, with the consent of the defendant, is treated as though it had been admitted over the objection of the defendant, as being immaterial, irrelevant, and incompetent, and further, that it is not typical but represents data for the week of maximum demand in the year 1935, as specified by Plaintiff.

3486 *Government exhibits Nos. 200 to 200–B incl.*

3 prints U. S. Eng. Office, Huntington, W. Va., showing navigation features (barge lift, log chute, etc.) for Bluestone reservoir project. (Original Exhibits.)

Government exhibit No. 201

Map showing existing ferries below the mouth of Wilson Creek on New and Kanawha River. (Original Exhibit.)

Government exhibit No. 202

Map showing ferries in operation prior to 1935. (Original Exhibit.)

Government exhibit No. 203

Photograph album of ferries on New River. (Original Exhibit.)

Government exhibit No. 204

Illustration showing how Radford project could affect operating results of Bluestone development. (Original Exhibit.)

Government exhibit No. 205

Photograph taken to show or to determine the direct measurement thickness of sediment in Byllesby reservoir. (Original Exhibit.)

Government exhibit No. 206

(Excluded.)

Government exhibit No. 207

Sedimentation map of Washington Mills reservoir showing original and present contours. (Original Exhibit.)

Government exhibits Nos. 208 & 209

Topographic maps of sections of Washington Mills reservoir showing conditions—April 17 and April 23, 1936—after breakdown. (Original Exhibits.)

3487 *Government exhibit No. 210*

Cross sections showing profiles on two ranges across the Washington Mills reservoir as of 4/17, and again on 4/23, 1936. (Original Exhibit.)

Government exhibit No. 211

Columnar sections of borings through sediment of Washington Mills reservoir. (Original Exhibit.)

Government exhibit No. 212

Sedimentation map of Byllesby reservoir. (Original Exhibit.)

Government exhibit No. 213

Chart showing longitudinal profiles of Byllesby reservoir. (Original Exhibit.)

Government exhibit No. 214

Map of Buck reservoir showing present shore line. (Original Exhibit.)

3488 *Government exhibits Nos. 215 to 217, inclusive*

Cross sections showing original and present profiles of the Buck reservoir. (Original Exhibits.)

Government exhibits Nos. 218 to 220, inclusive

Cross sections showing the original and present profiles of Fields Mfg. Co.'s reservoir. (Original Exhibits.)

Government exhibits Nos. 221 to 221–E, inclusive

Charts of the Ohio River, Pittsburgh, Pa., to mouth showing topography and soundings. (Original Exhibits.)

Government exhibit No. 222

(Excluded.)

Government exhibit No. 223

Federal Power Commission, National Power Survey, Principal Generating Plants and Electric transmission lines, United States, 1935. (Original Exhibits.)

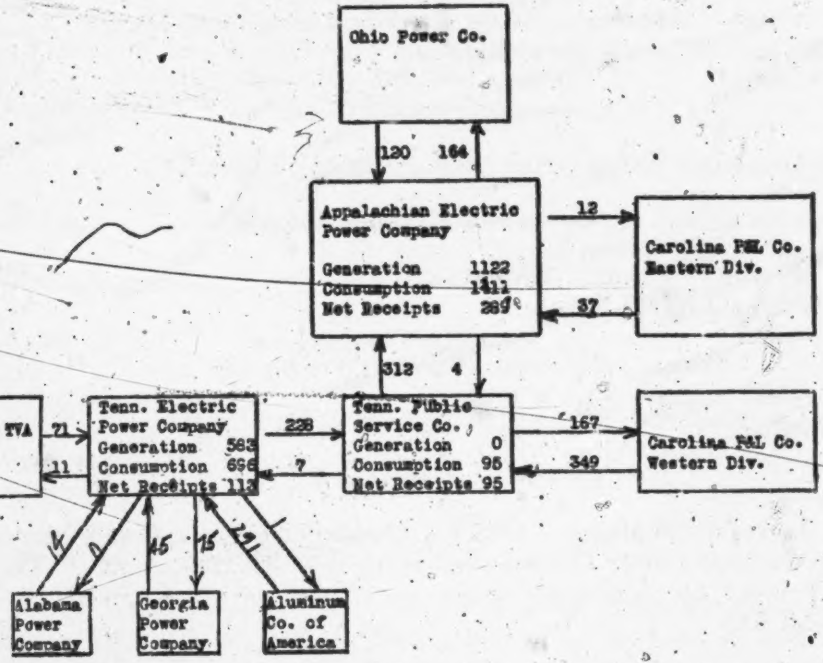
3489 *Government exhibit No. 225.*

1 page—"Energy transactions between Appalachian Electric Power Co. and interconnected systems, 1934."

490 *Government exhibit 225*

NERGY TRANSACTIONS BETWEEN APPALACHIAN ELECTRIC POWER COMPANY AND INTERCONNECTED SYSTEMS—1934

Figures are Million Kilowatthours


Ohio Power Co.
120
164
Appalachian Electric Power Company
Generation 1122
Consumption 1411
Net Receipts 289
12
37
Carolina P&L Co. Eastern Div.
312
4
TVA
71
11
Tenn. Electric Power Company
Generation 583
Consumption 696
Net Receipts 113
228
7
Tenn. Public Service Co.
Generation 0
Consumption 95
Net Receipts 95
167
349
Carolina P&L Co. Western Div.
45
15
291
Alabama Power Company
Georgia Power Company
Aluminum Co. of America

ata from Public Utility Reports to Federal Power Commission
HGG: KW.
8/12/36.

491 *Government exhibit No. 226*

Chart—"Study showing operation of Radford with stream flow onditions, as of the week ending Sunday, November 2, 1930, based n load/curve, shape proportional to system load reported by ppalachian Electric Co. for week ending November 3, 1935." (Original Exhibit.)

493 *Government exhibit No. 227*

Map—"Appalachian Electric Power Co., wave study, New and anawha Rivers, March 1930." (Original Exhibit.)

Government exhibit No. 228

Map—"New River and Kanawha River Power Waves, March 11 to April 3, 1930." (Original Exhibit.)

3495 *Government exhibit No. 229*

Chart—"Automatic Gauge Records, London and Marmet, June 15–19, 1936." (Original Exhibit.)

Government exhibit No. 329–A

Corrected Exhibit No. 229. (Original Exhibit.)

Government exhibit No. 230

Profile of London, Marmet, and Dam No. 6 pools for June 16, 1936. (Original Exhibit.)

Government exhibit No. 230–A

Corrected Exhibit No. 230. (Original Exhibit.)

Government exhibit No. 231

Letter dated March 1, 1928, Curtis, Mallet-Prevost, Colt & Mosle to Federal Power Commission, re Project No. 739, A. E. P. Co. (Printed at page 2499 herein as a part of Government Exhibit 91.)

Government exhibit No. 232

Executive Order of the President authorizing the construction of the Bluestone reservoir project on New River. (Original Exhibit.)

Government exhibit No. 233

Letter from Wm. W. Belknap, Secretary of War, in answer to the resolution of the House, on February 3, 1871, House Document No. 110, concerning James River and Kanawha Canal. (Original Exhibit.)

Government exhibit No. 234

"The Congressional Globe"—1873, page 204 and page 206, adoption of resolution offered by Senator Windom. (Original Exhibit.)

Government exhibit No. 235

"Journal of the House of Delegates of the State of West Virginia for the 11th Session, 1872-3" re James River and Kanawha Canal. (Original Exhibit.)

3496 *Government exhibit No. 236*

Report of the Committee of the House of Representatives, containing report No. 76 of the 3rd session of the 42nd Congress, re James River & Kanawha Canal. (Original Exhibit.)

Government exhibit No. 237

"Congressional Record" Special Session of the Senate of the United States, March 4 to 26, 1873, Volume #1, re James River and Kanawha Canal. (Original Exhibit.)

Government exhibit No. 238

Report of Major Craighill with report of Engineers Hutton and Harris, "James River and Kanawha Canal, United States Engineer Office, Baltimore, Md., April 11, 1873. (Original Exhibit.)

3497 *Government exhibit No. 239*

Letter from Senator Davis, of the State of West Virginia, to Sec. of War, W. W. Belknap, dated November 12, 1873, re James River & Kanawha Canal. (Omitted in printing.)

Government exhibit No. 240

Report of Board of Engineers of March 18, 1874. (Omitted in printing.)

3565 *Government exhibit No. 241*

Report 307, Part 1, Senate, 43rd Congress, 1st Session, "Select committee on transportation routes to the seaboard, April 24, 1874." (Original Exhibit.)

Government exhibit No. 242

Photostatic copy of four pages from "Congressional Record" year 1874, re James River & Kanawha Canal. (Original Exhibit.)

Government exhibit No. 243

Statutes at large, Volume 18, Part 3, Page 237, etc. re Act passed June 23, 1874, Chapter 457, for estimates and surveys on transportation routes to the seaboard. (Original Exhibit.)

Government exhibit No. 244

Report of Major Craighill, Corps of Engineers, U. S. A., entitled "Third Sub-division of the Central Transportation Route, January 13, 1875. (Original Exhibit.)

3566 *Government exhibit No. 245*

Letter from the Secretary of War, etc., Senate Document No. 15, 44th Congress, 2nd Session, containing the reports of Major Craighill and Brig. Gen. Humphreys, Nov. 10, 1876.

3567 REPORT ON RE-EXAMINATION AND SURVEY OF THE NEW RIVER DIVISION, SURVEY OF 1874, BY MR. N. H. HUTTON, ASSISTANT ENGINEER.

(pp. 54–57)

BALTIMORE, *May 28, 1876.*

COLONEL: I have the honor to submit the following report of the results of the re-examination and survey of the New River division of the central water-line, made under your direction during August, September, and October of 1874.

Your instructions, dated July 15, 1874, said * * * "not later than August 1, you will enter upon a resurvey of the Greenbrier River below Howard's Creek, and of New River below the Greenbrier, the object being to fix the precise location of dams and other details of the slack-water navigation of those streams, with the collection of such additional information as will enable a detailed determination to be made of the location and cost of the canal which, by some engineers, is considered a necessity for that part of the line, and by others a desirable though not a necessary alternative to the slack water. You will keep in view also the possible advantages to be gained by resort to tunnels for avoiding difficult places, in the valley of New River especially, and thereby at the same time shortening the line, either for canal or slack water navigation."

"It is desirable, if possible, that the information you will gain be such as to enable the work along that portion of the line to be put promptly under contract should Congress provide the means." * * *

Under these instructions, the organization of two engineering parties was at once commenced, one for the examination of the slack-water scheme and the other for the survey of an independent lateral canal.

On the 1st of August, both parties were assembled in camp at the mouth of Howard's Creek, and operations were commenced at that point. A rapid reconnaissance meantime was made of the valleys of the Greenbrier and New Rivers, which developed the impracticability of procuring, over this whole distance, 3568 the amount and quality of information called for by your instructions with the time and money at my disposal.

I was accordingly relieved of the duty of examining the Greenbrier division, and the parties under my charge were transferred to the New River, at the mouth of the Greenbrier, where the field-work was resumed on August 8, continuously carried forward to Kanawha Falls, and completed about November 1.

Throughout this division (62 miles in length) transit and level lines were run by both parties, and soundings were made where practicable, to determine the form and character of the river-bottom, depths of water, &c.

Using the survey of 1872 (made under the late Mr. E. Lorraine) as a basis, sites for locks and dams were selected, surveyed, and marked in the field, the governing considerations being that all dams should be located on foundations of solid rock, should, if possible, be at least 600 feet long on the crest, and that they should nowhere endanger, by overflow, the track of the Chesapeake and Ohio Railroad during floods of equal volume to that of 1861.

An experimental line for a lateral canal, with cross-sections of the surface at every hundred feet, was traced and marked from the last dam on the Greenbrier to the pool above Kanawha Falls, a distance of 60 miles. The location was governed by the consideration that the top of the tow-path bank should be two feet above the flood-line of 1861, the marks of which were obtained and noted wherever practicable.

Detailed surveys and measurements were made to determine the cost of removing from the river-bed the masses of loose rock which now encumber it between Keeny's Shoals and Narrow Falls, a distance of about 20 miles, through what is sometimes called the "gorge" of New River.

Surveys were made with a view of cutting off bends in the immediate valley of New River by means of tunnels, wherever practicable, and extended reconnaissances and surveys were made to determine the practicability of suggested lines using tunnels

outside the limits of the immediate valley, and cutting off la
sections of the river proper.

Since the completion of the field-work, the want of money l
greatly retarded the preparation of maps, drawings, and es
mates of cost, which have mainly been done by the of
569 staff when they could be spared from other duties. Nev
theless, it is believed that the papers, drawings, &c. he
with submitted furnished all the information called for by yo
instructions.

Plane of reference.

The levels, as marked and described on the maps, drawin
profiles, &c., refer to elevations above tide-water at Richmon
Va.

The basis for all the levels was a bench-mark on the left ba
of the Greenbrier, near our initial point, established by the pa
under the late Mr. Ed Lorraine, in 1872. This bench-mark w
in turn, established by levels based upon a bench-mark esta
lished by parties under Mr. W. R. Hutton, in 1870, on the l
bank of the Greenbrier, near the mouth of Howard's Creek, t
levels having been brought over the Alleghanies by these parti

During the summer of 1874 other lines of levels were broug
over the Alleghanies by parties under Lieut. Thomas Tur
United States Engineers, which were found to differ somewh
from those of 1870, and upon their prolongation to the mou
of the Greenbrier this difference was increased largely, so th
according to the last levels run, our bench-mark at initial po
was 4.8 feet too low. This discrepancy was not discovered un
the field-work and notes of both divisions were completed, an
in order that the drawings might correctly represent the conte
of the note-books, the original levels have been retained a
marked, so that the water-surface at dam No. 32 of the Gree
brier division appears to be 4.8 feet higher on the maps a
profiles of that division than the level of the same point appe
to be on the maps and profiles of the New River division.
other words, to reduce the levels of New River division to c
respond to those of the Greenbrier division, 4.8 feet must
added to them.

General features of the country

The New River, throughout the portion which was embrac
within the limits of this survey and report, presents in vario
degrees of development in its different sections the contract
valley and sudden changes of slope usually found in strea
3570 flowing through mountainous districts. Between t

Greenbrier and Kanawha Falls, the river may be divided into four sections, possessing, in varying and increasing proportions, from the upper to the lower end, the characteristics referred to.

The first section (about 15 miles long) extends to Meadow Creek, with an average fall (excluding the abrupt fall at Richmond's) of about 7 feet per mile. The valley, though narrow, presents usually on one side or the other strips, at least, of bottomland, and the hill-slopes are not continuously precipitous.

The second section (about 25 miles long) extends to Sewell, with an average fall of about 9 feet per mile. The valley becomes more contracted; bottom-land (properly so called) has almost entirely disappeared, its only representative being short stretches of high benchland. Vertical cliffs impinge more frequently upon the water's edge, and the hill-slopes are everywhere ragged with masses of rock detached from the cliffs, always found at short distances in the rear. At this point (Sewell) is usually said to commence the "gorge" where the river breaks through the high lands connecting the Gauley Mountains with those of Coal River.

The third section (12 miles in length) extends to Hawk's Nest, with an average fall of 17 feet per mile. Throughout this, as well as the following section, the river has cut its way over a thousand feet deep through the highlands, and were it not for the more friable nature of the materials encountered, (sandstones and shales,) would present all the features of a veritable canon as found in metamorphic regions of the Great Basin.

Both valley and river-bed are much contracted, with steep slopes of loose rock thrown down from the cliffs. The water-way is frequently clogged with large masses of rock, through which the river alternately rushes with violence in many narrow streams, or eddies, in deep and sluggish pools.

The fourth section, extending to Narrow Falls, about seven miles in length, has an average fall of 19 feet per mile, and is the culmination of the gradual increase of ruggedness, contraction,
3571 and slope. Though the average fall, as stated, is 19 feet, there are several miles in which the fall is nearly 30; there can hardly be said to be any valley; the vertical and at times overhanging cliffs rise abruptly from the water's edge, or are at best only separated from it by a sloping mass of loose rock of all shapes and sizes; the masses of rock cumbering the water-way appear at times almost to have absorbed the river, which truly offers at first sight small chance for improvement. From this point (Narrow Falls) to the Kanawha Falls the river extends in a wide pool of varying depth, the side-hills come closely down to the river until the Gauley enters on the right bank, from which to

the falls the valley expands on that bank in a wide flat. The width and depths of water-way on this whole division vary so frequently and so greatly, that it would be impossible to give an accurate general statement of them; it may, however, be roughly said in the first section the width is from 400 to 800 feet, with a depth of from 7 to 12 feet in the pools; in the second section, from 250 feet to 400 feet, with the same depths in the pools; and in the third and fourth sections it rarely ever exceeds 250 feet in width, and is often less than 200 feet, with depths in the pools as great at places as 30 to 40 feet.

It flows in alternating pools and rapids, with depths in the latter varying from a few inches in the upper sections of the river to 10 feet in the lower portions. The only vertical falls encountered are Richmond's, about 10 miles below the Greenbrier, where the river falls 28 feet, 15 feet being nearly vertical over a ledge of hard, conglomerate sandstone; and Kanawha Falls, where it descends 19½ feet over a ledge of sandstone. In both cases the river has a width of over 1,000 feet on the high-water crest-line, and immediately above the river is very shallow. At Richmond's Falls, the hill-slopes, or cliffs, come closely down to the water's edge on both sides of the river; at Kanawha Falls, the hills come down closely on the left bank, and a wide, low bottom extends along the right bank.

The Chesapeake and Ohio Railroad occupies the right bank of the river, from the Greenbrier to Hawk's Nest, and the left bank thence to Kanawha Falls. The rock, exposed throughout
3572 is mainly a compact sandstone in nearly horizontal beds,
occasionally overlaid with red shale, and sometimes merging into a hard conglomerate, as at Richmond's Falls. The hill-slopes are generally formed of debris from the adjacent cliffs in the upper portion, to some extent mixed with alluvial deposits; but lower down they form, as before stated, almost pure masses of detached rock. A large majority of the shoals are composed of loose rock and bowlders, forming dams, over and through which the river flows, and which have apparently (after the manner of the formation of "pot-holes") abraded and broken up the bed-rock to great depths, rendering these apparently-natural sites for dams actually the least desirable, in so far as foundations are concerned. For this reason it will be found that in the present project the dams are frequently located in the deep water, above the shoals, giving an increased height of masonry, but securing undoubted rock-foundations. Except at the shoals, the soundings indicated generally a bottom of rock in place, with little or no deposit overlying it. The bottom-lands have generally a loose, sandy soil, in most cases intimately mixed with debris from the cliffs.

The side-hills are almost entirely destitute of any thing like soil in masses, such as there is being swallowed up in the crevices of the loose rock which everywhere covers their slopes. Nevertheless, walnut and poplar timber, of large size and excellent quality, abounds on these slopes throughout the whole distance.

The sandstone everywhere found is of excellent quality for building purposes, and easily quarried in immediate proximity to the sites where required for use.

The question of water-supply does not enter into the discussion of any method of navigation-improvement, as its abundance is undoubted, its superabundance during freshets being the most formidable obstacle.

Until the construction of the Chesapeake and Ohio Railroad, owing to the scarcity of arable land, the valley between the Greenbrier and Kanawha Falls was an unknown land, except to parties of surveyors or hunters, who at long intervals forced their way down it. Owing to this absence of settlement, we have not only no accurate record as to the volume, frequency, and duration of floods, but not even the ordinary hearsay information 3573 usual in such cases. The wild and gloomy appearance of the river through the "gorge," as seen from the cliffs above, has doubtless caused an exaggeration of their heights and violence, great as they undoubtedly are; but that they attained great heights, with extreme rapidity, is all that we really do know. During the summer of 1861 occurred a freshet which is admitted by the few old settlers scattered throughout the valley to have been the greatest known for forty years; and of this some few records of heights are obtainable, though that they are uncertain may be admitted, when it is known that at one point a difference was found of 7 feet in the elevations, as given by different persons claiming to have seen and noted the flood at its height. However, this flood, and the measures of it thus obtained, have, since its occurrence, been used as the standard of reference by the Chesapeake and Ohio Railroad Company and for all projected improvements of the river, including the projects herewith submitted. To determine its volume, reference has been had to its reported observed height of 8 feet just above the crest of Richmond's Falls.

It has been assumed that for a length of 1,200 feet (which is less than the development of the crest-line by probably 15 per cent.) the discharge was equivalent to that over a weir having 8 feet depth above the comb. This would give a volume for this flood of about 90,000 cubic feet per second, which is the amount that has been assumed heretofore as well as in this project to determine proportions of guard-walls and banks and the heights of dams with reference to the railroad. From observations at other points of the water-marks of this flood, combined with the cross-sections of the valley, I am inclined to the belief that this estimate of quantity is exaggerated. It is true that the data available are too rude for other than a very approximate solution of the question, and altogether insufficient to justify the construction of works on any other basis previous to the procurement of more reliable information. The matter is referred to simply to call the attention to the possibility of greatly lessening the cost of any scheme of improvement by the aid of more full and reliable data as to the floods. The 3574 reasons for a belief in this possibility are twofold; in the first place, the observed height of 8 feet at Richmond's Falls was toward (if not on) the left bank, from which extends, for more than half the total width of the river, an irregular island, (or peninsula,) immediately below the crest of the falls, at some points really connected with it, at many nearly of equal height, and covered throughout with loose rock and a dense growth of timber, which during this great freshet was in full foliage. It seems almost impossible that this obstruction to the free escape of the water should not have caused an elevation of the level of the crest on this part of the line over that portion which afforded a free discharge, and consequently the assumption that 8 feet was the average depth is an overestimate. Secondly, a comparison of the observed heights of the flood, at some points, with the cross-sections of the valley, with liberal allowances for the unknown and for errors in the known quantities, indicates a volume not exceeding 60,000 or 65,000 cubic feet per second. Should this assumption prove to be true, it will result that the project as now presented will tax the work with difficulties of execution and operation in excess of any probable requirements. The evidence of flood-heights in the "gorge" of 50 to 60 feet was, at the time of this survey, confined to a single log lodged in the cliffs, in the right bank, below Cotton Hill station. This undoubtedly presented evidence of abrasion, as if by contact with water and rocks, yet it may have come down the hill and not up, for almost immediately below it (about 30 feet) is a cave or hole in the cliffs, so situated that it would seem impossible for all, if any, of the drift entering it to escape; yet a careful investigation failed to discover any signs of such deposit within it.

3575 *Government exhibit No. 246*

U. S. G. S. Report No. 20, the Whitetop Area, Virginia-Tenn. (Original Exhibit.)

Government exhibit No. 247

Photostatic copy of hearing before Major H. M. Trippe, re Diversion of New River to N. C. Jan. 13, 1925. (Original exhibit.)

Government exhibit No. 248

Copy of letter addressed to the Hon. R. J. Noell, East Radford, Va., and signed by R. J. Holden, Professor of Geology, dated March 4, 1936. (Original Exhibit.)

Government exhibits Nos. 249 to 252 inc.

"Aerial photos of certain reaches of New River, being nos. 35, 58, 56, 57, in Government Exhibit no. 273." (Original Exhibits.)

Government exhibit No. 253

(Excluded.)

Government exhibit No. 254

Letter dated November 14, 1927, to Major E. D. Ardery on "New River Development #6, Radford, Geological Examination," signed by F. W. Scheidenhelm. (Original Exhibit.)

Government exhibit No. 255

Letter dated November 17, 1927 to Major E. D. Ardery from F. W. Scheidenhelm on "New River Development No. 6 (Radford), Geological Examination." (Original Exhibit.)

Government exhibit No. 256

Letter dated October 16, 1931, to Major Fred W. Herman from F. W. Scheidenhelm, pertaining to maintaining pool levels at dams 2, 3, and 4 on Kanawha River. (Original Exhibit.)

3576 *Government exhibit No. 257*

Letter dated September 18th, 1934, to Major John F. Conklin on subject of "Hydro electric project of Appalachian Electric Power Company on New River near Radford, Va."—by F. W. Scheidenhelm. (Original Exhibit.)

Government exhibit No. 258

Letter of April 2, 1936, to Major John F. Conklin on "Radford Hydro Project of Appalachian Electric Power Company, Capacity Curve of Reservoir."—by F. W. Scheidenhelm. (Original Exhibit.)

Government exhibit No. 259

Letter dated April 12, 1932, to Major Fred W. Herman, on New River Power Wave Study, by F. W. Scheidenhelm. (Original Exhibit.)

Government exhibit No. 260

Letter dated April 20, 1932, to United States Engineer Department, signed by Daniel W. Mead and F. W. Scheidenhelm, re "New-Kanawha River Power Wave Study." (Original Exhibit.)

Government exhibit No. 261

Telegram dated December 10, 1930, addressed to F. E. Bonner, Executive Secretary, Federal Power Commission, sent by F. W. Scheidenhelm. (Original Exhibit.)

3576–A *Government exhibit No. 263*

WAR DEPARTMENT, UNITED STATES ENGINEER OFFICE
13TH FLOOR, CHESAPEAKE AND OHIO BUILDING
Huntington, West Virginia, June 26, 1936

Subject: Kanawha River pool fluctuations resulting from operation of the Marmet and London hydro-plants

KANAWHA VALLEY POWER COMPANY,
Charleston, West Virginia.

Attention: Mr. Ellis

GENTLEMEN: At a conference held in this office on June 23, attended by your Mr. Ellis and Mr. McCormack, to consider means for avoiding sudden changes in pool level resulting from operation of the London and Marmet hydro-plants, the attention of your representatives was called to the following:

(a) Changes in pool level in excess of one foot per hour have been of frequent occurrence in both the London and Marmet pools and have reached in excess of 1½ feet per hour.

(b) Dangerous currents are set up by such sudden changes of pool level.

(c) Considerable additional work is caused to the lock operating forces at the movable dams in lowering wickets to pass the excess water and restoring them later to retain sufficient water to maintain the pool.

(d) The Hatfield-Campbell Creek Coal Company has recently complained of the difficulties of moving their fleet to provide for a sudden rise and of grounding during the sudden fall.

(e) The rate of the use of 3-foot drawdown in the London pool s subject to limitation for the purpose of protecting favorable avigation conditions, not only within that pool but in the Marnet pool and particularly in the pools of the movable dams below Iarmet.

(f) The maintenance of favorable navigation conditions could ot be emphasized too highly as being of primary importance in he formulation of rules for the operation of the hydro-plants at London and Marmet.

576–B Your representatives advised this office as follows:

(a) The most effective use of the Marmet and Lonon plants is for peak load operation and necessarily involves ome fluctuation of pool levels but it is the aim of their company o minimize such fluctuation as much as may be necessary for avigation interests.

(b) Your plant operators at London and Marmet have been nstructed to cooperate closely with the lockmasters of those ocks to give due notice of plant operation with the view to avoidng excessive pool fluctuation but that such excessive waves as ave recently occurred were due in part to imperfection of the resent system of manual control and in part to inadequacy of he prescribed rules.

(c) A central control system is being established at the Cabin reek steam plant for the more effective coordination of the perations at London and Marmet. This system will be comleted in about two months and will include a system of autoatic pool stage indication which will enable the operator at abin Creek to control the operation of each plant in such anner as to attain a minimum amount of pool fluctuation.

Following some discussion, it was agreed to proceed as follows, ith the understanding that the procedure is subject to such odifications as developments may necessitate:

(a) The rate of drawdown in the London Pool will not exceed ne-half foot per hour.

(b) The level of the Marmet Pool will be kept within the nge of +0.0 and −0.3 and pool oscillation on the lower gage London due to turbine operations will not exceed the rate of ne-half foot per hour.

(c) Pending completion of the central control system, current les for manual operation will be modified at once with the ew to minimizing fluctuations as follows:

(1) Power increment, both positive and negative, will be apied at the rate of 5,000 K.W., applied gradually over a period 60 minutes instead of 30 minutes as at present.

3576-C (2) Within the limits of +0.0 to −0.3 at the Marmet upper pool, the operation of the Marmet plant will be started in advance of the London plant and closed in conjunction with the London plant to equalize as much as possible the level of the lower pool at Marmet. Concentration of the heavier peak for shorter duration with incidental fluctuations will be carried primarily at London but in this operation, due care will be exercised at both plants to avoid drawing the lower pool at London below normal.

It is requested that you confirm the above understanding.

Very respectfully,

JOHN F. CONKLIN,
John F. Conklin
Lt. Col., Corps of Engineers,
District Engineer.

3577 *Government exhibits Nos. 264-A, 264-B and 264-C*

Aerial photographs of New River from Hinton, W. Va. to Narrows, Va. (Original Exhibits.)

Government exhibit No. 265

Document on Report on Application for license, Federal Power Project No. 1175, West Virginia, to Chief of Engineers, U. S. Army, Washington, D. C. dated Feb. 24, 1932, at St. Louis, Mo., (changed to defense exhibit No. 525 as it was already in evidence). (Original Exhibit.)

Government exhibit No. 266

Dated March 12, 1932 informal comment upon the report of the United States Division Engineer at St. Louis, Feb. 24, 1932, on application of Kanawha Valley Power project No. 1175, West Virginia, by F. W. Scheidenhelm, Consulting Engineer for applicant. (Original Exhibit.)

Government exhibit No. 267

(Excluded.)

Government exhibit No. 268

(Excluded.)

Government exhibit No. 270

(Excluded.)

Government exhibit No. 271

Copy of protest to A. E. P. Co. against application of Town of Galax, Va., for grant and loan from government for construction of municipal hydro and diesel engine power plant and distribution system. (Original Exhibit.)

3578 *Government exhibit No. 272*

Letter dated April 9, 1932, from George Otis Smith to Mr. Thompson. (Original Exhibit.)

Government exhibit No. 273

Book of aerial photographs of New River, W. Va., Va., and N. C. (Original Exhibit.)

Government exhibit No. 274

An Act approved May 6, 1887, incorporating the New River Steam Boat Company, and authorizing them to operate a steam boat on New River. (Original Exhibit.)

Government exhibit No. 275

Act of February 3, 1888, of the General Assembly of Virginia, to authorize the Radford Land and Improvement Company to erect a dam across New River. (Original Exhibit.)

3579 *Defendant's exhibits Nos. 500 to 504, inc.*

Discharge hydrographs, wave study of New River. (Original Exhibit.)

Defendant's exhibit No. 505

Document dated May 9, 1927, New River Development Company. Record for minutes. (Original Exhibit.)

Defendant's exhibit No. 506

Copy of 7th Annual Report of the Federal Power Commission 1927. (Original Exhibit.)

Defendant's exhibit No. 507

Gage recorder chart of Kanawha River at Kanawha Falls, W. Va., for the period July 6 to 13, 1936 incl. (Original Exhibit.)

Defendant's exhibit No. 509

House Doc. No. 190, 70th Congress, 1st Session. (Original Exhibit.)

Defendant's exhibit No. 510

Letter dated Feb. 5, 1927 from Major H. M. Trippe to F. W. Scheidenhelm. (Original Exhibit.)

Defendant's exhibit No. 511

Letter dated February 4, 1927 from F. W. Scheidenhelm to Major H. M. Trippe. (Original Exhibit.)

Defendant's exhibit No. 512

House Doc. No. 91, 74th Congress, 1st Session. (Original Exhibit.) (Same as Exhibit 145, a part of which is set forth at fol. 3419 herein.)

Defendant's exhibit No. 513

Chart-Power Waves on New & Kanawha Rivers.. (Original Exhibit.)

3580 *Defendant's exhibit No. 514*

Letter dated October 20, 1931, from F. B. Duis to F. W. Scheidenhelm re pool levels on Kanawha River. (Original Exhibit.)

Defendant's exhibits Nos. 515 to 517 inc.

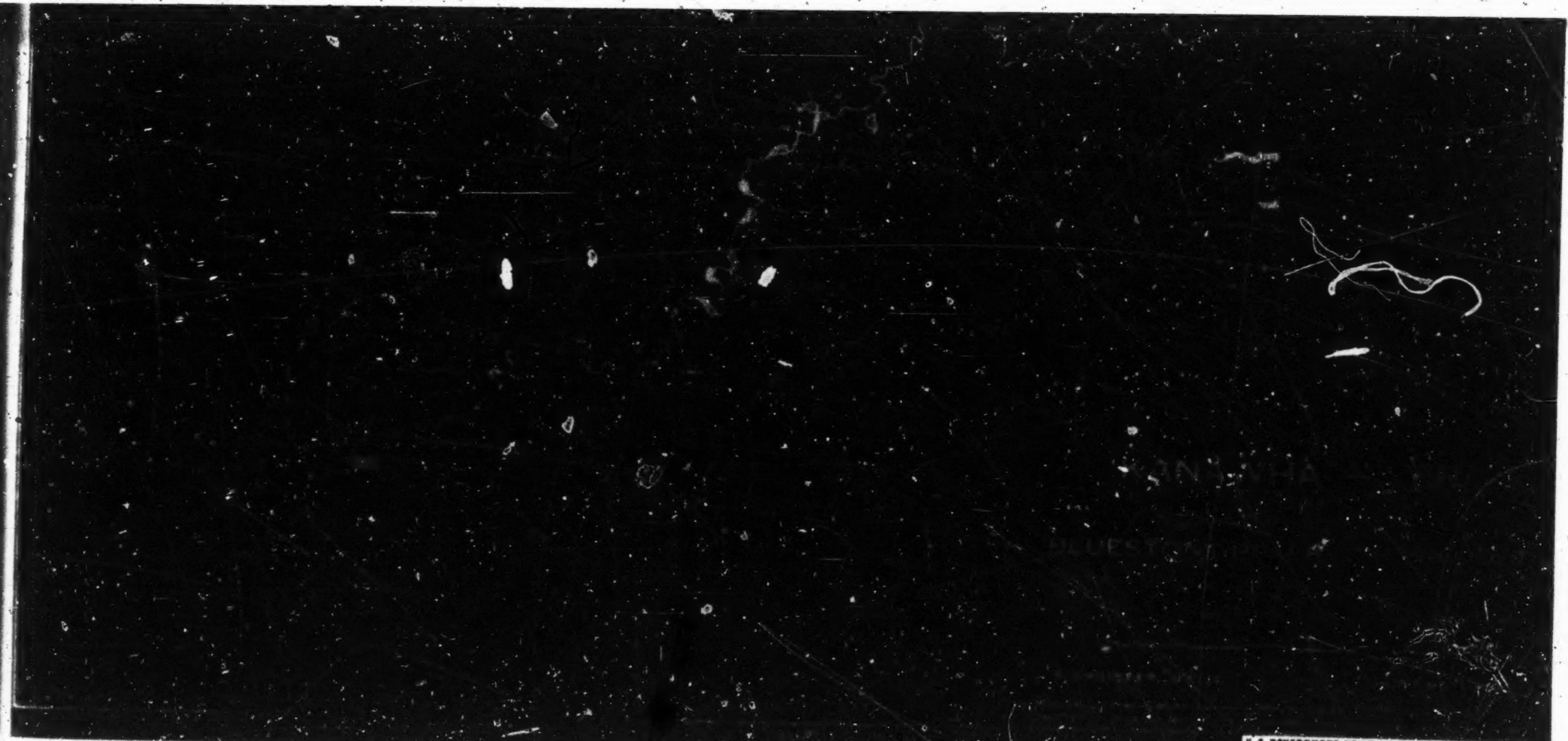
Photographs of certain sections of New River. (Original Exhibits.)

3580–A *Defendant's exhibit No. 518*

3580–B *Defendant's exhibit No. 519*

Scarborough's New Census Map of Virginia, W. Va., Maryland, Del. & District of Columbia. (Original Exhibit.)

3444-Y


KANAWHA
BLUESTONE [illegible]
[illegible]

Defendant's exhibit No. 520

Map entitled "The Middle Atlantic Group comprising Va., W. Va., Maryland, Delaware & District of Columbia," published by National Power Survey. (Original Exhibit.)

Defendant's exhibit No. 521

Map of Va., Maryland, Delaware & District of Columbia, published by National Map Co., Indianapolis, Indiana. (Original Exhibit.)

Defendant's exhibit No. 522

Randall McNally Map of Virginia. (Original Exhibit.)

Defendant's exhibit No. 523

Map entitled "Commonwealth of Virginia, State Highway System, State Highway Commission, July 1936." (Original Exhibit.)

Defendant's exhibit No. 524

Map of Giles County, Commonwealth of Va., Dept. of Highways, Richmond, Va. (Original Exhibit.)

Defendant's exhibit No. 525

Copy of a report on application for license, Federal Power Project No. 1175, W. Va., dated Feb. 24, 1932. (Original Exhibit.)

3581 *Defendant's exhibit No. 526*

Photograph of Shumate Falls. (Original Exhibit.)

Defendant's exhibit No. 527

Map dated 11/21/1912, reconnaissance map of New River from Hinton, W. Va. to Radford, Va., compiled under direction of Major F. W. Alstaetter. (Same as original Exhibit 558-G.)

3582 *Defendant's exhibit No. 528*

Report of Major Craighill, Corps of Engineers, U. S. A., dated April 17, 1891.

3583 *Defendant's exhibit 528*

Craighill, Colonel, Corps of Engineers,

U. S. ARMY

U. S. ENGINEER OFFICE, 9 PLEASANT SREET,
Baltimore, Md., April 17, 1891.

BRIG. GEN. T. L. CASEY,
Chief of Engineers, U. S. A., Washington, D. C.

GENERAL: A balance of $2,341.79 remains of the last appropriation for New River, Virginia and West Virginia, of $10,000, August 1886. For reasons which will appear below it is believed the expenditure of this balance would be a waste of money.

The law of June 10, 1872, called for a survey of the river from the mouth of the Greenbrier at Hinton, West Virginia, to the lead mines in Wythe County, Virginia. A full report, with maps, was submitted in a short time thereafter, which may be found in the Annual Report for 1873, pages 842–54. This included 128 miles of the river.

Three plans of improvement were estimated for, viz: 1st, a 2-feet bateaux navigation to cost $100,000; 2d, a 3-feet steamboat navigation without locks to cost $1,000,000; 2d, a system of locks and dams for a navigation of 5½ feet, to cost $2,500,000.

The first appropriation was made in 1876, $15,000; work was commenced in 1877 and continued several years on the section of the river indicated, with good results for a fine country bordering the stream but up to that time much undeveloped. The railroads of the country at that time were the Norfolk & Western which crossed the river in Pulaski County in the South Western part of Virginia, and the Chesapeake & Ohio which touched it at the mouth of the Greenbrier at Hinton in West Virginia.

The law of June 18, 1878, called for a survey of the upper portion of the river 62 miles in length from the Lead Mines in Wythe County to the mouth of Wilson Creek in Grayson County, Virginia, near the border of North Carolina. The report in full may be found in the Annual Report for 1879, Part 1, pages 3584 538–45. Three estimates were presented for this part of the river also, one half the length of the lower portion already referred to. These estimates were as follows, Viz: 1st, for a 2-feet bateaux navigation to cost $115,000; 2d, for a 3-feet steam navigation $1,200,000; 3d, a 5-feet steam navigation, $1,600,000, with locks and dams.

The plan of improvement adopted for the whole river was that which would cost the least, $215,000, and called for a navigation of 2 feet at low water. There were appropriations in 1880, 1881,

1882. Meantime the usefulness of the river as a means of
portation became less and less, due much to the great de-
ment of the railroad systems, in some parts paralleling the
; and because the great cost of the improvements especially
e upper portions was greatly out of proportion to the
ntages under the changed conditions.

re attention may be called to the effect of the changing con-
ns which sometimes arise and New River is a striking illus-
on of it. In a country rich in minerals and agricultural
ucts a natural waterway may be of the greatest value, espe-
if there be no competing railroads and the cost of its im-
ements be not very great. In course of time competing rail-
are built, the topography being favorable. If the expense
e improvement of the river be great and the available money
the railroads will take the business and the river becomes
aratively unimportant. This has for some years been the
tion in the New River country, especially the upper portion.
time, as population increases and great mining, manufac-
g, and agricultural industries become enlarged the im-
nce of the natural waterway again increases to such an ex-
as to justify a higher style of improvement, and in many
nces the construction of canals is also found advantageous.
condition has been reached in several of the great European
s, and will be in time in the United States.

w River has, however, not reached this stage. It is at pres-
the second stage of comparative unimportance.

is condition seems to have been recognized by Congress as
be inferred from the fact that there were no appropriations
for New River in 1883, 1884, and 1885. July 1, 1886, there
was a balance remaining unexpended of $3,000 from the
appropriation of August 2, 1882. This pertained by
l designation of the law to the portion of the river above
's Falls, which were not passable. The balance remained
ended because of the impassability of these falls. As the
nection with routes of transportation caused by these falls
practically disappear on the completion of the railroad
being constructed up Cripple Creek, and as boats could
hip to the railroad their freight at Porter's Ferry above
d mines and the falls, it was concluded to improve the
ion of Williamson's ledges and shoals for temporary uses.
vork was continued as late as the season allowed, a small
of funds being left unexpended but not large enough to
the resumption of operations in the summer of 1886.

e was an appropriation of $10,000 in the law of August 5,
pplicable only to the portion of the river above the lead

mines—the most expensive portion. When the money became available it was too late to commence operations in 1886. For more than one reason it seemed inexpedient to expend this appropriation in the year ending June 30, 1888. The portion of the river to which it was applicable is above Foster's Falls, and these can only be passed by one or two locks, for the construction of which the money available was altogether inadequate. There was also strong reason for doubt whether, considering the present development of that section of the country, the construction of such locks would be justifiable, even if the money were available. The construction of railroads near this stream had diminished very much the importance of the improvement of the portion above Foster's Falls. After a careful re-examination of the subject and reconnaissance of the river and its vicinity, it was decided by the Secretary of War to postpone the expenditure of the appropriation until the will of Congress could be further ascertained.

In the river and harbor act of August 11, 1888, it was, however, directed that the balance should be spent in improving the river

> between Ivanhoe Furnace, in Wythe County, and the mouth
> 3586 of Wilson Creek, the most expensive part of the work.

Operations in accordance with this specific direction were therefore commenced June 9, 1889, and continued until October 10, 1889.

In 1885 there was a channel 2 feet deep and 20 feet wide from Ivanhoe Furnace to within 600 feet of the head of Wilkinson's Shoals and Ledges, a distance of 3.9 miles.

In 1889 this channel, with the same width and depth, was extended to the lower end of the approach to the Gulf, a distance of five miles from the initial point, with four-tenths of a mile farther up the river, partially improved. This is obviously a very local improvement made almost entirely in rock at great expense and in my opinion of no value whatever. No work was done in the calendar year 1890, and none has been possible as yet in 1891, the water being too high and too cold.

The last directions of Congress have been practically complied with by the expenditure of 75% of the last appropriation. The last work done, however, under those directions was a subject of ridicule by the community near its locality because of its evident uselessness except to put money into the pockets of a few men and to lead to the probable control of a few votes. The expenditure of the remaining balance almost entirely in the excavation of rock on the limited part of the river to which it is specifically applicable under the law would not accomplish the smallest useful result and would, in my judgment, be a shameful waste of public money. It is recommended that it be covered into the Treasury as no longer required for expenditure.

No appropriation has been made since 1886.

Very respectfully, your obedient servant,

(Signed) Wm. P. Craighill,
Colonel, Corps of Engineers, U. S. A.

3587 Baltimore, *April 17, 1891.*

Col. Wm. P. Craighill:

In his opinion the expenditure of the balance of $2,341.79 of appr. of 1886 for New River, Va. & W. Va. would be a waste of money, and recommends that it be covered into the Treasury.

Letter of approval April 23/91; pp. 6 & 7 & Insts.

(1st indorsement)

Office Chief of Engineers, U. S. Army,
April 21, 1891.

Respectfully submitted to the Secretary of War.

The appropriation of $10,000, made by the River and Harbor Act of Aug. 5, 1886, for improvement of New River, Va., to be applied between the lead mines in Wythe County and the mouth of Wilson's Creek in Grayson County, was, by authority of the Secretary of War of June 4, 1887, reserved, as its expenditure could not at that time be advantageously made.

By the River and Harbor Act of Aug. 11, 1888, the balance then available for the improvement of this river was "directed to be spent in improving said river between Ivanhoe Furnace in Wythe County and mouth of Wilson Creek." Operations in accordance with this specific direction were therefore commenced June 9, 1889, and continued until October 10 of that year, leaving an unexpended balance of $2,341.79.

Colonel Craighill, the officer in charge of the improvement of New River, states that the expenditure of this remaining 3588 balance almost entirely in the excavation of rock on the limited part of the river to which it is specifically applicable under the law would not accomplish the smallest useful result, and would, in his judgment, be a shameful waste of public money.

It is recommended that the unexpended balance be withheld from expenditure until further action is taken by Congress.

W. M. Adams,
Major, Corps of Engineers, In Charge.

2516–1891.

WAR DEPARTMENT, *April 22, 1891.*

Approved as recommended by the officer in charge of the office of the Chief of Engineers.

S. T. GRANT,
Acting Secretary of War.
J. B. R.

Rec'd. Engr. Dept. Apr. 22, 1891.
Noted IV. Division.

3589 *Defendant's exhibit No. 529*

February 4, 1930.

Attention: Executive Secretary.
Subject: Project 739 Virginia,
APPALACHIAN ELECTRIC POWER COMPANY,

FEDERAL POWER COMMISSION,
Washington, D. C.

SIRS: Regarding the above project, the Company remains firmly of the opinion that its construction, maintenance and operation will not affect the interests of interstate commerce, I. E., injuriously affect navigation on the Kanawha River approximately 150 miles below. At least the method by which it is intended the project shall be operated will have no harmful effect on navigation.

In fact there have always been serious doubts in the minds of many engineers, including Army engineers, as to whether it could be possible to operate the proposed plant in a manner which would substantially interfere with navigation.

The basis for assuming jurisdiction over this project lies in the fact that in very dry seasons there might be such operation as to cause an interference. The Company respectfully submits that such a basis is unfair and beyond the meaning of the Act. The intended methods of construction and of operation are the elements which should be considered and the finding should be based solely on such declared intention and not upon any speculations as to how a project might, but will not, be operated. The Company is willing to submit and agree upon a plan of operation in such further detail as may be appropriate and reasonable under all of the circumstances.

The Company, therefore, respectfully petitions the Commission to reconsider the finding it has made to the effect that the proposed project will affect the interests of interstate commerce and, in arriving at a new conclusion, investigate only the effect that the intended construction together with the intended method of operation will have on navigation below. It is re-
3589-A quested that the Commission find that such intended

construction and intended operation will not (detrimentally) affect navigation.

Upon such a finding the Company would be permitted to construct the project without any license from the United States. Such permission, however, would be limited to the declared or intended methods of construction and of operation. Any harm or threatened harm to navigation, caused by an unanticipated or unintended method of construction or of operation of the project, could certainly be adequately remedied by the United States under the Act of March 3, 1899 (30 Stat. L. 1151). In fact, it is believed that this same remedy would be available to the United States even though the actual or threatened harm proved to be due to the declared or intended method of operation.

In the event, however, the Commission feels that it cannot reopen the question of the effect the proposed project will have on navigation or, in the event the Commission does reconsider this question of fact and finds that it must assume jurisdiction, it is requested that the Commission issue a so-called "minor part" license for the project pursuant to section 10 (i) of the Federal Water Power Act.

In this connection the Company would ask the Commission to reconsider also the letter to the Commission dated March 1, 1928, regarding the validity of the form of license previously tendered to the Company for this project. The legal position therein taken still remains the view of the Company and it believes such a license illegal. The Commission refused at that time to grant a license with only terms and conditions which the Company believes to be within the authority of the United States to impose. At that time, however, both the Company and the Commission had in mind a license for a major project pursuant to Section 4 of the Act with such provisions as some of those demanded by Section 10 of the Act eliminated. This, the Commission believed, it was not authorized to do under the Act. However, a so-called "minor part" license can legally be issued for such a project, and could contain such provisions only as will protect the interests of the United States in navigation. In substantiation of the authority of the Commission to issue a "minor part" license for such a project there is enclosed herewith a memorandum re "Federal Power Commission's Authority to Adopt a Policy of Issuing a 'Minor Part' License For Projects Located on Non-Navigable Streams and Not Involving The Use of Any Land or Other Property of the United States."

Respectfully yours,

APPALACHIAN ELECTRIC POWER COMPANY
By CURTIS, MALLET-PREVOST, COLT & MOSLE

(Enclosure.)

3589-C *Defendant's exhibit No. 530*

MEMORANDUM RE FEDERAL POWER COMMISSION'S AUTHORITY TO ADOPT A POLICY OF ISSUING A "MINOR PART" LICENSE FOR PROJECTS LOCATED ON NON-NAVIGABLE STREAMS AND NOT INVOLVING THE USE OF ANY LAND OR OTHER PROPERTY OF THE UNITED STATES

Dated February 4, 1930

Submitted by Curtis, Mallet-Prevost, Colt & Mosle, in collaboration with Col. F. W. Scheidenhelm, Consulting Engineer.

3589-D

Synopsis

Page

I. There is a grave question as to whether the United States may properly require or issue any license whatsoever for a project located on a non-navigable stream and not involving the use of any land or other property of the United States 1

(a) The requirement of a license is not justified because the United States has nothing to give or grant, i. e., has nothing to form the basis of a license 2

(b) Congress did not contemplate the issuance of a license pursuant to the second paragraph of Section 23 of the Act when applied to the given circumstances, i. e., a project located on a non-navigable stream 5

II. If the United States is to assume jurisdiction at all in advance of actual or intended acts which will be substantially detrimental to navigation, it may properly do so only in a regulatory capacity 6

i. e., in the strict sense the "license" evidencing such an assumption of regulatory jurisdiction would be one in name only; in essence, it would prescribe an appropriate method of regulation intended to prevent injury to navigation.

III. The prima facie or literal meaning of Sections 10 (i) and 23 of the Act permits the interpretation that a "Minor Part" license is applicable to the given conditions 8

IV. The Congressional records indicate strongly that Congress did not have in mind any contrary interpretation of Section 10 (i) 17

3589-E V. If the Commission were to insist upon taking jurisdiction and issuing a license under the given circumstances, then the terms of a "major" license containing all of the conditions set forth in the Act would be unconstitutional 22

VI. The issuance of a "minor part" license under the given circumstances will be free from attack on the ground of unconstitutionality 23

VII. The issuance of a "minor part" license under the given circumstances would obviate any question as to the continuing right of the United States to safeguard the navigable capacity of navigable streams downstream from the project in point 24

VIII. A "minor part" license, issued under the given circumstances and limited as above indicated, would leave to the respective states the regulation of power developments in all respects except as to the protection of navigation 25

IX. The "minor part" licenses heretofore issued by the Federal Power Commission constitute precedents which are compatible with the proposal of applying such a type of license to the given situation 26

Conclusion.—It is submitted that a "minor part" license would be precisely appropriate and applicable under the circumstances considered herein 32

3589–F (February 4, 1930)

MEMORANDUM RE FEDERAL POWER COMMISSION'S AUTHORITY TO ADOPT A POLICY OF ISSUING A "MINOR PART" LICENSE FOR PROJECTS LOCATED ON NON-NAVIGABLE STREAMS AND NOT INVOLVING THE USE OF ANY LAND OR OTHER PROPERTY OF THE UNITED STATES

I. There is a grave question as to whether the United States may properly require or issue any license whatsoever for a project located on a non-navigable stream and not involving the use of any land or other property of the United States.

The term "license" as used in the Federal water power act is not defined, but Section 4 of the Act states to whom, for what, and under what circumstances licenses can be issued:

"SEC. 4. That the Commission is hereby authorized and empowered * * * to issue licenses to citizens of the United States * * * for the purpose of constructing, operating and maintaining dams, water conduits, reservoirs, power houses, transmission lines or other project works necessary or convenient for the development and improvement of navigation, and for the development, transmission and utilization of power across, along, from or in any of the navigable waters of the United States, or upon any part of the public lands and reservations of the United States (including the territories), or for the purpose of utilizing the surplus water or water power from any Government dam except as herein provided. * * *."

Evidently the foregoing contemplates the issuance of licenses for the purpose of constructing, operating, and maintaining dams, etc., including any other project works for example, gates controlling the passage of water. 3589–G

There being no definition in the Act itself, it would seem appropriate to turn elsewhere for definitions of "license."

Bouvier:

"License (Lat. licere—to permit.)

* * * * *

"In Governmental Regulation. Authority to do some act or carry on some trade or business, in its nature lawful but prohibited by statute, except with the permission of the civil authority or which would otherwise be unlawful."

Corpus Juris:

"License. The term 'license' does not involve any uncertainty or doubt; in its general and popular sense, as used with reference to occupations and privileges, it means a right or permission granted by some competent authority to carry on a business or do an act, which, without such license, would be illegal. It is a formal or official permit or permission to carry on some business or do some act which, without the license, would be unlawful, the words 'license' and 'permit' often being used synonymously."

Accordingly, it would not be necessary to obtain a license to do an act or carry on some business in its nature lawful and not prohibited by statute.

(a) The requirement of a license is not justified because the United States has nothing to give or grant, i. e., has nothing to form the basis of a license.

3589-H The proper extent of jurisdiction of the United States over projects not involving property of the United States and located on non-navigable streams is clearly described and limited in the opinion of the Court in United States v. Rio Grande Irrigation Co., 174 U. S. 690. This decision stands squarely for the proposition that the United States has no interest in or jurisdiction over any acts carried on in a non-navigable stream unless such acts will substantially diminish navigability and that, if they do have such effect, the United States may restrain those acts only to the extent that they will so diminish navigability.

The Act of March 3, 1899 (30 Stat. L. 1151) forbids any obstruction to the navigable capacity of any waters of the United States. The Rio Grande case supra has in effect validated this legislation, and this essential, namely, the protection of navigation, can be accomplished by the United States through that act. Therefore, so far as the protection of navigability is concerned, a license from the Federal Government is unnecessary inasmuch as there are ample means at the disposal of the Government to effect that end.

3589-I If the use of any lands or other property of the United States were necessary for a given project, then the United States, being able to refuse permission for the use of Government property, might grant such permission conditionally. Such permission would constitute a "license" in the strict meaning of the term, for it would constitute consent to use property the use of which is prohibited by statute except with permission of the owner (the United States). However, the type of project now under consideration does not involve the use of any government land.

It is submitted that a license granted under the second paragraph of Section 23 of the Federal water power act does not grant the licensee even the right to do any acts or carry on any business in its nature lawful but forbidden by statute: Thus, if there were a permission of that kind at all, it would have to be permission to interfere (substantially) with navigation. However, there is considerable basis for the argument that it is beyond the power and authority of the United States to permit a substantial interference with navigation.

Moreover, a specific provision of the Act, which negatives any theory that a license issued pursuant to Section 23 may permit (license) any interference with navigation, follows:

"SEC. 10. * * * All licenses issued under this Act shall be on the following conditions:"

* * * * *

> "(c) That the licensee * * * shall so maintain
> 3589-J and operate said works as not to impair naviga-
> tion. * * *"

Therefore, even as regards navigation which is the sole basis of any interest of the United States, a license under Section 23 grants no right or permission which could have been withheld. In other words, in so far as the license concerns the effect of such a project on navigation, the license does not grant any rights in addition to those which the licensee theretofore had, but rather, on the one hand, permits only what the licensee could theretofore legally do without any permission or license from the United States and, on the other hand, prohibits the licensee from doing any acts which, even without a license, would have been illegal. Thus, in effect, a license under Section 23 appears to be solely restrictive and not in any way permissive.

(b) Congress did not contemplate the issuance of a license pursuant to the second paragraph of Section 23 of the Act when applied to the given circumstances, i. e., a project located on a non-navigable stream.

An examination of Congressional records gives strong reason to believe that the framers of the Act had in mind that the second paragraph of Section 23 would apply only when there is doubt
as to the navigability of the stream at the proposed
3589-K site of the power development. At least the records
reveal nothing to indicate that the Commission was to take jurisdiction in the case of a project on a non-navigable stream and utilizing no Federal properties.

In substantiation of the foregoing, there is attached hereto and marked Exhibit "A" a memorandum captioned "Intention of Congress Re Second Paragraph of Section 23 of the Federal Water Power Act."

II. If the United States is to assume jurisdiction at all in advance of actual or intended acts which will be substantially detrimental to navigation, it may properly do so only in a regulatory capacity.

I. e., in the strict sense the "license" evidencing such an assumption of regulatory jurisdiction would be one in name only: in essence, it would prescribe an appropriate method of regulation intended to prevent injury to navigation.

Regarding a project not involving property of the United States and located on a non-navigable stream, it has been submitted that the United States has no interest or jurisdiction unless the actual or intended operation of the project will be of substantial detriment to navigation elsewhere. See U. S. v. Rio Grande Irrigation Co., supra. Furthermore, for such a project, so long as
3589–L the actual or intended operation will not injure navigation, no license is necessary inasmuch as no authority or permission is needed to maintain and operate a project which is in its nature lawful and which could not be forbidden by a law of the United States.

It has also been pointed out hereinabove that, as soon as the actual or intended operation will substantially harm navigation, the United States has jurisdiction to restrain such acts or intended acts * * * but only to the extent that they substantially harm or will substantially harm navigation.

Nevertheless, where a declaration of intention has been filed under Section 23 and the Commission has found that the interests of interstate commerce would be affected thereby, that section makes it obligatory that the declarant shall not proceed with construction until the declarant shall have received a license under the provisions of the Act. Inasmuch, however, as it has been shown that such a license cannot grant permission to do any acts which would be otherwise unlawful, it follows that it is not a license in the strict meaning of the word. Such a so-called license could only prescribe appropriate regulations to prevent injury to navigation and thus in contrast with a true license, it would be merely restrictive and regulatory in its character.

3589–M Furthermore, because such a license does not grant anything which could have been refused or which would otherwise have been unlawful, the licensor cannot demand conditions and terms not necessary for the protection of navigation.

When compared with the scope of a standard license for a major project which is located on a stream which is navigable in fact or which involves the use of property of the United States, such a license embodying merely regulatory terms could only be of minor scope.

III. The prima facie or literal meaning of Sections 10(i) and 23 of the Act permits the interpretion that a "Minor Part" license is applicable to the given conditions.

That part of the Federal water power act which provides for "Minor Part" licenses is as follows:

"Sec. 10. That all licenses issued under this act shall be on the following conditions:"

* * * * *

"(i) In issuing licenses for a minor part only of a complete project, or for a complete project of not more than one hundred horsepower capacity, the commission may in its discretion waive such conditions, provisions and requirements of this act, except the license period of fifty years, as it may deem to be to
3589–N the public interest to waive under the circumstances:
Provided, that the provisions hereof shall not apply to lands within Indian reservations."

(1)

According to the express language of that section it is possible for the Commission to grant a license for a minor part of an entire project. It is, therefore, necessary to ascertain in what instances the Commission may properly issue a "minor part" license. As an aid toward a proper analysis, it may be well first to consider situations where "minor part" licenses would seem inappropriate and irrelevant.

Thus, in the case of a project located entirely on public lands of the United States, clearly nothing less than what one may style a "major" license, embodying inter alia all of the conditions set forth in Section 10 of the Act, would be appropriate. As owner, the United States may prescribe conditions at will.

Again, because the United States has paramount control over the navigable waters of the United States, it is within the province of Congress to permit or forbid entirely the erection of structures and their operation in navigable waters. If a project be permitted in a navigable stream, the Government is interested in the entire project, that is, in its construction, its operation and its maintenance. Hence, a "minor part" license would seem inappropriate.

3589–O On the other hand, in the case of a project a small part of which is located on public lands, the interest of the United States obviously is substantially less than in the two former cases. In such an instance it seems reasonable, and would appear to be authorized by the Act, that the Commission issue a "minor part" license therefor. Such a license would contain terms and conditions which could amply protect the Government's interest in the minor part of the complete project. In fact, licenses of this kind have been issued by the Commission. Some of these licenses have permitted the utilization of substantial amounts of Government land.

If a minor part license be appropriate when a part of a project involves United States property, such a type of license seems all the more appropriate when no part at all of the project utilizes United States property and the project is not located on a navigable stream. Such is the type of project herein under consideration.

(2)

Under such circumstances the United States has no interest or jurisdiction over the lands, riparian rights or physical works involved. In fact, its interest is limited to any adverse 3589-P effect which that project might have on the navigable capacity of a navigable stream to which the project stream is tributary. (Rio Grande case, supra.)

Once a dam on a nonnavigable tributary has been completed and its resultant reservoir filled, it is physically impossible that such dam per se, i. e., without interference by man, have any detrimental effect upon navigation downstream therefrom. On the contrary, the effect, if any, would be beneficial (in moderating the intensity of flood peaks). Similarly, an appurtenant power station, if kept free from interference or operation on the part of man, could have no detrimental effect upon navigation. (It is conceivable that failure of a dam or power station would have such detrimental effect, but, if the aspect of safety is to be considered at all, clearly it should be considered from the standpoint of Federal regulation or State police power—certainly not from the standpoint of a Federal grant).

It is to be admitted that the process of initial filling of a reservoir of substantial size could conceivably have a detrimental effect upon navigation in event such filling were to be done during a period of relatively low stream flow. However, ordinarily the filling would not be accomplished during low flow periods—in fact the stream flow might naturally remain high during the period of filling. Moreover, the owner of a dam and res- 3589-Q ervoir would ordinarily not choose a low water period for filling a reservoir, because the rate of filling would be too slow. In any case, this aspect of the matter likewise involves manipulation or operation of the dam or project works and is essentially a question of regulation.

In view of the foregoing, one is led unavoidably to the conclusion that the interest of the United States in a project located on a non-navigable stream and not involving any property of the United States is limited to the operation of the project works and hence to a minor part of the "constructing, operating and maintaining" (Sec. 4 of the Act) of the project, i. e., is limited to a minor part of the project as a whole.

(3)

This conclusion is strengthened when one takes into account the fact that in general it is only a portion of even the operation of the project which holds possibilities of interference with navigation and hence is properly of interest to the United States. For instance, operation of a project during periods of flow above the average would in general contain no possibilities of harm. Indeed, the interest of theUnited States is limited to such scope or character of operation as would substantially diminish navigability (Rio Grande case, supra).

3589-R Not merely is the interest of the United States limited to a certain portion of the operation of the project, in the sense that the operation directly concerns or constitutes regulation of stream flow, but it is true further that such a conception of operation is incomplete. That is, operation of a water power or hydro-electric project includes substantially more than mere regulation of stream flow. Thus there are elements of operation which concern only the electrical functions of the station and have no effect at all upon stream flow or the regulation thereof.

For instance, the regulation of electrical voltage and electrical frequency are matters of operation of the project but do not concern stream flow. Again, the hydro-electric machines or generating units are, as a practical matter in a large power system, frequently operated without the use of any water at all (excepting a negligible amount for cooling bearings). Under such circumstances the hydro-electric units are used to absorb the wattless current of the power system so as to permit generating apparatus in other power stations, usually steam-electric, to operate in essence more efficiently (specifically, at higher power factor).

It appears clear, therefore, that both in the limited significance
of "operation" as affecting only stream flow and also in the
broader significance of "operation" as extending to all
3589-S of the elements of use or operation of the hydro-electric
development, the interest of the United States is limited
to what is only a part of the operation of the project.

(4)

The interest of the United States in the project being minor, it would seem to follow that the Commission would be authorized under Section 10 (i) to issue a "minor part" license.

(5)

That part of the operation of the project in which the United States is interested is limited to the use of the gates, whether the gates be those controlling the passage of water through the power station or those, if any, mounted upon or forming part of the dam outside of the power station. If the United States has control of the gates, it has control of the regulation of stream flow. In other words, it has control of what is practically the only element of the project which may affect navigation downstream from the dam.

Certainly so far as the physical structures are concerned, the gates constitute only a minor part thereof.

3589–T Indeed it may be desirable that the proposed "minor part" license cover, as the subject of the license, either the operation of the project in so far as the operation involves regulation of stream flow or, alternatively, the construction, operation, and maintenance of the gates themselves. The latter alternative might be deemed preferable in that it would involve the licensing of a minor part of the physical works of the project.

The licensing of the gates appears to be entirely justifiable for the reason that gates constitute "other project works" which in section 4 of the Act are specifically stated to be appropriate subjects of licenses.

The significance and reasonableness of the suggested possibility of licensing the construction, maintenance, and operation of the gates may be the more apparent when considered in the following light:

If on such a non-navigable stream there be constructed an overflow dam not equipped with any gates, not even flash-boards, then (except for the secondary and non-controlling features of safety and of initial filling of the reservoir created by the dam) such dam cannot possibly have any detrimental effect upon navigation downstream therefrom. If in such case there be any detrimental effect on navigation, it must be due to interference on part of man, with resultant modification of the natural stream flow. Such interference or modification can come about only by means of the installation and operation of gates.

3589–U If, then, the United States has control of the installation and operation of those gates, it will have control of the only elements which can result in detriment to navigation. Consequently it would appear logical that the United States, through the Federal Power Commission, should issue a license for the construction, maintenance and operation of all gates affecting stream flow through, over or past the dam. As aforesaid, the gates would constitute a minor part of the project—the more so if appurtenant to the dam there be a power station.

(6)

Although, under Section 23, once the Commission has made a finding that the interests of interstate commerce would be affected (adversely), it is mandatory that the declarant receive a license under the provisions of the Act; the section does not specify in further detail what kind of a license is mandatory. Primarily the Act provides for a "regular" or "major" license (Section 4 (d)) and Section 10 sets forth conditions which must be inserted in such a license. However, Section 10 (i) provides two exceptions to the "regular" or "major" form of license. These are the so-called "minor part" and "minor project" licenses. All of these three forms of licenses are authorized under the provisions of
3589–V the Act and, therefore, meet the requirements of Section
23. In short, there appearse nothing in the act, itself, which precludes the issuance of a "minor part" license under the circumstances.

It is contemplated that the conditions contained in such a "minor part" license would include only (1) the prescribed limitation to a duration of not more than 50 years and (2) such provisions as are necessary for the protection of navigation.

IV. The Congressional records indicate strongly that Congress did not have in mind any contrary interpretation of Section 10 (i).

(1)

In the preliminary stages of this water power legislation a bill consisting of 29 sections passed the House but the Senate disagreed. A conference committee appointed by the House and Senate to consider the bill made a report February 26, 1919 (House Report No. 1147, 65th Congress, 3rd Session). This report shows that the Conference Committee added to Section 10, paragraph (h), which reads as follows:

"That combinations, agreements, arrangements, understandings, express or implied, to limit the output of electrical energy, to restrain trade or to fix, maintain, or increase prices for electrical energy or service are hereby prohibited"
3589–W the following:

"In issuing licenses for a part only of complete project, where land of the United States required is to be used only for transmission lines, water conduits, or for storage reservoirs, or for a complete project of not more than 50 h. p. capacity, the Commission may in its discretion waive such conditions, provisions and requirements of this Act as it may deem equitable in the circumstances."

The Committee made this statement in regard to the above:

"It is thought by your conferees that such discretion should be vested in the Commission." (February 26, 1919, House Report 1147 to accompany S. 1419, 65th Congress, 3rd Session, Congressional Record Volume 57, page 4635.)

The report of the Conference Committee was agreed to by the House on February 28, 1919, but as the third session of the 65th Congress was drawing to a close the Senate never acted upon the report.

During the first session of the 66th Congress, Congressman Esch introduced a bill, H. R. 3184, which apparently was copied from the previous conference report. Section 10 (h), including the provision for the issuance of licenses for a part only of a complete project, was identical with that above quoted.

The Committee on Commerce of the Senate amended the bill by deleting the above quoted portion of paragraph (h) re the issuance of licenses for a part only of a complete project and added paragraph (i), in the following form:

3589–X "In issuing licenses for a minor part only of a complete project, or for a complete project of not more than 200 h. p. capacity, the Commission may in its discretion waive such conditions, provisions and requirements of this Act, except the licenses of fifty years, as it may deem to be to the public interest to waive under the circumstances."

There is no statement in regard to the purpose of the Committee in making this amendment.

During the course of the reading of the bill in the Senate on January 12, 1920, Senator Curtis proposed "provided that the provisions hereof shall not apply to lands within Indian reservations", which proviso was agreed to, and the bill in this form passed the Senate January 15, 1920.

The bill was then referred to a conference committee of both Houses. The report of the Conference Committee (Senate document 269, 66th Congress, 2nd Session, April 30, 1920) recommended that the bill pass as amended by the Conference Committee. The amended bill included Section 10, paragraph (i) in its present form. The statement accompanying the report contains the following:

"On amendments Nos. 42 and 43, These amendments strike from the House bill the provision authorizing the Commission in its discretion to waive certain conditions, provisions and requirements of the Act in issuing licenses for a part only of a complete project, where land of the United States required is to be used for transmission lines, water conduits or storage reservoirs, or for a complete project of not more than 50 h. p. capacity.

In lieu of the House provision the Senate excepted from
3589-Y such waiver the license period of fifty years and increased the capacity of 200 h. p. The House conferees agreed to the Senate substitute with an amendment reducing the horse power capacity to 100. Under the House provision the Commission could allow perpetual grants without conditions for transmission lines, water conduits and storage reservoirs if the remainder of the project was on private land."

The Conference Committee evidently anticipated grants without any conditions but desired them to be limited to 50 years. The bill, containing Section 10 (i) in its present form, passed both Houses without further debate on paragraph (i).

From the foregoing it appears clear that Congress did not have in mind merely cases where lands of the United States were to be used for transmission lines, water conduits, or a storage reservoir and cases of projects under 100 h. p. capacity. Otherwise, it would seem that the original Section 10 (h) would not have been revised to its present form or, alternatively, in Section 10 (i) there would have been retained the explanatory clause "where land of the United States required is to be used only for transmission lines, water conduits, or for storage reservoirs."

Incidentally, it seems fairly clear that "minor part" licenses were intended for cases where an entire storage reservoir
3589-Z is to be located upon lands of the United States; yet in general a storage reservoir is no small part of a project.

(2)

The foregoing discussion (under provision IV) has been in the light of a tacit assumption that Congress intended that under special circumstances set forth in the second paragraph of Section 23, some kind of a license would be required for projects which are located on nonnavigable streams and which do not involve the use of any property in the United States. However, the validity of such an assumption is doubtful, to say the least. In fact, there are good grounds for the contention that Congress did not contemplate that a license should under any conditions be required for such a project. (More detailed consideration of this point will be found at proposition I-(b), page 6, hereinabove and in Exhibit "A" hereof).

If, then, one makes what is apparently the more proper assumption, viz, that Congress did not intend that a license should be required for a project on a non-navigable stream and not involving the use of any property of the United States, it follows that Con-

gress had in mind applying neither Section 4 nor Section 10 (i) to projects referred to in the second paragraph of
3589–AA Section 23 excepting only when the stream, on which the pertinent project is located, is upon investigation by the Commission found to be navigable. In short, under such latter assumption and as regards the type of projects considered herein, it is immaterial what Congress had in mind in drafting Section 10 (i).

V. If the Commission were to insist upon taking jurisdiction and issuing a license under the given circumstances, then the terms of a "major" license containing all of the conditions set forth in the Act would be unconstitutional.

In the case of a project located on a non-navigable stream and involving no property of the United States, a license which contains requirements beyond those necessary for the protection of navigation is subject to at least grave doubt as to its legality. Examples of such illegal provisions are the recapture clause and certain provisions specified by Section 10 of the Act.

This view of the illegality of such a license is set forth in a letter dated March 1, 1928, from Curtis, Mallet-Prevost, Colt & Mosle, on behalf of Appalachian Electric Power Company and may be found on page 143 of the Eighth Annual Report. A copy of that letter is annexed hereto and marked Exhibit "B."

3589–BB VI. The issuance of a "minor part" license under the given circumstances will be free from attack on the ground of unconstitutionality.

Inasmuch as it is contemplated that such license to be issued under the provisions of Section 10 (i) would contain no conditions excepting those necessary for the protection of navigation, it follows that the license would be free from the objections, on the ground of unconstitutionality, which are cited in Exhibit "B" hereof.

It is a primary rule of construction that, whenever possible, legislation is to be so interpreted that its constitutionality will be preserved. In this connection it is submitted that Section 10 (i) and the second paragraph of Section 23 can jointly and readily, in the light of the foregoing, be so interpreted as to be consistent with each other and with the remainder of the Act and as to be free from successful attack on the ground of unconstitutionality.

Further, it is suggested that, if a court were faced with the alternatives, on the one hand, of insisting that Section 23 demands a "major" license containing all of the conditions recited in Section 10, the recapture clause, etc., with consequent probability of unconstitutionality, and, on the other hand, of confirming
3589–CC an interpretation of Section 10 (i) to the effect that a "minor part" license is applicable under the given cir-

cumstances, then the court would certainly choose the latter alternative because it would preclude the necessity of holding any part of the act unconstitutional.

VII. The issuance of a "minor part" license under the given circumstances would obviate any question as to the continuing right of the United States to safeguard the navigable capacity of navigable streams downstream from the project in point.

The continuing right of the United States (under the Act of March 3, 1899, 30 Stat. L 1151) to safeguard navigation, downstream from a project such as is under consideration herein, has apparently been challenged only under circumstances under which the Commission pursuant to the second paragraph of Section 23 of the Act makes a finding that the given project will not affect (adversely) the interests of interstate commerce; i. e., when the Commission refrains from taking jurisdiction. The present proposal, however, involves the taking of jurisdiction by the Commission—for this would be the only basis on which it could issue any license at all.

The "minor part" license, it is contemplated, would contain specific provision for the exercise of such a continuing right on the part of the United States.

3589-DD VIII. A "minor part" license, issued under the given circumstances and limited as above indicated, would leave to the respective states the regulation of power developments in all respects except as to the protection of navigation.

If the conditions of "minor part" licenses in point were, as contemplated, limited to those for the protection of navigation, it is obvious that the States would be left in full control in all other respects and particularly there would be no conflict between Federal requirements and State requirements as regards recapture, amortization, etc.

It is understood that the policy of the present administration of the United States is to leave to the respective States' jurisdiction as completely as practicable in all matters as to which the fundamental law does not require the Federal Government to exercise jurisdiction.

Moreover, various States have taken pronounced stands on this very question of Federal jurisdiction for water power projects located on non-navigable streams and not involving any property of the United States. These States desire to encourage the development of the streams over which they have jurisdiction and properly resent the intrusion of the Federal Government in 3589-EE a field over which it has no right nor jurisdiction. It is believed that those States could not properly and would not have any objection to the exercise of jurisdiction of a regulatory character for the protection of navigation.

In short, a "minor part" license as contemplated herein would meet the demands of those States.

IX. The "minor part" licenses heretofore issued by the Federal power commission constitute precedents which are compatible with the proposal of applying such a type of license to the given situation.

Standard Forms of Licenses:

In 1921 the Federal Power Commission adopted four standard forms of licenses as follows, viz. for:

(1) A major project on a navigable stream;
(2) A major project on public lands or reservations;
(3) A minor project (100 h. p. or less);
(4) A transmission line.

It is noteworthy that the Commission did not at that time provide a standard form of license applicable to a project located on a non-navigable stream and involving no property of the United States—which circumstances are those constituting the basis of
the present discussion. In due course, however, the
3589–FF Commission did issue various "major" licenses for projects located under such latter circumstances.

"Minor Part" Licenses:

Heretofore the Commission has issued minor licenses under two sets of circumstances. The first of these involves transmission lines or water conduits across public lands or reservations.

The second involves situations where only part of the major project is located upon public lands. The reports of the Commission contain various examples, including:

Southern California Edison Co. (Project 298). Third Annual Report, page 95.

Great Western Power Co. (Project 616). Sixth Annual Report, page 254.

However, the Commission also has issued a "minor part" license under circumstances quite different from the foregoing:

"Minor Part" License to Hydraulic Race Co., et al. (Project 15):

This license pertained to a project involving the diversion of water from Niagara River at Tonawanda above eleven miles upstream from Niagara Falls, the transportation of that water through the New York State Barge Canal and finally the utiliza-
tion of the water for power within the Town of
3589–GG Lockport and in and along "Eighteen Mile Creek."

As to magnitude, the project was greatly in excess of the limit of 100 h. p. which under the terms of Section 10 (i) would have allowed a project to be classed as a minor project.

In fact, the Commission contemplated that the project should develop a minimum of 6,875 h. p.

Again, the project involved the diversion of water from a river which the Commission held to constitute "navigable waters" of the United States. In fact, at the point of diversion the river was and is actually navigated.

The foregoing facts are set forth in the Fifth Annual Report of the Commission at page 109 et seq. At page 111 thereof the minutes of the Commission set forth the reasons for issuing a minor part license, to wit:

> "It was further voted that since said power houses and other project works are not located or to be located in or across navigable waters of the United States and do not occupy or involve the use of lands or other property of the United States, and since the carriage of water for use in said works is and will be accomplished through the agency of the State of New York and by means of property of said State, that the commission finds that the diversion of water applied for constitutes a minor part only of a complete project, and that in view of such finding authorization be given to waive, with the exception of the following special conditions, such provisions of the act and of the rules and regulations of the Commission thereunder as are not necessary in the public interest."

3589-HH It is pertinent to compare those reasons with the corresponding conditions obtaining under projects such as are under consideration herein. Thus, in the first place, no project works were to be located in or across navigable waters of the United States. (But in the Hydraulic Race Co. case the contemplated diversion was actually from a navigable river whereas the projects considered herein are located entirely on nonnavigable streams.) Secondly, no project works were to occupy or involve the use of lands or other property of the United States. (The same is true of the type of projects considered herein.) Thirdly, the carriage (transportation) of the water was to be accomplished through agencies other than those of the United States.

These three reasons or conditions find counterparts in the circumstances obtaining in the cases of projects under consideration herein. If there is any difference between the projects considered herein and the Hydraulic Race Co. project, it will appear to lie in the noncontrolling fact that in the latter case the water was transported for some distance between intake and power station. Even that circumstance finds a counterpart in some projects constructed or contemplated on streams which are nonnavigable and where no Federal property is involved.

3589–II In the Hydraulic Race Co. case the Federal license involved ostensibly only the diversion of water. However, the facts were that the diversion was of the essence of the entire project, that such diversion was from a stream which constituted both navigable waters and treaty waters of the United States and that therefore the diversion could not have been made lawfully without the consent of the United States. In short, here was a case where the United States had something to give.

In contrast therewith, in the case of a project located on a nonnavigable stream and not involving the use of any property of the United States, there are the open questions as to whether a license from the United States is necessary and in any case whether the United States has anything to give.

It is submitted that, all facts considered, there would be involved substantially less strain in applying a "minor part" license to the conditions contemplated herein than in applying a "minor part" license to the Hydraulic Race Co. project.

It is of pertinent interest to note that apparently in the Hydraulic Race Co. case the Commission might have licensed the intake works or gates of the project and could have issued a "minor part" license therefor on the ground that such

3589–JJ intake works or gates involved only a minor part of the entire project.

Instead the Commission issued a license for something which is not physical, namely, the diversion of water. Diversion of water is akin in that respect to operation of a dam and power development.

No action by Commission on a Proposal such as that made herein:

It is believed that at no time in the past has the Commission been requested to issue a "minor part" license for a project of major proportions located upon a nonnavigable stream and not involving use of any property of the United States. It is true that, by letter of March 1st, 1928 (Exhibit "B" hereof), Appalachian Electric Power Company requested the Commission to issue for such a project a license free from conditions other than those relating to the protection of navigation. However, both the applicant power company and the Commission had in mind a so-called "major" license, from which the applicant had proposed that there be eliminated certain provisions which it alleged to be illegal. The Commission found that "modification of the form of license as requested in the letter of March 1st would be in violation of the provisions of the Federal Water Power Act." (Eighth Annual Report, page 147.) At no time, however, was the applicability of a "minor part" license considered.

3589-KK Conclusion

It is submitted that a "minor part" license would be precisely appropriate and applicable under the circumstances considered herein.

Submitted by Curtis, Mallet-Prevost, Colt & Mosle, in collaboration with Col. F. W. Scheidenhelm, Consulting Engineer.

3589-LL *Defendant's exhibit No. 531*

FEDERAL POWER COMMISSION,
Washington, July 21, 1930.

Secretary of War, Chairman; Secretary of the Interior; Secretary of Agriculture; F. E. Bonner, Executive Secretary.

Address reply to Executive Secretary and refer to MP-739-Virginia, Appalachian Electric Power Company.

DEAR MR. ATTORNEY GENERAL: In your letter of June 13, in reply to my letter of June 9, you suggest that the questions upon which your opinion is desired be formulated. In accordance with that suggestion the following is submitted:

The Federal Power Commission now has before it for consideration an application from the Appalachian Electric Power Company for a license for a power development on the New River in the State of Virginia.

The facts in the case are as follows:

(a) The Kanawha River is entirely in the State of West Virginia and is formed by the junction of the New and Gauley Rivers a short distance above Kanawha Falls. It flows about 97 miles in a general northwesterly direction and empties into the Ohio River at Point Pleasant, West Virginia. It is improved from its mouth for about 90 miles. The existing project was adopted by the River and Harbor Act of June 12, 1875, and provides for eight locks with movable dams and two locks with fixed dams to furnish a 6-foot navigable depth from the mouth to a point 90 miles above.

(b) New River is neither navigated nor navigable in fact.

3589-MM (c) On June 26, 1925, the New River Development Company submitted to the Federal Power Commission a declaration of intention covering the proposed construction of a power development on New River, in Pulaski County, Virginia. The dam was to be located six miles above the city of Radford, Virginia, and about 155 miles above the head of navigation on the Kanawha River.

(d) The United States own no lands or other property in the vicinity of the project.

(e) Under date of September 2, 1926, Appalachian Electric Power Company, as successor in interest to New River Development Company, submitted an application for license.

(f) None of the proposed works is in navigable waters. All are at least 155 miles from the head of navigation. None of the works can in itself offer physical obstruction to navigation. Only by the operation of the works in impounding and releasing water can any effect on the navigable waterway, the Kanawha River, possibly be produced.

(g) At its eighty-eighth meeting, June 1, 1927, the Commission found that said river (New) in the part involved in said declaration is not "navigable waters" within the definition thereof in said act, but that the interests of interstate or foreign commerce would be affected by such proposed construction. The decision of the Commission on this declaration is printed in full on pages 113 and 114, seventh annual report of the Federal Power Commission—1927.

3589–NN (h) On July 1, 1927, the Commission forwarded to the attorneys of the applicant copies of the license which it proposed to issue. Copy of the proposed license is herewith. All the provisions necessary for the protection of navigation on the Kanawha River are contained in Article 14 on page 10 thereof.

(i) Under date of March 1, 1928, Appalachian Electric Power Company addressed to the Federal Power Commission a request that it issue for the project a license containing provisions limited to those which are relevant for the protection of navigation on the Kanawha River. Copy of letter is herewith and also it is printed on pages 143 to 147, inclusive, of the eighth annual report of the Federal Power Commission—1928.

The determination of what is the proper action in this case appears to depend upon the interpretation of Section 23 of the act. It would appear, therefore, that if a license must be issued under Section 23 of the act, consideration should be given as to what provision may be legally included in the license.

It is necessary, in the administration of the affairs of the Commission and to act under the law, to determine the following legal questions:

1. The applicant having agreed to accept the conditions relating to the release of water from the project, may the Commission deny a license and thereby deny to the applicant the use of his property, until he accepts the application to his project on a non-navigable stream of all the provisions of the act?

3589–OO 2. Is the Commission authorized or required, by Section 23 or any other section of the Federal water power act, to write into the license for this project on private property and on a non-navigable tributary of a navigable waterway, any provisions other than those necessary to insure such release of water therefrom as will maintain unimpaired the navigable capacity of the navigable waterway below, viz., the Kanawha River, or, otherwise stated, may all conditions imposed on licenses on navigable streams, including the recapture clause, be inferred under the facts in this case?

Heretofore the policy of this Commission has been to require the same license conditions both as to licenses for projects on navigable streams and as to those granted for projects on non-navigable streams under Section 23 of the act, but contentions have been made as set out in the attached memorandum which is submitted for your consideration.

Very truly yours,

(Signed) PATRICK J. HURLEY,
Secretary of War, Acting Chairman.

Inclosures: Memorandum on Section 23 of the act. Map. Copy of license. 8th annual report—Federal Power Commission. Letter of Curtis, Mallet-Provost, Colt & Mosle of Feb. 4, 1930, and accompanying memorandum. Copy of letter from State Commission on Conservation and Development dated May 29, 1930.

3589–PP *Defendant's exhibit No. 532*

(The following opinion of the Attorney General was released by the Federal Power Commission, September 26, 1930.)

DEPARTMENT OF JUSTICE,
Washington, September 22, 1930.

SIR: In response to your letter of July 31, 1930, requesting my opinion on certain questions regarding the issuance of a license under Section 23 of the Federal Water Power Act (41 Stat. 1075; 16 U. S. C., c. 12, Sec. 817) contained in a letter addressed to me by Hon. Patrick J. Hurley, Secretary of War, as Acting Chairman of the Federal Power Commission, under date of July 21, 1930, I have the honor to advise you as follows:

The questions submitted arise in connection with the application of the Appalachian Electric Power Company for a license for a projected water power development on New River, a nonnavigable stream. The power Company has requested the Commission to issue a license containing only such conditions as the Commission shall deem reasonable and appropriate for the protection of navigation on the Kanawha River, a navigable stream to which the New River is tributary, and has declined to accept a license ten-

dered by the Commission containing all of the conditions, provisions, and requirements specified in the Federal Water Power Act of June 10, 1920, 41 Stat. 1063, c. 285. This request and declination of the Appalachian Electric Power Company are contained in its letter of March 1, 1928, directed to the members of the Commission and published in the Eighth Annual Report of
the Federal Power Commission, at pages 143 to 147.
3589–QQ The questions submitted are as follows:

1. The applicant having agreed to accept the conditions relating to the release of water from the project, may the Commission deny a license and thereby deny to the applicant the use of his property, until he accepts the application to his project on a non-navigable stream of all the provisions of the Act?

2. Is the Commission authorized or required, by Section 23 or any other section of the Federal Water Power Act, to write into the license for this project on private property and on a non-navigable tributary of a navigable waterway, any provisions other than those necessary to insure such release of water therefrom as will maintain unimpaired the navigable capacity of the navigable waterway below, viz., the Kanawha River, or, otherwise stated, may all conditions imposed on licenses (sic) on navigable streams including the recapture clause, be inferred (sic) under the facts in this case?

The facts of the case as recited in the Commission's letter of July 21, 1930, are as follows:

The Kanawha River is a navigable stream entirely within the State of West Virginia. It is formed by the junction of the New and the Gauley Rivers, a short distance above Kanawha Falls; flows thence about 97 miles in a generally northwesterly direction, and empties into the Ohio River at Point Pleasant, West Virginia. It is navigable for 90 miles above its mouth, a 6-foot navigable depth being maintained by means of eight locks with movable dams and two locks with fixed dams. New River, upon which the proposed development of the Appalachian Electric Power Company is located, is neither navigated nor navigable in fact. On June 26, 1925, the New River Development Company submitted to the Federal Power Commission a declaration of intention
covering the project in question, to be located near Rad-
3589–RR ford, in Pulaski County, Virginia, about 155 miles
above the head of navigation on the Kanawha River.
The United States owns no lands or other property in the vicinity of the project. None of the proposed works is in navigable waters and none can in itself offer physical obstruction to navigation. Only by the operation of the works in impounding and releasing water, and thus creating an uneven stream flow, can any effect upon the navigability of the Kanawha River be produced. Under the date

of September 2, 1926, Appalachian Electric Power Company, as successor in interest to New River Development Company, submitted its application for license under Section 23 of the Federal Water Power Act. The Commission thereafter, on June 1, 1927, made the following decision with respect to this application:

"The Commission having caused investigation of such proposed construction to be made and it appearing from such investigation and from reports submitted thereon that said project, unless operated in the interests of interstate or foreign commerce in accordance with the requirements of said Act, would have an adverse effect on such interests, but if operated in accordance with such requirements would materially benefit such commerce, thereupon found that said River and the part thereof involved in said declaration is not "Navigable waters" within the definition thereof in said act, but that the interests of interstate or foreign commerce would be affected by such proposed construction. (Seventh Annual Report of the Federal Power Commission, 1927, pp. 113–114.)

In my opinion of July 1, 1930, with reference to an application for license for a power project on the Cumberland River in Kentucky, I had occasion to advise you in regard to the application of Section 23 of the Federal Water Power Act to a project for the development of water power on the upper nonnavigable part of a stream which in its lower reaches was a highway of interstate commerce, and concluded that the 3589–SS Commission had jurisdiction in that case to entertain the application of the Cumberland Hydroelectric Power Company for a license to carry on its project on the Cumerland River. Similarly in this case I am constrained to conclude that in view of the findings of the Commission above quoted the Commission has power to entertain the application of the Appalachian Electric Power Company, and to issue a license for this project under the provisions of Section 23 of the Act. The Commission having found that the interests of interstate and foreign commerce would be affected by the proposed construction, the Appalachian Electric Power Company is prohibited by the terms of Section 23 of the Federal Water Power Act from proceeding with the construction of its project "until it shall have applied for and shall have received a license under the provisions of this Act."

Section 10 of the Act provides that all licenses issued under the Act, except minor part licenses authorized under paragraph (i) of Section 10, shall be on certain specified conditions, and such other conditions not inconsistent with the provisions of the Act as the Commission may require. Many of the conditions specified in Section 10 appear to have no effect in preventing impairment of or in developing the navigable capacity of t Kanawha River, which can only be effected by the manner which the flow of the stream is controlled in connection with t operation of the projected water power. It is to such conditio that the applicant for a license objects. The only authori granted to the Commission to dispense with these conditio specified in Section 10 is found in subdivision (i) of Section 1 which reads as follows:

3589–TT “(i) In issuing licenses for a minor part only of complete project, or for a complete project of not mo than one hundred horsepower capacity, the Commission may its discretion waive such conditions, provisions, and requiremen of this Act, except the license period of fifty years, as it ma deem to be to the public interest to waive under the circumstances: Provided, That the provisions hereof shall not apply t lands within Indian Reservations.”

The question is therefore presented whether the Commission ma in this case issue a minor part license with such conditions as i shall deem necessary in the public interests.

The legislative history of this provision throws but little ligh upon its precise meaning. The genesis of the clause is found i a Conference Committee Report on a Bill pending in the 65th Congress which failed of passage. (House Report No. 1147, 65th Congress, 3rd Session; Congressional Record, Vol. 57, p. 4635. This report shows that the Conference Committee added to Section 10, paragraph (h), which reads as follows:

“(h) That combinations, agreements, arrangements, or understandings, express or implied, to limit the output of electrica energy, to restrain trade, or to fix, maintain, or increase prices fo electrical energy or service are hereby prohibited. In issuin licenses for a part only of a complete project, where the land o the United States required is to be used only for transmissio lines, water conduits, or for storage reservoirs, or for a complet project of not more than fifty horsepower capacity, the commission may in its discretion waive such conditions, provisions, and requirements of this act as it may deem equitable in the circumstances.”

The only comment upon this amendment found in the Reports i a statement by the managers on the part of the House: “It i thought by your conferees that such discretion should be vested in the commission.”

3589–UU During the First Session of the 66th Congress, H. R. 3184 was introduced containing Section 10 (h), as above quoted, from the Bill which failed of passage in the previous Congress. Thereafter the Committee on Commerce of the

Senate proposed an amendment to the Bill by deleting the second sentence of paragraph (h), above quoted, and adding paragraph (i) in the following form:

"(i) In issuing licenses for a minor part only of a complete project, or for a complete project of not more than two hundred horsepower capacity, the commission may in its discretion waive such conditions, provisions, and requirements of this act, except the license period of fifty years, as it may deem to be to the public interest to waive under the circumstances." (66th Congress, 1st Session; Senate Report No. 180, p. 15.)

There was no statement in this Report regarding the purpose of the Committee in proposing this amendment.

The Bill passed the Senate, with a proviso added to this clause reading: "Provided, That the provisions hereof shall not apply to lands within Indian Reservations," and was then referred to a Conference Committee of both Houses. In Conference, Section 10 (i) was amended to read in its present form. A statement by the managers on the part of the House appearing in the 59th Congressional Record, Part 6, p. 6384, with reference to this clause, read as follows:

"On amendments No. 42 and 43: These amendments strike from the House bill the provision authorizing the commission in its discretion to waive certain conditions, provisions, and requirements of the act in issuing licenses for a part only of a complete project, where the land of the United States required is to be used only for transmission lines, water conduits, or for storage reservoirs, or for a complete project of not more than 50-horsepower capacity. In lieu of the House provisions the Senate excepted from such waiver the license period of 50 years and increased the horsepower capacity to 200 horsepower.
3589–VV The House conferees agreed to the Senate substitute with an amendment reducing the horsepower capacity to 100. Under the House provision the commission could allow perpetual grants without conditions for transmission lines, water conduits, and storage reservoirs if the remainder of the project was on private land."

The Bill containing Section 10 (i), as thus agreed upon by the Conferees, passed both Houses without debate on this paragraph.

The intent to broaden the application of the clause and thus to bring within the discretion of the Commission the provisions of any license for a minor part of a complete project is entirely clear but precisely what was meant by the clause "In issuing licenses for a minor part only of a complete project" is left obscure, and this clause requires interpretation in the light of the powers which Congress intended to exercise, and the purposes which it intended to accomplish.

Upon the facts stated by the Commission in this case the United States has no power to prevent the construction of the proposed project on the New River unless its operation will tend to impair the navigability of the Kanawha River by changing the normal and regular flow of the stream; and the only interest which the United States has to protect, and for which it may be justified in issuing a license, is a very minor part of the complete project, viz., the manner in which the flow of the stream below the dam is affected by the operation of the water power. I am advised by a representative of the Commission that under a license providing merely for proper control of the retention and release of water, this project will tend to improve the navigability of the
Kanawha River. Under these circumstances every
3589–WW purpose within the power of Congress may be accomplished by the issuance of a minor part license under paragraph (i) of Section 10. Accordingly I am of the opinion that the most reasonable construction of this statute is that paragraph (i) of Section 10 was intended to have application in such a case provided the interests of the United States may be fully protected by the issuance of a license to control the flow of the stream and/or to use physical instrumentalities which may be constructed for this purpose, the conditions of such license to be fixed by the Commission in its discretion under Section 10 (i) of the Act.

This interpretation appears necessary in order to avoid serious questions regarding the constitutionality of the Act which might be presented if Section 10 (i) should be interpreted so as to have no application to projects constructed in or on non-navigable streams, which only remotely and indirectly affect the navigability of waters in the lower reaches of streams to which they are tributaries. If paragraph (i) of Section 10 is not applicable in such cases the Commission would in no such case be authorized to waive any of the conditions specified in Section 10, because Section 23 prohibits any such construction, once the Commission finds that the interests of interstate or foreign commerce will be affected, until a license is issued under the provisions of the Act. To hold that the Commission has full authority under this section to exercise its discretion in granting a minor-part license in this case leads to a reasonable construction of the statute and a full accomplishment of its legislative purpose.

3589–XX This interpretation of paragraph (i) of Section 10 finds some support in the administrative construction of the Act adopted by the Commission on May 23, 1925, in its consideration of several applications (Project No. 15) of Hydraulic Race Company and other corporations, reported in the fth Annual Report of the Federal Power Commission, 1925, pp. 111 and 112.

In answering the questions proposed by the Commission, I have cordingly to advise you that it is my opinion that the Commis- on may, in its discretion issue a minor-part license under para- aph (i) of Section 10, for the construction and operation of e project here in question; that it is not required to insert in a ense issued for this project, any conditions (except the fifty- ar limitation upon the terms of the license) which, in its judg- ent, are not necessary or appropriate to fully utilize the waters the New River in the protection or development of navigation the Kanawha River.

Respectfully,

(Signed) WILLIAM D. MITCHELL,
Attorney General.

The PRESIDENT.

89-YY *Defendant's exhibit No. 533.*

CURTIS, MALLET-PREVOST, COLT & MOSLE,
ATTORNEYS AND COUNSELLORS AT LAW,
New York, October 6, 1930.

Subject: Project 739 Virginia Appalachian Electric Power Company

EDERAL POWER COMMISSION,
Washington, D. C.

SIRS: We have been advised of the opinion rendered by the ttorney General of the United States in the above matter dated ptember 22, 1930, and released by your Commission under te of September 26, 1930.

We respectfully refer to application for license made by the dersigned Company under date of August 30, 1926 heretofore ed with your Commission under the project number above entioned and we request that such application for license be ly considered and acted upon by your Commission in the light the above mentioned opinion of the Attorney General of the nited States.

In this connection we intend shortly to submit to you appro- iate copies of revised plans to be substituted for certain of plans which were filed with you as part of the above-men- ned original application.

As evidence of compliance with requirements of the laws of State of Virginia in relation to the proposed project and pplementing the information submitted with the Company's original application was send you herewith photostatic copies of letter from the Company to the State Corporation Commission, Richmond, Va., dated June 11, 1930, and the State Corporation Commission's reply dated June 16, 1930.

Respectfully yours,

APPALACHIAN ELECTRIC POWER COMPANY,
By CURTIS, MALLET-PREVOST, COLE & MOSLE.

Enc.
CEM:20

3589-ZZ *Defendant's exhibit No. 534*

Photostat copy of letter of October 16, 1930, to Federal Power Commission, signed—A. E. P. Co., by Curtis, Mallet-Prevost, Cole & Mosle. (Original Exhibit.)

3589-AAA *Defendant's exhibit No. 535*

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 7, 1930.

The EXECUTIVE SECRETARY,
Federal Power Commission,
Interior Department Building, Washington, D. C.

DEAR SIR: 1. Reference is made to your letter dated October 17, 1930, requesting approval by the Chief of Engineers and the Secretary of War of tracings accompanying the application of the Appalachian Electric Power Company (Project 739) for a minor part license to develop water power on the New River, near Radford, Va.

2. In reply I would inform you that the plans, which have been examined and found satisfactory so far as the interests of navigation are concerned, have been approved by the Chief of Engineers and the Secretary of War and are returned herewith.

3. It is understood that the construction of the project will be under the supervision of this office, that all work will be done to the satisfaction of the District Engineer in charge and that detailed plans will be submitted to him for approval as he may direct.

4. It is requested that the condition suggested in your letter of October 3, 1930, and approved in the letter of October 10, 1930, be revised to read as follows:

"Whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 second-feet, the Licensee shall when so directed by the Secretary of War discharge in each 24 hours the natural flow of the river at the dam site during that period up to a discharge of 1,150 acre-feet. The discharge from the project shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent undue interference with navigation on the Kanawha River."

For the Chief of Engineers:

Very respectfully,

JOHN J. KINGMAN,
John J. Kingman,
Lieut. Col., Corps of Engineers.

Inclosures: subs. 1–6 (tracings).

3589–BBB *Defendant's Exhibit No. 536.*

Letter dated October 31, 1930, from F. E. Bonner to A. E. P. Co., re Project No. 739. (Original Exhibit.)

3589–CCC *Defendant's Exhibit No. 537*

FEDERAL POWER COMMISSION

Secretary of War, Secretary of the Interior, Secretary of Agriculture.

Address Reply to F. E. Bonner, Executive Secretary, And Refer To EP–739–Virginia, Appalachian Electric Power Company.

Washington, November 6, 1930.

APPALACHIAN ELECTRIC POWER COMPANY,
c/o Col. F. W. Scheidenhelm,
50 Church Street, New York, N. Y.

GENTLEMEN: Please refer to our letter of October 31.

Further study of the draft of proposed license for the Radford development has resulted in several changes therein, and a revised copy is being transmitted herewith. Please substitute it for the one previously furnished you.

Very truly yours,

(Sd.) F. E. BONNER,
Executive Secretary.

Incl. 1088.

Answered Nov. 8, 1930. F. W. Scheidenhelm.

3589–DDD Federal Power Commission

Minor-Part License on Nonnavigable Waters

Project No. 739—Virginia. Appalachian Electric Power Company

Whereas, the act of Congress approved June 10, 1929 (41 Stat. 1063), designated therein as "the Federal Water Power Act" and hereinafter called "the Act," provides, inter alia, "that a commis-

sion is hereby created and established to be known as the Feder
Power Commission," hereinafter called "the Commission," a
"that any person, association, corporation, State, or municipali
intending to construct a dam or other project works across, alo
over, or in any stream or part thereof, other than those defin
herein as navigable waters, and over which Congress has jurisd
tion under its authority to regulate commerce between forei
nations and among the several States, may in their discretion f
declaration of such intention with the Commission, whereupon t
Commission shall cause immediate investigation of such propos
construction to be made, and if upon investigation it shall find th
the interests of interstate or foreign commerce would be affect
by such proposed construction, such person, association, corpor
tion, State, or municipality shall not proceed with such constru
tion until it shall have applied for and shall have received a licen
under the provisions of this Act. If the Commission shall not
find, and if no public lands or reservations are affected, permissi
is hereby granted to construct such dam or other project works
such stream upon compliance with State laws;" and

Whereas, Appalachian Electric Power Company, hereinaft
called "the Licensee," a corporation organized a
3589-EEE existing under the laws of the State of Virginia a
having its office and principal place of business in t
city of Richmond, in the State of Virginia, has made application
due and proper form to the Commission for a license for a pow
project designated as project No. 739 on the records of the Co
mission, and for authority to construct, maintain, and operate
the New River, in the vicinity of Radford, in the County
Pulaski, State of Virginia, certain project works hereinaft
described; and

Whereas, in accordance with the foregoing provision of la
the New River Development Company, a corporation organiz
under the laws of the State of Virginia, did on June 26, 19
declare its intention to construct a dam and other works in t
New River, in the vicinity of said power development; and

Whereas, said Commission caused investigation of the propos
construction to be made as required by said Act, and at
meeting of June 1, 1927, made the following findings:

"In the matter of the declaration of intention, under the pro
sions of Section 23 of the Federal Water Power Act, of N
River Development Company, a corporation organized under t
laws of the State of Virginia, to construct a dam and oth
structures across and in New River in the vicinity of Radfor
Pulaski County, State of Virginia, said dam and other structur
being part of a power project proposed to be constructed for t
purpose, inter alia, of the development and utilization of pow

said declaration having been submitted to the Commission under date of June 26, 1925: The Commission having caused investigation of such proposed construction to be made and it appearing from such investigation and from reports
3589-FFF submitted thereon that said project, unless operated
in the interests of interstate or foreign commerce in accordance with the requirements of said Act, would have an adverse effect on such interests, but if operated in accordance with such requirements would materially benefit such commerce, thereupon found that said river in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said Act, but that the interests of interstate or foreign commerce would be affected by such proposed construction;" and

Whereas, on September 4, 1926, the Appalachian Electric Power Company presented evidence of its succession to the rights of New River Development Company; and

Whereas, the Commission at its meeting of found that the manner in which the flow of the stream below the dam will be affected by the operation of the project and the conditions which are necessary or appropriate to be imposed upon the project to fully utilize the water of the New River in the protection or the development of navigation of the Kanawha River constitute a minor part of a complete project; and

Whereas, the maps, plans, and specifications of said project and of said project works, as hereinafter described, have been approved by the Commission, and the plans of the dam and other structures affecting navigation have been approved by the Chief of Engineers and the Secretary of War; and

Whereas, the Licensee has submitted to the Commission satisfactory evidence of compliance with the laws of the State of Virginia, as required by Section 9, subsection (b), of the Act; and

3589-GGG Whereas, the Licensee on the day of
pursuant to an authorization of its board of directors, a certified copy of the record thereof being hereto attached, accepted in writing all of the terms and conditions of this license:

Now, therefore, the Commission hereby issues this license to the Licensee for a period terminating fifty (50) years from the date hereof, subject to the conditions hereinafter specified, for the purpose of constructing, operating, and maintaining in New River, Virginia, the following project works: A dam, a power plant, and other appurtenant structures and equipment; the location, nature, and character of which works are more fully shown and described by certain exhibits filed with the Commission in connection with said application for license and which are designated and described as follows:

Exhibit J—Map (FPC No. 739–1) with title "Location Map and Drainage Area (A. E. P.–R. D.–3001)."

Exhibit K—Map (FPC No. 739–9) with title, "General Map of Project (A. E. P.–R. D.–3002)."

Exhibit L—Maps and plans in two sheets (FPC Nos. 739–10, 13) with titles as follows: L–1, "Plan of Dam Site (A. E. P.-R. D.–3003)." L–4, "Elevation and Sections of Dam and Power Station (A. E. P.–R. D.–3005)."

which said exhibits approved by the Executive Secretary on behalf of the Commission are hereby made a part of this license, and no substantial change shall hereafter be made therein, until such change shall have been similarly approved; said license being subject to the following express conditions, other provisions and requirements of the Act being waived under authority of Section 10 (i) thereof. 3589–HHH

Article 1. The Licensee shall begin the construction of said project works on or before January 1, 1932, shall thereafter in good faith and with due diligence prosecute such construction, and shall complete the same on or before December 31, 1936, such construction to be in substantial conformity with the approved exhibits or as modified under proper authorization; and in case the Licensee shall not commence actual construction of the project works within the time prescribed in this license or as extended by the Commission, then, after due notice given, the license may be terminated upon written order of the Commission.

Article 2. The work of construction under this license shall be subject to the inspection and approval of the District Engineer, U. S. Engineer Office, Huntington, West Virginia, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall notify such representative of the date upon which work will begin, and as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of construction for a period of more than one week, and of its resumption and completion.

Article 3. The Licensee shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of said project works, or of the works appurtenant or accessory thereto, and in no event shall the United States be liable therefor.

3589–III Article 4. The License shall allow officers and employees of the United States free and unrestricted access in, through, and across the lands occupied by the project works in the performance of their official duties.

Article 5. The Licensee shall maintain said project works in a condition of repair adequate for the safe and efficient operation thereof in the development of power and shall make all necessary renewals and replacements for such purpose.

Article 6. Whenever the flow at Lock No. 2, Kanawha River, falls below 1,400 second feet, the Licensee shall when so directed by the Secretary of War discharge in each 24 hours the natural flow of the river at the dam site during that period up to a discharge of 1,150 acre feet. The discharge from the project shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent undue interference with navigation on the Kanawha River.

Article 7. The Licensee shall install and maintain at its own expense such gage or gages and such gaging station or stations, or such other means of stream-flow measurements as the District Engineer of the War Department, in charge of the improvement of the Kanawha River, may deem necessary to protect the interests of navigation.

Article 8. Whenever the Licensee is directly benefited by the construction of a storage reservoir or other headwater improvement by another licensee, a permittee, or the United States, the Licensee shall reimburse the owner of such reservoir or other improvement for such part of the annual charges for interest, maintenance, and depreciation thereon as the Commission may deem equitable. The proportion of such charges to be paid by the Licensee shall be determined from time to time by the Commission. Whenever such reservoir or other improvement is constructed by the United States, the Licensee shall pay similar charges into the Treasury of the United States upon bills rendered by the Commission.

3589—JJJ

Article 9. The Licensee shall pay to the United States as reimbursement for the cost of the administration of the Act, an annual charge of One Hundred Dollars ($100), such charge for any calendar year to be paid at the end thereof, or within thirty days thereafter, upon bills rendered or approved by the Commission.

Article 10. With the written consent of the Licensee, the Commission may by order made under its seal, modify, alter, enlarge, or omit, in so far as authorized by law, any one or more of the conditions or provisions of this license.

Article 11. The rights of the Licensee and of its transferees, assignees, or successors acquired by this license shall absolutely cease at the end of the period thereof, unless a new license shall be issued pursuant to then existing laws and regulations.

Article 12. The provisions of Section 16 of the Act, all provisions reserving any power of taking over the project by condemnation proceedings, and all applicable provisions of law, including the Act, providing remedies to the United States for the violations of the terms and conditions of this license, shall remain applicable thereto.

3589-KKK In witness whereof, the Federal Power Commission has caused its name and seal to be hereto signed and affixed by its this day of pursuant to authority given at its meeting of a certified copy of the record thereof being hereto attached.

FEDERAL POWER COMMISSION,
By ——— ———.

3589-LLL In testimony of acceptance of all the terms and conditions of the foregoing license, the Licensee, this day of has caused its name and corporate seal to be hereto signed and affixed by its pursuant to a resolution of its board of directors passed on the day of , a certified copy of the record thereof being hereto attached.

APPALACHIAN ELECTRIC POWER COMPANY,
By ——— ———, *President.*

Attest:
——— ———, *Secretary.*

3590 *Defendant's exhibit No. 538*

NOVEMBER 8, 1930.

EP-739-Virginia—Appalachian Electric Power Company

DEAR GENERAL BROWN: I have Colonel Kingman's letter of November 7 regarding the approval of the plans for the project on New River near Radford, Virginia, contemplated by the pending license application (No. 739) of the Appalachian Electric Power Company.

In preparing this case for presentation to the Commission for final action a question has been raised regarding the formal finding made by the Commission on June 1, 1927, that the portion of New River embracing the proposed project works is not "navigable waters" within the definition of the act. This finding was made pursuant to the recommendation of your office included in report of December 29, 1925.

For your information I am inclosing a copy of my memorandum of October 30 to the Acting Chairman of the Commission, together with copies of the two memoranda referred to therein. These papers will serve to explain the question which has been raised regarding the nonnavigability finding. It will be much appreciated by the Commission if at your early convenience you will review the inclosed material in so far as it relates to this point and advise whether there is anything therein presented which would cause you to change or modify the previous conclusion of your office.

Very truly yours,

F. E. BONNER, *Executive Secretary.*

The CHIEF OF ENGINEERS,
War Department.

Incl. 1090.
FEB: ARH.
3 copies to the Chief of Engineers.

3590-A *Defendant's exhibit No. 539-A*

Letter by Federal Power Commission of December 15, 1930, signed by F. E. Bonner, Executive Secretary, to Curtis, Mallet-Prevost, Colt & Mosle. (Original Exhibit.)

3591 *Defendant's exhibit No. 539-B*

"Inclosure 7992, from Federal Power Commission, U. S. Government Printing Office 1927." Marked Copy. War Department office of Chief of Engineers, Washington, 11/11/1930 addressed to Federal Power Commission, signed "Lytle Brown, Major General, Chief of Engineers."

3592 *Defendant's exhibit 539-B*

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 11, 1930.

The EXECUTIVE SECRETARY,
FEDERAL POWER COMMISSION,
DEPARTMENT OF THE INTERIOR,
Washington, D. C.

DEAR SIR: 1. Your letter dated November 8, 1930, referred to this office certain memoranda relating to the proposed license to the Appalachian Electric Power Company, Project 739, for a power development in the New River near Radford, Va. The letter specifically requests that this office review the above material, so far as it relates to the navigability of the New River, with a view to determining if it is desired to modify the opinion expressed in the report to the Commission dated December 29, 1925.

2. After a careful consideration of the material submitted, I have reached the conclusion that there is no reason for changing the previous report of this office dated December 29, 1925, with respect

to the navigability of New River. It is my opinion that New River is not navigable at any point in its course.

Very truly yours,

(Signed) LYTLE BROWN,
Major General, Chief of Engineers."

3593 *Defendant's exhibit No. 540–A*

Letter dated 11/28/1930 from F. E. Bonner, Exec. Secy. of F. P. C. to A. E. P. Co. (Original Exhibit.)

Defendant's exhibit No. 540–B

Certified copy of action of the Federal Power Commission upon application of the defendant for Minor Part license. (Original Exhibit.)

Exhibit 540–B is included in Plaintiff's Exhibit 91 and is set forth at page 2506 hereof, but, unlike Exhibit 91, was admitted in evidence for all purposes.

3593–A *Defendant's exhibit No. 541*

FEDERAL POWER COMMISSION,
Washington, October 28, 1930.

Memorandum for the Executive Secretary:

1. In his memorandum for the Executive Secretary of October 21, 1930, the Acting Chief Counsel advances three reasons why, in his opinion, a minor-part license should not be issued as proposed to the Appalachian Electric Power Company for the construction and operation of its project on New River near East Radford in Pulaski County, Virginia.

His three propositions are:

1st. Evidence that the applicant has complied with the laws of the State of Virginia, as required by section 9 (b) of the Federal water power act is, in his opinion, not satisfactory.

2d. If the applicant has complied with State law, in that he has begun construction to the extent necessary to establish exemption from obtaining a State license, he has, in his opinion, violated the prohibitions of section 23 of the water power act against proceeding without a Federal license and civil and criminal actions will lie against him. Proper steps should therefore be taken to penalize him accordingly.

3d. That the finding of the Commission at its meeting of June 1, 1927, "that said river (New) in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said act, but that the interests of interstate or foreign commerce would be affected by such proposed construction" is wrong; that the finding should now be reversed; and that the Commission should now make a finding that the New River in the part thereof involved in said declaration is navigable waters of the United States.

2. As to the first proposition. The Acting Chief Counsel states:

"From experience it is learned that it is not safe to rely upon unofficial assurances from State officials that the State laws have been complied with. The Commission and its agents must examine the record and the action required, as supplied pursuant to the regulations of the Commission, and must judge for itself whether the compliance is adequate."

3593-B The applicant has submitted the following evidence of its compliance with State law:

(1) Letter signed by the Chairman of the State Corporation Commission, Commonwealth of Virginia, stating that the applicant company has complied with the conditions of the (State) water power act, granting it exemption from the necessity of obtaining a license from that commission.

(2) Certified copy of an opinion rendered by the Judge for the Circuit Court of Pulaski County, Virginia, in a suit brought by the Appalachian Electric Power Company to condemn certain lands for the project now under consideration by the Federal Power Commission.

(3) Certified copy of an order appointing commissioners to fix the value of certain lands to be condemned for the project now under consideration by the Federal Power Commission.

(4) Certified copy of Certificate No. 1 in the Circuit Court for Pulaski County, Appalachian Electric Power Company vs. George H. Miller.

In the opinion rendered by the Judge for the Circuit Court the following conclusions are stated:

"For the foregoing reasons the Court is of the opinion that petitioner has brought itself within section 12 of the Act hereinbefore referred to and may exercise the power of eminent domain without the necessity of obtaining a license from the State Corporation Commission."

In the order appointing commissioners the Judge said:

"The case having been thereupon adjourned, for further evidence and argument on the matters contained in the motion to quash and special plea, to the 7th day of March, 1930, to be determined at Wytheville, Virginia, in vacation of said Judge of said Circuit Court . . . and it appearing from the evidence submitted at the hearing held on February 17, 1930, and at the further hearing held on March 7, 1930, that the petitioner has made the expenditures in the amounts, in the manner, for the pur-

poses, and within the periods required by Chapter 424 of the
Acts of the General Assembly of 1928 as a primary condition of
exemption from the necessity of obtaining a license under said
Act, and it appearing that, in compliance with the further conditions
requisite to petitioner's continuing exemption from the
necessity of obtaining a license under the said Act of 1928, the
petitioner has instituted its condemnation proceedings solely and
entirely under the provisions of Chapters 160 and 176 and Acts
amendatory thereof as contained in the Code of Vir-
3593-C ginia of 1924 and is not invoking any rights of eminent
domain which are conferred by the said Chapter 424
of the Acts of the General Assembly of 1928, and which are not
conferred by Chapters 160 and 176 aforesaid, i. e., is not attempting
to exercise any of the additional powers of eminent domain
conferred by said Chapter 424 and not existing under the law
in effect January 1, 1928, and the petitioner has begun actual
construction of its water-power development within the period
specified by the said Act of 1928, and it further appearing that
the petitioner is not required by the Act of 1928 to obtain a
license or other authority from the State Corporation Commission,
it is so adjudged, ordered and decreed."

Certificate No. 1 states in part as follows:

"Upon a hearing of motion to quash and special plea filed herein, the following facts were established:

"1. Petitioner is a public service corporation engaged within the State of Virginia in the production, transmission and distribution *and distribution* of electric energy generated partly by steam and partly by water power, and is entitled under the laws of the State of Virginia to exercise the power of eminent domain for the purpose of acquiring properties to be used in the production and distribution of hydro-electric power.

"2. The proposed work of petitioner involves the construction of a dam across New River in Pulaski County, Virginia, with an appurtenant power station, and the impounding of the waters of said river, which will submerge or affect the lands of the defendants to the extent proposed to be acquired by the petitioner.

* * * * * *

"4. New River is not now, and has never been, navigable in fact, in the State of Virginia.

* * * * * *

"11. Petitioner and its predecessor have expended since January 1, 1923, and prior to January 1, 1928, more than $10,000, and since January 1, 1923, and up to this time an aggregate of upwards of $600,000 in investigation, surveys, acquisitions of lands

l construction work in respect to this project, and more than
),000 between January 1, 1923, and the effective date of the
rginia Water Power Act of 1928, in the investigation of, the
quisition of lands and rights for, and the construction of the
said power development.

3-D "12. Physical work necessary in the construction of the
hydro-electric development has been done; explorations
the reservoir site have been carried on with the view of ascer-
ning its suitability in various respects; necessary roadways
ze been built and other necessary roadways reconditioned and
fted for the purpose of bringing materials to be used in the
nstruction work and for other uses in connection with the con-
uction work; holes have been drilled both in the natural rim
the proposed reservoir and also at the dam-site, including the
l of New River at the dam-site, which holes are to be grouted,
at is, will be filled with either liquid cement or asphalt in order
seal the crevices in the rock; the Petitioner has acquired a
aded railroad bed with track thereon leading directly to the
m-site by means of which necessary materials will be taken to
dam-site and unnecessary excavated material will be re-
oved; although that part of the hydro-electric development
own as the dam has not been erected, there has been done
tain excavation work necessary for the foundation of the dam
the south side of the river and for the power station, includ-
g the stripping of the surface material down to bedrock and
removal of the inferior surface rock.

* * * * *

"The foregoing, together with those facts set forth in the order
rein, are the material facts proved at hearings upon the motion
quash and the special plea filed in this case.

"Given under my hand this 30 day of May, 1930.

(Signed). HORACE SUTHERLAND, *Judge*."

Here we have a duly constituted court of the Commonwealth
Virginia finding the facts, and from the facts determining
at the Appalachian Electric Power Company by spending cer-
in sums and beginning construction prior to a certain date has
ablishing exemption from the necessity of obtaining a license
om the State Corporation Commission. Further, the court
termines that the company has the right to secure through
ndemnation the lands it needs for the project. Also we have
e letter of the Chairman of the State Corporation Commission
ating that no State license is required.

Are these "unofficial assurances from State officials that the
ate laws have been complied with"?

What better evidence can be obtained? How is the decision of the State court that the company has the right to go ahead with the project even through condemnation, to be set aside?

3593–E 3. As to the Acting Chief Counsel's second proposition.

In the construction industry, work on a project is deemed to have been begun when work which must be done in the prosecution of the work is begun. The construction of roads and railroads, the assembly of plant, construction of camps, and the like constitute a beginning of construction. The expenditures for such work are legitimate charges against the project and are allowed by the Federal Power Commission itself.

The Judge of the Circuit Court of Pulaski County, Virginia, has decided that for purposes of the State water power act the facts establish a beginning of construction by the company.

The Acting Chief Counsel argues that such beginning of construction under State law must be a violation of the prohibition of section 23 of the Federal water power act against proceeding without a Federal license. This is a new and novel idea. Since the New River is not navigable, the United States has no rights for the passage of vessels or floated materials over the bed and banks below ordinary high water. The only right of the United States is that established by the Supreme Court in the Rio Grande case, viz, to prevent any acts which will substantially diminish the navigability of the Kanawha River. The facts established by the Circuit Court of Pulaski County show that no such acts have been committed.

Even if the New River at the site of the project were navigable, the company has built nothing in the river below ordinary high water which would constitute an obstruction to navigation under the Rivers and Harbors Act of 1899, if it were applicable in this case.

Under that act, for example, permits must be obtained from the War Department for the construction of bridges across navigable streams, but the construction of approaches and abutments on private property above ordinary high water, in the expectation of obtaining a permit, can not be held to be in violation of the law.

Even in the administration of the Federal water power act it has not been suggested that an attempt be made to prevent a prospective licensee from going ahead with construction work on private lands, pending issuance of a license for permanent work in the river. Such action would not be in the public interest.

The facts, as established by the State court, demonstrate that no rights of the United States in the New River have been invaded, and it is not apparent how "civil and criminal actions lie" inst the company or how it is to be penalized as suggested by the Acting Chief Counsel.

3-F 4. The third proposition advanced by the Acting Chief Counsel is that the finding of the Commission, le June 1, 1927, that New River in the part involved in the aration of intention is not "navigable waters" is wrong and ıld be reversed.

et us first examine the record as to the finding which it is posed to reverse, and then the purpose of the recommenda- to reverse it.

he declaration of intention of the New River Development npany, predecessor in interest of the Appalachian Electric ver Company, was made to the Commission June 26, 1925.

he second paragraph of section 23 of the Federal water power provides:

That any person, association, corporation, State, or munici- ity intending to construct a dam or other project works across, ng, over, or in any stream or part thereof, other than those ned herein as navigable waters, and over which Congress has isdiction under its authority to regulate commerce between eign nations and among the several States, may in their dis- tion file declaration of such intention with the commission, ereupon the commission shall cause immediate investigation such proposed construction to be made, and if upon investi- ion it shall find that the interests of interstate or foreign nmerce would be affected by such proposed construction, such son, association, corporation, State, or municipality shall not ceed with such construction until it shall have applied for l shall have received a license under the provisions of this act. the commission shall not so find, and if no public lands or ervations are affected, permission is hereby granted to con- uct such dam or other project works in such stream upon npliance with State laws."

n compliance with this provision of law, a most thorough estigation was made both as to the question of navigability l as to the effect which the operation of the proposed works ght have upon the commerce on the Kanawha River.

The Chief of Engineers of the Army made for the Commission horough study covering the past and present physical conditions the stream, its history, all the Federal laws relating to the eam, and all the decisions of the Supreme Court of the United ates bearing upon the question as to whether it could be held be navigable. In a comprehensive report dated December 29, 1925, the Chief of Engineers, United States Army, stated:

03-G As to navigability

"I, therefore, conclude that New River is not at the present time a navigable water of the United States within the meaning of the Constitution and laws of Congress including section 3 of the Federal Power Act."

And as to the effect upon interstate and foreign commerce

"I, therefore, report that in my opinion New River in its present condition is not a navigable stream and that navigation on the Kanawha River will not be adversely affected by the proposed power development."

On March 2, 1926, the Secretary of War, the Secretary of the Interior, and the Secretary of Agriculture, sitting as the Federal Power Commission, held a public hearing on the effect of the proposed works on interstate and foreign commerce.

On the initiative of the Executive Secretary investigations were made on the Pit River in California to secure data on the propagation of waves down stream from power plants operating on variable loads. The results of these investigations were furnished the Chief of Engineers.

On July 23, 1926, the Chief of Engineers reported that he did not consider the Pit River data applicable to the New River and further stated:

"3. The previous report of this office dated December 29, 1925, on the effect the proposed project would have on navigation in the Kanawha River was based on records of stream flow from 1909 to 1916, inclusive. These records showed that during the period in question the drainage area below the proposed plant would provide sufficient water to meet the needs of navigation in the Kanawha River. The summer of 1925 was exceptionally dry and considerable difficulty was experienced in maintaining navigation in the Kanawha River. It appears, therefore, that at long intervals there may be seasons in which the stream flow is smaller than that covered by the years 1909–1916 and during which the run-off from the area below Radford might be inadequate for navigation purposes.

"4. I, therefore, report that there is reason to believe that in the future exceptionally dry seasons may occasionally occur during which the proposed project near Radford, if unregulated, might adversely affect the navigable capacity of the Kanawha River."

3593–H The facts brought out by the investigation in this case are:

(a) The river was not navigable in fact in its original condition.

(b) All attempts to make the river navigable in fact were unsuccessful.

(c) All acts appropriating money for the improvement of the river were repealed by Congress.

(d) It is well settled by judicial decisions that acts of Congress appropriating money for the improvement of a stream are not to be construed as declarations express or implied that the stream is actually navigable. Congress may authorize the improvement of a nonnavigable stream with a view to creating navigability, yet unless the improvement is accomplished the natural state of the stream is not changed. Whether or not it is navigable is still a question of fact unaffected by the consideration that money has been appropriated and expended in an effort to improve it (Brewer Elliott Gas Company vs. U. S. 260 U. S.).

(e) New River is not now navigable in fact. It is not used or usable for the transportation of persons or property in interstate or foreign commerce.

(f) There is no authorization by Congress for its improvement.

(g) There is no recommendation before Congress for its improvement.

(h) In the future, exceptionally dry seasons may occur during which the proposed project, if unregulated, might adversely affect the navigable capacity of the Kanawha River.

On the foregoing facts, fully supporting a finding of "not navigable," the Commission on June 1, 1927, made its finding "that said river in the part involved in said declaration is not 'navigable waters' within the definition thereof in said act, but the interests of interstate and foreign commerce would be affected by such proposed construction."

3593–I Heretofore the administration of the Federal water power act with respect to projects on nonnavigable streams which might have an effect upon navigation on a navigable stream into which the waters of the nonnavigable stream empty, has been conducted on the following theory of law, viz:

That, since the Government by virtue of the decision of the Supreme Court in the Rio Grande case (U. S. v. Rio Grande Dam & Irrigation Co., 174 U. S. 690) can restrain the acts of the builder of a dam on a nonnavigable portion of a stream in so far as those acts will substantially diminish the navigable capacity of the navigable portion of the stream below, the Federal Power Commission is required to assume complete control over all such projects on nonnavigable streams within the States.

There have been issued by the Commission 30 licenses for projects in navigable streams and 6 licenses under the foregoing theory of law.

The exercise of complete control by the Commission of projects on nonnavigable streams within the States has been protested as exceeding Federal authority by certain State executives and in this case by the applicant company.

The President on July 31, 1930, requested the Attorney General to render an opinion as to whether the Commission is authorized or required to write into the license for this projec any provisions other than those necessary to insure such releas of water therefrom as will maintain unimpaired the navigabl capacity of the navigable waterway below, viz, the Kanawha River, or, otherwise stated, whether all conditions imposed on licensees on navigable streams, including the recapture clause, may be inferred under the facts in this case.

The opinion of the Attorney General was rendered September 22, 1930, and is now available, and states:

"Upon the facts stated by the Commission in this case the United States has no power to prevent the construction of the proposed project on the New River unless its operation will tend to impair the navigability of the Kanawha River by changing the normal and regular flow of the stream; and the only interest which the United States has to protect, and for which it may be justified in issuing a license, is a very minor part of the complete project, viz., the manner in which the flow of the stream below the dam is affected by the operation of the water power. I am advised by a representative of the Commission that under a license providing merely for proper control of the retention and release of water, this project will tend to improve the navigability of the Kanawha River. Under these circumstances every purpose within the power of Congress may be accomplished by the issuance of a minor part license under paragraph (i) of Section 10. Accordingly I am of the opinion that the most reasonable construction of this statute is that paragraph (i) of Section 10 was intended to have application in such a case provided the interests of the United States may be fully protected by the issuance of a license to control the flow of the stream and/or to use physical instrumentalities which may be constructed for this purpose, the conditions of such license to be fixed by the Commission in its discretion under Section 10 (i) of the Act.

"This interpretation appears necessary in order to avoid serious questions regarding the constitutionality of the Act which might be presented if Section 10 (i) should be interpreted so as to have no application to projects constructed in or on nonnavigable streams, which only remotely and indirectly affect the navigability of waters in the lower reaches of streams to which they are tributaries. If paragraph (i) of Section 10 is not applicable in such cases the Commission would in no such case be authorized to waive any of the conditions specified in Section 10, because Section 23 prohibits any such construction, once the Commission finds that the interests of interstate or foreign commerce will be affected, until a license is issued under the provisions of the Act. To hold that the Commission has full authority under this section to exercise its discretion in granting a minor-part license in this case leads to a reasonable construction of the statute and a full accomplishment of its legislative purpose.

"This interpretation of paragraph (i) of Section 10 finds some support in the administrative construction of the Act adopted by the Commission on May 23, 1925, in its consideration of several applications (Project No. 15) of Hydraulic Race Company and other corporations, reported in the Fifth Annual Report of the Federal Power Commission, 1925, at pp. 111 and 112.

"In answering the questions proposed by the Commission, I have accordingly to advise you that it is my opinion that the Commission may, in its discretion, issue a minor-part license under paragraph (i) of Section 10, for the construction and operation of the project here in question; that it is not required to insert, in a license issued for this project, any conditions (except the fifty-year limitation upon the terms of the license) which, in its judgment, are not necessary or appropriate to fully utilize the waters of the New River in the protection or development of navigation of the Kanawha River."

3593–K Under the law, if the New River in the part thereof involved in this project is declared to be 'navigable waters,' there is no question but that the Commission would be required to write into the license all the provisions contained in the act.

If, however, the finding of the Commission stands, viz, that New River, in the part thereof involved in this case is not 'navigable waters,' the Commission may, in its discretion, issue a license in accordance with the opinion of the Attorney General.

The memorandum of the Acting Chief Counsel is an argument in support of what he considers to be the law on navigability, together with an exposition of what he believes should be the policy of the Government with respect to water power, navigation, flood control, and the financing thereof. It consists of selected citations from court opinions and official reports suitable to his argument. It contains none of the many Supreme Court decisions adverse to his contentions. He presents no new facts. In short, it is not, in my opinion, a sound analysis of existing law, but rather a creed which may be developed into law through a reversal of the finding of the Commission in this case, future findings of the Commission in line with his views, and by future legislation by Congress and future decisions of the courts in accordance with his suggestion that:

"In view of the challenge to the constitutionality of the Act, I think this an appropriate place to point out the fact that water, flowing in a great river from State to State, or forming State boundaries in such manner as to be useful to a dozen States, is in itself a commodity in interstate commerce, so as to be an object of Federal concern and legislation quite as lawfully as migratory birds (Missouri v. Holland, 252 U. S. 416) or pests against which Federal quarantine is established. (Oregon-Washington R. & N. Co. v. State of Washington, 270 U. S. 81) This is an idea well worthy of the consideration of the courts."

The memorandum in my opinion establishes no sound grounds for a reinvestigation of the navigability of the New River and a reconsideration of the formal finding of the Commission made June 1, 1927, in accordance with the provisions of the act.

M. C. Tyler,
Lt. Col., Corps of Engineers, Chief Engineer.

MCT:ARH.

3593–L *Defendant's exhibit No. 542*

November 8, 1930.

Mr. F. E. Bonner, Executive Secretary,
Federal Power Commission,
Interior Building, Washington, D. C.

EP–739–Virginia—Appalachian Electric Power Company

Dear Sir: Receipt is acknowledged of your letter of the 31st ult. with enclosed draft of license and likewise of your letter of the 6th inst. with a revised draft.

I am authorized by Appalachian Electric Power Co. to inform the Commission that the revised form of 'minor part' licenses for New River Development No. 6 (Radford, Va.), is satisfactory and that if tendered such a license the power company will accept.

Also I am authorized to state that if such a license is tendered the power company will at once begin the active prosecution of the construction of the project.

Very truly yours,

F. W. Scheidenhelm.

PWS–k.
cc—Geo. N. Tidd.
M. F. Millikan.
C., M–P., C. & M.

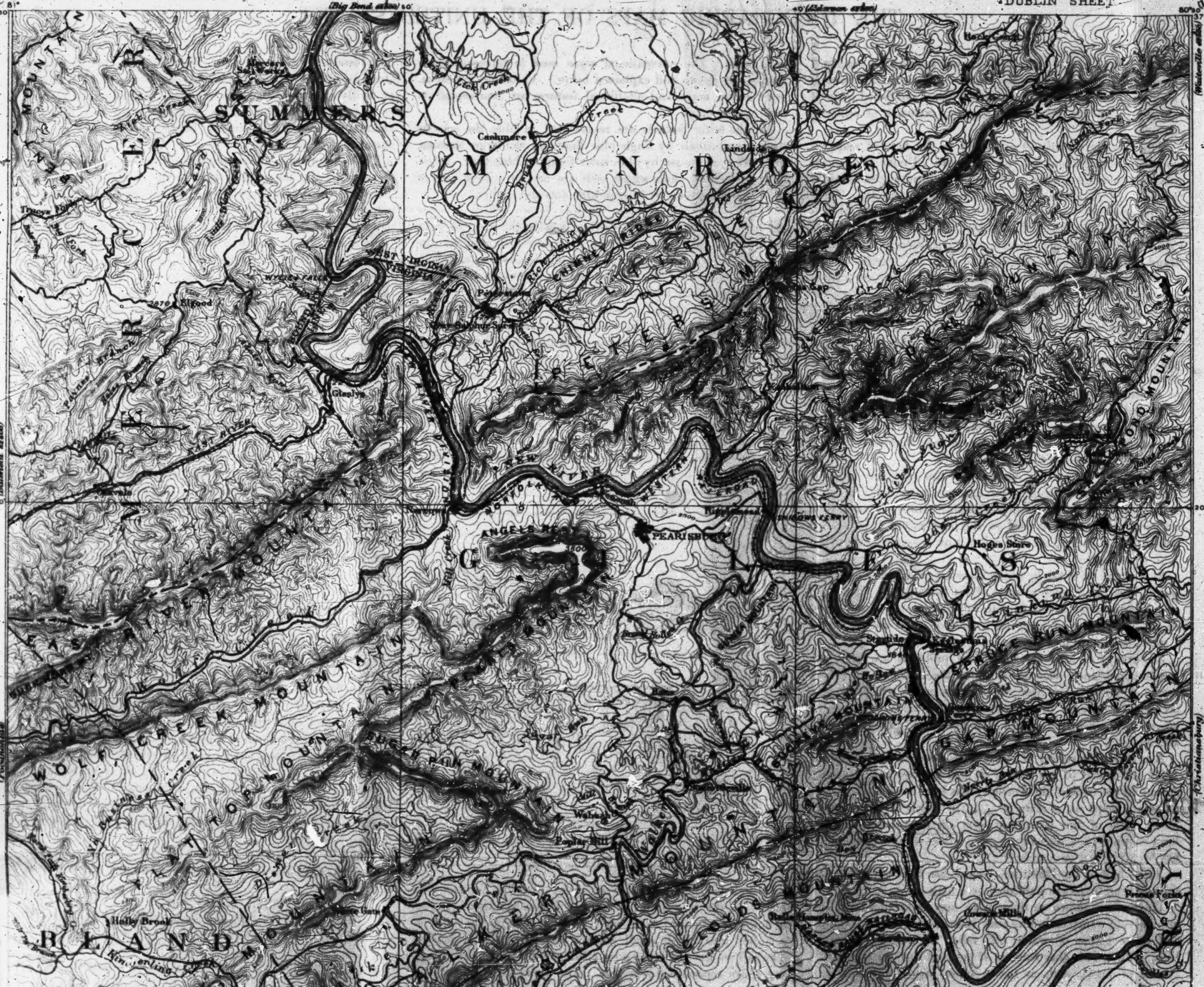
3593–M *Defendant's exhibit No. 543*

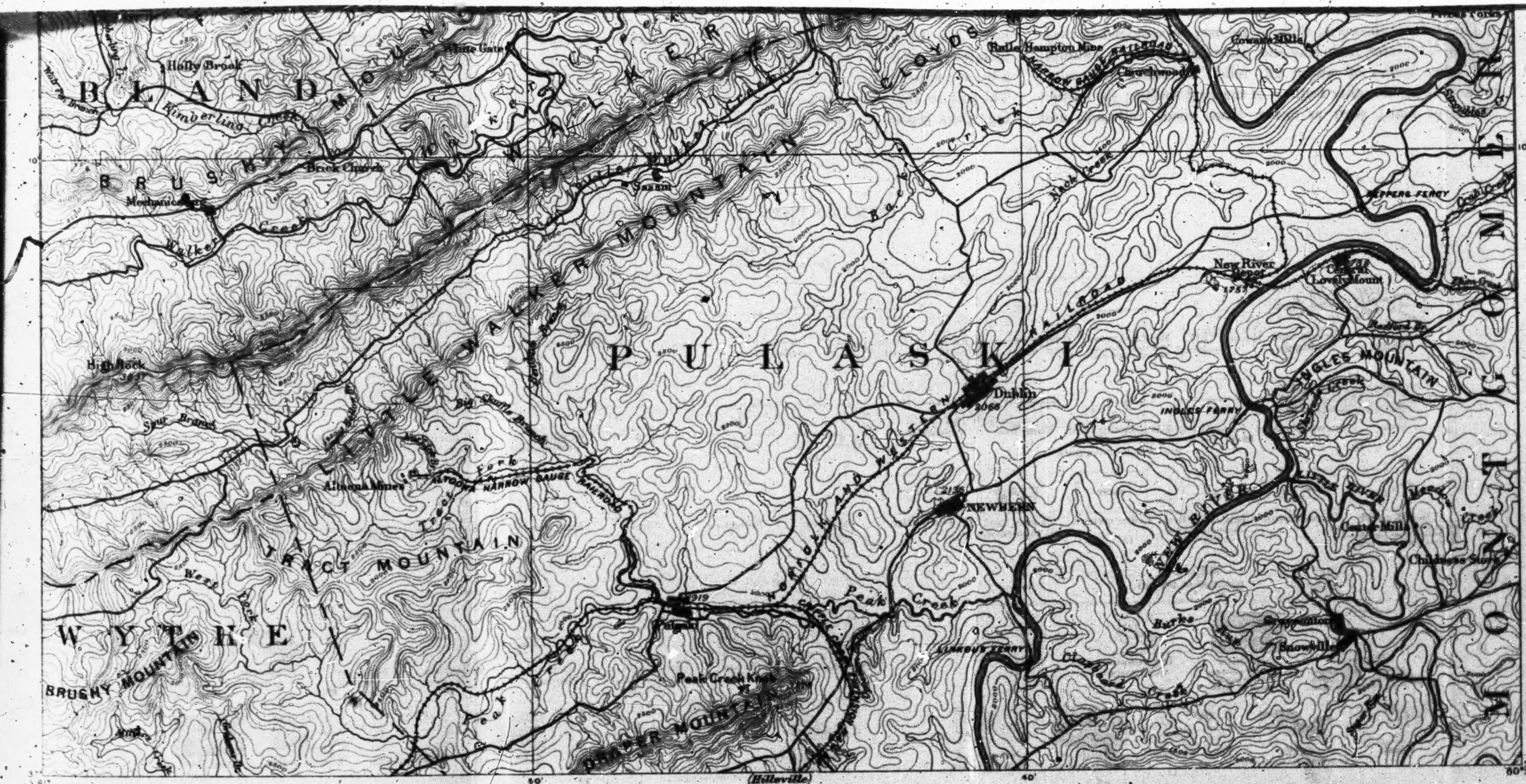
"Maneuvers of dams on Kanawha River during wave test, 1930." (Original Exhibit.)

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

RECONNAISSANCE MAP

VIRGINIA–WEST VIRGINIA
DUBLIN SHEET


(Big Bend atlas)
(Lewisburg)
(Bluefield atlas)
(Pocahontas)
(Christiansburg)
SUMMERS
MONROE
MERCER
GILES
BLAND
WEST VIRGINIA
VIRGINIA
Cashmere
Lindside
Elgood
Glenlyn
Peterstown
Narrows
PEARISBURG
Hoges Store
Holly Brook
Poplar Hill
PETERS MOUNTAIN
EAST RIVER MOUNTAIN
WOLF CREEK MOUNTAIN
ANGELS REST
SPRUCE RUN MOUNTAIN
GAP MOUNTAIN
NEW RIVER
20'
10'
40'


BLAND
WYTHE
PULASKI
MONTGOMERY
BRUSHY MOUNTAIN
WALKER MOUNTAIN
LITTLE WALKER MOUNTAIN
TRACT MOUNTAIN
DRAPER MOUNTAIN
GLES MOUNTAIN
Holly Brook
White Gate
Kimberling Creek
Brick Church
Mechanicsburg
Walker Creek
High Rock
Sour Branch
Altoona Mines
Big Stone Branch
Peak Creek Knob
Pulaski
Dublin
2066
Newbern
New River Depot
Lovely Mount
Ingles Ferry
Peppers Ferry
Cowans Mills
Churchwood
Hampton Mine
Cloyds Creek
Back Creek
Peak Creek
Little River
New River
Claytor Creek
Burke Creek
Lindsay Ferry
Snowville
Graysontown
Center Mills
Childress Store
Price's Forks
NORFOLK AND WESTERN RAILROAD
10'
50'
40'
(Hillsville)
(Wytheville) 81°
37°
80°30'

Henry Gannett, Chief Topographer
Gilbert Thompson, Geographer in charge.
Triangulation by the U.S.Coast and Geodetic Survey and S.S.Gannett.
Topography by Morris Bien
Surveyed in 1884-5-6-7

Scale $\frac{1}{125,000}$

0 1 2 3 4 5 6 Miles

Contour Interval 100 feet

Maps of Petersburg and Pearisburg, scale 1:62,500, from later and more detailed surveys of the West Virginia part of this area, are available

Edition of Sept. 1891, reprinted 1927
Polyconic projection. North American datum

No 518

THE TOPOGRAPHIC MAPS OF THE UNITED STATES

The United States Geological Survey is making a standard topographic atlas of the United States. This work has been in progress since 1882, and its results consist of published maps of more than 40 per cent of the country, exclusive of outlying possessions.

This topographic atlas is published in the form of maps on sheets measuring about 16½ by 20 inches. Under the general plan adopted the country is divided into quadrangles bounded by parallels of latitude and meridians of longitude. These quadrangles are mapped on different scales, the scale selected for each map being that which is best adapted to general use in the development of the country, and consequently, though the standard maps are of nearly uniform size, they represent areas of different sizes. On the lower margin of each map are printed graphic scales showing distances in feet, meters, and miles. In addition, the scale of the map is shown by a fraction expressing a fixed ratio between linear measurements on the map and corresponding distances on the ground. For example, the scale $\frac{1}{62500}$ means that 1 unit on the map (such as 1 inch, 1 foot, or 1 meter) represents 62,500 similar units on the earth's surface.

Although some areas are surveyed and some maps are compiled and published on special scales for special purposes, the standard topographic surveys for the United States proper and the resulting maps have for many years been divided into three types, differentiated as follows:

1. Surveys of areas in which there are problems of great public importance—relating, for example, to mineral development, irrigation, or reclamation of swamp areas—are made with sufficient accuracy to be used in the publication of maps on a scale of $\frac{1}{[illegible]}$ (1 inch = one-half mile), with a contour interval of 1, 5, or 10 feet.

2. Surveys of areas in which there are problems of average public importance, such as most of the basin of the Mississippi and its tributaries, are made with sufficient accuracy to be used in the publication of maps on a scale of $\frac{1}{[illegible]}$ (1 inch = nearly 1 mile), with a contour interval of 10 to 25 feet.

3. Surveys of areas in which the problems are of minor public importance, such as much of the mountain or desert region of Arizona or New Mexico, are made with sufficient accuracy to be used in the publication of maps on a scale of $\frac{1}{[illegible]}$ (1 inch = nearly 2 miles), with a contour interval of 25 to 100 feet.

A topographic survey of Alaska has been in progress since 1898, and nearly 37 per cent of its area has now been mapped. About 10 per cent of the Territory has been covered by reconnaissance maps on a scale of $\frac{1}{[illegible]}$, or about 10 miles to an inch. Most of the remaining area surveyed in Alaska has been mapped on a scale of $\frac{1}{[illegible]}$, but about 4,000 square miles has been mapped on a scale of $\frac{1}{[illegible]}$.

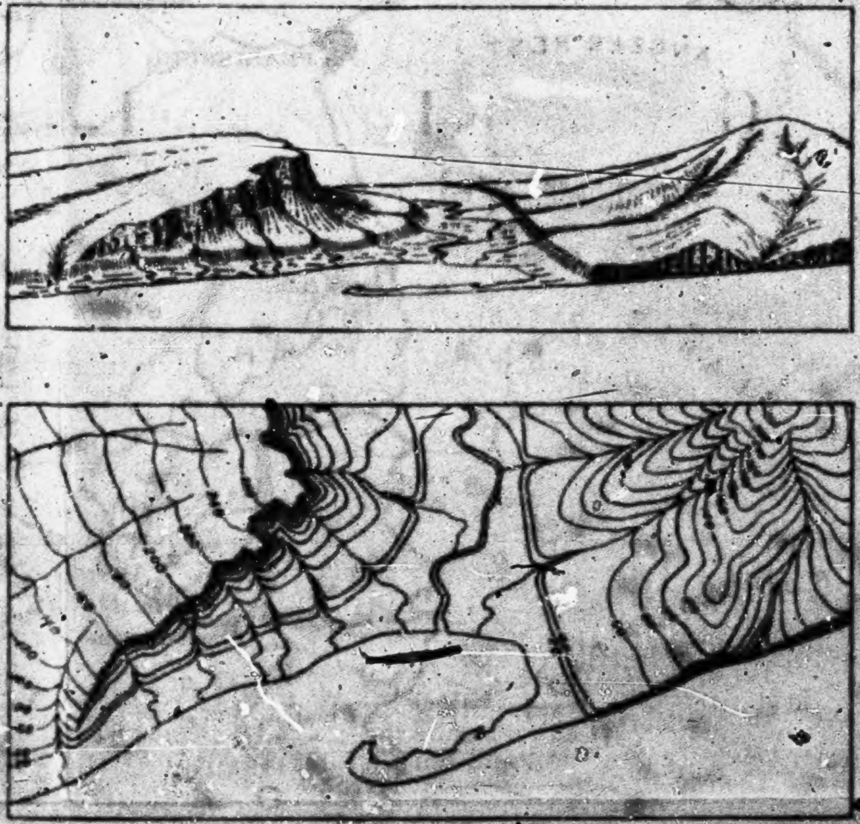
About half of the Hawaiian Islands has been surveyed, and the resulting maps are published on a scale of $\frac{1}{[illegible]}$.

The features shown on these maps may be arranged in three groups—(1) water, including seas, lakes, rivers, canals, swamps, and other bodies of water; (2) relief, including mountains, hills, valleys, and other features of the land surface; (3) culture (works of man), such as towns, cities, roads, railroads, and boundaries. The conventional signs used to represent these features are shown and explained below. Variations appear on some earlier maps, and additional features are represented on some special maps.

All the water features are represented in blue, the smaller streams and canals by single blue lines and the larger streams, the lakes, and the sea by blue water lining or blue tint. Intermittent streams—those whose beds are dry for a large part of the year—are shown by lines of blue dots and dashes.

Relief is shown by contour lines in brown, which on some maps are supplemented by shading showing the effect of light thrown from the north west across the area represented, for the purpose of giving the appearance of relief and thus aiding in the interpretation of the contour lines. A contour line represents an imaginary line on the ground (a contour) every part of which is at the same altitude above sea level. Such a line could be drawn at any altitude, but in practice only the contours at certain regular intervals of altitude are shown. The line of the seacoast itself is a contour, the datum or zero of altitude being mean sea level. The 20-foot contour would be the shore line if the sea should rise 20 feet. Contour lines show the shape of the hills, mountains, and valleys, as well as their altitude. Successive contour lines that are far apart on the map indicate a gentle slope; lines that are close together indicate a steep slope; and lines that run together indicate a cliff.

The manner in which contour lines express altitude, form, and grade is shown in the figure below.



The sketch represents a river valley that lies between two hills. In the foreground is the sea, with a bay that is partly inclosed by a hooked sand bar. On each side of the valley is a terrace into which small streams have cut narrow gullies. The hill on the right has a rounded summit and gently sloping spurs separated by ravines. The spurs are truncated at their lower ends by a sea cliff. The hill at the left terminates abruptly at the valley in a steep scarp, from which it slopes gradually away and forms an inclined table-land that is traversed by a few shallow gullies. On the map each of these features is represented, directly beneath its position in the sketch, by contour lines.

The contour interval, or the vertical distance in feet between one contour and the next, is stated at the bottom of each map. This interval differs according to the topography of the area mapped: in a flat country it may be as small as 1 foot; in a mountainous region it may be as great as 250 feet. Certain contour lines, every fourth or fifth one, are made heavier than the others and are accompanied by figures showing altitude. The heights of many points—such as road corners, summits, surfaces of lakes, and bench marks—are also given on the map in figures, which show altitudes to the nearest foot only. More exact altitudes—those of bench marks—as well as the geodetic coordinates of triangulation stations, are published in bulletins issued by the Geological Survey.

Lettering and the works of man are shown in black. Boundaries, such as those of a State, county, city, land grant, township, or reservation, are shown by continuous or broken lines of different kinds and weights. Metaled roads are shown by double lines, one of which is accentuated. Other public roads are shown by fine double lines, private and poor roads by dashed double lines, trails by dashed single lines.

Each quadrangle is designated by the name of a city, town, or prominent natural feature within it, and on the margins of the map are printed the names of adjoining quadrangles of which maps have been published. Over 3,000 quadrangles in the United States have been surveyed, and maps of them similar to the one on the other side of this sheet have been published.

The topographic map is the base on which the geology and mineral resources of a quadrangle are represented, and the maps showing these features are bound together with a descriptive text to form a folio of the Geologic Atlas of the United States. More than 200 folios have been published.

Index maps of each State and of Alaska and Hawaii showing the areas covered by topographic maps and geologic folios published by the United States Geological Survey may be obtained free. Copies of the standard topographic maps may be obtained for 10 cents each; some special maps are sold at different prices. A discount of 40 per cent is allowed on an order for maps amounting to $5 or more at the retail price. The geologic folios are sold for 25 cents or more each, the price depending on the size of the folio. A circular describing the folios will be sent on request.

Applications for maps or folios should be accompanied by cash, draft, or money order (not postage stamps) and should be addressed to

THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

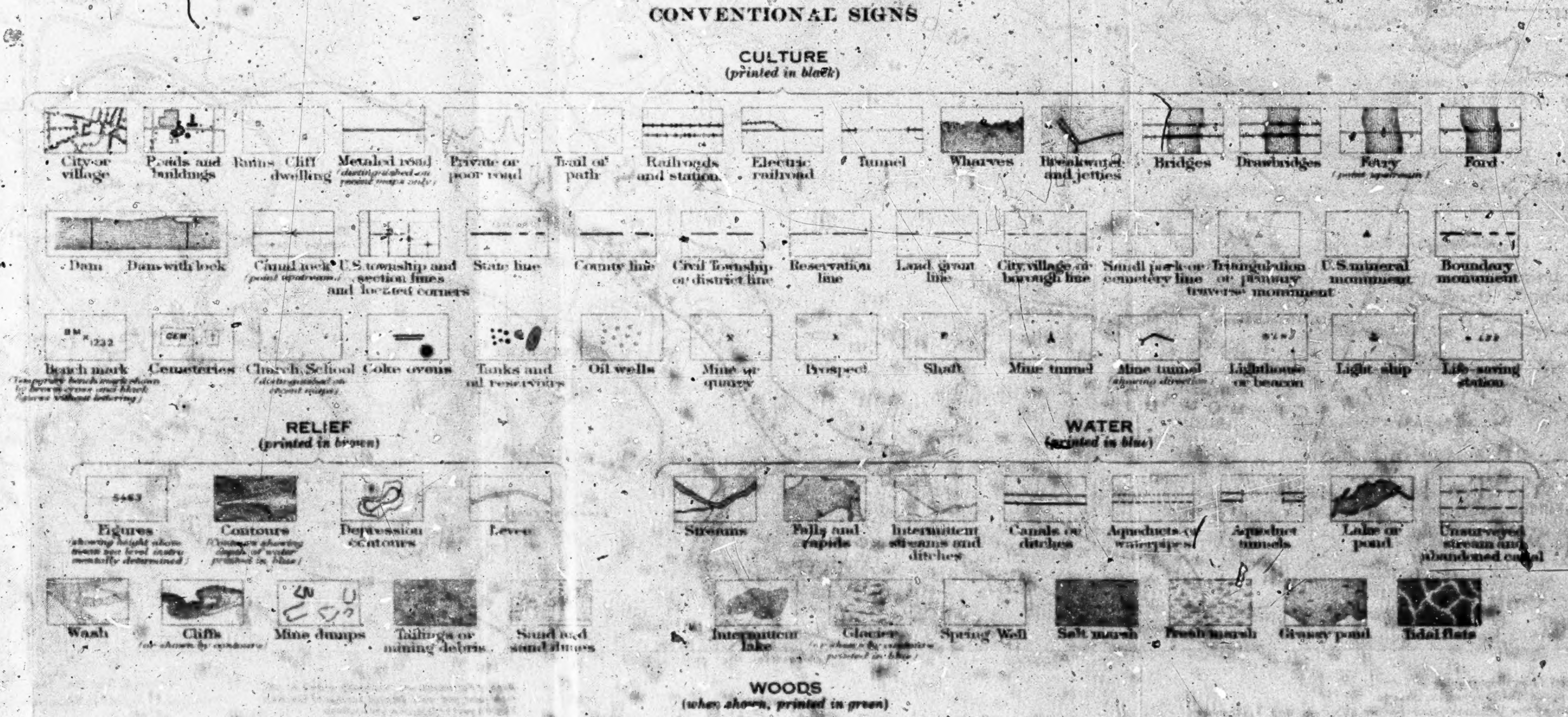
January, 1924.

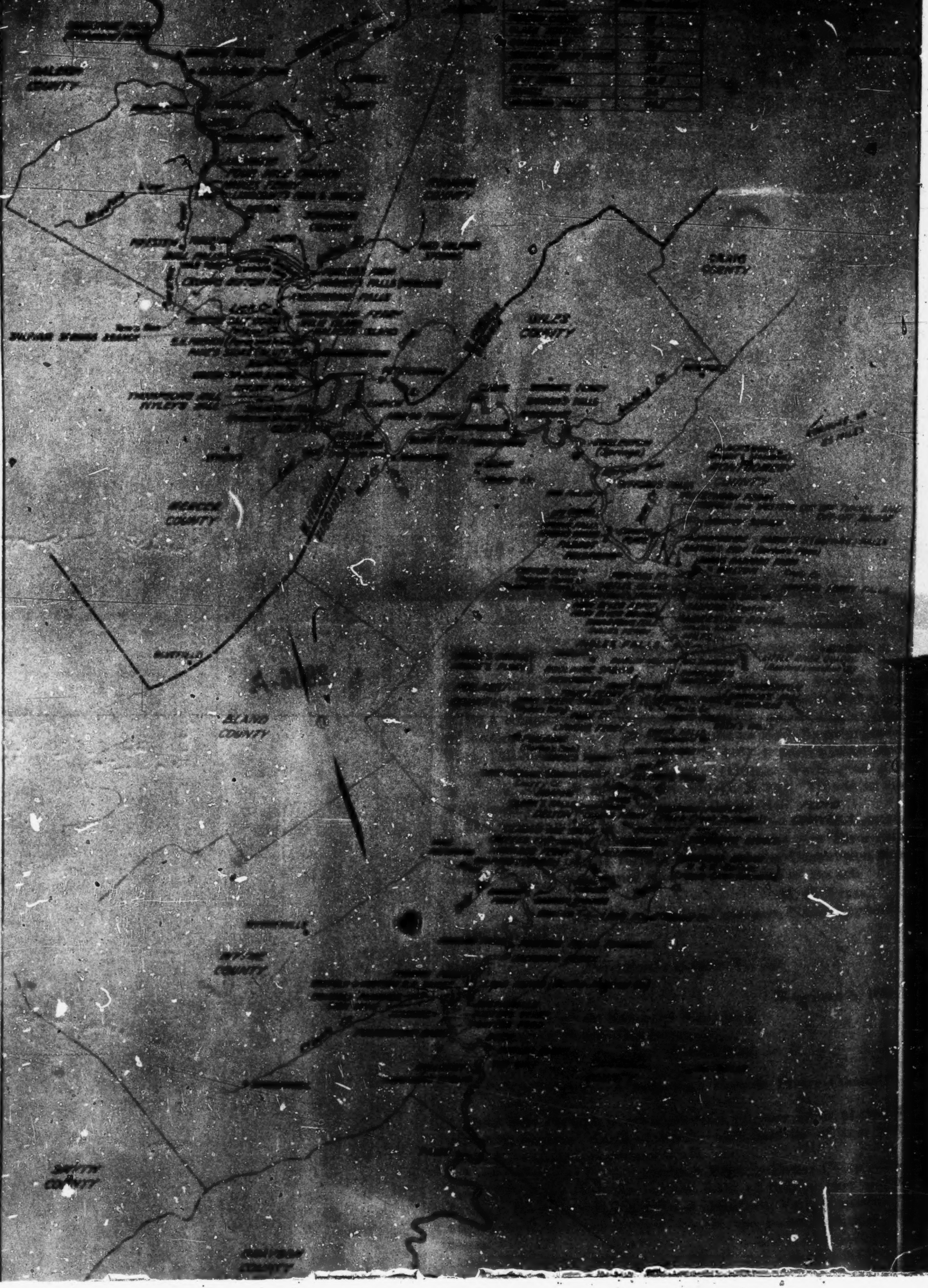
The features shown on these maps may be arranged in three groups—(1) water, including seas, lakes, rivers, canals, swamps, and other bodies of water; (2) relief, including mountains, hills, valleys, and other features of the land surface; (3) culture (works of man), such as towns, cities, roads, railroads, and

hills. In the foreground is the sea, with a bay that is partly inclosed by a hooked sand bar. On each side of the valley is a terrace into which small streams have cut narrow gullies. The hill on the right has a rounded summit and gently sloping spurs separated by ravines. The spurs are truncated at

THE DIRECTOR,
United States Geological Survey,
Washington, D. C.

January, 1924.


CONVENTIONAL SIGNS
CULTURE
(printed in black)
City or village
Roads and buildings
Ruins
Cliff dwelling
Metaled road (distinguished on recent maps only)
Private or poor road
Trail or path
Railroads and stations
Electric railroad
Tunnel
Wharves
Breakwater and jetties
Bridges
Drawbridges
Ferry (point upstream)
Ford
Dam
Dam with lock
Canal lock (point upstream)
U.S. township and section lines and located corners
State line
County line
Civil township or district line
Reservation line
Land grant line
City, village or borough line
Small park or cemetery line
Triangulation or primary traverse monument
U.S. mineral monument
Boundary monument
BM × 1232
Bench mark (Temporary bench marks shown by brown cross and black figures without lettering)
CEM
Cemeteries
Church
School (distinguished on recent maps)
Coke ovens
Tanks and oil reservoirs
Oil wells
Mine or quarry
Prospect
Shaft
Mine tunnel
Mine tunnel (showing direction)
Lighthouse or beacon
Light ship
Life saving station
RELIEF
(printed in brown)
5463
Figures (showing height above mean sea level instrumentally determined)
Contours (Contours showing depth of water printed in blue)
Depression contours
Levee
Wash
Cliffs (or shown by contours)
Mine dumps
Tailings or mining debris
Sand and sand dunes
WATER
(printed in blue)
Streams
Falls and rapids
Intermittent streams and ditches
Canals or ditches
Aqueducts or water pipes
Aqueduct tunnels
Lake or pond
Unsurveyed stream and abandoned canal
Intermittent lake
Glacier (or shown by contours printed in blue)
Spring
Well
Salt marsh
Fresh marsh
Grassy pond
Tidal flats
WOODS
(when shown, printed in green)


RALEIGH COUNTY
SULPHUR SPRINGS BRANCH
CRAIG COUNTY
GILES COUNTY
MERCER COUNTY
BLAND COUNTY
WYTHE COUNTY
SMYTH COUNTY
GRAYSON COUNTY

"
ina.

3593

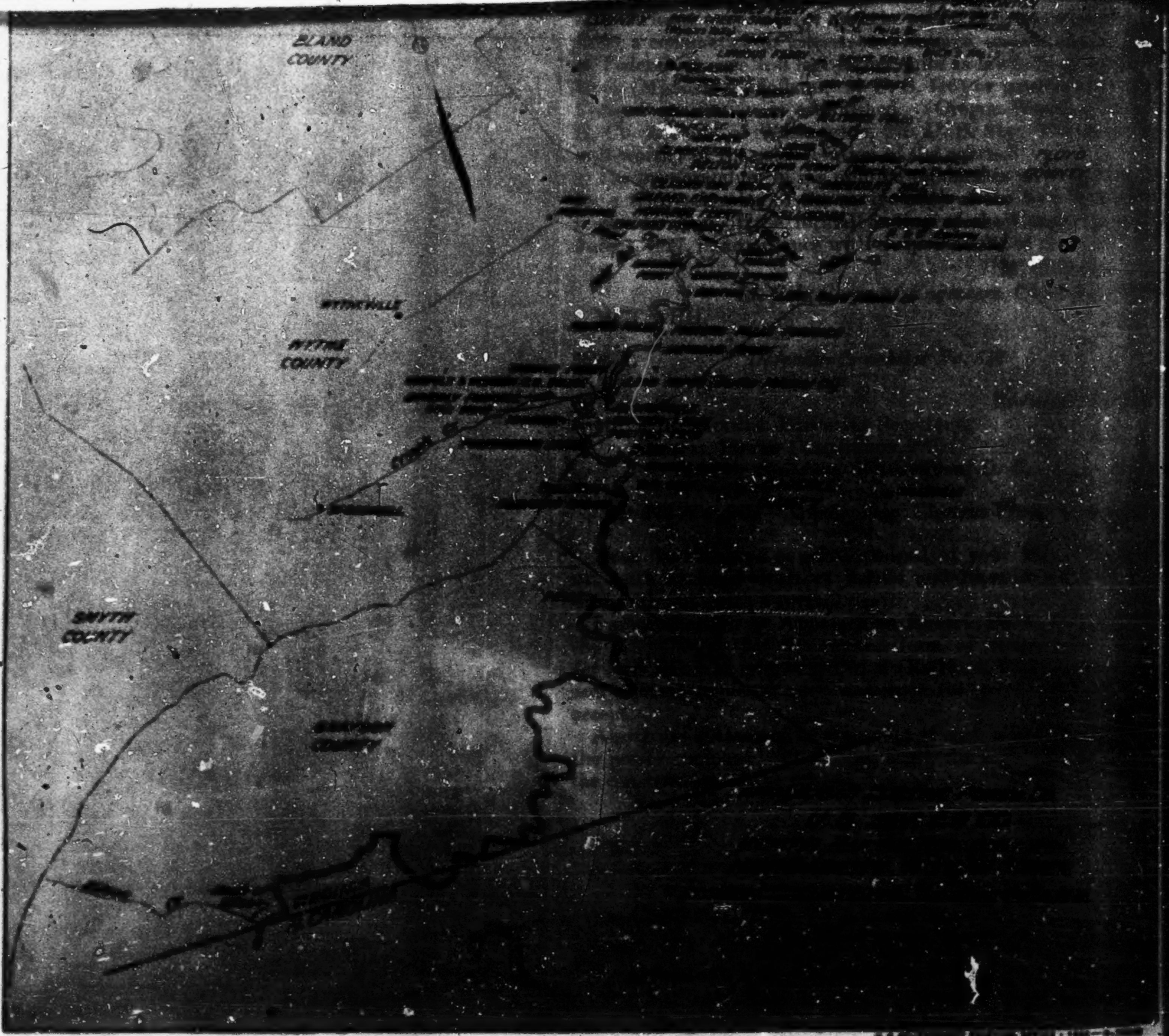
C

3594

F.
Jan
Jan
Jan
Jan

3595

Mr.
to thi
milk
I have
of Ah
Tilan
of thi
Powe
[Laug
river
I co
been p


BLAND COUNTY
WYTHEVILLE
WYTHE COUNTY
SMYTH COUNTY

Defendant's exhibit No. 544

"Report of Power Waves, New and Kanawha Rivers." (Original Exhibit.)

3593-O *Defendant's exhibit No. 546*

Certificate for W. H. Hundly, East Radford, Va.

3594 *Defendant's exhibit No. 547*

Four pages; namely, page 848 of the Congressional record for January 10, 1901; page 1001 of the Congressional record for January 14, 1901; page 1002 of the Congressional record for January 14, 1901; and page 1096 of the Congressional record for January 16, 1901.

3595 *Defendant's exhibit No. 547*

CONGRESSIONAL RECORD—HOUSE

January 10, 1901—p. 848

Mr. OTEY. Mr. Chairman, I do not rise to make any objection to this bill. I have no objection to the improvement of Buttermilk Channel, Contentnea Creek, Winyah Bay, nor Wappoo Cut. I have no objection to the improvement of those familiar harbors of Ahnapee, Saugatuck, Menominee, Manitowoc, Kewaunee, and Tillamook. None whatever. They are familiar to every member of this Congress. I have no objection to the improvement of Powow River, Murderkill River, Tickfaw, and Big Sunflower. [Laughter.] But in looking over this bill I find that an important river—New River, Virginia—is not included. [Applause.]

I come before this House (while the appropriation has not been put in the bill and was not recommended by the engineer) to ask for the modest sum of $500,000 for that river; but, like the man and his wife who quarreled whether they should have canvasback duck or terrapin for dinner and compromised on cabbage, I will compromise on $5,000. [Laughter and applause.] This is a very important matter to the people of my district; and since the River and Harbor Committee have met, I bid them be of good cheer on their bill. I intend to vote for those 17 States that are represented on the River and Harbor Committee as well as the 28 States that are not, and especially for the appropriation to those States that get none. I come with a petition signed by some of the most distinguished gentlemen of the State of Virginia, among whom is the governor of the State, asking for this small sum of $5,000.

I am called away on account of sickness in my family, and therefore I will not be here to present the amendment myself, but I wish to call your attention to the importance of this measure. It is not, understand, any money for any additional improvement.
It is simply to clean out and to repair the channel that has
3596 already been made, on which $112,000 has been already expended.
There is a balance of $2,800 unexpended, and this means an appropriation of only $2,200. The amendment will be in the words as follows:

"For cleaning out and repairing the deep channel made by the United States Government in New River, Virginia, $5,000."

In my absence that amendment will be presented by another gentleman; and I ask that such fair consideration be given to him as you have always so generously accorded to me. [Applause.]

CONGRESSIONAL RECORD—HOUSE

January 14, 1901—pp. 1001–1002.

Mr. OTEY. I gave notice, Mr. Chairman, a few days ago that I would introduce an amendment here for $5,000 for the improvement of a channel already constructed by the United States Government in New River. I come with another compromise this evening, and do not ask for an appropriation at all, but I ask that the $2,300 of unexpended appropriation be expended on that river for the improvement and maintenance of the channel already constructed by the United States Government. They have spent $112,000 on it; they have got a good channel, and work was stopped.

But I wish to read you what is said about that place from a newspaper clipping:

News of Radford—Performance of the launch Altha—Governor Tyler's visit

The launch "Altha," built by Mr. Robert McWane, was placed at the disposal of the business men of Radford Wednesday afternoon in order to show them what an easy thing it is to navigate New River and enlarge the zone of Radford's trade and influence.

The trim little boat behaved beautifully and "walked the waters like a thing of life" as the veteran pilot, Mr. Dudley, guided her through the old Government channels, and showed that by means of very little work the town of Radford could be made accessible by water to the rich farming lands along the banks of New River miles above the town.

3597 Now, Mr. Chairman, this is a navigable river. When last year we wanted to build a bridge across the river and a dam way up in the mountains the Secretary of War said it was a navigable river and we should not do it, and we had to come to Congress and get a bill passed for that purpose. When we want to build a bridge or a dam it is a navigable river, and when we want to navigate it they tell us it is not navigable. That is what the River and Harbor Committee say. [Laughter.]

Now, I have asked a good many gentlemen about this on the other side of the Chamber, and every one of them have said it was a just thing and ought to be done. I do not ask for any appropriation. I simply ask for the little paltry sum of $2,300 for cleaning out the channel so that a steamboat can go up and down the river. Yes, I have asked nearly everybody I have seen over there, and on this side of the Chamber they are unanimous for it. Why can not we pass it? What is the trouble? [Laughter.]

It is very seldom I ask a favor, and I think now you will come and help me to get this little paltry sum put upon this bill, not as an appropriation, but simply to extend that which is already there.

The **Chairman**. The question is on the amendment offered by the gentleman from Virginia.

Mr. **Burton**. Mr. Chairman, [illegible] was a project that was practically abandoned ten years ago. [Laughter.]

Mr. **Otey**. What did the gentleman say? I was unable to hear.

Mr. **Burton**. Well, there are several statements here that I want the gentleman to hear. In the official report of the War Department for 1900, on page 5081, is the following statement:

New River, Virginia and West Virginia.—No work has been done on this river since 1889, and the cost of further improvement would be out of all proportion to the benefits to be conferred. Captain Hodges states:

"Work on this improvement has ceased for ten years, during which time there have been no funds appropriated, although there has been a balance of about $2,300 on hand. Under date of April 17, 1891, Gen. (then Col.) W. P. Craighill, Corps of

3598 Engineers, reported against further expenditure on the river, stating in substance that the railroads had taken most of the trade which could be accommodated by the river if improved according to the existing project by open-river regulation, and that the time was not yet ripe to initiate more expensive improvements by locks and dams, which alone could restore the importance of the waterway.

"There is no reason at present to depart from the views stated in his report.

"The expense of further improvement of the stream, even under the present project, is very large in proportion to the results attained, since a great deal of rock excavation must be done, while the cost of canalizing the river would be out of all relation to the benefits to be derived now or in the near future.

"Under date of June 27, 1899, authority was received from the Chief of Engineers to drop this work from annual and monthly reports subsequent to those rendered in July, 1899."

Mr. Otey. Will the gentleman permit a question?

Mr. Burton. Yes.

Mr. Otey. What was the name of the engineer which the gentleman gave?

Mr. Burton. Gen. W. P. Craighill.

Mr. Otey. Did he know anything about this steamboat? [Laughter.]

Mr. Burton. I think he did.

Mr. Otey. Well, the steamboat was not built till two or three months ago. [Laughter.]

Mr. Burton. Was it a phantom ship or a real ship?

Mr. Otey. This is a real boat. I have just read the article where the governor was present after the boat was built and when she was launched.

Mr. Burton. This item is included with some nine or ten others, on page 86, to be repealed and the amount of the appropriation covered back into the Treasury. The committee thought it was time to take up a few of these projects which it was thought were impracticable, or, I might say, absurd, and cover the money back into the Treasury.

I want to say to the gentleman from Virginia, further, that $2,300 would be a bagatelle in improving that river, because the improvement, if any should be made, would be rock ex-
3599 cavation, which would cost tens of thousands of dollars even to make a beginning.

The question being taken on the amendment of Mr. Otey, there were on a division (called for by Mr. Otey)—ayes 45, noes 89.

So the amendment was rejected.

CONGRESSIONAL RECORD—HOUSE

January 16, 1901—p. 1096

The Chairman. The Clerk will proceed with the reading of the bill.

The Clerk read section 7, as follows:

Sec. 7. That the provisions of river and harbor acts heretofore passed providing for the prosecution of work upon the following projects are hereby repealed, and any amounts heretofore appropriated for any of the same now remaining unexpended shall be paid into the Treasury of the United States, to wit: Entrance to Point Judeth Pond, Rhode Island; Harbor of St. Augustine, Fla.; Pensaukee Harbor, Wisconsin; New River, Virginia and West Virginia; Cypress Bayou, Texas and Louisiana; Wolf Lake, Indiana; Chippewa River, Wisconsin; Yellowstone River, Montana and North Dakota; Clearwater River, Idaho; Boat railway from the foot of The Dalles Rapids to the head of Celilo Falls, Washington and Oregon.

Mr. Otey. Mr. Chairman, I move to strike out line 1, page 86. I refer to New River, Virginia and West Virginia.

This, Mr. Chairman, is the first time that I have ever desired to strike out New River [laughter], but I am as much in earnest and as serious about it now as a man who is going to be hung. [Laughter.] It is a matter of great importance that this amount should still be available for the purpose of the improvement of that river. It is an unexpended balance of but $2,300, and the Treasury of the United States does not need it at all. The report of the engineer in charge of the work some years ago, which
indicated that there was no need for using it, was made so
3600 long ago that conditions have materially changed, and the
steamboat that is on that river now is necessary for the
transportation of the traffic along its banks.

The improvement of this stream is just as important as the improvement of other rivers embodied in this bill. The chairman of the committee has not seen this river. Some people call it a little creek, but the longest iron bridge in the State of Virginia crosses this stream at Radford, and all that is necessary to make the river available for the commerce upon its banks is the utilization of this $2,300 to make the navigation possible for that steamboat up and down the stream.

I went to a distinguished member of the River and Harbor Committee—which some gentleman in the rear irreverently calls the "Robber" and Harbor Committee, but which enconium I do not pass upon the committee myself. I went to a distinguished member and he advised me to bring in an amendment, such as I brought in a short time ago, with a request that the River and Harbor Committee would concur in the amendment. But the generalship of the chairman of that committee is a monument to his management. When I expected an avalanche of votes from the other side of the House and a unanimous vote on this side, and when I tried to keep the chairman from doing anything opposed to the amendment, he got up and gave but a word or two, and what was the result? Why, Mr. Chairman, I was routed—horse, foot, and dragoons. [Laughter.]

Now, I do not ask any appropriation, but simply that you strike this out covering that amount back into the Treasury. Why? You cannot use it. We cannot use it there, unless you give the engineer in charge the power to use it. If the necessities of the case demand it, then why not permit him to use it and let the work go on?

I therefore hope that the chairman of the committee will feel some sort of sympathy in this matter, exhibit some human kindness in his soul, and not have the heart to get up and oppose this as he has done heretofore, because this is a provision which stands upon an entirely different footing. This money
3601 has been appropriated. I only ask that you allow it to remain in the bill and strike out this proposition which covers it back into the Treasury.

Mr. Burton. Mr. Chairman, I notice that this item is up now for the second time. We had a discussion upon the floor upon it, and it was defeated at that time.

I will only say that for many years past no work has been done on that river. The engineer reports that it is useless to do any work. The stream runs through a rocky gorge, and in order to improve it it will need expensive works, and very extensive rock excavations would have to be made.

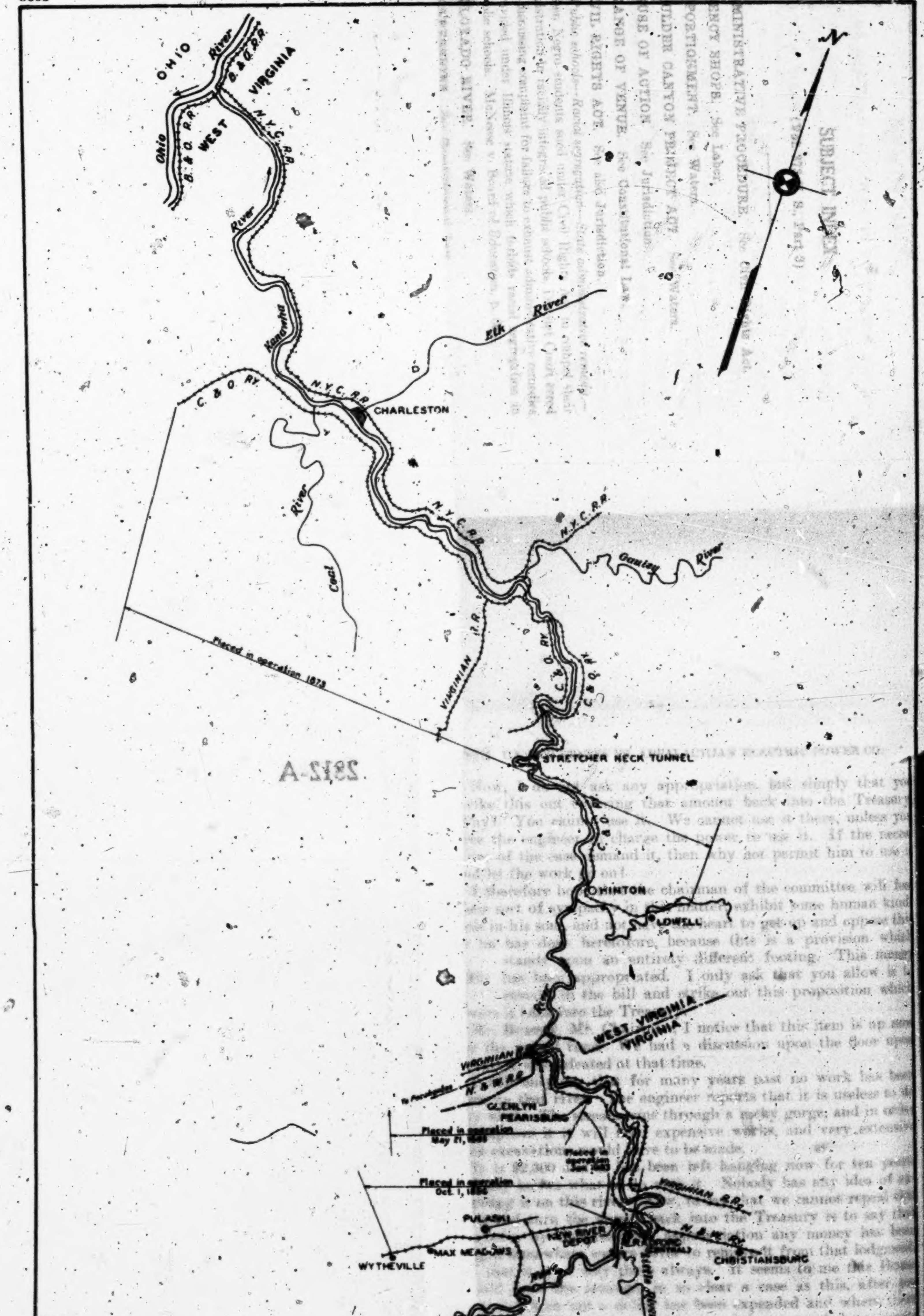
It is $2,300 and it has been left hanging now for ten years. Nobody knows what to do with it. Nobody has any idea of expending it on this river. Now, to say that we cannot repeal this item and turn the money back into the Treasury is to say that whenever by Congressional appropriation any money has been lodged somewhere we are never to remove it from that lodgment, but that it must stay there always. It seems to me this House should have the courage, in so clear a case as this, after ten years in which not a dollar has been expended and where there is no probability of any money ever being expended, to pursue a businesslike course and take it off the books. If an appropriation is needed in the future for any practicable improvement, we can give it careful attention.

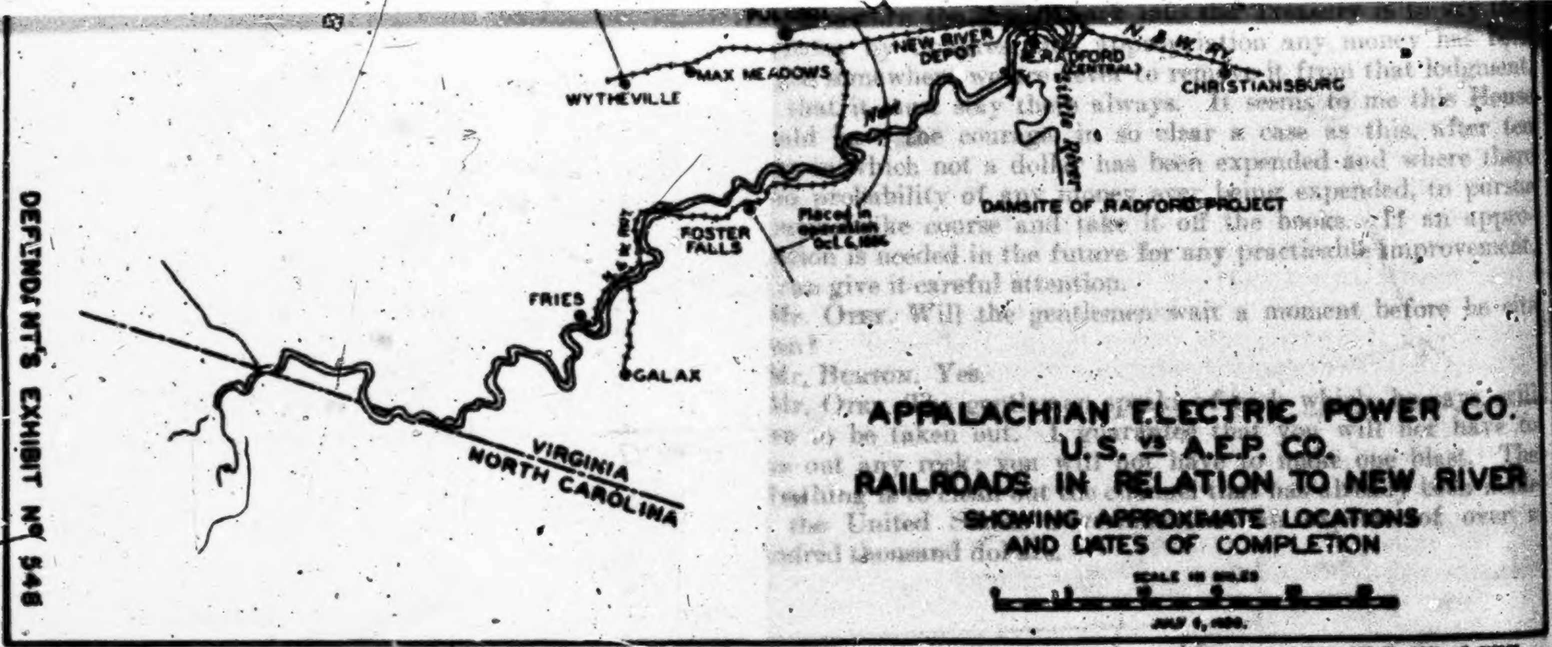
Mr. Otey. Will the gentlemen wait a moment before he sits down?

Mr. Burton. Yes.

Mr. Otey. The gentleman speaks of rock which, he says, will have to be taken out. I guarantee that you will not have to take out any rock; you will not have to make one blast. The only thing is to clean out the channel that has already been made by the United States Government at an expense of over a hundred thousand dollars.

Defendant's exhibit No. 548


N
OHIO
Ohio River
B. & O. R.R.
WEST VIRGINIA
N.Y.C. R.R.
Kanawha River
Elk River
CHARLESTON
C. & O. RY.
Coal River
Gauley River
Placed in operation 1873
VIRGINIAN R.R.
STRETCHER NECK TUNNEL
HINTON
LOWELL
WEST VIRGINIA
VIRGINIA
VIRGINIAN R.R.
N. & W. R.R.
GLENLYN
PEARISBURG
Placed in operation May 21, 1883
Placed in operation Oct. 1, 1884
PULASKI
NEW RIVER DEPOT
MAX MEADOWS
WYTHEVILLE
CHRISTIANSBURG
DAMSITE OF RADFORD PROJECT
FOSTER
Placed in operation
DEF.


WYTHEVILLE
MAX MEADOWS
NEW RIVER DEPOT
E. RADFORD (CENTRAL)
N. & W. RY.
CHRISTIANSBURG
New
Little River
DAMSITE OF RADFORD PROJECT
Placed in operation Oct. 6, 1886
FOSTER FALLS
FRIES
GALAX
VIRGINIA
NORTH CAROLINA
SCALE IN MILES

DEFENDANT'S EXHIBIT No 548

APPALACHIAN ELECTRIC POWER CO.
U.S. vs A.E.P. CO.
RAILROADS IN RELATION TO NEW RIVER
SHOWING APPROXIMATE LOCATIONS AND DATES OF COMPLETION

U. S. GOVERNMENT PRINTING OFFICE

Mr. **Burton**. Have you been having an earthquake there to get rid of some of those rocks?

Mr. **Otey**. No; but we do not want any rock work done; we just want to clean out the channel that is there.

3602 Mr. **Burton**. That does not agree with the engineer's report about that.

Mr. **Otey**. That engineer's report was made ten years ago, when you and I were boys. [Laughter.]

The **Chairman**. The question is on the amendment offered by the gentleman from Virginia [Mr. Otey].

The question being taken, Mr. Otey demanded a division, but subsequently, pending the announcement of the division, withdrew the demand.

The amendment was rejected.

3605 *Defendant's exhibit No. 549*

Album of photographs. (Original Exhibit.)

Defendant's exhibit No. 550

Map "Geological Map of the New River, Cripple Creek region, showing the approximate location of ore openings and properties tributary to the Cripple Creek Extension of the Norfolk and Western Railroad, by E. N. D'In-Villiers, Geologist, 1887." (Original Exhibit.)

Defendant's exhibit No. 551

Letter addressed to Dr. J. E. Williams, Dean at V. P. I., Blacksburg, Va., Dated February 2, 1936, and signed by R. J. Noell. (Original Exhibit.)

Defendant's exhibit No. 552

Carbon copy of a letter dated March 2, 1936 addressed to Hon. R. J. Noell, East Radford, Virginia, and without signature except "Dean of the College" and bearing the initials "JEW." (Original Exhibit.)

Defendant's exhibit No. 553

Letter dated March 4, 1936, from R. J. Holden, Professor of Virginia Polytechnic Institute, Department of Geology Blacksburg, Virginia, addressed to Hon. R. J. Noell, East Radford. (Original Exhibit.)

Defendant's exhibit No. 554

Album, together with the identification map and the 60 photographs of New River. (Original Exhibit.)

Defendant's exhibit No. 555

Map showing locations of photographs, and photographs Nos. 114 to 127 inclusive, of New River. (Original Exhibit.)

Defendant's exhibit No. 556

Annual report of the President and Directors of the Board of Public Works to the General Assembly of Virginia, in pursuance of an Act, entitled "An Act creating a fund for internal improvements." (Original Exhibit.)

Defendant's exhibit No. 557

Pages 140 and 141 of the Journal of the Virginia House of Delegates for 1817–18 containing a portion of the Report of the House Committee on Roads and Inland Navigation brought in on January 21, 1818. (Original Exhibit.)

3606 *Defendant's exhibits 558–A to 558–G, inc.*

Map dated November 21, 1912, survey made by Major F. W. Alstaetter, Corps of Engineers. Sheets 1 to 6 inclusive, of the Alstaetter map dated November 21, 1912, marked respectively 558–A to 558–G. (Original Exhibits.)

3606-A *Defendant's exhibit No. 559*

Pages from the Report of the Chief of Engineers for 1875

W 10

EXAMINATION OF NEW RIVER, FROM THE LEAD MINES, IN WYTHE COUNTY, TO THE "MOUTH OF WILSON," IN GRAYSON COUNTY, VIRGINIA

UNITED STATES ENGINEER OFFICE,
Washington, D. C., February 7, 1875.

GENERAL: In the River and Harbor bill approved June 23, 1874, provision is made for the examination and survey of New River, Virginia, between the lead mines in Wythe County, and the "Mouth of Wilson," in Grayson County. By your letter the duty was assigned to me, and I have now the honor to communicate the result of a personal examination.

It was necessary to proceed by rail to Wytheville, and then over a mountain-road about twenty-five miles to Independence, in Grayson County. From this point I visited the river, drove along the banks as far as practicable, and crossed and recrossed it at several points. A cursory examination was made of the copper mines at Ore Knob, and the mineral deposits at some other points.

Returning to Wytheville, I visited the lead and zinc mines of Captain Raper, situated on New River, about fourteen miles from Wytheville. The following general description of the river will give an idea of its character.

Two tributary streams, which rise in the mountains of North Carolina, unite on the border of Virginia to form New River. The north fork rises at the base of the Blue Ridge, Ashe County, and the south fork at the foot of Stone Mountain, Watauga County, and they unite about five miles above the mouth of Wilson Creek, in Grayson County, Virginia. From Wilson Creek to the lead mines the distance is estimated at forty miles, and from the mines to Max Meadows, the shipping-point of the Atlantic, Mississippi, and Ohio Railroad (formerly known as the Lynchburg and Tennessee Railroad), the distance is ten miles by the turnpike, but by way of the river the distance to the railroad bridge is thirty miles. This portion of the river has been surveyed, under the orders of Colonel Craighill.

The section of the river between the source and the lead mines flows among ridges of the Appalachian chain, and intersects in its course fertile valleys and hill-slopes, covered with forests of fine timber. Near its course may be observed precipitous cliffs of granite and limestone. Between the terminal points of the survey the river flows rapidly over a rocky bed, composed of the upturned strata of granite, gneiss, mica, micaceous schist, slate, sandstone, limestone, and ferruginous rocks in recurring series, and inclined at every angle from zero to ninety degrees. Portions of the strata may be observed beneath the water, or appearing above the surface, scattered in irregular masses along its course. These obstructions, taken in connection with the rapid descent of the stream, constitute insuperable objections to the improve-
3606-B ment of the natural channel by lateral dams and rock excavation. I saw nothing, however, to justify the conclusion that the river could not be improved by means of locks and dams, and small sections of canals. To determine this question a careful instrumental survey will be necessary. The means at my command being insufficient to defray the expenses of such a survey, I am obliged to confine my report to such facts as seem to establish its expediency.

Although I visited the headwaters of the river during the low-water season, yet I found in both of the forks a considerable volume of rapidly-flowing water, which seemed ample for the purposes of a slack-water navigation. As has been said, a careful survey is necessary to determine the practicability of this scheme, and I will now submit an account of the resources of the section in question, which will enable Congress to determine the propriety of making an appropriation for this object.

General Description—Agricultural and Mineral Resources.

It will not be out of place to notice the salubrity of the climate, which is due to the elevation of the land, the purity of the water, and the absence of marshes. By a survey made in 1826, from Lynchburg—which was placed at 528 feet above the tide—Wytheville was found to be 2,237 feet, and Mount Airy Ridge—the summit of the Atlantic, Mississippi and Ohio Railroad—to be 2,574 feet above the same level.

A recent survey, beginning at Norfolk, places Lynchburg at 522.7 feet; Wytheville, at 2,230 feet; and Mount Airy Ridge at 2,570.7 feet above tide. Between Wytheville and Wilson's Creek the general elevation increases, and the mountain ridges seem to be from 1,000 to 1,500 feet above the valleys. The mountains are, for the most part, well wooded, or cultivated to the tops. The slopes afford good grazing for flocks and herds of meat and horned cattle. The valleys and low hills are extremely picturesque, and are well farmed by a thrifty population. The Hon. A. M. Davis, ex-member of Congress, rates the average yield per acre in Grayson County as follows: Corn, 27 bushels; wheat, 12 bushels; rye, 15 bushels; oats, 25 bushels; buckwheat, 25 bushels; and hay, from 2 to 4 tons. He thinks this average would be doubled with proper tillage, which would follow the improvement of the avenues to market. After leaving Independence and approaching the copper regions of North Carolina, the soil becomes less fertile. Nearly all the agricultural products of Pulaski, Floyd, Carroll, and Grayson Counties, Virginia, and of Ashe, Alleghany, and Watauga Counties, North Carolina, have to be hauled from ten to sixty miles, over mountain roads, and at a cost, in many cases, of from 40 to 50 cents per 100 pounds, and are subject to an additional charge of from 20 to 25 cents per 100 pounds in order to reach Richmond. These rates render exportation from the back counties unprofitable, and they are, except for live stock, shut out from market. The opening of the river would stimulate the cultivation of resources now without value. The timber consists of white, black, and red oak, hickory, chestnut, poplar, and pine, which are found in large quantities and of considerable size; but, on account of the difficulty of the mountain roads, are now worthless, except for local uses, for fuel or fences.

The agricultural resources are, however, exceeded by the mineral. These extend along the course of the river and beyond the limited section assigned to me for examination. But in all this region the cost of hauling, when added to railroad freights, destroys the profits.

2806-C From Mr. Edward Shelly—an intelligent land-agent residing at Wytheville—I have the following statement in relation to ores of iron:

"We have of iron-ores, limonite, haematite, black oxide, or magnetic, and other ores in such quantity, they alone might be made the source of wealth and industry, if suitable transportation could be provided. But only a "tithe of those which now spin out a feeble existence" can reach market. Great efforts have been made to economize these ores on the spot, especially in Wythe County, and there has been an outlay of from $150,000 to $200,000 in the erection of blast or smelting furnaces, which are capable of producing about 10,000 tons per annum of the best cold-blast, car-wheel, charcoal-iron, which costs, on an average, $4 per ton for haulage to railroad, or from $40,000 to $50,000 per annum. The following furnaces are in active operation, and are all situated only a few miles from the river, mostly under three miles: Graham & Robinson's, two furnaces; Radford Iron-Works, one ten-ton furnace; Howard & Saunders, one; Painter & Co., one; Huddle, one; Crockett & Sanders, one; Sayers & Oglesby, one; Speedwell, one; some others are in course of erection. Beside the blast-furnaces, several bloomeries and forges exist on or near the river for manufacturing blooms and bars, direct from the ores, or otherwise converting pig-metal."

According to the geological map, the iron lead is one of considerable extent, being found between the headwaters in Watauga and the lead-mines in Wythe, and in Wythe, Pulaski, and Mongomery Counties, varying in width from a half-mile to two miles. It has a general trend northeast and southwest, and a dip at many points of 30° southwestwardly.

In Grayson County, Virginia, and in Ashe and Alleghany Counties, North Carolina, four forges have been opened on the north side of the river, and five on the south side, but in reference to their capacity, or whether they are now in operation, I can say nothing. Captain Raper, the principal proprietor of the Wythe lead and zinc mines, states that the number of iron-furnaces in Wythe County is eight, and that the annual productive capacity of each is about 1,000 tons. Another furnace, now in course of construction, will produce the same amount.

Copper Mines and Mining in Grayson and Carroll Counties, Virginia, and in Ashe County, North Carolina.

About fourteen miles from Independence, at the foot of the hill and near the edge of a small brook, is an abandoned copper-mine. A crushing-mill and grist-mill stand close by. It was stated that this mine had been abandoned on account of litigation in regard to the title. Ore-Knob mine, in Ashe County, North Carolina, is about forty-four miles from Independence, over a tortuous and rugged mountain-road; by the way of the river it is about eighteen miles above the mouth of Wilson Creek, and about three miles back from the river. The company has an office in Baltimore, but the work is managed by the principal proprietor, Mr. James Clayton, who resides at Ore Knob. The company has been extending its property by the purchase of large tracts in Ashe County, and in the adjacent county of Carroll, Virginia, which is said to abound in rich deposits of copper-ore. The vein trends southeast, with a dip nearly vertical, and a width of not less than 8 feet. The ores are either a red or black oxide or "smut," giving an average of about 32 per cent. for the more favorable specimens. The vein is supposed to belong to the cupriferous deposit which is found distributed irregularly as far as Duck River in Tennessee.

The Ore-Knob metal is extracted by a process which has been patented, and which is known as cementation. The process is analogous to that described in elementary works on chemistry under the name of "zinc tree," a familiar but curious illustration of the law of crystallization. The fronds of copper closely resemble those of the fern, having a stem, in some specimens, 3602–D of 1 inch in length, with needles about one-fourth of an inch long, and in color of a bright copper hue. The ore is raised to the top of the hill through shafts about 25 feet deep, and then, after calcining and being reduced to coarse powder, it is conveyed to circular vats or tanks, sixty in number, and arranged in successive tiers on the slope of a hill. The vats contain old iron, upon which, while undergoing oxidation, the crystallized copper accumulates. Mr. Clayton describes the process as follows:

"Our present process of working is a patent of Messrs. T. S. Hunt, of Boston, and Q. Douglass, jr., of Quebec, Canada, and is known as the Hunt and Douglass process of making copper by cementation. Our sulphureted ores are reduced, calcined, and made into oxides of copper. The oxidized ores are charged into vats or tanks into a solution of dissolved salt and copperas, the mass agitated, and the dissolved copper extracted by precipitation on metallic iron; the liquor is then pumped back and reused, and the operations continued. Our product is now about 120,000 pounds cement copper per month, and when our new works are increased the product will be near or about 200,000 pounds ingot-copper per month."

One hundred pounds of copper may be precipitated by 80 pounds of iron, but in practice 200 to 300 pounds more iron is used. This is occasioned by the free acid as well as the neutral sulphate of iron which dissolves the iron. In a solution containing iron vitriol, an insoluble neutral and insoluble basic salts of peroxide of iron are formed of different composition. Heating the solution facilitates the oxidation of the iron. Mr. Clayton attains this result by passing pipes of steam through the vats. The separation of the peroxide requires further manipulation. The resulting copper-crystallization is not a pure metal, but a sulphide or chloride of copper, and requires further process to separate the copper. The method employed by Mr. Clayton has been in use for some years in Europe.

The average actual product of copper by this process when I visited the mines was about 300 pounds per day. At that time the manager had to contend against several difficulties. The iron used in the process was purchased chiefly in Baltimore, and was hauled forty-four miles over badly-worn mountain roads from Marion, on the Atlantic, Mississippi and Ohio Railroad. The copper had to be hauled back to the same station. The cost per day for hauling to and from Marion is $300, but the number of days actually consumed in hauling is unknown. This expense, which will last as long as iron is required for the reduction of the copper, shows the importance of improved communication by river or rail for the development of the metallic resources of this section of country. During my stay work was suspended on account of the sudden fall of the market value of copper from 30 to 20 cents per pound. This company has made unavailing efforts to induce the railroad to extend a branch to its mines. Unless something is done this important industry must fail for want of proper encouragement. The capital invested in buildings and machinery at Ore Knob amounts to $150,000. Although this company seems willing to continue the contest with the difficulties which surround it, yet the long and necessary haul and the extravagant plan of purchasing the iron used in the reduction of the ore, may in the end prove fatal to the enterprise. Mr. Clayton is now engaged in a search in Wythe County for a suitable locality for an iron-smelting furnace, in order that he may be able to make the iron required in his process. It is hardly necessary for Mr. Clayton to go so far, as good magnetic iron-ore can be found on the South Fork near Helton Creek, about eight miles distant.

A valuable product, the red peroxide of iron, having the properties and consistence of paint, is now thrown away as useless, the cost of transportation not permitting it to be brought to 3606–E the railroad. It may seem remarkable that this company, notwithstanding the difficulties above mentioned, is able to compete with the Lake Superior mines, which supply copper of great purity. But the purity and consequent toughness of the lake ores render it extremely difficult to break up the large masses which form the deposit. The ores of Ore Knob and the vicinity are soft and easily reducible, and pay a fair per cent. on the cost when the market-price of the metal is at the average rate.

In reference to the cupriferous lands of the company, Mr. Clayton states:

"Our beds are the largest and nearest to tide-water of any yet known, and with any ordinary means of cheap transit we should be able to ship 500 to 1,000 tons pyrites daily. By introducing a cheap supply of sulphur we could reduce the cost of sulphuric acid, decrease the price of superphosphates, and increase the general prosperity of the Southern and Middles States by making available the use of superphosphates. Our present work is only valuable on account of the value of our ores for copper. By increased facilities of transportation we could utilize the sulphur and peroxide of iron which are now worthless and waste products."

Zinc and Lead Mines

The Union lead and zinc mines are located on New River, about fourteen miles from Wytheville and ten miles from Max Meadows (the shipping-point on the railroad) by an ordinary road.

The distance to the railroad-bridge over New River, by the course of the river, is thirty miles. In this distance the river is obstructed by many ledges of rock and rapids. At Forster's Falls the river has a descent of 18 feet in the distance of half a mile, and Colonel Craighill estimates the cost of a canal at this point at $250,000.

As the country between Max Meadows and the lead-mines is comparatively level, the railroad company would no doubt extend a branch to this point in order to command the trade.

The lead and zinc works are found at the same locality, and belong to the same company. The lead-mines have been in operation more than one hundred years. They were much used during the Revolution and during the late civil war. Since then the lead has become less valuable than the zinc. The ores are chiefly carbonates, silicates, and sulphurets of lead, overlaid by masses of zinc, which last are mined and shipped North in a crude state. I am unable to say why the zinc is not rolled before being shipped, as this would save the loss that must result from the transportation of crude ore. The vein is about 50 feet thick, and is traceable as far as Tennessee. Captain Raper, the principal proprietor, has communicated the following:

"The annual product of this mine for the last few years has been from 200 to 300 tons metallic lead, and we have shipped from 1,500 to 2,000 tons zinc-ore annually. The cost of raising the zinc-ore, which is mined in connection with the mining for lead, is about 50 cents per ton. The cost of manufacturing lead is about $3.75 per 100 pounds. The nominal capital invested is $400,000, divided into 20,000 shares, at $20 each. Rate of wages paid to operatives, from 75 cents to $1.25 per day; tenement-houses, fuel, and pasturage for milch-cows furnished free of rent."

Trade

In order to present a satisfactory exhibit of the trade of the region covered by my report, I have procured from Mr. E. E. Portlack, auditor of the road, the following statement of tonnage received and sent at and from the undermentioned stations (on the border of the region tributary to New River above the lead-mines) of the Atlantic, Mississippi and Ohio Railroad during the fiscal year ending September 30, 1874:

3606-F

Stations	In pounds		Total
	Received	Sent	
Dublin	2,741,280	9,105,146	11,846,435
Martins'	410,660	1,244,879	1,655,530
Max Meadows	2,768,760	10,953,401	13,722,161
Wytheville	5,208,680	8,124,658	13,333,338
Rural Retreat	1,213,240	1,884,196	3,097,436
Total received and sent	12,342,620	31,312,280	43,654,900

The bulk of the tonnage sent West from Max Meadows is pig-iron, shot and bar lead; of total tonnage sent, 3,235,780 pounds went West.

A classified return of the tonnage sent East over this road during the year ending September 30, 1874, from the aforementioned stations, was also furnished by Mr. Portlack, but being incomplete I have not thought it necessary to submit it. It embraces products of animals, of which the principal are bacon, butter, and lard, eggs, fowls, feathers, fresh meats, wool, cattle, hogs, horses and mules, and sheep; products of agriculture, of which the principal are corn and corn-meal, flaxseed, hay, rye, and other grains, tobacco-leaf, and wheat; products of the forest, including bark, lumber, roots and herbs, and staves; products of manufacture, including bees-wax, flour, shot, and bar-lead; products of the mines, including barytes, iron-pig, lead-pig, plaster, zinc-ore, and other articles. I am satisfied that this statement does not give all the products of the section of country under consideration.

Conclusion

The conclusion which I desire to present may be summarized as follows:

1. That the portion of New River between the mouth of Wilson Creek and the lead-mines cannot be improved by contracting the channel; erecting lateral dams, and removing the rock, but it may be improved by locks and dams and small sections of canal.

2. That a careful instrumental survey would be necessary in order to determine the feasibility of such an improvement.

3. The actual products, mineral and agricultural, as well as the resources of this region, are of sufficient extent to justify the cost of making a careful survey.

4. In case Congress desires a survey to be made, I respectfully submit the following estimate for that object. But in order that the projected improvement may be available for transporting copper from Ore Knob, I would recommend that the survey be extended for eighteen or twenty miles up the fork on which it is situated. An examination of the same distance on the South Fork would penetrate to the Helton Iron Furnace. The entire length to be examined on both forks and on the river would then be about eighty miles.

The estimate is as follows, made on the basis of ninety working days of field-work:

2 assistants, at $150 each, three months	$900 00
4 rodmen, at $70 each, three months	840 00
3 ax-men, at $30 each, three months	270 00

3606-G

3 canoes and boatmen, $45 each, three months		$405 00
4-horse wagon, at $150 a month, three months		450 00
1 cook, at $35, and 1 caterer, at $35 a month, three months		210 00
Subsisting 14 men and 4 horses three months, at 50 cents per day		810 00
Transportation of party to point and back		210 00
Instruments, transit, level, rods, chains, &c	$700 00	
3 tents and camp-equipage	150 00	
Cooking utensils, tools, &c	100 00	
		950 00
Completing maps and reports, and note-books and stationery		455 00
Total		5,500 00

Very respectfully, your obedient servant,

S. T. Abert,
U. S. Civil Engineer.

Brig. Gen. A. A. Humphreys,
Chief of Engineers, U. S. A.

3607 *Defendant's exhibit 560*

Report of the Chief of Engineers—Year 1887

(pp. 251–253; 1925–1926; 1927–1929)

3. New River, from the mouth of Wilson, in Grayson County, Virginia, to the mouth of Greenbrier River, West Virginia. The appropriations have been made in such manner as to divide this portion of the river into three sections, as follows:

	Miles
Upper, or Lead Mines	62
Middle, or New River Bridge	43
Lower, or Greenbrier	86½

Throughout this distance the navigable channel consisted of natural chutes through the ledges and shoals of varying widths, rarely over 1 foot in depth, in some places so tortuous as to render navigation extremely difficult and dangerous.

The original project adopted for the improvement of these natural channels was to widen them to 30 or 50 feet, as might be required, deepen them to 2 feet, and straighten such as needed it. This was for bateau navigation; the improvement, however, to be made in such a manner as to aid the work should a greater depth and width be required in the future.

A small steam-boat, draught 12 inches when light, having been built at Hinton, in the fall of 1878, rendered it necessary to make the channel in that section 50 feet wide at all points, and in many from 75 feet to 100 feet, the depth of 2 feet being retained. This steam boat was not adapted in dimensions and power to the navigation of the river, and was withdrawn.

The original plan of improvement has been adhered to, except that the width of channels on the middle and upper divisions has been reduced to 20 feet, and on the former to 10 feet for several miles, to allow iron to be shipped from the furnaces above.

There was no appropriation for this river in 1883, 1884, or 1885. July 1, 1886, there was a balance remaining unexpended of $3,000 from the appropriation of August 2, 1882. This pertained
3608 by special designation of the law to the portion of the river above Foster's Falls, which are not passable. The balance remained unexpended because of the impassibility of these falls. As the disconnection with routes of transportation caused by these falls would practically disappear on the completion of the railroad up Cripple Creek, and as boats could then ship to the railroad their freight at Porter's Ferry, above the lead mines and the falls, it was concluded to improve the condition of Williamson's Ledges and Shoals. This work was continued as late as the season allowed, a small balance of funds being left unexpended, but not large enough to justify the resumption of operations in the summer of 1886.

The navigation of the river not being continuous as yet, it is practically a feeder to the railroads which cross it and run along portions of it. It has also been of much use in carrying materials and supplies to the railroads while in process of construction near it. It is probable that when the river is fully improved boats will transport one-third of the products of the fine agricultural country through which it flows, and seven-eighths of those of the mines, exclusive of coal.

There was an appropriation of $10,000 in the law of August 5, 1886, applicable only to the portion of the river above the lead mines. When the money became available it was too late to commence operations in 1886. For more than one reason it seemed inexpedient to spend this appropriation in 1887. The portion of the river to which it is applicable is above Foster's Falls, and these can only be passed by one or two locks at a cost much greater than Congress is likely to authorize. There is also strong reason for doubt whether, considering the present development of that section of the country, the construction of such locks would be justifiable even if the money were available. The construction of railroads near this stream has for the present diminished very much the importance of the improvement of the portion above Foster's Falls. After a careful re-examination of the subject, and a reconnoissance of the river and its vicinity, it was decided to postpone the expenditure of the appropriation.

uly 1, 1886, amount available	$466.57
mount appropriated by act approved August 5, 1886	10,000.00
	10,466.57
009 July 1, 1887, amount expended during fiscal year, exclusive of liabilities outstanding July 1, 1886	244.28
	10,222.29
July 1, 1887, amount available	
mount (estimated) required for completion of existing project	1[illegible]0,000.00
mount that can be profitably expended on lower river in fiscal year ending June 30, 1889	20,000.00

ubmitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867.

E E 3

IMPROVEMENT OF NEW RIVER FROM THE MOUTH OF WILSON, IN GRAYSON COUNTY, VIRGINIA, TO THE MOUTH OF GREENBRIER, IN WEST VIRGINIA

After a suspension of operations for some years for want of funds an appropriation of $10,000 was made August 5, 1886, applicable, however, only to the portion of the river above the lead mines.

Doubt having arisen in view of the changed condition of affairs on and near the river as to the propriety of expending this appropriation at once, a special report was made to the Chief of Engineers May 19, 1887, as follows:

Referring to my request of April 8, approved April 13, for authority to have a reconnaissance made of New River, Virginia, above the lead mines in Wythe County, I have the honor to state that I employed for that purpose Mr. W. Proctor Smith, formerly of the Corps of Topographical Engineers, who had made a survey of that part of the river in 1878. His report of the survey may be found in the Annual Report of the Chief of Engineers for 1879, part 1, pages 538–545.

Previously an examination of the same portion of the river had been made by Mr. S. T. Abert, whose report, dated February 7, 1875, is in print in the Annual Report of the Chief of Engineers for 1875, part 2, pages 133–139.

Both of the reports referred to give much important information concerning the part of the river to which they relate. The former contains three estimates for the improvement of this stretch of the river of 62 miles as follows:

(1) For a 2-foot navigation for push boats 60 feet long, 7 feet wide, and carrying about 6 tons, with a channel not less than 30 feet wide, with tracking and towing paths at the falls and rapids	$115,000
(2) For a steamboat navigation, with a channel 90 feet wide and not less than 3 feet deep, with a grade always less than 1 in 400, including 28 locks and dams	1,200,000
(3) For a 5-foot stream navigation	1,600,000

Colonel Smith has lately inspected the upper river and submits a report, dated May 18, of which a copy is herewith.

3610 Reference is requested to what was printed concerning New River in the Annual Report of the Chief of Engineers for 1886, which need not be now repeated.

Up to July 1, 1886, the money available for the upper portion of the river had amounted to $10,000, of which there had been expended $9,533.43, leaving a balance of $466.57.

In the law of August, 1886, there was a new appropriation of $10,000.

The season for work in the river in that section is short and it was too late to make economical beginning after August, 1886.

For reasons often mentioned in annual and special reports, no attempt has been made to give a continuous navigation of the New River (which rises near the line between North Carolina and Virginia, runs nearly north, receiving many tributaries) to Hinton, on the Chesapeake and Ohio Railroad, where the Greenbrier empties into it. A short distance above the Falls of the Great Kanawha River it united with the Gauley to form the Great Kanawha River. The part of the river below Hinton is incapable of being navigable except at very great expense, and by resorting in some places to side canals. The Chesapeake and Ohio Railroad, now become a trunk line, is built upon the bank of the river below Hinton.

The portion of the river from the northern border of North Carolina to Hinton flows through a very picturesque country, sparsely populated, but containing a great and varied store of useful minerals, in some parts covered with large tracts of valuable timber, in others admirably adapted to agriculture and grazing. The most serious obstacle to a continuous navigation of the river above Hinton is Foster's Falls, which isolate the lead mines section from that immediately below.

Estimates for the improvement of the river above Hinton to the lead mines have been given in previous reports. These may be found in the Annual Report of the Chief of Engineers for 1873, pages 842–854.

As Congress has never given such a sum of money as would justify the proper beginning of a connected project for a continuous navigation from the North Carolina border to Hinton, the effort has been to apply such funds as were supplied in ameliorating the condition of the river and facilitating its use as a means of enabling the people to carry their salable products to the railroads which were in connection with the great markets of the Atlantic and the valley of the Mississippi. In carrying out this idea, there has been spent in the past ten years the sum of $58,000 in improving the portion of the river in the vicinity of New River Bridge, which is the point of intersection with the Norfolk and Western Railroad. The sum of $34,000 has been similarly spent on the portion of the river called the lower or Greenbrier section, which reaches the Chesapeake and Ohio Railroad at Hinton.

The question now is as to the best use to be made of the late appropriation of $10,000, which by the terms of the law can only be spent above the lead mines. As it is not likely Congress will in the near future supply the money necessary to make Foster's Falls passable and thus connect the upper and middle sections, it is supposed the same policy should continue of partial improvement in connection with the railroads. While there is much development in progress and more in prospect for the country on and near this upper section, yet the recent examinations of Colonel Smith seem to indicate that while the rafting of timber would be facilitated by spending the available $10,000 in the method suggested by him, that kind of navigation is already practicable, and the expenditure of the money would not be advantageous to any important extent to navigation by push-boats. Under all the circumstances it seems unnecessary to spend $10,000 on the upper New River in 1887, and it is accordingly recommended that the money be held in reserve.

3611 The recommendation to refrain from expending the money was approved. It may be added that the improvement of New River above the point to which it has now been carried would be quite expensive, requiring a very heavy excavation of rock. It would be a very uneconomical proceeding to spend the available appropriation in view of the very small benefit it would cause. It does not revert to the Treasury at present.

Precise statistics could not be obtained for the last fiscal year for the reason that, no work having been in progress, there has been no one to collect them from the individual owners of the bateaux, that alone are employed in the navigation of the river.

Money statement

July 1, 1886, amount available	$466.57
Amount appropriated by act approved August 5, 1886	10,000.00
	10,466.57
July 1, 1887, amount expended during fiscal year, exclusive of liabilities outstanding July 1, 1886	244.28
July 1, 1887, amount available	10,222.29
Amount (estimated) required for completion of existing project	159,000.00
Amount that can be profitably expended on lower river in fiscal year ending June 30, 1889	20,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867.

3611-A BALTIMORE, MD., *May 18, 1887.*

SIR: In compliance with your instructions to examine the resources and commerce of the section of country in Virginia through which New River runs, between the mouth of Wilson Creek and the lead mines, a distance of 62 miles, to ascertain, whether they would warrant the expenditure of the $10,000 appropriated by Congress in August, 1886, I have the honor to report that on Monday, April 25, I went to Wytheville, Va., and thence to Ivanhoe Furnace, in Wythe County, on New River, 2.6 miles above the lead mines.

Making the furnace my starting point, I examined the country by making frequent horse-back trips, and find as follows: That in 1885–86 a branch railroad was built from Martin's Station (now Pulaski City), on the Norfolk and Western Railroad, to a point on the river 23 miles above New River Bridge, and about the same distance by rail; thence the road was continued up to Foster's Falls (6 miles below the lead mines) when it stopped. Much work was also done on this road between Foster's

3611-B Falls and Ivanhoe Furnace, which is to be resumed at once and completed this fall. Ivanhoe Furnace is 2 miles above the mouth of Cripple Creek, up which the railroad is to run, and is now called by its name.

This road is built principally to get at the iron, lead, zinc, copper, and other metals in this section. The charcoal furnaces are to be changed to coke.

Abundance of timber; oak, black, white, and red; pine, white, and yellow; and hemlock, poplar, lynn, and chestnut. Some of this is found at Crooked Creek, but the forests get heavier at and above the mouth of Chestnut Creek, 8 miles above Ivanhoe Furnace; thence the timber continues all the way up the stream and in large quantities in Alleghany, Ashe, and Watauga counties, North Carolina. The Carroll County Mineral Company owns 450 acres on Crooked Creek, 4 miles up; and 730 acres on Chestnut Creek, 5 miles up, which comes to within 1½ miles of the river at Dixon's, 10.8 miles above the furnace; this property is full of black oxide and sulphate of copper and some iron.

The great magnetic vein of iron ore which runs through the country crosses the river here, and is now being developed, as it is also 2 miles above. Further up the stream there is plenty of copper; in fact minerals and timber abound beyond the usual amount found in any section of the same dimensions.

As regards the commerce proper of this section, I may say that through the mountains there is little else for transportation than timber and minerals; food supplies have frequently to be brought there.

Above the mountains the people raise some little more breadstuffs than they use, which are sold in North Carolina, off the river. Horses, stock cattle, and sheep are raised in very considerable quantities, but of course they are driven to market and do not affect the water route.

Considerable developments are being made, and mineral lands are much sought after and readily bought and sold.

The Cripple Creek Railroad Company is putting up a new iron furnace on Reed Island Creek, also one at Foster's Falls.

Ivanhoe Furnace is soon to be changed from charcoal to coke, and so are several others further up the creek.

A survey of the portion of the river under consideration was made under your direction in September, 1878, a report of which will be found in the Report of the Chief of Engineers U. S. Army, for 1879, Appendix F, commencing at page 539, to which you are respectfully referred, for it gives in detail much information with regard to the resources of this country.

From the above showing it will be seen that in timber and minerals the country abounds. The question now arises, can they be carried down the river through the channel, as it is now being made? The sum of $10,000 has already been expended, producing a channel 20 feet wide and 2 feet deep, at ordinary summer water, to within 400 feet of Fowler's Ferry, 6¼ miles above the lead mines and 3.65 miles above Ivanhoe Furnace.

The distance is given from the furnace, for it in the future must be the initial point of this work, if the plan of making the improvement tributary to the railroads running along the banks of the river and crossing the same is to be adhered to.

The grades being heavy and obstructions numerous, it was decided to make the channel only 20 feet wide, in order that the small appropriations might be made as useful as possible. This width, however, does not permit walls being built along which the boatmen could move and pull their boats. The current and natural channel, for the same reason, had to be followed, which makes the new channel very much curved in many places and somewhat difficult to navigate.

With an appropriation of $5,000 the channel as now made to Foster's Ferry, 6¼ miles, could be widened to 40 feet and the walls referred to be built with the extra material, and by an increased width the velocity would be diminished, thus enabling boats to go up as well as down, which is now very difficult and rarely attempted.

This width of 40 feet could be carried up the stream at a cost about double that of the 20-foot channel. The boats referred to are 60 feet long, 7 feet wide, and 3 feet deep, carrying about 6 tons.

With regard to rafting timber, the channel can be left as it now is, with the exception of straightening two points in Rogers's and cutting off two bends in Wilkinson's shoals; in fact a contract has been made to raft heavy oak timber down this channel in its incomplete state this summer. These timbers are for bridges and trestles on the Cripple Creek Railroad.

It is thought that the $10,000 now under consideration will make such a channel as far as Grayson Sulphur Springs, 6.8 miles above Ivanhoe Furnace, and into the timber region; anyhow it will make it as far as the New River Mineral Company's ferry at Crooked Creek, 5¾ miles above the initial point, where timber can be had, but not in such quantities as higher up the river.

It may as well be mentioned here that the heavy work in this section begins at Rogers' Shoals, 1.4 miles above Ivanhoe Furnace, and continues for nearly 14 miles through the mountains (river hills); thence to the mouth of Wilson Creek, 43 miles. With the exception of two falls, 10 miles below the stream mentioned, the stream can be easily and cheaply improved.

36kl–C

A map (scale 6 miles to the inch) of New River and its tributaries, from its sources in North Carolina, through Virginia, to the mouth of the Greenbrier, in West Virginia, showing the railroad following and crossing the same, accompanies this.[13]

A project for the expenditure of the $10,000 last appropriated to continue the improvement for the purpose of making a channel for rafting is herewith appended.

Respectfully submitted.

Wm. Proctor Smith.

Col. William P. Craighill,
U. S. Engineers.

PROJECT FOR THE EXPENDITURE OF $10,000 APPROPRIATED AUGUST 5, 1886, FOR CONTINUING THE IMPROVEMENT OF NEW RIVER, VIRGINIA, BETWEEN THE MOUTH OF WILSON AND THE LEAD MINES IN WYTHE COUNTY, VIRGINIA

4 canoes, at $20	$80
5 rock boats, at $25	125
1 skiff, at $25	25
Tools, tents, lumber, rope, chain, and camp outfit	450
	680

---

[13] Map omitted.—W. P. C.

ROGERS' LEDGES

(1.4 miles above Ivanhoe Furnace)

To straighten channel and widen curve at upper ledge	$300

WILKINSON'S SHOALS AD LEDGES

(2.1 miles above Ivanhoe Furnace)

To widen and smooth channel at forge and to widen at curve at Fish Trap	400
To finish channel at upper end, not completed in 1885	300

EARLY'S SHOALS

(4.4 miles above Ivanhoe Furnace)

10 ledges, flat slate, 25 to 35 feet wide each; almost continuous cutting; river broad; length about 300 feet; fall, 2.7 feet	1,800

ALLEY'S LEDGE

(4.9 miles above Ivanhoe Furnace)

6 scattering ledges, about 25 feet wide each; fall, 6.45 feet	450

GULF SHOALS

(5.6 miles above Ivanhoe Furnace)

Between one-half and three-fourths mile long; lower part very rough; runs between hills on either side; water swift; consists of 20 ledges slate; sometimes as many as 3 in a group; fall 12.54 feet—10 feet in less than one-half the distance	4,000

CROOKED CREEK SHOALS

(5¾ miles above Ivanhoe Furnace)

5 ledges, close together; fall, 21½ feet	375

GRAYSON SPRING'S LEDGES

(6.8 miles above Ivanhoe Furnace)

Five-eighths mile in length; fall, 8 feet; 12 to 16 ledges, 10 to 25 feet wide each	$1,665
	10,000

Rather a small amount for the last shoal, but some money may be saved from the others. Early's Shoal has been estimated at much less, previously, but in fact it is with great difficulty one can get even a good approximate with water tolerably high and not clear. Rogers' and Wilkinson's ledges are not described, as they have been worked through and described fully in reports and projects.

In view of the difficulty in making accurate estimates as to quantity and quality of the material to be removed on which to ask bids for contracts, it is respectfully recommended that the work can be better and more economically carried on by procuring the labor and purchasing the materials in the open market.

3612 *Defendant's exhibit No. 561*

Report of the Chief of Engineers for the year 1888, pages 225, 226, 1760, 1761. (Original Exhibit.)

Defendant's exhibit No. 562

Report of the Chief of Engineers for the year 1889, pages 261, 262, 1961, and 1962. (Original Exhibit.)

Defendant's exhibit No. 563

Report of the Chief of Engineers for the year 1890, pages 235, 236, 2249, 2250, 2251. (Original Exhibit.)

3613 *Defendant's exhibit No. 564*

Report of Brigadier General Casey, Chief of Engineers, United States Army, to the Secretary of War, dated November 16, 1894, to which is attached a third endorsement by Col. Craighill's underlying report, and also a second endorsement.

3614 *Defendant's exhibit 564*

Filed: Office of the Secretary, War Department, October 8, 1894. 1373—3. Office of Chief of Engineers, War Department, October 9, 1894. 8366—3. W. H. Bolling, Attorney.

Petitions on behalf of Pulaski Iron Co. & other iron & mineral companies, that New River, Va. be exempted from operations of R. & H. Act, & that permission be granted them & others engaged in similar operations to flow water from their washers into New River & its tributaries & that Sec'y of War hear testimony & grant them full relief from operation of act above referred to.

* * * * *

(2d indorsement)

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
Oct. 9, 1894.

Respectfully referred to Col. Wm. P. Craighill, Corps of Engineers, for report.

To be returned.

By command of Brig. Gen. Casey:

H. M. ADAMS,
Major, Corps of Engineers.

8366—3. 8366 & inclos. 1 & 2 accomp'g.

(3d indorsement)

U. S. ENGINEER OFFICE,
9 PLEASANT ST.,
Baltimore, Md., November 14, 1894.

Respectfully returned to the Chief of Engineers. I was unable to visit New River owing to my detail on the Board to 3615 select a route for a canal between Chesapeake & Delaware Bays, and other duties which prevented an absence from Baltimore of sufficient length for a personal examination. A reliable assistant was sent who has made a report which is herewith. In addition I have had correspondence with other parties and send herewith a letter of October 29, 1894 from Gov. MacCorkle of West Virginia in which he encloses a report of certain experts who have examined into this matter; also a letter of Nov. 1, 1894 from Atty. H. E. Davis.

The law which is brought forward as applicable to this case is Sect. 6 of the River and Harbor act of 1894, in which the following is found: "That it shall not be lawful to place, discharge, or deposit, by any process or in any manner, ballast, refuse, dirt, ashes, cinders, mud, sand, dredgings, sludge, acid, or any other matter of any kind other than that flowing from streets, sewers, and passing therefrom in a liquid state, in the waters of any harbor or river of the United States, for the improvement of which money has been appropriated by Congress, elsewhere than within the limits defined and permitted by the Secretary of War."

Some of the language is peculiar and seems to be specially applicable to New River, which is a river "for the improvement of which money has been appropriated by Congress." In a previous endorsement (3d, Sept. 29, 1894, 8366, herewith) it was stated

that "the last appropriation for 'this river was made in 1886 and the last work on it by the U. S. was in 1889. Since the development of the railroads in that section there has been no need for work on the river by the U. S.'" And it may be added that there is no navigation at present on the river except by a few push-boats, and there is not likely to be a commerce on the river for many years nor until the population and trade should increase to such an extent as to justify the expense of introducing a system of locks and dams. It may therefore be stated that the discharge of ore-washings into New River should not be considered as endangering navigation. As the New River with the Gauley form the Great Kanawha on which the U. S. has expended a large sum of money with important results for great commercial interests, it was deemed necessary to ascertain whether the
3616 discharge of ore-washings in the New River near its head would work injury to the navigation of the Great Kanawha. My opinion is that no such injury need be apprehended.

If, however, it should be deemed necessary to prevent in whole or in part this discharge into the river, I can suggest no other remedy than the construction of settling basins & dams and a sufficient definition of their "limits" would be at any place near each plant which should be preferred by the owner or operator, with compliance with the conditions of consistency of the material prescribed by Congress.

(Signed) Wm. P. Craighill,
Colonel, Corps of Engineers, U. S. A.

4 Enclosures.

(4th)

Nov. 16, 1894.

Respectfully returned to the Secretary of War.

Certain iron and furnace companies in the State of West Virginia petition the Secretary of War to exempt New River, in that State, from the operation of Section 6 of the Act of Congress of August 17, 1894, and to grant them permission to flow the waters from their ore washers into New River and its tributaries.

It appears that there are about eighteen ore washers in New River and its tributaries and that they throw a volume of over two million gallons of mud laden water into the river, each day, in a distance of 30 miles. It is alleged by the Governor of West Virginia, and others, that this flowing of ore washings into the river pollutes the water and renders it unfit for domestic purposes, destroys the character of the scenery, and destroys both fish and game.

These papers have been referred to Col. W. P. Craighill, Corps of Engineers, to whose report, in third indorsement hereon, attention is respectfully invited. This officer states that the discharge of ore washings into the New River endangers neither the navigation of that river, on which there is no commerce, 3617 nor the navigation of the Great Kanawha River which is formed by the junction of the New and Gauley rivers.

As navigation is not interfered with, and no complaint is made of injury to navigation interests, it would seem that the Secretary of War has no authority to restrain the flowage of these washings into the river, for the jurisdiction of the War Department over the river attaches solely for the preservation and protection of navigation and that is the object of Section 6 of the Act of August 17, 1894. Again it would appear that he has no authority to license or permit the doing of the thing which is claimed to be a local damage to the country and an injury to the people.

I recommend therefore that this petition be denied and that both parties to the controversy be informed that the War Department will take no action in the matter unless it should appear in the future that navigation was injured or was threatened with injury.

(Signed) Jno. Lincoln Casey,
Brig. Gen., Chief of Engineers.

8366-3. 8366 & inclos. 1, 2, 4, 5, 6. 11—14 accomp'g.
Rec'd. Office Chief of Engineers, Nov. 21, 1894.
Rec'd. Back, War Dep't. Nov. 16, 1894.

3618 *Defendant's exhibit 565*

58th Congress, 2d Session. House of Representatives. Document No. 176.

New River, West Virginia

Letter from the Secretary of War, transmitting, with a letter from the Chief of Engineers, report of examination of New River, West Virginia.

December 18, 1903.—Referred to the Committee on Rivers and Harbors and ordered to be printed.

War Department,
Washington, December 16, 1903.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated December 1, instant, together with copy of a report from Capt. W. E. Craighill, Corps of Engineers, dated February 4, 1903, of a preliminary examination of New River, West Virginia, made by him in compliance with the provisions of the river and harbor act of June 13, 1902.

Very respectfully,

ELIHU ROOT,
Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 1, 1903.

SIR: I have the honor to submit herewith report, dated February 4, 1903, by Capt. W. E. Craighill, Corps of Engineers, on preliminary examination of New River at its confluence 3619 with the Greenbrier River, West Virginia, ordered by the river and harbor act of June 13, 1902. Captain Craighill expresses the opinion, which is concurred in by the division engineer, Col. G. J. Lydecker, Corps of Engineers, that the locality is not worthy of improvement by the United States.

The object of this examination and the effect on the water front at Avis, or Upper Hinton, of improvements heretofore made in this stream by the General Government are fully stated in a report, dated May 1, 1903, by the Board of Engineers for Rivers and Harbors, which has reviewed this report under the provisions of sections 3 and 14 of the above-mentioned act. The locality has been personally inspected by a representative of the Board, and in view of the information before it the Board concludes that it is not advisable for the United States to undertake the improvement of New River at its confluence with the Greenbrier.

I concur in this opinion.

Very respectfully, your obedient servant,

G. L. GILLESPIE,
Brig. Gen., Chief of Engineers, U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF NEW RIVER, WEST VIRGINIA, AT ITS CONFLUENCE WITH THE GREENBRIER RIVER

UNITED STATES ENGINEER OFFICE,
Wheeling, W. Va., February 4, 1903.

GENERAL: In compliance with instructions contained in your letter dated June 23, 1902, I have the honor to submit the follow-ng report upon the examination of New River at its confluence vith the Greenbrier River.

From correspondence with those interested in having this examination made it was learned that the object of it was to determine whether or not the improvements made by the United States in the New River at and near the mouth of the Greenbrier in the year 1878 (see Annual Report of the Chief of Engineers for 1879, Part I, p. 536) have operated to cause the bank of the New River to scour, injuring the town of Avis.

Avis (formerly known as Upper Hinton) is immediately above Hinton, W. Va., on the right bank of the New River and
3620 a short distance below the mouth of the Greenbrier, which comes into the New River on the side upon which Avis is built.

The work of improvement by the United States in the New River consisted in blasting channels out of the solid rock bottom above and below the mouth of the Greenbrier. The rock excavated was piled on both sides of the channels, the object being to form chutes for flatboat navigation, the chutes being about 50 feet wide and intended to give a depth of 18 inches at low water.

The Greenbrier enters the New River at an acute angle, pointing downstream, and just below the junction there are three low islands, separated from each other and from the point between the two rivers by narrow channels.

Both rivers are mountain torrents, with very steep, rocky beds.

The Greenbrier River rises in the eastern part of West Virginia, while the New River rises in North Carolina and flows thence northward through Virginia into West Virginia. As the two rivers have their sources so widely separated a considerable freshet may occur in one while the other is low. When a rise comes out of New River and none out of the Greenbrier, the New River flood water passes between the islands below the confluence, and when it reaches a height of about 10 feet passes over the islands. The resultant current strikes the shore in front of Avis, and in the past has caused considerable damage. It is claimed by some of the citizens of the town that the direction of the channels cut by the United States tends to throw more of the current against the Avis water front than would otherwise naturally be the case. In the report of the improvement of the New River above referred to the following statement is made, indicating that the erosion of the bank in front of Avis was going on at the time of the commencement of the work of improvement:

"Arrangements for beginning work, the procuring of tools, boats, blasting materials, etc., were made at once, and a force of hands got to work on the shoals between the landing and the foot of Greenbrier shoal on September 7.

"Operations were a good deal delayed by the unprecedented rise in the river, which on September 13 reached 20.2 feet above low water at Hinton. At the mouth of Blue Stone River, 5 miles above, its highest point was 23.7 feet above low water. This was from 5 to 6 feet higher than ever known before. It did 3621 much damage in the valley. At Upper or Old Hinton, sixteen buildings, several of them good frame houses, were carried away. The sawmill of Mills & Co., the only one then in operation in the place, was also seriously damaged."

In view of the statements contained in the preceding quotation and from a personal examination of the ground I am satisfied that the causes of the damage to the town of Avis were in operation before the commencement of the Government work in the New River, and that these works are not responsible for its continuance. As a rule rivers which are subject to freshets are liable to erode their banks after the country is settled and the banks cleared of their trees and underbrush. At many points on the Kanawha, of which the New River is one of the headwaters, this action has taken place and is now going on.

In my opinion the locality is not worthy of improvement by the United States.

Very respectfully,

W. E. CRAIGHILL,
Captain, Corps of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

(First indorsement)

ENGINEER OFFICE, U. S. ARMY, CENTRAL DIVISION,
Cincinnati, Ohio, February 5, 1903.

Respectfully forwarded to the Chief of Engineers, United States Army, concurring in the views and opinion expressed within.

G. J. LYDECKER,
Colonel, Corps of Engineers,
Division Engineer, Central Division.

(Second indorsement)

OFFICE CHIEF OF ENGINEERS, U. S. ARMY,
February 17, 1903.

Respectfully referred to the Board of Engineers for Rivers and Harbors constituted by Special Orders, No. 24, Headquarters, Corps of Engineers, series of 1902, for consideration and recommendation, as required by section 3 of the act of June 13, 1902.

Previous papers on the subject on file in this office are herewith.

By command of Brig. Gen. Gillespie:

A. MACKENZIE,
Colonel, Corps of Engineers.

3622 (Third indorsement)

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., May 1, 1903

Respectfully returned to the Chief of Engineers, United States Army.

The Board of Engineers for Rivers and Harbors has considered the within report of the district officer upon a preliminary examination of "New River (West Virginia, at its confluence with the Greenbrier River," the indorsement of the division engineer thereon, and other data available, including detailed maps showing the extent and character of improvements heretofore made in the vicinity by the United States. On April 7, 1903, the locality was inspected and further reported upon by the assistant engineer of the Board.

It appears that the object of the preliminary examination is to determine whether or not certain works of improvement made by the United States in New River in the years 1878–79 have operated to cause the bank of New River to erode in front of the town of Avis, or Upper Hinton. The works referred to consist of a channel blasted through a rocky reef from a point 6,400 feet above Avis to a point 10,000 feet above that town and of deposits of spoil along the sides of said channel. At the time of the inspection of the locality the river was at a 3-foot stage, somewhat below a mid stage, yet even at the lower water the works complained of were not even visible, and produced no apparent effect on the current.

The absence of erosive effects upon the islands below the reef and above Avis, against which the water would impinge if the Government work produced any marked diversion of the current, the remoteness of the Government work from the town of

Avis, and the slight effect which could be produced upon the banks by work of such character and limited extent convince the Board that no connection can be traced between the Government work and bank erosion at Avis.

The Board believes that it is not desirable that the United States should undertake the further improvement of "New River at its confluence with the Greenbrier River," West Virginia.

For the Board:

H. F. HODGES,
Major, Corps of Engineers,
Senior Member Present.

3623 *Defendant's exhibit 566*

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, May 19, 1916.

Refer to File No. 8366.

Memorandum for the Secretary of War

Subject: Pollution of the waters of New River and its effluent, the Kanawha River, by the flowing of ore washings from the mines and furnaces located on the former river and its tributaries

1. This matter has been under consideration by the War Department, from time to time, since 1894, and has been the subject of much investigation and study. The original allegation was that the flowage of ore washings into New River polluted the water, rendered it unfit for domestic uses, defaced the scenery, destroyed both fish and game, and thereby inflicted serious injury upon the people of the State. For these reasons the State of West Virginia asked that the Secretary of War invoke the power conferred by Federal laws, enacted for the preservation and protection of navigation, to prohibit the operations of the iron and furnace companies in this regard. These companies, on the other hand, asked to have New River exempted from the operations of the aforesaid laws, and to have permission granted them to flow their ore washings into these waterways. After thorough consideration of the facts, and arguments presented by the opposing interests, and examination of conditions on the river, the conclusion was reached that navigation was neither injured nor endangered by the discharge of ore washings, and the Secretary of War decided to take no action whatever in the matter.

2. Subsequently, the iron and furnace companies presented a petition to the Department, asking that a permit be granted to cover their operations, it being alleged that the U. S. District Attorney was about to institute proceedings against them,
3624 and a permit was therefore necessary to forestall such proceedings. In reporting on this petition the Chief of Engineers expressed adherence to his former conclusion, and added:

"The interests of navigation are not involved in this matter; the controversy is one purely of local concern, and it is believed that the War Department should take no action that would embarrass any of the citizens of West Virginia in taking steps to abate what they consider a nuisance, or in making legal resistance to what they conceive to be an aggression upon their rights."

The Secretary of War concurred in this view, and the case was again dismissed.

3. About a year later the companies, through their representatives in Congress, again petitioned for a permit. The Chief of Engineers against opposed the proposition on the aforesaid grounds that the case did not come within the purview of the Federal laws, but was one for local adjudication; but, in an opinion rendered February 12, 1896, by the Attorney General, to whom the question was submitted, it was held that the Secretary of War should act on the petition, but should be governed only by considerations affecting the present and prospective navigation of the rivers. Accordingly the Secretary of War, under date of February 26, 1896, addressed a letter to Messrs. James A. Walker and Claude Swanson, representatives in Congress from the State of Virginia, in which after naming the petitioners, the iron and furnace companies, 24 in all, he said:

"I have the honor to inform you that the limit within which ore washings from those mines may be deposited shall be that portion of New River near said mines, respectively; it being distinctly understood that this permission is revocable and void if at any time in the future the amount of ore washings be so great as to be hurtful to the interests of navigation."

4: This was regarded as a permit under which the companies continued the practice of flowing their ore washings into the aforesaid streams. Efforts were made by the State of West Virginia at various times to have this action revoked, and in
3625 1899, Senator Elkins brought the matter to the attention of the Department presenting a copy of the original complaint and petition of 1894. In submitting the case at that time to the Secretary of War for decision, the Chief of Engineers,

after reciting the essential features of the complaint (set forth in paragraph one above) stated his position as follows:

"These are important matters to the people of West Virginia, and the injury inflicted is doubtless of a serious nature; but it is submitted that the General Government can afford no relief and provide no remedy in the premises. The control of Congress over waterways is conferred by the commerce clause of the Constitution of the United States, and is to be exercised for the preservation and protection of navigation and the regulation of commerce only. The existing laws were enacted, and are to be executed for this purpose only.

"Congress has passed no statute to protect the fish or the scenery of New River, or the purity of its water, and unquestionably such a statute if passed would be invalid. These are subjects which belong to the States alone, and as Congress could not directly legislate concerning them, it follows that it could not reach them indirectly through the powers committed to the Secretary of War in the existing laws.

"As these matters bear no relation to navigation, and no injury to navigation interests is to be apprehended, I am convinced that the only action the Secretary of War can take to relieve the situation, would be to revoke the permit heretofore given to the iron and furnace companies to deposit ore washings in the river near their mines. I think this should be done, and then the matter can be left for local adjustment without being complicated by War Department action.

"The parties aggrieved can then apply to the legislatures of the States for the passage of the necessary laws to effect an abatement of the nuisance complained of, if there are no such laws now in existence; if the necessary laws are already enacted, then they can resort to the local courts for a redress of their grievances."

3626 5. By letter of September 11, 1899, the Secretary of War (Mr. Root) advised Senator Elkins that as the case "involved no interference with navigation, and no complaint is made of injury to navigation interests, it would seem that the Secretary of War can afford no relief in the premises, the matter being one within the control of the State authorities."

6. Ten years later, or in 1909, the matter was again investigated, it being alleged that navigation was injured, by reason of deposits from the washings, and to the chemical action of the water on the boilers and other apparatus of steamboats, but, on investigation, it was again decided that no injurious effect on navigation was apparent.

7. Again in 1910 a petition was filed by the State of West Virginia renewing the original controversy, the essence of the complaint being the same, with the added allegation:

(a) That the ore washings caused solid deposits in Kanawha River, to which New River is tributary, thus decreasing navigable depths of the channels;

(b) That the washings increase the tendency of all the iron and steel, employed in the locks and dams, to rust, thereby decreasing their period of usefulness; and that, by adding to the turbidity of the streams, the washings interfere with work of improvement carried on under water, such as lock excavation, removal of logs and stumps, and other operations requiring the service of divers;

(c) That the washings produce conditions destructive to the boilers, machinery and apparatus of steamboats, and other vessels, employed in navigation; and also render the water unfit for the usual purposes to which it is applied on such boats thus adding to the dangerous discomforts, and inconveniences of navigation.

8. This petition and complaint took the usual course. The district engineer officer gave the allegations exhaustive consideration, held a public hearing, accorded both interests the fullest opportunity to present their respective sides of the controversy and submitted a report thereon in November 1910, which
3627 covered the various arguments and contentions presented by
the parties. The report was then examined by the attorneys to both sides of the controversy and they were afforded an opportunity to submit comment and argument upon its various features. Summarized, the specific request of the petitioners was:

(a) That the aforesaid permit (so-called) of February 26, 1896, be revoked;

(b) That the mining companies be required to construct and use settling basins in connection with their operations, or some other device that would accomplish the same purpose.

9. In presenting the matter to the Secretary of War, July 13, 1911, the Chief of Engineers stated:

"While this action is desired ostensibly in the interest of navigation on the Kanawha River, it is probable that the real basis of the request is the desire to preserve for the people of the State the use and enjoyment of the waters and the scenery of New River.

"I have given all the facts presented careful examination and study, and am unable to find any good reason for dissenting from the position taken by my predecessors as hereinbefore set forth. At the time the permit was granted there was no apparent interference with navigation by the ore washings, and the only effect of the permit was to save the companies from any attempted prosecution in the Federal courts, and that is the only office it serves now. It did not then, nor does it now, authorize any infringement of state laws, or affect in any way the power of the State and local authorities to regulate and control the operations of the companies in matters of local concern.

"There has been no useful navigation on New River at any time, and none is possible under existing natural conditions, nor without the expenditure of vast and prohibitive sums in improvement work. While the discharge of ore washings in New River may produce conditions in Kanawha River injurious and obstructive to navigation, in the various ways alleged by the petitioners, it is probable that in most instances the effect is too remote, and too much complicated with other causes to warrant the action desired by the petitioners; and it is extremely doubtful that such action, if taken by the Department, would be sustained by the courts.

"That the continued operations of the mining companies have, however, now begun to injuriously affect to some extent navigable conditions on Kanawha River, is believed to be susceptible of proof. The District engineer states that around the forebays of the Government locks, the amount of dredging necessary has been increased in recent years, which increase is properly traceable to the New River ore washings; and that the deposit of mud on the service bridge trestles, causing them to rust and deteriorate, is much more common at the present time than in the earlier years of the improvement, this mud deposit being likewise attributable to the ore washings.

"In view of these results of the companies operations, results which are tangible and capable of being demonstrated, and which are directly harmful to the public interest committed to the care of the War Department, I am of the opinion that, as the Department may not be justified in the immediate and arbitrary revocation of the permit and the consequent subjection of the companies to prosecution in the Federal Courts, it would be proper for the Department to now require the added installation, in connection with these operations, of settling basins or other suitable devices for minimizing their objectionable and injurious effects. I recommend therefore as a condition precedent to any continuance in force of the existing permit, all the mine owners whose operations will extend over a longer period than one year and are covered by the said permit, be required to install the foregoing devices without delay. I further recommend that a similar requirement be made regarding those mine owners, if any, whose operations are not covered by the permit, in lieu of the institution of proceedings against them for violating the provisions of the Federal statute."

3629 10. On November 20, 1911, the Secretary of War approved the recommendation of the Chief of Engineers and on December 2, 1911, the various corporations and companies discharging ore washings into New River were given notice that such deposits would only be allowed within or behind settling basins, or their equivalents, outside of the river, so arranged that their over-flow reaching the river shall be free from solid matter of any kind, such basins to be commenced within six months and be completed within 12 months from date of the said notice.

11. July 16, 1912, the Virginia Iron, Coal and Coke Co., stated that they were erecting settling basins for their Sanders and Cedar Run mines but asked for an extension of time in which to exhaust certain others (Tasker, Rustin, Reed Island and Rich Hill mines). An extension of time to December 2, 1913, was recommended by the district officer and the Chief of Engineers and granted by the Secretary of War.

12. In a report of November 10, 1913, the District Engineer Officer stated that the last personal examination of iron ore washings in the New River district was made about June 1, 1913, which showed that all companies except the Virginia Iron, Coal & Coke Co., had ceased depositing their washings in the New River without first being settled; that they would probably ask for another extension of time; and that in view of the probable short time that the mines would be worked, for which it would be unprofitable to build settling basins, he intended to recommend that an extension of time be granted.

13. On December 3, 1913, the Virginia Iron, Coal and Coke Company, requested an extension of time within which to mine out the ore remaining in three of its properties (Tasker, Rustin and Reed Island mines). A personal examination of conditions was made by the District Engineer Officer on January 5, and 6, 1914, and an exhaustive report on conditions submitted February 14, 1914. He expressed the belief, giving his reasons therefor, that the chief causes of the unsatisfactory conditions of the New and Kanawha rivers were erosion from soil and factory and industrial wastes. He stated that the mines depositing washings in the river had been reduced from 17 to 3 and calculated

3630 that the decrease in deposits, turbidity, etc., caused by the ore washings should have been between 80 and 90 percent of what they were previous to 1910 whereas the average improved condition was about 50 per cent, and that for a period (May to December, 1913) of no high waters. A further extension of time to June 1915 was recommended by the district officer, but the

Chief of Engineers, in submitting the matter to the Secretary of War recommended that an extension to June 30, 1914, and no longer be granted. This recommendation was approved by the Acting Secretary of War May 23, 1914, and the company so notified on May 29, 1914.

14. On June 9, 1914, the Virginia Iron, Coal & Coke Co., petitioned for an extension of time until June 30, 1915, in which to exhaust their three mines (Tasker, Rustin and Reed Island) before the order of the Secretary of War, regarding the erection of settling basins, should be made applicable to them. The mines are about 250 miles above navigation. The Chief of Engineers in a memorandum of July 2, 1914, to the Secretary of War recommended that no further extension of time be granted, on the basis that for each ton of ore mined ten tons of solid matter were being discharged into a tributary of navigable water. He stated that this material had moved downward and had been deposited at various places, upon bars and in shallows, perhaps clear down to the mouth of the Mississippi, and that in his opinion navigation has, or may have been impeded or obstructed thereby. This recommendation was approved July 6, 1914, by the Assistant Secretary of War, then Acting Secretary, but the Secretary, on July 16, 1914, reversed the ruling and extended the time to July 1, 1915, saying to the Company that "this is the final extension that will be granted, and you must not expect favorable consideration upon any application for any further continuance or extension."

15. On July 10, 1915, after the time had expired, the district officer inspected the mines of the company and found active operations being carried on at the Cedar Run and Sanders mines, for which settling basins had been constructed, and steps were being taken to place the Tasker mine in active operation, for which a settling basin was being provided by the construction of an earthen dam or embankment to retain the material.

3631 16. Although all the mines in operation have been provided with settling basins, complaints against the pollution of the rivers are still being received. On March 14, 1916, a letter was received from Hon. Adam B. Littlepage, M. C. in which a statement is made in regard to past action with reference to this pollution and asking that the Attorney General be called upon to prosecute and to enforce the revocation of the permits allowing the discharge of these iron ore washings in the rivers.

17. On April 19, 1916, the district officer (Major T. H. Jackson, Corps of Engineers) made another inspection of the mines to determine the conditions, not only at the basins, but at the washers and in the streams into which the basins are discharged, with a view of learning something of the operations since the time

f the last inspection, July 10, 1915. As a result of the inspecion he reports that the washers are being operated in accordance vith the War Department instructions and the operators indiated a willingness to do anything within reason that will meet ot only the present but any additional requirements. He conidered the depth of water in the vicinity of the discharge outlets t the Cedar Run basin insufficient and gave instructions to have t increased. He also reported that no complaints had been nade to his office by river interests that navigation was being nterfered with or injured by this or other industries placing naterials in the Kanawha River or its tributaries; that the oprations as at present conducted cannot be said to have any njurious effect on navigation; and he recommends that no further ction be taken in the matter and the complainants be so informed.

18. The output of spoil from the Tasker and Cedar Run mines, ased on active operations, is estimated by the district officer as bout 275,000 cubic yards per year, and he considers, assuming easonable care in the control of the settling basins, that one per ent of this, or 2,750 cubic yards, is a high estimate of the amount f the material which escapes from the basins. Such material s escapes from the basins is so fine that he considers it doubtful
if more than a small portion of it will be deposited in the
3632 river at any point, and that if it is deposited in the river
during low water stages at points where the current is
lack, it would be picked up again during flood stages and carried ut of the river. He states that the material in the navigable portion of the Kanawha River is especially fine, so fine that sand nd gravel for building purposes are in general obtained from the Ohio River, indicating that little heavy material is brought down to the navigable waters of the Kanawha River.

19. All of the mines now in operation have settling basins. It is not believed that the United States should attempt to force these operators to so control their settling basins that only clear water should pass into the river. The turning loose in the Kanawha River, at a point over 180 miles above the navigable portion, of 5,000 or even 50,000 cubic yards of fine material per year cannot possibly produce any appreciable injury to navigation.

20. I recommend therefore that Hon. Adam B. Littlepage, and also Hon. Carter Glass, be informed that all of the ore mines in operation on the New and Kanawha rivers have installed settling basins for taking care of their ore washings; that the United States would not be justified in attempting to force the operators to so control their settling basins that only clear water should pass into the river; that the amount of material which escapes from the basins is so fine and so small in quantity that it cannot

possibly produce any appreciable injury to navigation; and that the War Department will take no further action in regard to the matter unless really satisfactory evidence is produced, that navigation is injured or threatened with injury as a result of the deposit of this material in the river. They should also be informed that on April 19, 1916, an inspection of the impounding reservoirs of the Tasker and Cedar Run mines of the Virginia Iron, Coal and Coke Company was made; that the depth of water in the vicinity of the discharge outlets of the Cedar Run mine was considered insufficient and instructions were given to increase the same, and that the conditions at all points indicate that the operators are trying to comply with the instructions of the Department, but that it is the intention of the District Officer 3633 to require that in future a prescribed minimum depth of water be maintained near the outlets of basins and that a monthly report be submitted giving such data as will permit him to keep a check on the conditions of the discharge and direct the raising of the dams and outlets from time to time.

(Signed) W. W. **Black**,
Chief of Engineers, U. S. Army.

11 inclos. viz:
8366/193 Letter of Hon. Carter Glass, Dec. 10, 1915;
" 195 Copy of W. D. letter of Jan. 3, 1916 to Mr. Glass;
" 196 Letter of Hon. Carter Glass, Jan. 7, 1916;
" 197 Letter of Hon. Adam B. Littlepage, Mar. 14, 1916;
" 198 Copy of W. D. letter of Mar. 17, 1916 to Mr. Littlepage;
" 199–204 subsequent correspondence and reports.

8366/206. (2nd Ind.) wsh.

Office C. of E., May 23, 1916—To The District Engr. Officer, Wheeling, W. Va.

To note.

C. K.

2 inclos. viz:
8366/207 Copy of W. D. letter May 22 to Hon. Adam B. Littlepage;
" 208 Copy of W. D. letter May 22 to Hon. Carter Glass.

280/72. (3d Ind.) SAA-RIL

J. S. Engr. Office, Wheeling, W. Va., May 27, 1916—To the
ief of Engrs.

. Noted.

T. H. S.

inclosures—
Copies of W. D. letters to
Hon. Adam B. Littlepage & Hon. Carter Glass.
Tues. 207–208 accpg.

34 *Defendant's exhibit No. 567*

Page 1284 of the Annual Reports of the Chief of Engineers
the War Department, year 1917. (Original Exhibit.)

34-A *Defendant's exhibit No. 568*

Federal Power Commission,
Washington, July 1, 1925.

E.
Decla. of Int.—Va.
New River Development Co.

r. C. Bascom Slemp,
Care, Good, Childs, Bobb & Westcott,
815 Fifteenth Street, Washington, D. C.

Dear Sir: Receipt is acknowledged of the declaration of in-
ntion filed by the New River Development Company of New
ork to construct a dam in the New River near Radford,
irginia.

From a study of the data at hand it appears that the United
tates has expended funds for the improvement of the New
iver and, therefore, it is "navigable waters" within the defini-
on of the Federal Water Power Act. Because of this fact it
ppears that the proposed project must necessarily come within
e jurisdiction of the Commission. However, in order to com-
ly with the provisions of the Act the declaration is being for-
arded to the War Department for investigation and recom-
endation as to such jurisdiction.

In view of the practical certainty that a decision will be made
lacing the proposed development under Federal control, it will
xpedite matters if you will now prepare and forward to the
ommission an application for preliminary permit or license.

Such application can be withdrawn if it should later develo that a Federal license is not required.

Very truly yours,

(Signed) O. C. Merrill,
Executive Secretary.

3634–B *Defendant's exhibit No. 569*

Letter dated July 3, 1925, addressed to Honorable O. C. Mer-rill, Exec. Secy., F. P. Co., Washington, D. C. and signed b C. B. Slemp. (Original Exhibit.)

3634–C *Defendant's exhibit No. 570*

October 24, 1925.

Attention Major Edgerton, Chief Engineer

The Federal Power Commission, *Washington, D. C.*

Dear Sirs: We beg to enclose our letter of this date to Majo General Harry Taylor, Chief of Engineers, in regard to reques for modification of his report dated August 20, 1925 in the abov matter, which we should appreciate your forwarding to Genera Taylor if, as we assume, that is the proper procedure. An addi-tional copy of our letter, together with copies of the documents attached to the original letter, except those which are already o file with you, is enclosed for your files.

However, if it should have been decided that the recommenda-tion to be submitted to the Commission in regard to New Rive Development Company's Declaration of Intention should be tha the Commission does not find that the interests of interstate o foreign commerce would be affected, i. e., substantially affecte we should, of course, not desire to request a reconsideration b the Chief of Engineers of his report of August 20, 1925 and i such case would thank you to advise us and return to us ou letter addressed to the Chief of Engineers without submitting i to him.

Respectfully,

Curtis, Mallet-Prevost, Colt & Mosle.

CMM–12.
Encl.

3634-D *Defendant's exhibit No. 571*

OCTOBER 24, 1925.

By Courtesy of Federal Power Commission.

Re Report of Chief of Engineers dated August 20, 1925 upon Declaration of Intention by New River Development Company to construct a Power Development in New River near Radford, Pulaski, Virginia

Major-General HARRY TAYLOR,
Chief of Engineers,
War Department, Washington, D. C.

DEAR SIRS: After mature consideration we feel, in the interests of our client, New River Development Company, and in order that the record of proceedings before the Power Commission may be clear, that there are certain records in regard to New River and facts in regard to its flow which warrant a request for reconsideration of the report above mentioned.

We have therefore prepared and take the liberty of sending herewith a memorandum of request for reconsideration of the report, which is hereby respectfully submitted.

We also enclose copy of a memorandum prepared for submission to the Commission, setting forth the position of New River Development Company with reference to its declaration of intention.

We shall be glad to have an opportunity of discussing the matters set forth, with you and your counsel, if you desire, at your convenience.

A copy of this letter, with the documents submitted, is being sent to the Federal Power Commission for its files.

Respectfully submitted.

CURTIS, MALLET-PREVOST, COLT & MOSLE.

CMM-12.
Encl.

3634-E *Defendant's exhibit No. 572*

Report of Major General Taylor, Chief of Engineers, dated December 29th, 1925, addressed to the Executive Secretary of the Federal Power Commission, Washington, D. C. The text of this exhibit is the same as the text of Plaintiff's Exhibit 97, but Exhibit 572 was offered and admitted in evidence for all purposes. (Original exhibit.)

3635 *Defendant's exhibit No. 573*

"Defendant's Exhibit No. 505" identified by Col. Edgerton as a part of the minutes subsequently printed as of the minutes of the meeting of June 1, 1927. (Original Exhibit.)

3635–A *Defendant's exhibit No. 574–A*

Federal Power Commission,
Washington, July 1, 1927.

Secretary of War, Chairman. Secretary of the Interior. Secretary of Agriculture. O. C. Merrill, Executive Secretary.

Messrs. **Curtis, Mallet-Prevost, Colt & Mosle,**
30 Broad Street, New York, N. Y.

Gentlemen: There are enclosed duplicate copies of the license which it is proposed to issue to the Appalachian Electric Power Company for a power project in the New River near Radford, Pulaski County, Virginia.

If the instruments are satisfactory, it is requested that both copies be signed and returned together with two certified copies of the resolution of the board of directors authorizing acceptance.

The Commission has not yet authorized the granting of this license, but it is expected that such authorization will be given at a future meeting, and in order to expedite matters the drafts are being sent you in advance for acceptance. As soon as the Commission has acted favorably and the accepted drafts have been returned both copies will be executed and the original will be forwarded for the files of the licensee.

A certified copy of that part of the minutes of the Commission's meeting on June 1, showing the action taken on the declaration of intention of the New River Development Company, is enclosed for your information.

It is understood that the company is contemplating modifying its plans. It is requested that with the acceptance of the license it submit the new plans so that they may be approved by the Chief of Engineers and the Secretary of War. The license will then be modified where necessary in order to cite the new exhibits.

Very truly yours,

O. C. Merrill,
Executive Secretary.

3 Incls. #8784, 5, 6.

3635–B *Defendant's exhibit No. 574–B*

I, O. C. Merrill, Executive Secretary of the Federal Power Commission, do hereby certify that the following is a true and correct copy from the record of the proceedings of the Commission in my custody, of that part of the minutes of the eighty-eighth meeting of the Commission, held on the first day of June,

, which refers to the action taken on the declaration of inten-
of the New River Development Company:

In the matter of the declaration of intention, under the provi-
s of section 23 of the Federal water power act, of New River
elopment Company, a corporation organized under the laws
he State of Virginia, to construct a dam and other structures
ss and in New River in the vicinity of Radford, Pulaski
nty, State of Virginia, said dam and other structures being
t of a power project proposed to be constructed for the pur-
e, inter alia, of the development and utilization of power,
l declaration having been submitted to the Commission under
e of June 26, 1925: The Commission having caused investiga-
n of such proposed construction to be made and it appearing
m such investigation and from reports, submitted thereon that
l project, unless operated in the interests of interstate or for-
n commerce in accordance with the requirements of said act,
ild have an adverse effect on such interests, but if operated in
ordance with such requirements would materially benefit such
nmerce, thereupon found that said river in the part thereof
olved in said declaration is not "navigable waters" within the
inition thereof in said act, but that the interests of interstate
foreign commerce would be affected by such proposed
struction."

Witness my hand and the seal of the Federal Power Commis-
n at Washington, D. C., this 16th day of June 1927.

O. C. Merrill,
Executive Secretary.

35-C *Defendant's exhibit No. 574-C*

Form of license entitled "License on Navigable Waters" accom-
nying Exhibit 574-A. (Original exhibit.) Exhibit 574-C is
same as the license which constitutes a part of Exhibit 130
d which is printed at page 2650 hereof.

35-D *Defendant's exhibit No. 575*

Letter dated March 1, 1928, to Hon. Dwight F. Davis, Secy.
War, Hon. Hubert Work, Secy. of Interior, Hon. Wm. N.
rdine, Secy. of Agriculture, constituting the Federal Power
mmission, and signed A. E. P. Co., by Curtis, Mallet-Prevost,
lt & Mosle. (Original Exhibit.)

Exhibit 575 is included in Plaintiff's Exhibit 91 and is set
rth at page 2483 hereof but, unlike Exhibit 91, was admitted
evidence for all purposes.

Defendant's exhibit No. 576

Letter dated March 5, 1930, to Lt. Col. M. C. Taylor, Chief Engineer, Federal Power Commission, Interior Building, Washington, D. C., and signed by F. W. Scheidenhelm. (Original Exhibit.)

3635-E *Defendant's exhibit No. 577*

Pages 6, 7, 8, and 9 of the tenth annual report of the Federal Power Commission for the year 1930.

RELATIONS WITH STATES

In most cases the development of water power is primarily a local problem over which the major responsibility should be assumed by the State directly concerned. This principle is embodied in the Federal water power act and, therefore, its administration has required close correlation with the activities of the State agencies. Clearly the Government has the principal obligation in safeguarding the interests of navigation and the Federal properties as may be affected by water-power projects, but in other respects the control of these developments is largely a matter of State interest. Since this situation involves a considerable degree of dual authority, there are present the elements of possible conflict and confusion which might seriously impede desirable developments unless the State and Federal agencies find a basis whereby each may properly supplement and not duplicate the other.

The commission has endeavored to conduct its affairs with the fullest cooperation of the States, and while, in general, 3635-F the relations have been harmonious and mutually helpful, there has been complaint at times that Federal jurisdiction was being stretched unduly. These complaints have related mostly to cases where the commission assumed jurisdiction over projects situated entirely on private land along nonnavigable streams. Obviously there can be no injury to navigation through the direct diversion of the waters of a nonnavigable stream through the turbines of a power plant. In certain cases, however, when a considerable amount of impounding capacity is involved, it has been conceived by the commission that some control over the regulation of the storage would be desirable in order to assure that the navigable waterways lower down may not be deprived of such natural flow as required.

There is no requirement in the law which compels the builder of a project on a nonnavigable stream to come before the commission, but if he elects to do so by filing a declaration of intention pursuant to section 23 of the act and the commission thereupon finds that the project may have some effect on navigable waterways, it has been considered that the construction of the project could then be permitted to proceed only under a license authorization in the same form as for projects in navigable waters. The law contains no express authority for the issuance of licenses for such projects on nonnavigable streams, but the authority to do so seemed a suitable inference from the provisions of section 23.

The proceedings of this character before the commission have not been numerous and licenses have been issued in only five cases. Nevertheless, a number of the States look upon the practice as the beginning of far-reaching usurpation of power by the Federal Government which will inevitably lead to serious conflict with the functions properly belonging to the States. They challenge the constitutionality of the Government's jurisdiction in so far as it may be extended beyond the limits actually necessary for the protection of navigation and contend that the encroachment upon their rightful field of activity introduces confusing duplication of authority. They assert that they are thoroughly capable of managing the development of their own water resources and that interference by the Federal Power Commission on nonnavigable streams is substantially hampering development under the State laws.

The position of the States in the matter is fully illustrated by the communications from Governor Horton, of Tennessee, Governor Conley, of West Virginia, and Chairman Carson, of the Virginia State Conservation and Development Commission, which are included in the appendix to this report. In order that the commission might have reliable guidance on the legal aspects of the question, the advice of the Attorney General of the United States was requested relative to the pending application 3635-G for a development on New River referred to in the letter from the Virginia authorities. In an opinion rendered September 22, 1930, the Attorney General concluded:

"Upon the facts stated by the commission in this case the United States has no power to prevent the construction of the proposed project on the New River unless its operation will tend to impair the navigability of the Kanawha River by changing the normal and regular flow of the stream; and the only interest which the United States has to protect, and for which it may be justified in issuing a license, is a very minor part of the complete project, viz, the manner in which the flow of the stream below the dam is affected by the operation of the water power. I am advised by a representative of the commission that, under a license providir merely for proper control of the retention and release of wate this project will tend to improve the navigability of the Kanawh River. Under these circumstances every purpose within th power of Congress may be accomplished by the issuance of minor-part license under paragraph (i) of section 10. Accord ingly, I am of the opinion that the most reasonable constructio of this statute is that paragraph (i) of section 10 was intended t have application in such a case provided the interests of th United States may be fully protected by the issuance of a licens to control the flow of the stream and/or to use physical instru mentalities which may be constructed for this purpose, the con ditions of such license to be fixed by the commission in its dis cretion under section 10 (i) of the act.

"This interpretation appears necessary in order to avoid se rious questions regarding the constitutionality of the act whic might be presented if section 10 (i) should be interpreted so a to have no application to projects constructed in or on non navigable streams, which only remotely and indirectly affect th navigability of waters in the lower reaches of streams to whic they are tributaries. If paragraph (i) of section 10 is not ap plicable in such cases, the commission would in no such case b authorized to waive any of the conditions specified in section 10 because section 23 prohibits any such construction, once the commission finds that the interests of interstate or foreign commerc will be affected, until a license is issued under the provisions o the act. To hold that the commission has full authority unde this section to exercise its discretion in granting a minor-par license in this case leads to a reasonable construction of the statute and a full accomplishment of its legislative purpose.

"This interpretation of paragraph (i) of section 10 finds some support in the administrative construction of the act adopted by the commission on May 23, 1925, in its consideration of several applications (Project No. 15) of Hydraulic Race Co. and other corporations, reported in the fifth annual report of the Federal Power Commission, 1925, at pages 111 and 112.

"In answering the questions proposed by the commission, I have accordingly to advise you that it is my opinion that the commission may, in its discretion, issue a minor-part license under paragraph (i) of section 10, for the construction and operation of the project here in question; that it is not required to insert in a license issued for this project, any conditions (except the 50-year limitation upon the terms of the license) which, in its judgment, are not necessary or appropriate to fully utilize the waters of the New River in the protection or development of navigation of the Kanawha River."

The full opinion will be found in Appendix B[14] together with a communication from Governor Parnell, of Arkansas, which affords further information regarding the attitude of the States.

It is possible that licenses restricted to the terms essential for safeguarding the navigation interests will serve the essential Federal interests and at the same time overcome the objections advanced by the States. The control over projects of this class is fundamentally a function of the States, and it seems appropriate that the Federal relationship should be conformably subordinated to an extent consistent with the protection of recognized Federal interests. 3635-H

3636 *Defendant's exhibit No. 578-A*

Letter dated October 3, 1930, to Gen. Brown, Chief of Engineers, and signed by F. E. Bonner, Exec. Secy. (Original Exhibit.)

Defendant's exhibit No. 578-B

Letter dated October 10, 1930, to the Exec. Secy., F. P. C., Washington, D. C., signed for the Chief of Engineers, by Hugh J. Casey, First Lieut. Corps of Engineers. (Original Exhibit.)

3637 *Defendant's exhibit No. 579-A*

Photostatic copy of letter dated November 5, 1930, to Exec. Secy. F. P. C. and signed by Lytle Brown, Major General, Chief of Engineers.

Defendant's exhibit No. 579-B

Photostat of report entitled "Second endorsement U. S. E. O. Huntington, W. Va., Oct. 18, 1930, Div. Engineer, Upper Miss. Valley Division, St. Louis, Mo., signed by Major Herman, District Engineer."

Defendant's exhibit No. 579-C

Photostat copy of report on navigability of New River, Va. (Huntington District, August 29, 1930.) Third endorsement, office, Division Engineer, Upper Miss. Valley Div., St. Louis, Mo., October 24, 1930, to Chief of Engineers, U. S. Army, Washington, and signed George R. Spalding, Lt. Col. Corps of Engineers.

---

[14] See page 149.

3638 *Defendant's exhibit 579–A, B, C*

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, Nov. 5, 1930.

Refer to File No. 6371 (New River, Virginia) 9.

The EXECUTIVE SECRETARY,
Federal Power Commission.

DEAR SIR: Transmitted herewith for your information a
copies of reports of the District Engineer, Huntington, We
Virginia, and the Division Engineer, Upper Mississippi Valle
Division, on the navigability of the New River, particularly
Jacksons Ferry, Wythe County, and Glenlyn, Giles Count
Virginia.

Very respectfully,

(Signed) LYTLE BROWN,
Major General, Chief of Engineers.

2 inclos., viz; Photostat copies of 2d & 3d Inds. on 6371 (Ne
River, Va.) 9.

(2d Ind.) JFR:MD

U. S. E. O., HUNTINGTON, W. VA.,
October 18, 1930.

To the DIVISION ENGINEER,
Upper Miss. Valley Division, St. Louis, Mo.

1. In compliance with instructions contained in 1st Ind., th
following report is submitted on the navigability of New Rive
at Jackson's Ferry, Wythe County, and at Glenlyn in Gil
County, Virginia.

2. The New River has its source in the Allegheny Mountai
in the northwest corner of the State of North Carolina. T
North and South Forks unite near Weatherford Postoffice, Nort
Carolina, to form New River. It flows thence, crossing the Vi
ginia-North Carolina State boundary line three times in the fir
nineteen miles, for a distance of 115 miles to Pepper
3639 Ferry, Virginia. From this point to its mouth at t
junction with Gauley River, the stream flows in a nort
westerly direction, through the states of Virginia and West Vi
ginia, for a distance of 140 miles. From source to mouth Ne
River traverses a rugged, mountain country. Its bed is gene
ally narrow and tortuous, is interrupted by numerous rapids a
falls, and has an unstable regimen. The Gauley and the Ne
River unite to form the Kanawha River. The last-named is
navigable tributary of the Ohio River.

3. The following tabulation gives the distance in miles above its mouth and the elevation in feet above sea level of the low water surface at such points, of some of the places along the course of the river which will be referred to.

Point on New River	Miles above mouth of New River	Approximate ele. feet L. W. surface above mean sea level
Mouth of New River	0	650
Mouth of Greenbrier River near Hinton, W. Va	65	1365
W. Va.-Virginia, State Line	87	1460
Glenlyn, Virginia	94	1495
Pepper's Ferry	140	1745
Radford project dam site	151.1	1790
Jackson's Ferry, Va	185	1925
Lead Mines	189	1955
Buck Power Dam	195	2000
Byllesby Power Dam	198	2060
Washington Mills Power Dam	207	2190
Forks River, Weatherford, N. C	255	2490

4. Under authority of the appropriation act approved June 10, 1872, an examination and survey of New River was made during the low water period of August 1872. This covered the river from the mouth of the Greenbrier to the Lead Mines in Wythe County, Virginia. The resulting report is contained in the Report of the Chief of Engineers for the year 1873, pages 842 to 854. A detailed description of the river, mile by mile, commencing at the "Lead Mines," is given on pages 845 to 848, inclusive, to which reference is made.

5. At the time the examination and survey was made a limited amount of transportation by keel-boats of two or three tons capacity drawing about 12 inches was being carried on probably only at favorable stages of the river and in certain
3640 stretches. The report considered two plans of improvements.

(a) An improvement estimated to cost $100,000 to facilitate 2-foot keel-boat navigation.

(b) An improvement estimated to cost $1,017,000 to afford 3-foot navigation, with so much reduction of grade at the numerous falls and rapids as would permit a small stern-wheel steamer to ascend with two barges in tow, even if at a few points, the ascent were required to be made by hauling up by ropes attached to fixed points above and to the drum of the steam engine.

6. In 1878 examination and survey was extended above the Lead Mines a distance of 62 miles, the results being printed in the annual reports of the Chief of Engineers for 1879, pages 538 et seq., to which reference is made.

7. The original project was adopted in 1876, was of an experimental nature, and provided for improving the stream from the mouth of the Greenbrier to the Lead Mines with a view to facilitating keel-boat navigation. The sum of $109,691.06 was expended on such work up to June 30, 1898. With this expenditure, a navigable channel 50 feet wide and 2 feet deep was secured for a distance of 26 miles above the mouth of the Greenbrier. A channel two feet deep and of varying width of from 10 to 30 feet was secured for a distance of about 20.5 miles from mile 145.8 to mile 175.3. There was also some work done above the Lead Mines in securing a 2-foot depth channel by 20-foot width for a distance of five miles.

8. The above experimental work when executed by the Government only slightly altered the natural difficulties of navigation. In the year 1882 after most of the expenditure had been made, the commerce on the river was reported to be about eleven thousand tons, and this, and such other commerce as has since existed, was local and was apparently confined to a section within a distance of 25 miles above the mouth of the Greenbrier. Waterborne commerce has now entirely disappeared from the river, except for ferrys at various places and these are being rapidly replaced by bridges as hard surface roads are being extended.

3641 9. As far as known, 23 bridges have been built across New River between the mouth of the Greenbrier and the forks of the river. There is nothing on record indicating that plans for these bridges were approved by the Department. In addition, the two bridges referred to in the basic letter, are now under construction by the Virginia Department of Highways.

10. The Appalachian Electric Power Company has built and operated since 1912 without Congressional authorization or Departmental permission, two power dams on New River at Buck and Byllesby, located at miles 195 and miles 198, respectively. The Washington Mills power dam located at Mile 207 was built under authority of an act of Congress approved June 4, 1900 (34 Stat. I. 264). Construction of other power dams is under consideration at Radford dam site, at two other sites just above the mouth of the Greenbrier, and at one site at Hawk's Nest 7.5 miles above the mouth of New River.

11. On September 30 and October 1 and 2, respectively, 1930, The Public Service Commission of West Virginia held a hearing in Charleston, West Virginia, on the application of the West Virginia Power Company for a permit to construct the two dams proposed to be built on New River just above the mouth of the Greenbrier River, and referred to in the preceding paragraph. At this public hearing ex parte testimony was introduced

the company relative to the navigability of that portion of
v River between the mouth of the Greenbrier River and the
ginia State line. A copy of the transcript of this testimony
secured and is transmitted herewith. This testimony tends
how that the stream is not navigable in fact.

2. Investigation and survey under authority of House Docu-
nt 308, 69th Congress, First Session, is now under way of the
nawha River and its tributaries. While this study has not
n completed, it appears improbable that any new or different
ht will be thrown on the question of present navigable capacity
l feasibility of navigation improvement on New River if such
undertaken in combination with power development and flood
trol, than has already been revealed by past surveys. This
stream, however, has been generally recognized as having
12 valuable power possibilities, and this view has been con-
firmed by the investigation. The river with its large run-
and its steep gradient is believed to possess a wealth of un-
veloped water pow . The fullest utilization of its water sup-
would result from comprehensive development including
ficient storage on the headwaters to impound the flood waters
hold-over storage, and with auxiliary storage on the tribu-
ies and the main stream below to complete the discharge regu-
ion. It would appear that such plan is feasible for partial
l ultimate complete development, provided it be taken in hand
time to define reservoir limits before new highway or railroad
struction within the present flood plain, with resultant in-
ase in costs, makes river development unduly costly. In the
sence of constitutional and congressional authority over non-
vigable streams where there are no public riparian lands, it is
t clear at this writing how the Federal Government may law-
lly, in the absence of full and voluntary cooperation of all
ate and private interests, exercise control over the situation
fficient to secure the fullest utilization of the water resources
New River for the common advantage of the public.

13. It is understood that the matter of navigability, within
scope of the meaning of the commerce clause of the Con-
tution, is a mixed question of law and fact upon which, for
ultimate determination, the Federal courts must pass. Expert
inion of officers of the executive branch of the Government has
ly the force of evidence of the fact.

14. On August 20, 1925, the Chief of Engineers, U. S. Army,
vised the Secretary of the Federal Power Commission in the
atter of the navigability of New River as follows: (Par. 18
D 7495 (New River Development Co.) 3.)

"From the above facts it is established that New River has been under Federal improvement for navigation, that navigation has actually existed and that the river was physically capable of interstate navigation although very light draft. * * * If free from any control by the United States it would be difficult to ascertain authoritatively that the proposed development would be in general accord with the most beneficial utilization of 3643 the water for navigation, water power, flood control and other beneficial public uses. It is obvious that such utilization is essential to the best interests of commerce. Therefore, while the navigable capacity of the stream is limited, this office must report that no sufficient reason is seen why the Federal Power Commission should not exercise jurisdiction over the proposed project."

15. In a letter dated December 29, 1925, to the Executive Secretary, Federal Power Commission, the Chief of Engineers (ED 7495 (New River Development Co.) 18), for reasons stated therein, qualified his letter of August 20, 1925, above quoted, regarding the navigability of New River, and after consulting the law, as exemplified in decisions of the United States Supreme Court bearing on the question of navigability, and after reviewing the facts disclosed by the examination and survey reports of the 1872 and 1878, supra, concluded (last paragraph of the letter):

"I, therefore, report that in my opinion New River in its present condition is not a navigable stream * * *."

16. After review of all of the facts, the District Engineer has reached the conclusion that New River, especially in the vicinity of the highway bridges now under construction over that stream by the Commonwealth of Virginia, Department of Highways, at Glenlyn, Virginia, and Jackson's Ferry, Virginia, respectively, is not susceptible of being used in its natural or ordinary condition, as a highway for commerce over which trade and travel may be conducted in the customary modes of trade and travel on water, nor does it afford in its natural and ordinary condition a channel for useful commerce. It is the District Engineer's opinion, therefore, that New River is not navigable in fact either at Jackson's Ferry or Glenlyn, or at any other point in its course.

(Signed) **Fred W. Herman,**
Major, Corps of Engineers,
District Engineer.

6 incls: 5 incls. accomp'g. unchanged. 1 added—Transcript of testimony before The Public Service Com. of W. Va. (Single copy.)

3644 6371 (New River, Va.)–1

Subject: Navigability of New River, Va.

(Huntington District, Aug. 29, 1930)

Ht 12–1/1 (3d Ind) GRS: MK.

OFFICE, DIV. ENGR., UPPER MISS. VALLEY DIV.,
St. Louis, Mo., Oct. 24, 1930.

To the CHIEF OF ENGINEERS, U. S. Army,
Washington, D. C.

1. Returned.

2. The District Engineer's report in 2d indorsement hereon is quite complete. The following additional information, quoted from report submitted by Assistant Engineer N. H. Hutton to Col. W. P. Craighill, Corps of Engineers, under date of Dec. 17, 1872, (P. 845, Report of Chief of Engineers, 1873), has been also of value to me in arriving at my opinion:

"In the upper portion of the river, for thirty-five or forty miles, the pools are generally very short, whole miles being composed of ledges of slate or limestone, 200 or 300 feet apart, with small pools between. In the lower portion, though the rapids are more concentrated, yet even there the pools will hardly average more than one mile in length." (Jackson's Ferry and Glenlyn lie in the upper section, above described.)

The average fall per mile in the entire distance from the "lead mines" to the mouth of the Greenbrier (128 miles) is given by Hutton as about 4½ feet, "a grade", as he expresses it, "that if equally distributed throughout, would offer no impediment to such navigation as the country along the river has need of."

* * * * *

"The present wants of this region would be met by any system of improvement which would afford 3 feet depth of water during the lower stages of the river. With only so much reduction of grade at the falls and rapids as would permit a small stern-wheel steamer to ascend with two barges in tow, even if at a few points, the ascent required to be made by hauling up by ropes attached to fixed points above and to the drum of the steamboat engine.

"The extent of the improvement can be accomplished except at Foster's Falls, by clearing out sluiceways through the shoals and rapids, at nearly their natural grades and by opening 3645 through the vertical falls and ledges, sluces with a slope not exceeding 1 to 10."

* * * * *

"The present system of transportation on this portion of the river is by keel-boats, which carry from two to three tons, and are rowed or floated down the river and poled up."

"The improvement, if effected, would, in about forty miles below the lead mines, intersect the Virginia and Tennessee Railroad, and the Chesapeake and Ohio (Railroad) at the mouth of the Greenbrier, thus opening to both eastern and western markets a large area of productive country, now practically shut up."

3. It is my opinion that the characteristics of the river as above described were not such as to make it, in its natural state, susceptible of anything but a very precarious and occasional use by very light draft keel-boats, at times of normal high water. The improvements made by the United States rendered the river safer for the floating of timber and keel-boats at high stages as may be seen from the following quotation, (P. 538, Report of Chief of Engineers, 1879):

"Many of the old batteaux channels and 'notches' are so narrow and crooked that rafting is attended with a good deal of risk; our channels being wide enough for the rafts, will render the passage of the shoals comparatively safe."

Steamboat navigation, though attempted by a steamer designed to draw 12 inches, was not successful.

4. It is my further opinion that the river was not made navigable in fact except for precarious and occasional navigation by the Federal improvements, and that it is not now navigable in fact or capable of being made so at any reasonable expense. The balance of the improvement appropriation was directed to be paid into the Treasury of the United States by the R. & H. Act approved June 13, 1902, which repealed the project.

5. The above applies to the river above the mouth of the Greenbrier. Below that stream, the slope of the river increases
3646 to double that of the reach described.

6. I therefore concur in full with the District Engineer in his statement that "New River is not navigable in fact either at Jackson's Ferry or Glenlyn, or at any other point in its course."

(Signed) GEO. R. SPALDING,
Lieut. Col., Corps of Engineers,
Division Engineer.

Inclos.—Transcript of Testimony before The Public Service Com. of W. Va.:

Copy of Ser. 1—Ltr. of Sen. Swanson,
Copy of Sub. 1—of Ser. 1—Letr. of Hon. H. G. Shirley,
Copy of E. D.—Ltr. to Sen. Swanson dated 8–25–30,

Copy of Extracts from Decision of Supreme Court on navigabi'ty Red R.

Copy of Extracts from Decision of Supreme Court re Navigable Waters.

47 *Defendant's exhibit No. 580*

Memorandum dated October 21, 1930, entitled "Memorandum Exec. Secy." and signed by J. F. Lawson, acting Chief unsel. (Original Exhibit.)

47–A *Defendant's exhibit No. 581*

OCTOBER 30, 1930.

P–739–Virginia. Appalachian Electric Power Co.

MEMORANDUM FOR THE SECRETARY OF THE INTERIOR, ACTING CHAIRMAN

Pursuant to opinion of the Attorney General, dated September , 1930, concerning the application for the New River project o. 739), we have proceeded with the preparation of the case r presentation to the Commission. The draft of license, folwing the minor-part form, was prepared by the Engineering ivision and upon submission to the Legal Division for review e Acting Chief Counsel declined to approve the instrument for e reasons set forth in his memorandum of October 21; attached ereto.

Mr. Lawson advances the theory that the Commission made a istake in finding by formal action of June 1, 1927, that the ction of the river at the location of the project is nonnavigable d urges that the Commission should now reverse the finding d declare the stream to be navigable. He also takes the posion that notwithstanding specific statements by the State of irginia authorities there may be some question as to whether e company has complied in all respects with the State laws.

I asked the Chief Engineer of the Commission for comment Mr. Lawson's objections and Colonel Tyler's memorandum of ctober 28 is attached hereto. It will be observed that he feel at Mr. Lawson's arguments on all points are without any sound foundation. Colonel Tyler's statement is very clear as 647–B to the actual facts bearing on the situation and I am convinced that his position is entirely correct.

Inasmuch as the divergent views on this case will come before e Commission when the application is presented at the next eeting, it occurred to me that you might desire to have the pportunity of some preliminary study. Extra copies of the accompanying papers may be supplied in case you wish to have them for the other two members of the Commission.

F. E. **Bonner**,
Executive Secretary.

Att.
FEB/ccm.

3647-C *Defendant's exhibit No. 582*

November 8, 1930.

S–Cooperation State of Virginia

Hon. John G. Pollard,
Governor of Virginia,
Richmond, Virginia.

Dear Governor Pollard: There is pending before this Commission a license application filed by the Appalachian Electric Power Company for a proposed project on New River near Radford, Virginia. The desirability of prompt action in respect to this application was pointed out by Mr. William E. Carson, Chairman of the State Commission on Conservation and Development, in letter of October 30, and of course the Commission is anxious to cooperate with the State authorities in any measures which may serve to relieve unemployment conditions and stimulate industrial development. We are endeavoring to prepare the case for early consideration by the Commission, but one question not entirely settled concerns the compliance with State laws.

The Federal water power act requires "that each applicant for a license hereunder shall submit to the Commission * * * satisfactory evidence that the applicant has complied with the requirements of the laws of the State or States within which the proposed project is to be located with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing power, and in any other business necessary to effect the purposes of a license under this act."

From the evidence submitted by the applicant, there seems to be no question as to its qualification to "engage in the business of developing, transmitting, and distributing power" as contemplated in connection with the project, and the applicant company has filed a copy of a letter, dated June 16, 1930, signed by Wm. Meade Fletcher, Chairman of the State Corporation Commission, which indicates proper compliance with the provisions of the Virginia Water Power Act. In order, however, that the Commission may be assured that the company has complied fully with all State laws contemplated by the above-mentioned provision of the Federal act, the Commission would appreciate your advice in the matter.

Very truly yours,

F. E. BONNER,
Executive Secretary.

Copy to Mr. Carson.
FEB/ccm.

3647–D *Defendant's exhibit No. 583*

COMMONWEALTH OF VIRGINIA,
GOVERNOR'S OFFICE,
Richmond, November 10, 1930.

Mr. F. E. BONNER, *Executive Secretary,*
Federal Power Commission,
Washington, D. C.

DEAR MR. BONNER: In reply to your letter of November 8th, in which you inquire whether the Appalachian Electric Power Company, a Virginia corporation, which has applied to your Commission for a license for the construction of a hydro-electric development on the New River near Radford, Virginia, has complied with all laws of this State contemplated under the section of the Federal Water Power Act mentioned in your letter, I have referred your inquiry to the proper departments of the State Government and am advised that this company has complied with all laws of this State having any connection with this proposed project.

I am pleased to note from your letter that this matter will be given early consideration by your Commission and trust that there may be no delay in the issuance of the license.

Very truly yours,

JNO. GARLAND POLLARD,
Governor.

3647–E *Defendant's exhibit No. 584*

Letter Jan. 27, 1931 from Curtis, Mallet-Prevost, Colt & Mosle, to F. P. C. re Project #739. (Original Exhibit.)

Defendant's exhibit No. 585

Telegram dated January 28, 1931, from F. P. C., signed by George Otis Smith, Chairman, Addressed to A. E. P. Co. (Original Exhibit.)

3647-F *Defendant's exhibit No. 586*

SEPTEMBER 13, 1934.

Hydro-Electric Project of Appalachian Electric Power Co. on New River near Radford, Va.

THE SECRETARY OF WAR,
Washington, D. C.

SIR: For many years Appalachian Electric Power Company, a Virginia Corporation, and its predecessors have been desireous of constructing a hydroelectric project on New River in Virginia about four miles upstream from Radford, Virginia. To this end a "declaration of intention" was made to the Federal Power Commission in 1925 by New River Development Company, a predecessor corporation.

It had been assumed by those responsible for filing that declaration that the Federal Power Commission would not merely take action consonant with the repeated holdings by the Chief of Engineers, U. S. Army, that New River is nonnavigable, but also would find no other basis for attempting to take jurisdiction over the project. Instead, however, the Federal Power Commission sought to take jurisdiction over the project upon the alleged ground that the interests of interstate or foreign commerce would be affected by the proposed construction.

Despite the fact that this company believes that there is no lawful basis for such attempted exercise of jurisdiction by the Federal Power Commission, it has for more than six years consistently expressed its willingness to accept from the Federal Power Commission a license containing such conditions, but only such conditions as are reasonably designed and necessary to protect the navigable waters of the United States and in particular to protect the navigability of Kanawha River, to which the nonnavigable New River is tributary. The Commission, on the other hand, has refused to issue such a license and about April 3, 1931, ordered the company not to proceed with the construction of its project until it shall have received and accepted a so-called standard license, containing many conditions unrelated to the protection of navigation.

Thereupon this company endeavored unsuccessfully to have the issues in point adjudicated in the Courts.

The Company holds a license from the State Corporation Commission of Virginia and has complied with Virginia laws in all other respects.

3647-G The various negotiations between the company and the Commission were well known to predecessor Secretaries of War so long as the Secretary of War was ex-officio a member of the Federal Power Commission, viz, until late 1930. Also the records of the Chief of Engineers contained much information upon this matter in view of various pertinent reports which the Chief of Engineers has been called upon to make by request of Federal Power Commisssion and otherwise.

It is desired to acquaint you with the present status of the matter to wit:

On June 12, 1934, the Board of Directors of this company adopted the following resolution:

"Whereas, Appalachian Electric Power Company and its predecessors have expended more than three quarters of a million dollars in the acquisition of lands and flowage rights and more than three quarters of a million dollars additional in investigations of dam and reservoir sites, surveys, highway and railroad construction work and other construction work, solely useful and valuable to it for the purpose of constructing a hydroelectric development on the nonnavigable New River in Pulaski County, Virginia; and

"Whereas, the Company has at all times been advised and believed and is now advised and believes that neither the Federal Power Commission nor the Federal Government has any power to require the acceptance of any license (and particularly a so-called standard form of license such as was sought to be required by the order of the Federal Power Commission) as a condition of the construction or operation of this project; and

"Whereas, nevertheless, in deference to the Federal Power Commission and the Government of the United States, this company made a serious effort to have any possible right of either in connection with this project judicially determined; and

"Whereas, that attempt was frustrated and a determination on the merits prevented by the fact that the then members of the Federal Power Commission failed to enter their appearances and raised technical jurisdictional questions; and

"Whereas, the heavy investment already made by the company and the results of its construction work to date have been lying idle and the orderly development of the company's business now requires the completion of this hydroelectric plant and the company has again submitted the matter to counsel and is again advised that since the project is located on a nonnavigable stream
and neither the construction nor the operation of such
3647-H project will adversely affect the interests of Interstate
commerce on the lower navigable waters, to wit: The Kanawha River, the Federal Government and the Federal Power Commission are without power to interfere with the construction

and operation thereof or to require therefor the acceptance of any license as a condition of such construction and operation,

"Now, therefore, be it,

"Resolved, that the officers of this company are directed to resume construction and to continue to construct and upon completion of construction to operate said hydro-electric development unless and until lawfully compelled to desist therefrom by the order of a competent Court,

"Be it further

"Resolved: That a copy of this resolution be transmitted to the Federal Power Commission, with the assurance that this action is taken with great deference but in full reliance upon what this company believes to be its rights, in order that the Commission, if it takes a different view of the law involved, may be apprised that the company is resuming construction and adding to its already large expenditures made by it upon the project."

Thereupon, this company promptly resumed the construction of its hydroelectric project and is continuing such construction.

Although this company, upon the advice of counsel, takes the position that the Federal Power Commission has no lawful jurisdiction over the project, it recognizes fully the authority and duty of the Secretary of War to protect the navigability of Kanawha River. Such duty and authority are believed to have been imposed upon and vested in the Secretary of War by the Congress through its Rivers and Harbors Act of March 3, 1899, and in particular, as regards the non-navigable New River, by virtue of Section 10 of that Act.

This company can and will so conduct the construction and the subsequent operation of its hydroelectric project that there will not result any obstruction to the navigable capacity of the Kanawha River or any other navigable waters of the United States. Indeed, it is improbable that under any reasonably conceivable method of construction or operation any such obstruction to navigation could arise. If, however, contrary to the apparent facts, there should arise some possibility of obstruction to navigability, this company is ready to recognize and abide by any and all requisite orders or regulations of the Secretary of War forbidding any method of construction or operation if and to the extent that obstruction to navigability results therefrom.

In the meantime this company asserts its willingness and desire to cooperate fully with the appropriate representatives of the War Department in pursuance of its good faith in the premises.

Respectfully submitted,

Appalachian Electric Power Company,
By George N. Tidd, *President*.

3647-I *Defendant's exhibit No. 587*

War Department,
Washington, October 9, 1934.

E. D. 7245 (Appalachian Elec.-Pow. Co.) 35
Attention: Mr. George N. Tidd, President

Appalachian Electric Power Co.,
30 Church Street, New York, New York.

Dear Sir: The Department is in receipt of your letter of September 18th, advising that your company has "resumed the construction of its hydroelectric project" on the New River, Virginia, and asserting that "this company can and will so conduct the construction and the subsequent operation of its hydroelectric project that there will not result any obstruction to the navigable capacity of the Kanawha River or any other navigable waters of the United States". You further state that "if, however, contrary to the apparent facts, there should arise some possibility of obstruction to navigability, this company is ready to recognize and abide by any and all requisite orders or regulations of the Secretary of War forbidding any method of construction or operation if and to the extent that obstruction to navigability results therefrom."

In view of the fact that in this matter the Federal Power Commission has already made findings "that New River, from the mouth of Wilson Creek, Virginia, north, is navigable waters within the definition thereof, as set forth in Section 3 of the Federal Water Power Act" and that "the interests of interstate or foreign commerce would be affected by such proposed construction" of the proposed project, this Department considers that the requisite regulations for the operation of the project to prevent impairment of the navigable capacity of the navigable waters of the United States should be contained in the license of the Federal Power Commission for the constructing, operating and maintaining of the project works.

Sincerely yours,

G. H. Dern,
Secretary of War.

3648 *Defendant's exhibit No. 588*

October 18, 1934.

Honorable **George H. Dern,**
U. S. Secretary of War,
War Department, Washington, D. C.

Dear Sir: Appalachian Electric Power Company acknowledges the receipt of your letter of October 9 in reply to the letter of this company of September 18 advising the Secretary of War that the company has resumed the construction of its hydro-electric project on New River, Virginia.

Note is taken of the view of the War Department that "The requisite regulations for the operation of the project to prevent the impairment of the navigable capacity of the navigable waters of the United States should be contained in the license of the Federal Power Commission for the constructing, operating and maintaining of the project works." In this respect, however, this company is advised by its counsel that the Federal Power Commission has no jurisdiction whatsoever over its project and specifically that the Commission has no right to impose, and this company is under no duty to accept, with regard to its project works, any license such as the Commission, by virtue of its order of April 3, 1931, sought to impose upon this company. Consequently, this company does not seek and will not accept such license from the Commission.

Note is taken also of your reference to a certain finding on the part of the Federal Power Commission "that New River, from the mouth of Wilson Creek, Virginia, North, is navigable waters within the definition thereof, as set forth in section 3 of the Federal Water Power Act." In this connection we call your attention to the fact that the Federal Power Commission itself on June 2, 1927, with regard to this very project on New River, made the finding

> "that said river in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said Act. * * *"

In fact, it was not until October 12, 1932—about sixteen months after this company had instituted proceedings for the adju-
dication of its controversy with the Commission—that
3648-A the Commission, without notice to or hearing of this
company, made the self-serving finding which is cited in your letter.

This company continues in its insistence that New River is non-navigable and in this position it is supported by the fact that reports of various Chiefs of Engineers of your Department have repeatedly and authoritatively declared New River to be non-navigable.

Nevertheless, this company desires to make plain that it does not deny, but has at all times recognized, the power and duty of the Secretary of War to protect the navigable capacity of the navigable waters of the United States. Specifically, since the non-navigable New River empties into the navigable Kanawha River, the company, while asserting that its project will be so operated as not to impair the navigability of any navigable waters, recognizes the power of the Secretary of War to impose, and the duty of the company to comply with, such reasonable regulations, if any, as may be necessary and proper to prevent any actual or threatened obstruction to the navigable capacity of the Kanawha River.

Respectfully yours,

APPALACHIAN ELECTRIC POWER COMPANY,
GEO. N. TIDD, *President*.

3648-B *Defendant's exhibit No. 589*

Letter dated September 18, 1934, to Hon. Frank R. McNinch, Chairman, F. P. C., signed by Appalachian Electric Power Company, by George W. Tidd, President. (Original Exhibit.)

Defendant's exhibit No. 590

Letter dated October 19, 1934 to Frank R. McNinch, Chairman, F. P. C., without signature but counsel for both sides agreed that it was signed by M. F. Millikan, General Counsel of the Company. (Original Exhibit.)

Defendant's exhibit No. 591

Photostat copy of letter to M. F. Millikan, American Gas and Electric Company, signed by G. W. Lineweaver, Secretary, Federal Power Commission, dated October 23, 1934. (Original Exhibit.)

Defendant's exhibit No. 592

Map showing locations of certain photographs from 61 to 113, both inclusive of New River. (Original Exhibit.)

3651–D *Defendant's exhibit No. 599*

Chart upon which Dr. Mead made diagram in connection with his testimony, pertaining to stream flow. (Original Exhibit.)

3654 *Defendant's exhibit No. 601*

House Document No. 306, 74th Congress, First Session, entitled "Ohio River, letter from the Sec. of War transmitting, pursuant to Section 1 of the River and Harbor Act approved January 21, 1927, and section 10 of the Flood Control Act approved May 15, 1928, a letter from the Chief of Engineers, United States Army, dated August 14, 1935, submitting a report, together with accompanying papers and illustrations, containing a general plan for the improvement of the Ohio River for the purposes of navigation and efficient development of its water power, the control of floods, and the needs of irrigation." (Original Exhibit.)

3654–A *Defendant's exhibit No. 602*

This Exhibit is the Table 45, Appendix A, referred to in paragraph 263, page 146, of Exhibit 601. The Appendices to the reports otherwise embodied in House Document No. 306 (being Exhibit 601) were not printed as part of that document. (Original Exhibit.)

3654–B *Defendant's exhibit No. 603*

Photostat of cover page of document entitled "The Ohio River Chart, drawings and description of features affecting navigation, navigable depths and tables of distances for its tributaries, complied under the direction of the Chief of Engineers, United States Army," and also photostat of page 267 of that document. (Original Exhibit.)

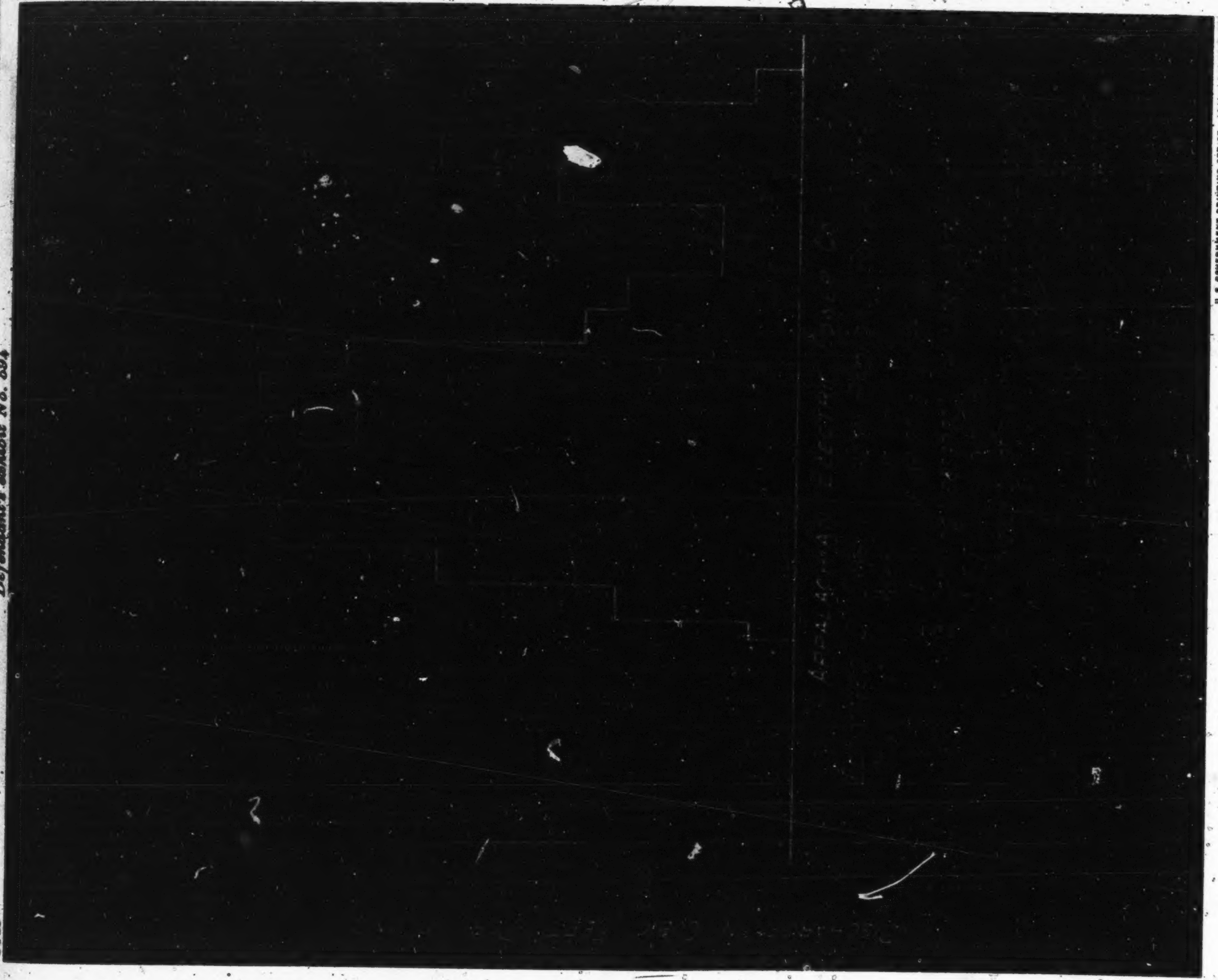
3654–C *Defendant's exhibit No. 604*

Copy of letter dated June 13, 1936 from Mr. Baker to the late Sec. of War, Mr. Dern. (Original Exhibit.) (Printed as part of motion at fol. 98, supra.)

Defendant's exhibit No. 605

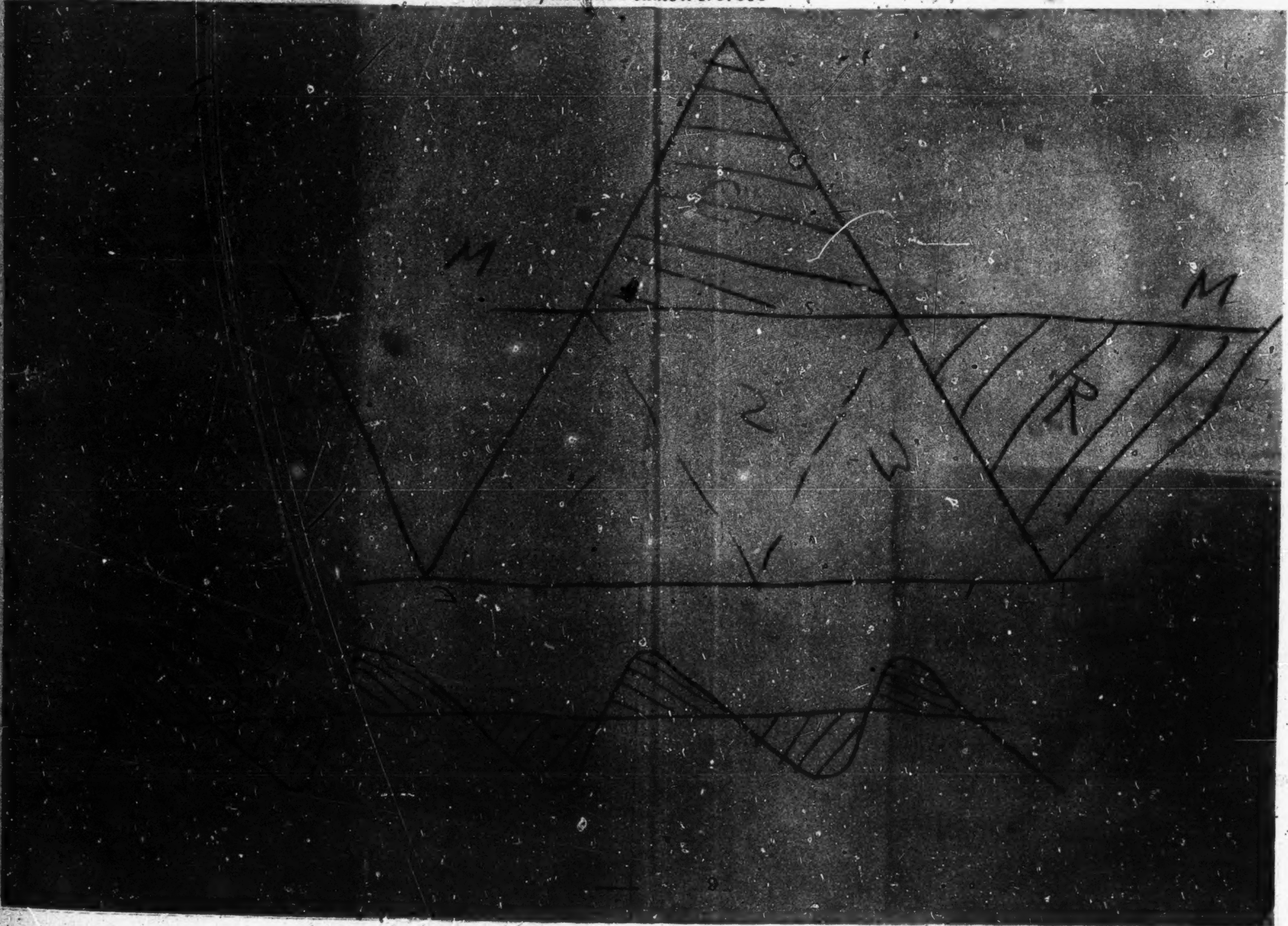
Reply of S. D. Embick, Acting Secretary of War to Mr. Baker, dated June 22, 1936. (Original Exhibit.) (Printed as part of motion at fol. 99, supra.)

Defendant's exhibit No. 594



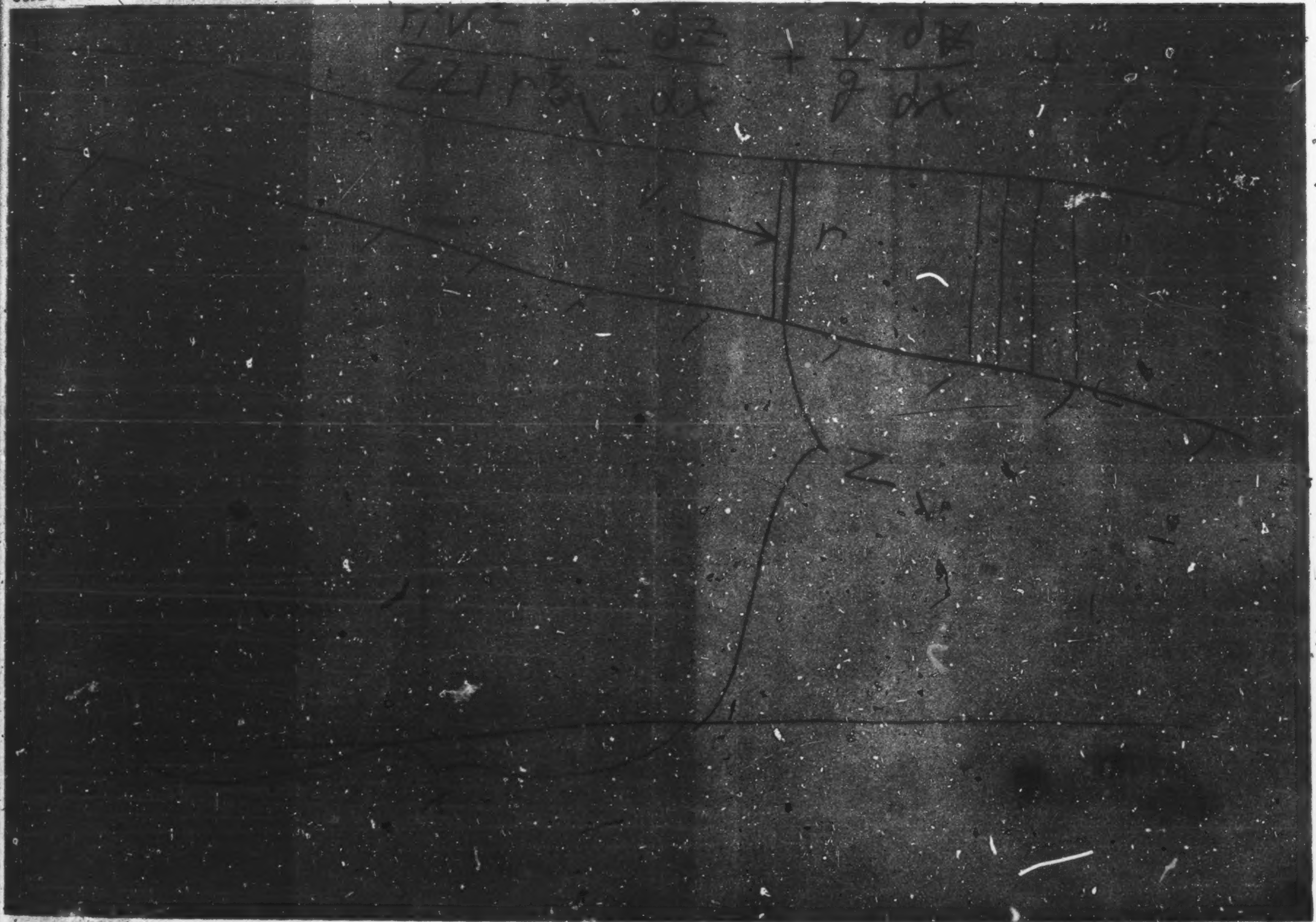
U. S. GOVERNMENT PRINTING OFFICE : 1940—O-219935

Defendant's exhibit No. 596



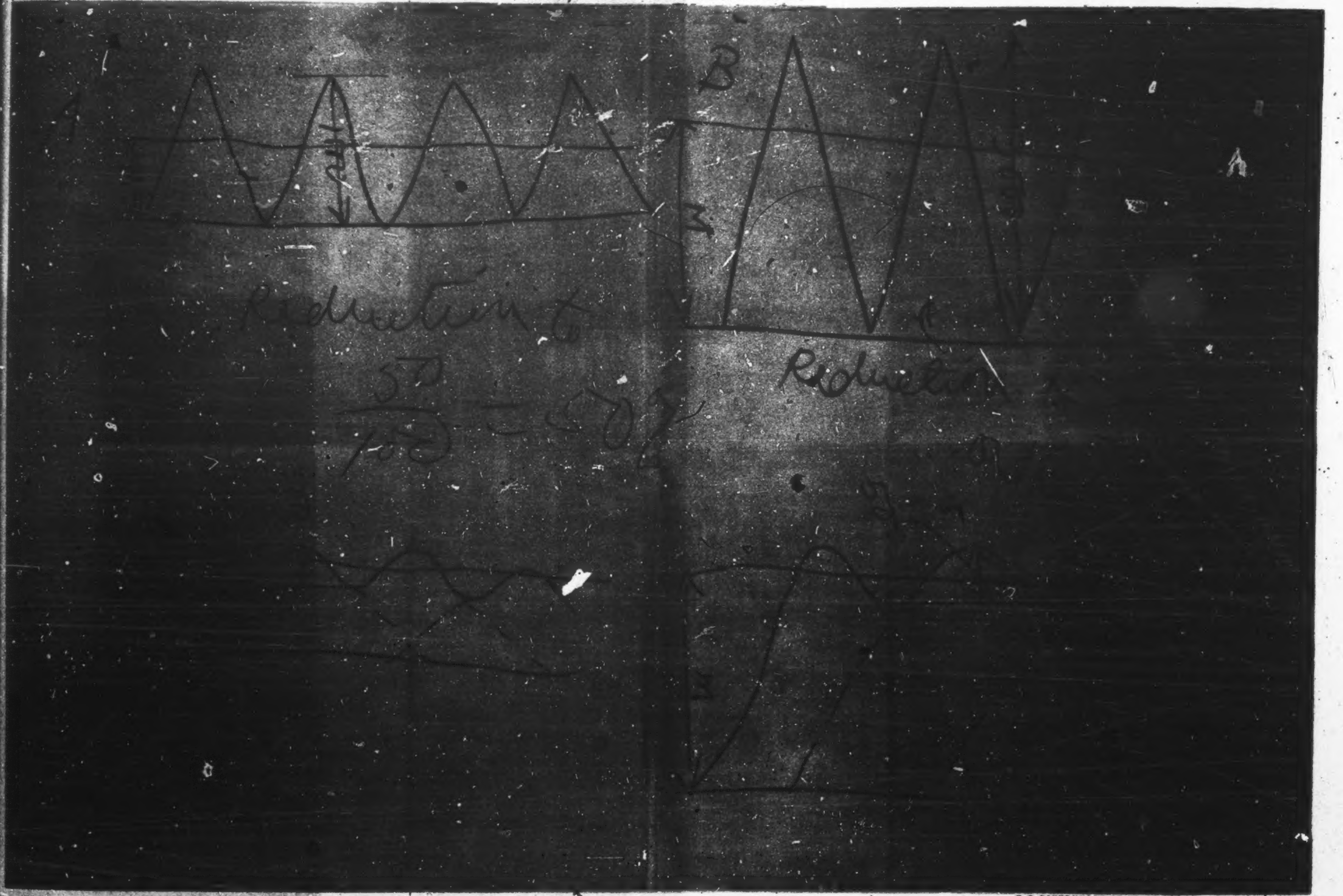
U. S. GOVERNMENT PRINTING OFFICE : 1949—0-215935

Defendant's exhibit No. 597


= dz/dx + V/g dv/dx +
V
r
Z

U. S. GOVERNMENT PRINTING OFFICE : 1940—0-218938

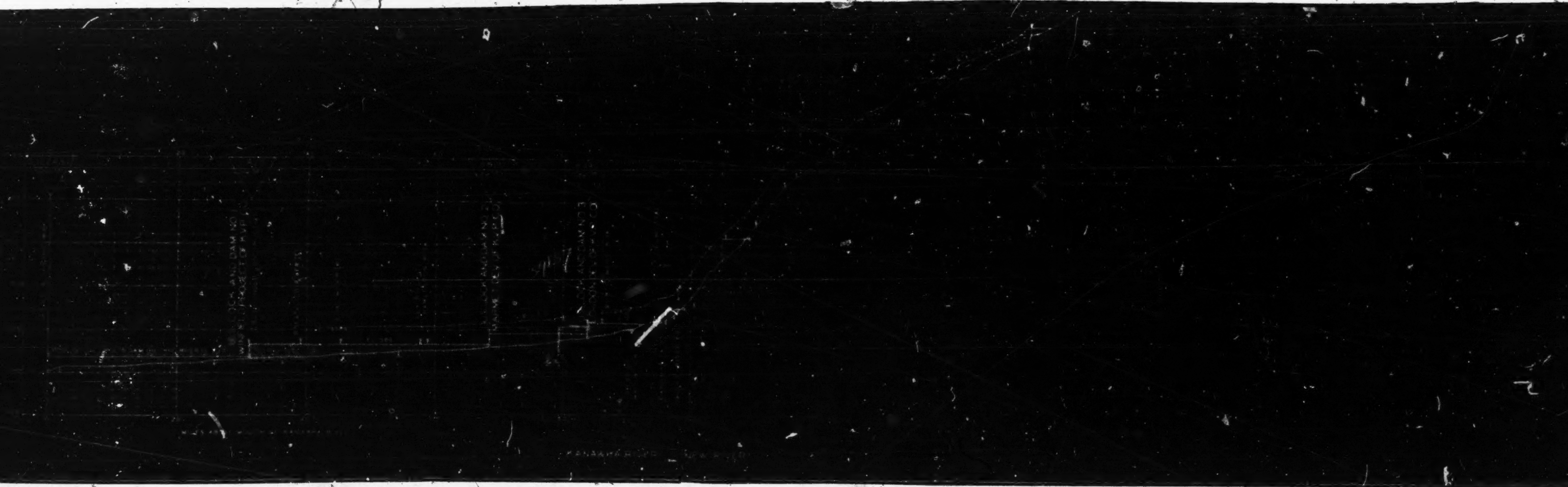
Defendant's exhibit No. 598

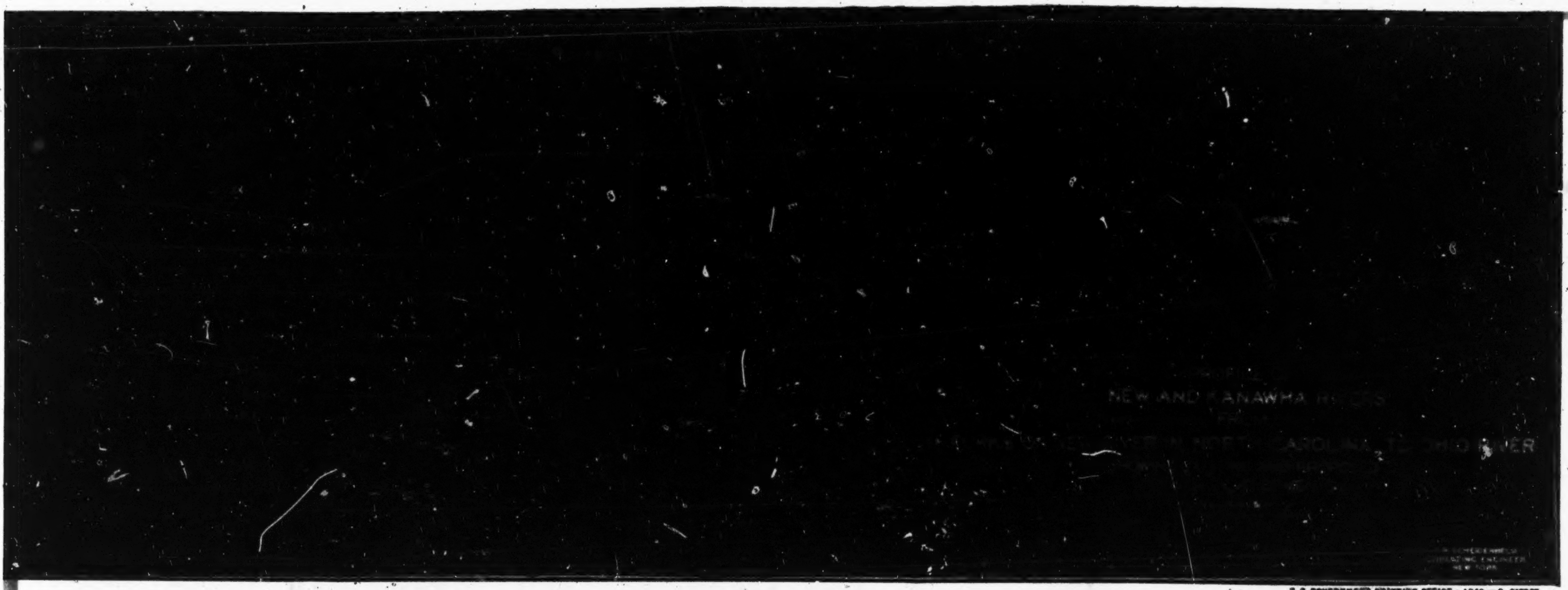

A
B
M
Reduction to
50/100 = 50%
Reduction

U. S. GOVERNMENT PRINTING OFFICE : 1949—O-[illegible]

Defendant's exhibit No. 600

OSBORNE'S FALLS PROJECT
POWER PROJECT
RADFORD DEVELOPMENT
NORTH CAROLINA
VIRGINIA
NEW AND KANAWHA RIVERS
OHIO RIVER


LOCK AND DAM NO
LOCK AND DAM NO 2
LOCK AND DAM NO 3
KANAWHA RIVER


PROFILE
NEW AND KANAWHA RIVERS
FROM
[illegible] NORTH CAROLINA TO OHIO RIVER
CONSULTING ENGINEER
NEW YORK

U. S. GOVERNMENT PRINTING OFFICE : 1940—O-216035

Defendant's exhibit No. 606

Letter dated June 26, 1936, from Hon. John Paul to Secretary of War. (Original Exhibit.) (Printed as part of motion at fol. 100, supra.)

Defendant's exhibit No. 607

Letter dated July 17, 1936, to the Hon. John Paul, from Mr. Woodring, Acting Sec. of War. (Original Exhibit.) (Printed as part of motion at fol. 101, supra.)

3655

Defendant's exhibit No. 608

Letter dated June 26, 1936, from Col. Conklin, Addressed to the Kanawha Valley Power Company. (Exhibit 608 is the same as Exhibit 263 which is printed at fol. 3576–A herein.)

3655–A

Defendant's exhibit No. 609

Col. Scheidenhelm

July 10, 1936.

Kanawha River Pool Fluctuations Resulting From Operation of the Marmet and London Hydro Plants

U. S. District Engineer Office,
The Chesapeake and Ohio Railway Company Building,
Huntington, West Virginia.

Gentlemen: Your letter of the 26th inst. on the above subject addressed to this company at Charleston, W. Va., attention of our Mr. Gould Ellis, has been referred to this office.

We are informed by Messrs. Ellis and McCormack that they did not understand that the conference held at your office on June 23, as referred to in your letter, was for the purpose of reaching any formal agreement, nor were they authorized to enter into such. Rather it was their intention to confer, in a cooperative spirit, to the end of solving the problems arising as to the relationship of the operation of the Marmet and London hydro stations to the needs of navigation.

We are impressed that in that respect the conference accomplished the intended purpose. At any rate Mr. Ellis, as Superintendent of System Operation of Appalachian Electric Power Company has proposed that tentatively the method of operating our two hydro stations be made to accord with the procedure as set forth in the latter portion of your letter. In this proposal we have acquiesced and it is our understanding that it has been put into effect.

We shall be glad to learn the effect of such procedure, both upon the needs of navigation and upon the needs of the power system, and we assure you that all concerned in behalf of this company will be instructed to consider sympathetically, and to cooperate as far as reasonable in making further modifications should the need arise.

We fully appreciate the fact that the operation of the power stations is subject to the paramount condition that, where the real needs of navigation conflict with the needs of the power system, the latter must be subordinated to the former. Nevertheless, we trust we will not be misunderstood if we ask 3655–B that our acquiescence for the time being in the proposed operating procedure shall not be construed as agreement upon our part with regard to the correctness of all of the series of propositions set forth initially in your letter.

With regard to the proposed operating procedure, please note that, although such procedure is tentatively being put into effect, it appears to us that the limitation of the rate of draw-down in the London pool to one-half foot per hour is hardly reasonable under all of the circumstances. Even assuming for the moment that it were absolutely necessary from the standpoint of navigation, and in particular velocity conditions, that the rate of variation in water level at the lower (lock) gage at London should be limited to the above rate, it seems clear that no such consideration is involved in the case of rate of variation of water level in the London pool. On the other hand, the fixed power station capacity at London automatically imposes a limit such that, without any flow into London pool from upstream, even the lowest foot of the three feet of available pondage could not be drawn down within an hour.

At this time we have no specific proposal to make in that respect, but simply ask that with us you observe the effects of this tentative operating procedure to the end that possibly in this particular respect and perhaps others modification can be accomplished favorable to power development and without impairment to navigation.

Very truly yours,

KANAWHA VALLEY POWER COMPANY,
GRAHAM CLAYTOR, *Vice President.*

GC/G.

3655-C *Defendant's exhibit No. 610*

Letter dated July 28, 1936, from the War Department, United States Engineer Office, Huntingdon, W. Va., addressed to Col. F. W. Scheidenhelm, and signed by John F. Conklin, Lt. Col., Corps of Engineers, District Engineer. (Original Exhibit.)

3655-D *Defendant's exhibit No. 611*

Executive Order No. 6251, dated August 19, 1933. (Said Exhibit is set forth in full at fol. 2900 hereof.)

End of all evidence. (Clerk's Memorandum): And which, by order of Court entered February 24, 1939, is certified and approved as all of the evidence constituting the record on appeal in this case. See fol. 234 of the record for this order.

3656 *Memorandum required by rule 14, section 7, of the rules of the Circuit Court of Appeals for the Fourth Circuit*

I, C. E. Gentry, Clerk of the United States District Court for the Western District of Virginia, at Roanoke, Virginia, certify as follows:

1. Petition for appeal, filed July 29, 1938.
2. Order allowing appeal was signed, entered and filed July 29, 1938.
3. Citation issued and service thereof accepted by counsel for defendant on July 29, 1938.
4. Order entered July 29, 1938, extending time for filing transcript of record on appeal in Circuit Court of Appeals to November 10, 1938.
5. Order entered September 15, 1938, further extending time for filing transcript of record on appeal to Circuit Court of Appeals to December 15, 1938.
6. Notice of lodgment of statement of evidence served November 17, 1938.
7. Order entered November 30, 1938, enlarging time for filing appellee's amendments to the statement of evidence to January 10, 1939, and for filing record on appeal in the Circuit Court of Appeals to January 25, 1939.
8. Order entered on the 21st of December, 1938, enlarging time for filing appellee's amendments to the statement of evidence to February 1, 1939, and for filing transcript of record on appeal in the Circuit Court of Appeals to February 15, 1939.
9. Order entered February 2, 1939, extending time for filing transcript of record on appeal in the Circuit Court of Appeals to March 1, 1939.

10. Order entered February 25, 1939, extending time for filing transcript of record on appeal in the Circuit Court of Appeals to March 15, 1939.

Given under my hand this 13th day of March, 1939.

[SEAL] C. E. GENTRY,
Clerk, U. S. District Court for the Western District of Virginia.

3657 [Clerk's certificate to foregoing transcript omitted in printing.]

3658 In the United States Circuit Court of Appeals for the Fourth Circuit

No. 4460

UNITED STATES OF AMERICA, APPELLANT

vs.

APPALACHIAN ELECTRIC POWER COMPANY, A CORPORATION, APPELLEE

Appeal from the District Court of the United States for the Western District of Virginia, at Roanoke

Docket entries

March 14, 1939, the transcript of the record is filed and the cause docketed.

Same day, the original petition for appeal, order allowing appeal, and citation are certified up.

Same day, the original exhibits are certified up.

Same day, the original documents called for in items a, b, c, d, and e of the praecipe are sent up.

Same day, two orders extending the time for the filing of the transcript of the record are filed.

Same day, three certified copies of orders extending the time for the filing of the transcript of record are filed.

Same day, order permitting appellant to file a main brief of not exceeding 100 pages and a reply brief of not exceeding 50 pages, and appellee to file a brief of 100 pages, is filed.

Appearances

March 18, 1939, the appearance of John L. Abbot is entered for the appellee.

March 20, 1939, the appearance of Joseph H. Chitwood, U. S. Attorney, David W. Robinson, Jr., Willard W. Gatchell, and Gregory Hankin is entered for the appellant.

3659 March 28, 1939, the appearance of Raymond T. Jackson, M. F. Millikan, A. Henry Mosle, Creswell M. Micou, Fraser M. Horn, Wendell W. Forbes, and M. W. Belcher, Jr. is entered for the appellee.

April 28, 1939, the appearance of John W. Aiken, Special Assistant to the Attorney General, is entered for the appellant.

May 9, 1939, motion of appellant for leave to file a supplemental brief and to file only 12 copies of volumes III, IV, V, and VI of appendix to brief, filed.

May 10, 25 copies of volumes I and II, and 12 copies of volumes III, IV, V, and VI of appendix to appellant's brief are filed.

May 16, 1939, order permitting appellant to file a supplemental brief in addition to main brief, and to file 12 copies of volumes III, IV, V, and VI of appendix to brief is filed.

May 26, 1939, joint motion for allowance of additional time for oral argument is filed.

May 29, 1939, order giving three hours to each side for the oral argument is filed.

May 31, 1939, motion of appellee for leave to file a supplement brief is filed.

June 2, 1939, order granting appellee leave to file a supplemental or reference brief is filed.

June 13, 1939, 25 copies of volumes A and B, and 3 copies of volume C of appendix to appellee's brief are filed.

June 16, 1939, motion of appellee for leave to dispense with the filing of more than three copies of volume C of its appendix filed.

3660 June 16, 1939, order permitting appellee to file three copies only of volume C of appendix to its brief is filed.

July 20, 1939, motion of appellee for order fixing time for service of appellant's reply brief, if any, is filed.

July 24, 1939, memorandum of appellant in opposition to motion of appellee for order fixing time for service of appellant's reply brief is filed.

July 27, 1939, order fixing time for filing of appellant's reply brief is filed.

August 8, 1939, motion of Clarence W. Meadows, Attorney General of the State of West Virginia, for leave to file brief and make oral argument on behalf of the State of West Virginia, as amicus curiae is filed.

August 8, 1939, order granting leave to Clarence W. Meadows, Attorney General of the State of West Virginia, to file brief and to make oral argument on behalf of the State of West Virginia, as amicus curiae, is filed.

August 18, 1939, 25 copies of volume VII of Appendix to brie of appellant are filed.

August 28, 1939, motion of Abram P. Staples, Attorney Genera of the Commonwealth of Virginia, for leave to file brief on behal of the Commonwealth of Virginia, as amicus curiae, is filed.

August 28, 1939, order granting leave to Abraham P. Staple Attorney General of the Commonwealth of Virginia to file brie on behalf of the Commonwealth of Virginia, as amicus curiae, i filed.

Argument of cause

August 28, 1939 (June term, 1939), cause came on to be hear before Parker and Northcott, Circuit Judges, and Chesnut, District Judge, and is argued by counsel and submitted.

3661 In United States Circuit Court of Appeals, Fourth Circui

No. 4460

UNITED STATES OF AMERICA, APPELLANT

vs.

APPALACHIAN ELECTRIC POWER COMPANY, A CORPORATION, APPELLE

Appeal from the District Court of the United States for th
Western District of Virginia, at Roanoke

Argued August 28, 1939. Decided November 6, 1939

Before PARKER and NORTHCOTT, Circuit Judges, and CHESNUT,
District Judge

John W. Aiken, Special Assistant to the Attorney General;
David W. Robinson, Jr., General Counsel, and Gregory Hankin,
Special Counsel, Federal Power Commission, (Richard J. Connor,
Assistant General Counsel; Willard W. Gatchell, Principal At-
torney, and Howard E. Wahrenbrock, Senior Attorney, Federal
Power Commission, on brief) for Appellant, and Raymond
3662 T. Jackson, Wendell W. Forbes, and John L. Abbot (M.
F. Millikan, A. Henry Mosle, Creswell M. Micou, Fraser
M. Horn, and M. W. Belcher, Jr., on brief, for Appellee; Clarence
W. Meadows, Attorney General of West Virginia, as amicus
curiae, and Abram P. Staples, Attorney General of Virginia, as
amicus curiae, on brief.

Opinion

Filed November 6, 1939

CHESNUT, District Judge:

The question for decision is whether the Appalachian Electric Power Company, a Virginia corporation (the defendant below and the appellee here) should be enjoined from the construction of a hydroelectric power dam in the New River at Radford, Virginia. To obtain this injunction the United States filed its complaint on May 6, 1935, in the District Court of the United States for the Western District of Virginia, in which it charged that the erection of the dam would be in violation of ss. 9 and 10 of the Rivers and Harbors Act of 1899 (33 U. S. C., ss. 401, 403), and also contrary to the provisions of ss. 4 (d) and 23 of the Federal Water Power Act of 1920 (16 U. S. C., 791–823), which was amended August 26, 1935, 49 Stat. 838.

Section 9 of the Rivers and Harbors Act provides in part that—

"It shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structure shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War."

And Section 10 provides in part that—

> "The creation of any obstruction not affirmatively
> 3663 authorized by Congress, to the navigable capacity of any
> of the waters of the United States is hereby prohibited;".

Under this statute it was necessary to obtain an Act of Congress to authorize the construction of a hydro-electric power dam in a navigable water of the United States, but by the Federal Water Power Act of June 10, 1920 (41 Stat. 1077; 16 U. S. C., Ch. 12, ss. 791–823) Congress created an administrative commission with authority to issue licenses to construct, operate and maintain "dams, water conduits, reservoirs, power houses, transmission lines, or other project works necessary or convenient for the development and improvement of navigation, and for the development, transmission and utilization of power across, along, over or in any of the navigable waters of the United States", such licenses (s. 803) to contain certain specified conditions, some relating to matters affecting navigation and others of an economic and financial nature; and with the further proviso that the Commission in its discretion might waive any of the conditions except the license period of 50 years, if the license was "for a minor-part only of a complete project." Under the original Act of 1920, the Commission was composed of the Secretaries of War, Interior and Agriculture; but by amendment of June 23, 1930 (46 Stat. 797) the personnel of the Commission was changed to five commissioners appointed by the President by and with the advice and consent of the Senate.

Upon procedure provided for in the Act, the Commission approved the construction of the dam at Radford in accordance with the plans and specifications therefor which had been approved by the Chief of Engineers and by the Secretary of War with respect to navigation, and formally tendered to the Appalachian Electric Power Company, a so-called "major" license containing all the conditions enumerated in section 10 of the Act (16 U. S. C., s. 803). The Company expressed its willingness to accept the license with all proper regulations affecting navigation but requested the Commission to waive other conditions not affecting navigation, particularly those which 3664 related to the regulation of rates to be charged for electric power, the setting aside thereout of amortization reserves, and the so-called "recapture clause" giving to the United States the right to take over the project at the expiration of the license period of fifty years upon the basis of original cost less amortization reserves. Among its objections to these latter conditions the Company made the point that the Commission was without constitutional authority to prescribe conditions other than those affecting navigation. The Commission refused to waive any of the conditions of the major-part license; and thereupon the Company, having acquired all riparian and overflowage rights and specific and full authority from the State of Virginia, proceeded toward the erection of the dam without obtaining a license from the Commission. The injunction suit followed.

In its complaint the Government took the position that the New River throughout its whole course constituted navigable waters of the United States, and therefore the dam could not be constructed without permission from Congress or a license from the Commission; and further, that the construction and operation of the dam would necessarily be an obstruction to the navigable capacity of waters of the United States; and in any event was prohibited by the Federal Water Power Act unless licensed by the Commission. The answer of the defendant controverted all three of these propositions.

Proceedings before this suit: The proceedings before the Commission ran over a period of several years. Section 23 of the

ederal Water Power Act of 1920 provided that persons intend-
g to construct a dam in a stream "other than those defined in
is chapter as navigable waters, and over which Congress has
risdiction under its authority to regulate commerce between
foreign nations and among the several States, may in their
665 discretion file a declaration of such intention with the
Commission", and if after investigation the Commission
hould find that the interests of interstate or foreign commerce
ould not be affected, permission was granted for the construc-
ion; otherwise not without a license granted by the Commission.
he original project for the Radford Dam was initiated by a
redecessor of the Appalachian Electric Power Company, the
ew River Development Company, which filed its declaration of
ntention with the Commission on June 25, 1925, after first ob-
aining an opinion from Engineers of the War Department that
he river was not navigable, and therefore in its view not subject
o the jurisdiction of the Commission. The declaration stated
mong other things that "the proposed project will be so con-
tructed and operated so as not to impair the navigable capacity
f the stream below, nor to affect the interests of interstate or
oreign commerce". Thereupon the Commission requested a re-
ort on the declaration from the Chief of Engineers of the War
Department, Gen. Harry Taylor. His report of August 20, 1925
was to the effect that no sufficient reason was seen why the Com-
mission should not exercise jurisdiction over the proposed project
because while there was no present navigation on the river there
had been some on parts of the river in the past and the Govern-
ment had done work on certain parts of the river to improve
navigability; and the water-flow from the dam if not properly
regulated could have an adverse effect on navigation during low
water stages in the Kanawha River; but that such possible ad-
verse effect was not such as to warrant refusal to permit the
construction of the dam if control was maintained by the United
States. On October 24, 1925 the declarant wrote to the Commis-
sion requesting re-consideration by Gen. Taylor of his report and
submitting additional data relating to New River, which he said
had not been considered in his original report. Thereafter Gen-
eral Taylor re-considered the matter and rendered a second
3666 report to the Commission on December 29, 1925, in which
he said:

"A careful study has been made of all the data presented by
the declarant and a further study has been made of all available
data and records bearing on the question at issue which are avail-
able in this office, or which could be obtained from other govern-
ment bureaus. The following report is the result of the addi-

tional studies which have been made and the additional information which has been obtained since the date of my original report."

In conclusion he stated:

"I therefore, report that in my opinion New River in its present condition is not a navigable stream and that navigation on the Kanawha River will not be adversely affected by the proposed power development."

On March 2, 1926 the Power Commission held a hearing on the declaration of intention as to the building of the power dam. The only evidence then submitted was the second report of Gen. Taylor, but there was argument by counsel for the Company and by the Attorney General of Virginia who appeared in opposition to the assumption of jurisdiction over the project by the Federal Power Commission. On April 17, 1926 the Commission transmitted to Gen. Taylor certain data with respect to the Pitt River in California which was considered as having a bearing on the question of the effect upon navigation on the Kanawha River by variations in the discharge of water from the Radford Dam, and requested his opinion thereon. On July 23, 1926 Gen. Deakyne, Acting Chief of Engineers, replied that the data with regard to the stream flow of the Pitt and Sacramento Rivers in California afforded no reliable comparison for New River by reason of different conditions, and that the correct procedure would be to study the action of waves in New River produced by
discharges from dams then operating on the river. He
3667 referred to a very exceptional dry summer of 1925 and
suggested the possibility that exceptionally dry seasons
may occasionally occur during which the Radford Dam if unregulated might adversely affect the navigable capacity of the Kanawha River.[15]

The declaration which had been filed by the New River Company was assigned to and adopted by the Appalachian Company with the consent of the Commission on August 30, 1926, and on September 2, 1926 the Appalachian Company filed an application for a license on the Commission's suggestion that it would expedite matters and could be withdrawn if it later developed that no federal license would be required. Pursuant to custom the District Engineer of the War Department gave public notice for a hearing at Radford on October 28, 1926, but no evidence was then introduced. Thereafter the District Engineer made a report on December 22, 1926 favorable to the issuance of the

---

[15] The experiments suggested by Gen. Deakne subsequently made on New River were discussed in the opinion of the district judge.

cense. On June 1, 1927 the Commission made a finding that he New River "is not 'navigable waters' within the definition hereof in said Act," but that the interests of interstate and oreign commerce would be affected by such proposed construc-ion. It was not stated in what respect interestate commerce vould be affected by the dam; but it appears that the Commission ad reference to the effect on navigability of the Kanawha River; nd the action of the Commission in that regard seems to have een based principally on its consideration of the data regard-ng the California rivers. On July 1, 1927 the Commission endered a full "major" license to the Appalachian Company. On April 26, 1928 the Company wrote the Commission that it vas willing to accept all conditions reasonably designed to pro-ect the navigability of the waters of the United States, and to e controlled by any reasonable rules and regulations which the ecretary of War might prescribe in the interests of naviga-tion, but that unless the Commission could issue a license,
668 the conditions of which related solely to navigation, the Company would proceed with the construction of its dam vithout obtaining a license from the Commission. The letter lso requested reference of certain questions of law to the Attorney eneral of the United States. This request was not acted on at he time; and on February 4, 1930 the Company again wrote he Commission asserting its position that its project as operated vould not affect navigable waters and therefore was not within he jurisdiction of the Commission and asking reconsideration f the subject, but nevertheless suggesting that if the Commis-ion still asserted jurisdiction the Company would be willing to ccept a so-called "minor-part" license containing only such con-litions as would protect the interests of the United States in navigation. The letter enclosed a memorandum or brief in sup-port of the authority of the Commission to grant such a license. On July 21, 1930 the Commission requested the opinion of the Attorney General of the United States as to its authority to issue a so-called minor-part license, and in formulating the question tated that "New River is neither navigated or navigable in fact." On September 22, 1930 Attorney General Mitchell in an extended opinion advised the Commission that it could properly do so. He said:

"This interpretation appears necessary in order to avoid serious questions regarding the constitutionality of the Act which might be presented if section 10 (i) should be interpreted so as to have no application to projects constructed in or on non-navigable streams, which only remotely and indirectly affect the navigability of waters in the lower reaches of streams to which they are tributaries." [16]

On October 6, 1930 the Appalachian Company requested action on its application for a minor-part license and submitted revised maps and plans for the project on October 16, 1930. On
3669 October 31, 1930 the Commission forwarded to the Company a draft of a minor-part license and on November 6, 1930 a revised draft of the same. This omitted the objectionable conditions as to rates, amortization reserves and recapture. The Company replied that the form was satisfactory and that if license was tendered it would at once begin construction work. In the meantime the draft of minor-part license had been submitted to the Acting Chief Counsel for the Commission who submitted a memorandum disapproving its issuance because it was not sufficiently shown that the Company had complied with the laws of Virginia and in his opinion it did not adequately protect the interests of the United States; and that the previous finding of the Commission that the river was not navigable waters of the United States was incorrect and should be reversed. The memorandum of counsel was submitted to the Chief Engineer of the Commission who replied in an extended memorandum not agreeing with the views expressed, and the Commission then resubmitted the question of navigability of the river to the then Acting Chief Engineer of the War Department, Gen. Brown, enclosing the memorandum of the Acting Chief Counsel of the Commission, and that of its Chief Engineer. Gen Grown replied that after reviewing the data there was no reason for changing the previous report of his office dated December 29, 1925, saying "it is my opinion that New River is not navigable at any point in its course." On October 18, 1930 Major Herman, the District Engineer for New River, had submitted a report in reference to a particular inquiry as to the navigability of New River at certain points in which he concluded: "It is the District Engineer's opinion, therefore, that New River is not navigable in fact either at Jackson's Ferry or Glenlyn, or at any other point in its course." On October 24, 1930, Col. Spaulding, the Division Engineer for New River, expressed his full concurrence with Major Herman's opinion. The Company submitted to the Commission an official letter from the Governor of Virginia
3670 stating that the Company had complied with Virginia laws for the construction of the project.

On November 25, 1930, at a meeting of the Commission, consideration was given to the issuance of the minor-part license and "after due consideration the Commission declined to take action on the application, favorable or adverse. It was concluded that in view of the importance of the questions of jurisdiction as between the United States and the State of Virginia involved in this case a court adjudication is desirable." At the Commission's meeting on January 26, 1931 (the personnel of the Commission having changed pursuant to the amendment of the Act above referred to) the subject was again brought up and, in view of "the extreme importance of the legal questions involved" the Commission determined to hold another public hearing, notice for which was given for February 16, 1931. At that hearing attorneys for the Company and for several States submitted arguments and briefs respecting the interpretation of the Power Act, and the constitutional power of the federal government with regard thereto, and the authority of the Commission to issue a minor-part license. No evidence was introduced. On April 3, 1931 the Commission filed an opinion and order denying the application for a minor-part license, and directing that the Appalachian Company be tendered a standard form license under the Act, and ordering that it should not proceed with construction without such license. A minority of the Commission then favored a reversal of the former finding that the river was not navigable waters, but the majority were of the opinion that that question was one for the courts; that any finding of the Commission in that respect would not be binding upon the courts; and that the jurisdiction of the Commission was properly based upon section 23 of the Power Act above referred to.

---

[16] Section 10 (1) related to issuance of minor-part licenses.

Thereafter on June 8, 1931 the Appalachian Company filed suit in the United States District Court for the Western District of Virginia against the individual members of the
3671
Commission to remove a cloud on the title to their land and to restrain the defendants from interfering with the Company's use of its property. The case was dismissed by the District Judge on the legal insufficiency of the complaint, but on appeal to this court the case was dismissed for lack of personal jurisdiction over the defendants. Appalachian Electric Power Co. v. Smith, et al., 67 F. 2d. 451, 458. While the case was pending in the District Court the Commission on October 12, 1932 adopted a resolution which, after referring to the pending case and the contentions of counsel therein as to the navigability of the New River, and the findings and action of the Commission with respect thereto, stated—"The Commission finds and declares that New River, from the mouth of Wilson Creek, Virginia, north, is navigable waters within the definition thereof, as set forth in section 3 of the Federal Water Power Act." This last action of the Commission was not taken after notice or hearing additional evidence.

The issues in the present suit: The Appalachian Electric Power Company began construction work on the dam about June 1, 1934. The bill of complaint in this case was filed May 6, 1935 to enjoin construction of the dam, averring that "New River is a navigable interstate stream arising in North Carolina and flowing in a northerly and northwesterly direction across the State of Virginia, into West Virginia, to the junction of Gauley River and New River, from which point it becomes known as the Kanawha River"; that the dam would constitute an obstruction to navigation and its construction was in violation of the two Acts of Congress above mentioned. The answer of the defendant denied these contentions. The principal and controlling issues presented by the pleading are therefore (1) whether the New River at Radford, Virginia, constitutes navigable waters of the United States; (2) if not, whether the construction and maintenance of the dam will naturally and
3672 necessarily obstruct or substantially impair the navigability of any other navigable waters of the United States and particularly those of the Kanawha River into which New River flows, or the Ohio River, into which the Kanawha flows; and (3) if neither of these facts is found, whether the defendant's actions are in violation of the Federal Power Act. There are some subordinate or incidental issues of law involved in these major propositions, one of which is the contention that the Commission's declaration of October 12, 1932, constituted a finding of fact that the New River is navigable; was based on substantial evidence, and therefore was conclusive in the case. There is also the contention by the Appalachian Company that there is no constitutional basis for the economic and financial conditions of the so-called major license contained in the Power Act as they do not in any way relate to navigation.

There was a lengthy trial of six weeks or more in the district court and a very voluminous record has resulted.[17] Much testimony was introduced regarding the physical characteristics of New River throughout its course and in particular stretches; concerning its history from its original discovery late in the seventeenth century; its use or lack of use for navigation during its history; the roadways and railroads touching it; the produce or commerce of the neighboring country; the natural and usual or normal methods of operation of a hydro-electric dam; the possible or probable or intended method of operation of the particular Radford Dam; and the effect, if any, that the discharge or lack of discharge of water therefrom would have upon the

---

[17] The printed matter submitted for our consideration on this appeal, including briefs, extends over 3,642 pages.

lower stream. The greater part of the extensive testimony was given before and orally heard by the district judge, and there was also a large amount of documentary evidence relating to the history and physical characteristics of the river, and re-
3673 ports of engineers of the War Department with respect to conditions found during the brief period of expenditure of government funds on strictly localized portions of the river, and proceedings before the Power Commission. The evidence also contains very numerous exhibits including many photographs of the river at various points, and maps and plats.

After the trial and consideration of briefs of counsel, the district judge filed an extended opinion reported in 23 F. S. 83, in which he discussed the issues of law and fact and separately made specific findings of fact and conclusions of law. On the controlling facts he found—

"13. The New River is not a navigable water of the United States, either at the site of defendant's project or elsewhere throughout its course. The site of defendant's project is approximately 152 miles above the mouth of New River and approximately 160 miles above the head of navigation on the Kanawha River.

"15. The construction of the defendant's project will not obstruct the navigable capacity of the Kanawha River or of any navigable water of the United States. And the operation of defendant's project in any normal, rational, or probable method of operation will not obstruct or impair the navigable capacity of the Kanawha or any navigable water of the United States and will not affect the interests of interstate commerce."

On issues of law he determined that the New River is not a navigable water of the United States; that findings made by the Power Commission are not final, but in each case are subject to the determination of the courts; that the proper construction of the Power Act did not vest in the Commission the authority to require a license for a project in a non-navigable stream; that even if the Commission had power to require some license for a power dam in non-navigable waters of the United States, it could not validly impose therein conditions having no relation to navigable capacity of any navigable water of the United
3674 States; and that its action in seeking to impose upon the defendant the full major-part license in this case without constitutional authority to do so, bars its right to the relief prayed for; and that the bill of complaint should be dismissed as without equity. By the decree of May 10, 1938 the bill was dismissed, but the opinion concluded:

"By that it is, of course, not meant to hold that all rights of the United States to complain of this project are forever barred. If at any time in the future the project should be operated in such manner as to interfere with the navigable capacity of the Kanawha or any other navigable water (a contingency which appears most improbable), the United States will not be barred from asserting its right to protect this navigable capacity by compelling a removal of the structure or such modification of its operation as is necessary. But I am convinced that the evidence in this case does not disclose grounds for the issuance of an injunction at this time and the prayer for an injunction will be denied and the bill dismissed."

As the facts in this case were determined by the court without a jury, we are guided in our consideration of the findings of fact made by the District Judge by Rule 52 of the new federal rules of civil procedure, which provides:

"52. In all actions tried upon the facts without a jury, the court shall find the facts specially and state separately its conclusions of law thereon and direct the entry of appropriate judgment. * * * Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses."

The new rule has been recently applied here in Guilford Const. Co. v. Biggs, 102 F. 2d. 46, where, in an opinion by Judge Parker, it was said:

"The provisions of the new procedural rules that the findings of fact of the trial judge are to be accepted on appeal unless
3675 clearly wrong (Rule 52 (a) 28 U. S. C. following section 723c) is but the formulation of a rule long recognized and applied by courts of equity. Adamson v. Gilliland, 242 U. S. 350, 37 S. Ct. 169, 61 L. Ed. 356; Deuster v. Marlboro Shirt Co., 4 Cir. 81 F. 2d. 139, 142; Sherman v. Bramham, 4 Cir. 78 F. 2d. 443; Miller v. Pyrites Co., 4 Cir. 71 F. 2d. 804; Suburban Imp. Co. v. Scott Lumber Co., 4 Cir. 67 F. 2d. 335; 90 A. L. R. 330."

This rule seems to have special application in a case such as this where the trial has been exceedingly lengthy, very many witnesses have been heard orally by the district judge, and the subject matter so largely concerns a prominent geographical feature of his own district. Nevertheless in view of the importance of the case, involving as it does conflicting contentions as to state and federal power, and an important policy making act of Congress, as well as individual property rights, we have felt it particularly necessary to carefully review the evidence in the case on which the findings of the District Judge are based. The States of Virginia and West Virginia have separately filed briefs in this case as amici curiae taking the position that the New River both in Virginia and West Virginia does not constitute navigable waters of the United States, and that the Federal Power Commission is without jurisdiction over the river.

In considering the effect and weight of the factual evidence regarding the New River, it will be helpful to first state the well established law with respect to rivers and streams, both intrastate and interstate, and whether navigable or not, and the riparian rights thereon respectively. In this case, which so directly involves state and federal rights, it is important to steadily keep in mind our constitutional distribution of power between the state and federal governments. The title to the beds of navigable waters within a state are vested in the State unless under its laws they belong to the riparian owners. (Borax Cons. Ltd. v. Los Angeles, 296 U. S. 10; Appleby v. New York, 271 U. S. 364; Port of Seattle v. Oregon & W. R. R., 255 3676 U. S. 56, 63; Arkansas v. Tennessee, 246 U. S. 158; United States v. Cress, 243 U. S. 316; Pumpelly v. Green Bay Co., 13 Wall. 166), and "the right of the United States in navigable waters within the several States is limited to the control thereof for purposes of navigation". Port of Seattle v. Oregon & W. R. R. Co., 255 U. S. 56, 63; United States v. Oregon, 295 U. S. 1, 14; James v. Dravo Contracting Co., 302 U. S. 134, 140. The federal government has no property rights in navigable streams or in the waters thereof. Its only power with respect thereto flows from the interstate commerce clause of the Constitution, a necessary incident of which is the power to control and protect navigation on navigable interstate rivers and other bodies of water. Gibbons v. Ogden, 9 Wheat. 1. Within the proper scope of the interstate commerce power, the control of navigation by the federal government is plenary; but its sphere of operation is necessarily limited to the protection of commerce which is interstate; the control over purely intrastate rivers and streams, as such, remains with the states, whether the waters are navigable or not; and it necessarily follows even an interstate stream which is not in fact navigable for purpose of interstate commerce is not subject to the control of the federal government, except to the extent necessary to protect other navigable waters. Federal legislation with respect to navigable waters is permissible only when it has some real and substantial relation to the control of navigation. United States v. River Rouge, 269 U. S. 411, 419; Port of Seattle v. Oregon, 255 U. S. 56, 63; Wisconsin v. Illinois, 278 U. S. 367, 415. For instance, Congress has no authority

to construct a hydro-electric dam primarily and only for the
velopment and sale of water power. Ashwander v. Tennes
Valley Authority, 297 U. S. 288, 333; Alabama Power Co.
Gulf Power Co., 283 F. 606, 613; Little Falls Fibre Co. v. Fo
& Son, 249 N.Y. 495, 507, affirmed 280 U. S. 369.

Where interstate waters are capable of promoting int
3677 state commerce to a substantial degree, they are said to
waters of the United States, a classic definition of whi
is given in The Daniel Ball, 10 Wall. 557, as follows:

“Those rivers must be regarded as public navigable rivers
law which are navigable in fact. And they are navigable in fa
when they are used, or are susceptible of being used, in the
ordinary condition, as highways for commerce, over which tra
and travel are or may be conducted in the customary modes
trade and travel on water. And they constitute navigable wate
of the United States within the meaning of the Acts of Congre
in contradistinction from the navigable waters of the States, wh
they form in their ordinary condition by themselves, or by un
ing with other waters, a continued highway over which con
merce is or may be carried on with other States or forei
countries in the customary modes in which such commerce
conducted by water.”

The rule of this case has not been since departed from, but
has been interpreted and applied in many different factual situ
tions, as a result of which it is now held that an intersta
stream is navigable in fact only when it is so used or susceptib
of being used in its natural and ordinary condition, (Unit
States v. Oregon, 295 U. S. 1; United States v. Utah, 283 U.
64, 76; United States v. Holt State Bank, 270 U. S. 49; Brewe
Elliott Oil & Gas Co. v. United States, 260 U. S. 77, 86); it mu
be capable of valuable public use in its natural condition, (Unit
States v. Cress, 243 U. S. 316, 321); must have a capacity f
useful interstate commerce of a substantial and permanent natu
(Leovy v. United States, 177 U. S. 621), and must have a capaci
for general and common usefulness for purposes of trade an
commerce (United States v. Oregon, 295 U. S. 1, 23). On
occasional or exceptional use under abnormal conditions is n
sufficient (Oklahoma v. Texas, 258 U. S. 574, 591; United Stat
v. Rio Grande Dam & Irrigation Co., 174 U. S. 690, 699); an
as this court said in United States v. Doughton, 62 F. 2d. 93
quoting from Harrison v. Fite, 148 F. 781: “A theoretic
3678 or potential navigability, or one that is temporary, pr
carious and unprofitable, is not sufficient.”

Is New River at Radford, Virginia, a navigable river of th
United States? A very large part of the evidence relates t
this issue. Apparently counsel have exhausted the available i

formation, documentary, historical and personal within living recollection. The whole evidence was reviewed and summarized and discussed at length in the opinion of the trial judge who reached the conclusion that the question must be answered in the negative, and our independent examination convinces us that he reached the right conclusion. The evidence is entirely too voluminous to review it in detail, but we will state the outstanding points which have convinced us that the dam is not located in navigable waters of the United States.

Physical characteristics of the river. A mere description of the physical and natural characteristics of the river is very persuasive that it is not susceptible of that character of navigation which is necessary, under the decisions above cited, to support the claim that it is navigable water of the United States. It is properly said to be sui generis, and is unlike many of the numerous rivers which have been described and held either navigable or nonnavigable in Supreme Court decisions which we have noted.[18] It is characteristically a mountain stream with steep gradient, relatively rapid current, and comparatively narrow stream bed, the river running in many places over
3679 limestone and sandstone, rocks and shale, the boulders frequently jutting above the surface of the water, with alternating comparatively still pools of varying length and numerous rapids, falls and shoals in many of which the depth of the water over the rocks is only about one foot, and frequently only a few inches. The following short general description is taken from a report by the Secretary of War to the House of Representatives in 1935 (74th Cong. House Document No. 91):

"Through almost its entire length the river flows through a rugged mountainous country. Its valley is narrow, the flood plain being very little wider than the low-water channel, which varies in width from about 200 to 1,000 feet. In many places the banks are sheer bluffs rising from the river's edge. Ledges of limestone, sandstone, and shale crossing the river at frequent intervals create rapids and waterfalls. The waterfalls vary in height up to about 18 feet. Between the ledges there are usually short pools of varying depth. The low-water depth in the channel varies from a few inches to more than six feet."

---

[18] See The Montello, 20 Wall. 430, 443 (Fox River); United States v. Rio Grande, 174 U. S. 690, 709 (Rio Grande River); Leovy v. United States, 177 U. S. 621, 634 (Red Pass); Oklahoma v. Texas, 258 U. S. 574, 591 (Red River); United States v. Cress, 243 U. S. 316 (Cumberland & Kentucky Rivers); Economy Light Co. v. United States, 256 U. S. 113, 119 (Des Plaines River); United States v. Holt State Bank, 270 U. S. 49 (Mud Lake, Minn.), United States v. Utah, 283 U. S. 64 (Grand, Green, & Colo. Rivers); United States v. Oregon, 295 U. S. 1, 23 (Malheur & Harney Lakes, Ore.). But some comparison may be made with the Upper Columbia described in Mason Co. v. Tax Comm., 302 U. S. 190.

Among mountain streams it seems to be unique in the peculiar geologic formation of its rocky bed due to folds and faults in the rock strata, producing ledges running across the stream in many places. In a thirty-five mile stretch of the river in Giles County, Virginia, (an important section in this case, as is hereinafter particularly discussed) the geologic environment is "markedly unusual" in that it has been the scene of four predominant breaks or faults; and the slope or gradient of the rocks in the river bed is very unusual in that the incline "is downward in an upstream direction rather than in downstream direction", with the result that the water falls over the ledges almost vertically. Some of the ledges are upthrust above the surface of the water, and some are barely submerged, and this relative condition varies naturally with the depth of the water in alternate
3680 wet and dry periods. The difficulties and dangers of navigation caused thereby, both downstream and upstream, are obvious.[19]

New River rises in northwest North Carolina near the Virginia line and flows generally north-easterly through Virginia for 125 miles. After passing Radford, Virginia, it turns generally

---

[19] The 35-mile section of the river referred to is a part of the 60-mile stretch between Radford, Virginia, the site of the dam in controversy, and the Virginia-West Virginia line. This section of the river is more fully described in the testimony of Prof. A. L. L. Mathews, a professor of geology who has specialized in stratigraphy. "New River is what we geologists call a young stream. That is, it has not yet completely adjusted itself to the geologic environment. It has not yet cut down through its length to such level that it has a low gradient or slope. It is still in the process of cutting down vertically through these rock strata. * * * From the standpoint of the geologist, the geologic environment of New River is markedly unusual. The region has been folded and faulted—that is, broken. At one time, millions of years ago, the rock strata now represented in the area were horizontal, but, due to the great earth forces exerted during the geologic ages, the rock strata were folded, twisted, and broken. So intensive has this warping and breaking of the rock been that various rock strata, which normally were at the bottom, so to speak, have been thrust up and over rock strata which ordinarily would lie uppermost. This particular area in New River has been the scene of four predominant breaks or faults. Perhaps the most unusual thing about the geologic condition in the region in point is the concentration of the folding or faulting within the relatively narrow area—that is, the distance from Glenlyn upstream to the south limit of Giles County. * * * As is frequently the case with faults, faulting in this area has resulted in the tilting of the rock strata, and, due to the concentration of the faultings, the strata are largely tilted to a very steep degree. In many cases they approach the vertical. * * * In its flow, the water of New River moves along and up the slopes of successive rock strata or ledges, and frequently falls over the upper or outcropping edges of these ledges. In many cases the falling over of out-cropping edges is practically sheer or perpendicular. * * * In other words, this results in a river with numerous ledges of rock strata, some partly submerged, some exposed, which are substantially vertical or standing on end, and which extend across the stream at right angles to the line of flow, this condition results in a stream with numerous submerged ledges, forming shoals, rapids, and falls. * * * Generally, the out-croppings of the resistant rock strata extend at right angles, across the stream. * * * the prevailing slope is downward in an upstream direction rather than in a downstream direction. * * * In the case of most streams flowing over sloping rock beds, the slope or dip is downward in a downstream direction. Here, however, the reverse is true."

northwestward and crosses the Virginia-West Virginia state line at a point about 160 miles below its head (the mouth of
3681 Wilson Creek), and then flows north about 25 miles to the City of Hinton in West Virginia, and thence northwesterly about 65 miles to Gauley, West Virginia where it unites with the Gauley River, and the two form the Kanawha River which continues in a northwesterly direction about 95 miles to Point Pleasant, West Virginia, where the Kanawha joins the Ohio River. The total distance from the head of the river at Wilson Creek to the Kanawha River is about 252 miles, and continuing to the Ohio River is 347 miles. Kanawha Falls, a precipitous rapid with a fall of 16 feet, is situated a mile or two below the junction of the New and Gauley Rivers, and the head of navigation on the Kanawha is a few miles below Kanawha Falls. The physical characteristics of the Kanawha are greatly different from New River, having a gradient of only 1.25 feet per mile as compared with the average gradient of the New River of 7.1 feet per mile. The Kanawha is admittedly navigable and has been fully "canalized" by the government which some years ago maintained ten navigation dams thereon, which have now been replaced in whole or in part by four new modern navigation and power dams of concrete construction. The gradient, slope or fall of the bed of New River is not uniform throughout its course but varies from three to four feet per mile to, at places, 31 feet per mile. The elevation above sea level at Wilson Creek is 2,240 feet and at Gauley, 651 feet; at the mouth of the Kanawha the elevation is about 500 feet. The stream velocity varies at the shoals and rapids from 3 to 5 miles per hour. The pools of comparatively still water vary in length from a few hundred yards to several miles with a probable average length of less than a mile. The rapids also vary in extent and in the degree of fall. Rapids of 2,000 feet are not uncommon and there are some of much longer extent. The low water depth in the channel varies from a few inches to more than 6 feet. After entering Virginia in Grayson County the river flows through and between spurs of the
3682 Blue Ridge Mountains, parallel to the main divides of the Blue Ridge and Alleghanies; and through almost its entire length at places through rugged mountainous country. The most steep, rough and rugged section of the river begins a few miles below Hinton and runs for approximately 45 miles in a narrow tortuous channel between high mountains where the river bed is a mass of sharp ledges and boulders and the water rushes with great velocity.

The average volume of flow of the river at Radford over a period of 28 years ending September 30, 1935, was 3,211 cubic feet per second; the lowest recorded flow there was 521 second-feet on

September 6, 1930 during the drought of that year. In the floods of 1878 and 1916 the flow was estimated at about 155,000 second-feet and 146,000 second-feet respectively. At Kanawha Falls, fifty-six year records show an average flow of 13,000 second-feet with a maximum of 270,000 in the flood of 1878 and a minimum of 640 second-feet on August 14, 1930.

The history of New River affords no satisfactory evidence of the early use of the river as a highway for trade or travel,[20] although the valley of the river would have made it a convenient highway through the mountains of Virginia toward the Ohio if the river had been navigable in fact. The river was discovered in 1671 by Col. Abram Woods, and there apparently were settlements in its valley by the middle of the eighteenth century. Early military expeditions toward the west apparently made no use of the river. Several exploratory trips on the river, or parts of it, were made in 1742, 1812, 1817, 1819 and 1828; but the reports thereof do not indicate that there was any navigation on the river. Some early Acts of Virginia and West Virginia have been referred to, relating to proposed opening or improvement of the river, or parts of it, for navigation, but nothing
3683 substantial seems to have been done under them. The earliest recorded use of the river for any form of transportation seems to have been during the Civil War when the Confederate Forces had a commissary depot some miles above the Virginia-West Virginia line and some supplies therefor were occasionally taken down the river in bateaux. There were a number of lead and iron mines situated on or near the river just above Radford, and there was coal in West Virginia. About 1872 some persons interested Congress in a plan for improving the New River for use in transportation between the two states. The implication would seem to be that the navigation of the river for this purpose did not then exist. In that year Congress authorized a survey of the New River which resulted in the so-called "mile by mile" survey which is, in our opinion, the most valuable evidence of the natural characteristics of the river.[21] Beginning in 1876 and running through 1882 Congress made various appropriations for work on the river. It was apparently contemplated that improvements should be made from Hinton up the river for 191 miles; but by reason of the very limited appropriation and the experience as to the cost of the work the engineers very soon decided that it would be impossible to create practical and con-

---

[20] In this respect it is different from the history of the DesPlaines River found navigable in Economy Light Co. v. United States, 256 U. S. 113, and the Fox River in The Montello, 20 Wall. 431.

[21] See Government's Exhibit No. 31; and also the Moore and Briggs survey of 54 miles upstream from the Greenbrier in West Virginia. Government's Exhibit No. 32.

tinuous navigation through this entire distance, and they therefore concentrated their work on the stretch-up-stream from Hinton for about 25 miles, and up-stream from Radford for about 30 miles. The work as originally planned was divided into three sections of the river, one known as the lower or Greenbrier Division extending up-stream from Hinton; the Middle or New River Bridge Division, beginning about Radford, Virginia, and extending upstream to the lead mines in Wythe County, and the third section was known as the Upper or Lead Mines Division, from the lead mines toward the head of the
3684 river. No work was done on the Lower and Middle Divisions after 1882 and very little work thereafter was done on the Upper Division. In all about $112,000 was expended under various annual congressional appropriations. In 1891 Col. Craighill, who had been in general charge of the work throughout, reported to the Chief of Engineers of the War Department that the expenditure of a small balance of the appropriation for the work on the Upper Division would be a useless waste of public money. It is said by the plaintiff that this was the most difficult portion to improve. The most reliable evidence in the case in our opinion with regard to the conditions of the river, and the use or absence of use thereof for navigation, is to be found in the annual reports of the District Engineers in charge of the work. The whole is summarized in the report of Gen. Taylor, Chief of Engineers of the War Department, to the Federal Power Commission on December 29, 1925.[22] After correctly stating the substance of the applicable law as to navigable waters of the United States, and expressing the opinion that the natural condition of New River prior to the federal work did not show that it was navigable in fact, he continued:

"It is my opinion that these natural conditions were not changed by subsequent improvements, to the extent of making the river a highway for commerce."

Then after stating the limited amount of work accomplished in the three divisions separately he said:

"Work was limited to the most easily improved places and effort made to so ameliorate conditions as to permit local navigation. The results were not satisfactory or important and Congress discontinued appropriations after 1886, less than one-third of the funds required for any effective improvement having been provided. * * * It is evident that the work executed by the government during the years 1877 to 1832, did not mate-
3685 rially change the natural non-navigable conditions of the river. The improvement effected was at most slight and

---

[22] Defendant's Exhibit No. 572.

fragmentary, and the small channels worked over are reported to have deteriorated due to the natural action of ice and current. Continuous navigation on the river has never been possible, and whatever commerce has existed has been altogether local, apparently confined to the 25-mile section in West Virginia ending at Hinton.

"The District and Division Engineers have reported that there is no commerce and that the river is not now navigable in fact, but they assume that it is legally navigable for the reason that moneys have been expended on it for channel improvement by authority of Congress. It is well settled by judicial decisions that acts of Congress appropriating money for the improvement of a stream are not to be construed as declarations express or implied that the stream is actually navigable. Congress may authorize the improvement of a non-navigable stream with a view to creating navigability, yet unless the improvement is accomplished the natural state of the stream is not changed. Whether or not it is navigable is still a question of fact unaffected by the consideration that money has been appropriated and expended in an effort to improve it."

Opinions of War Department Engineers. The opinions of the Chief and District Engineers of the War Department familiar with the conditions on New River are entitled to much weight in this case. It is true that they are only opinions and are by no means conclusive; but they represent especially competent professional opinions on the subject matter with which they were necessarily well acquainted; and their opinions are disinterested. Reference has already been made to many opinions of different engineers touching the matter at different times, both long before the origin of the present case, and during its currency. Thus we have the deliberate opinion of Gen. Taylor in December 1925, after a full review of all the data then available in the War Department upon the subject, and we have his opinion later confirmed in 1930 by the then Chief of Engineers of the
3686 War Department, Gen. Brown, and also confirmed by Col. Tyler, Chief Engineer of the Federal Power Commission. Similar opinions have been expressed by District and Division Engineers on other occasions with regard to the river. It is very significant that the Commission found the report and opinion of Gen. Taylor a sufficient basis for its (first) finding of non-navigability.

Other evidence on navigability. It is not disputed that there is no appreciable use of the New River either intrastate or interstate for navigation at the present time, and there has been none for probably at least 25 years in the past. Probably the disappearance of all navigation of the river even locally in the vicinity

of Radford and Hinton was partly influenced by the coming of the railroads and the improvement of adjacent roadways. However that may be, at the present time the river is certainly not used and is useless for any substantial or valuable navigation, but by virtue of its physical characteristics is very valuable for water power purposes. A number of power dams have been erected on the river of which there are two a considerable distance above Radford (one about fifty miles) which were constructed without obtaining any authority from the federal government and which have never been interfered with by it. There are also many bridges across the river. The government itself has determined to erect a very large dam and reservoir without locks or other means for navigation, for the combined purpose of flood control and power development, in the river a few miles upstream from Hinton. Condemnation proceedings for this purpose are now pending and the government's position therein has been sustained by this court. United States v. West Virginia Power Co., 91 F. 2d. 611. It is also not without significance that the plans and specifications for the Radford dam (without provision for locks) have been approved by the War Department
from the standpoint of navigation, and the Federal
3687 Power Commission in tendering a license to the defendant
company therein recited its finding that the construction of the dam would not be an obstruction to navigation but properly operated would be an improvement thereof. In these circumstances it is apparent that navigation on New River between Radford and Hinton is not a matter of practical moment and the question of navigation is at the most only theoretical. United States v. Doughton, 62 F. 2d. 936. It seems to be an entirely logical inference that if the government has heretofore maintained that the river constitutes navigable waters of the United States between these points, that view must be considered to have been abandoned by it for all practical purposes. We are not unmindful that the Supreme Court in Economy Light & Power Co. v. United States, 256 U. S. 113, held that unauthorized artificial obstructions in an otherwise originally navigable river did not destroy its legal navigability; but there the court was dealing with a situation where the DesPlaines River had been in the past one of the principal highways of commerce, trade and travel to the west for more than a century; and the intervention of the government was under different circumstances from those here existing. The question of navigability is one of fact and each case must be determined on its own circumstances. In the present case the actions of the government in the respects just referred to at least are important evidentiary facts bearing

on the question whether there is now or ever has been navigability in fact of the New River.

The complaint in this case alleged that New River was navigable throughout its whole course from its source at or near the North Carolina-Virginia line through the states of Virginia and West Virginia; but this extensive claim has now been abandoned and the contention as to navigability is limited to the 115 mile stretch of the river from Allisonia in Virginia (about 30 miles up-stream from Radford) to Hinton in West Virginia. From
Radford to the Virginia-West Virginia line the river is
3688 about 60 miles in length; and Hinton in West Virginia is
25 miles further down-stream. For the plaintiff to successfully maintain that New River at Radford, Virginia, constitutes navigable waters of the United States, it had the burden of proof to show that the river was a highway for substantial and permanent trade and travel of a generally useful and valuable nature between Radford and Hinton or other points in West Virginia. Upon consideration of voluminous evidence the district judge reached the conclusion that this had not been shown and our independent consideration of the evidence leads us to the same conclusion.

We have not failed to carefully consider the arguments of counsel for the plaintiff in opposition to this conclusion. It is said that the opinion of the district judge (contrary to his findings of fact) shows that the stretches of the river in the somewhat improved sections up-stream from Radford and Hinton respectively were navigable in fact, and it is contended that the physical characteristics of the river in the 60 mile stretch down-stream from Radford to the State line are such that it was susceptible of navigation equally with the improved sections before their improvement. We are not persuaded that this contention on the facts is established. The evidence of the defendant's photographs of places on this section of the river and the mile-by-mile survey above referred to show the serious obstacles to navigation in this stretch of the river consisting of several difficult falls, and many long rapids and shoals. And this stretch includes the 35 miles in Giles County having markedly unusual geologic formation of the rock strata of the river bed above mentioned. It is said there was an ample volume of water, and the gradient or slope of the river was on the average not much steeper than in the sections which were improved, and that the pools were much greater in extent than the rapids. But the
obstacles to navigation consisted chiefly in the falls and
3689 rapids which were numerous and long; and the slope was
not uniform, but very much greater than the average

in many places.[23] No federal work was done on this 60 mile section of the river between Radford and the State line with the exception of less than a mile in Virginia which had no important significance in interstate navigation. As appears from their reports the engineers concentrated their limited available funds on the improvement of conditions around Radford and Hinton where there was access to railroads and where it would therefore be of some value locally. If this stretch of the river was not navigable in fact in its unimproved condition, it is not to be considered navigable merely because it might have been made navigable by improvements which were not in fact made. Of course if the improvements had been made the question of fact might have been different.

Much reliance is also placed by plaintiff's counsel of 3690 their contention that despite any obstacles to navigation in the 60 mile stretch between Radford and the state line, there was sufficient testimony of non-expert witnesses with regard to the use of bateaux or keelboats on the river to show that it was navigable in fact even in this critical stretch. It appears from the engineers' reports that there was some use of keelboats on the river as early as 1873; but the extent of their operation before the beginning of the government work in 1878 is not stated, and the annual reports during the government work indicate quite clearly that their use was local in the vicinity of Hinton and Radford respectively; and there is nothing in these reports to show navigation by keelboats between Radford and Hinton. Plaintiff's counsel say that this missing evidence is supplied by a number of aged witnesses testifying from unaide memory as to their knowledge or observation of keelboats in th river fifty to sixty years ago. The district judge discussed a length the extent of the use of keelboats on the river and summarized it as follows:

---

[23] The mile-by-mile survey reached Radford coming down stream at about the fortieth mile. Thereafter for illustration some of the more difficult obstacles to navigation shown in the survey in various places reads as follows:

"49th mile. Rapids and shoals (mostly over bowlders) 2000 feet long; fall, 4 feet.

"51st mile. Rapid, over bowlders and gravel, 1500 feet long, fall, 8 feet.

"53rd mile. At lower end Barnitz Falls, over five ledges of limestone 450 feet, over all fall, 6 feet.

"54th mile. Shoal and rapid over bowlders and gravel 800 feet long, fall 4 feet.

"67th mile. Shoals continue for 1,600 feet; then a short pool and Walker's Mount Falls, where the river falls 5 feet in 500 feet, over two ledges of shale and metamorphic limestone.

"68th mile. Continuous ledges of 4,000 feet; fall 8 feet.

"74th mile. Snidow's Falls, 2,000 feet in length; over bowlders and gravel, fall, 5 feet.

"79th mile. Rapid over two ledges, 500 feet long; fall 7 feet; swift water whole mile.

"92nd mile. Peter's Mountain Falls, where river falls 4½ feet in 1,300 feet, over a succession of limestone ledges, terminating in an abrupt fall of 5 feet.

"100th mile. Neilley's Falls and rapids; whole fall 11 feet, 6 of it nearly vertical. A sluice 500 feet long, along left bank, will pass them, with 50 feet of rock excavation and 450 feet of bowlders and gravel.

"104th mile. Commences with shallow riffle, 600 feet long, over bowlders and gravel, and following this occurs Wiley's Falls where the river falls 4 feet in 10 feet, over a limestone ledge about 50 feet wide."

> "It was in these separated stretches of the river that practically all of the bateaux navigation took place and only o them that there was any appreciable trade or commerce by boat *It is not meant to say that continuous movement of such boat between Hinton and the vicinity of Radford was impossible o did not occur.* There is evidence which indicates that it did occur, but there is a vagueness about the extent to which it occurred and indications that *such trips were irregular, were attended with difficulty and formed no appreciable part of an commercial transportation which took place on the river.* Th most definite evidence of the extent of navigation on the rive are the reports of the government engineers both before and afte beginning improvement of the river in 1877, and these report repeatedly state that the commercial navigation was local t separated stretches of a stream and that there was no continuous navigation." [Italics supplied.]

3691 It is said that this conclusion did not correctly apprais the effect of the oral non-expert testimony; and in plaintiff's reply brief there are listed the names of 23 such witnesse from whose testimony it is contended the contrary conclusion should have been reached. We have carefully considered thi testimony, but are not convinced that it was given too littl weight. This is the type of testimony that the trial judge wh sees and hears the witnesses is particularly well qualified t appraise. These witnesses were for the most part elderly me who were testifying purely from unaided memory of events long past. Such testimony has inherent infirmities and is obviousl not entitled to the weight to be properly given to contemporar official written records (United States v. Oregon, 295 U. S. 19) It also had to be appraised in connection with similar testimon of almost an equal number of witnesses introduced by the defendant by which it was to a considerable extent contradicte or qualified; and proper consideration also had to be given to th other testimony in the case, verbal and documentary, of exper and scientific witnesses tending very strongly to show that th river was non-navigable in fact. But even if the recollectio testimony of the witnesses on both sides is viewed as a whol apart from the other evidence, we do not think that it showe interstate navigability of the river within the requirements of th judicial decisions above mentioned. Very few of these 23 witnesses for the plaintiff (about four or five) testified to any personal experience in keelboat trips on the river between Radford and Hinton (and from parallel testimony by defendant's witnesses several of these were not ordinary commercial trips for trade or travel); more (six or seven) related recollection of their use between Hinton and Glenlyn (the latter in Virginia about 5 miles from the state line); and the others stated that they had seen or used keelboats on one or more occasions at various points on the river within the 60 mile stretch, and some of them 3692 had hearsay information that some of the boats went as far down stream as Hinton. Viewed as a whole, the testimony seems to us to establish nothing more than that there were some trips of keelboats between Radford and Hinton; that such trips could be made only at particular times when there was unusually high water; that even then navigation was not only difficult but also dangerous; that while the boats at times may have carried some country produce there was nothing like an established trade and commerce between Radford and points in West Virginia; and that the duration of such use of the keelboats was for a few years only and has been non-existent for more than 50 years. Very possibly this entire disappearance of any keelboats on the river was influenced somewhat by the coming of the railroads to Glenlyn in 1883 and to Allisonia in 1886; (there were railheads at Hinton in 1873, and at Radford some years earlier); but there was also testimony of non-expert witnesses submitted by the defendant to the effect that the attempt to commercially use keelboats was unsuccessful and unprofitable, and in the Radford-Allisonia district was substantially abandoned before the railroad came to Allisonia in 1886. We conclude that the summary of the testimony on this point above quoted from the opinion of the district judge is a fair appraisal of the evidence; and that the plaintiff has not shown that there was interstate navigation on New River of such a substantial and permanent nature, and of such general and common usefulness, that it would subject the river to federal servitude for the benefit of navigation.

We have also considered the weight to be properly given to the fact of the government work. In many cases such evidence may be a factor of great importance in favor of navigability; but in this case we do not think it conclusive or even very important, in view of its limited nature and abandonment. It was referred to in the reports as "experimental" and was finally abandoned as a further waste of money, on the Upper 3693 Division. It did not, according to the reports, essentially change the original non-navigable condition, and was limited to a few local stretches. In the circumstances it cannot properly be regarded as establishing navigability. Oklahoma v. Texas, 258 U. S. 574, 590.

Will the maintenance and operation of the dam obstruct the navigable capacity of any down stream navigable waters of the United States? Here again the testimony bearing on this issue is voluminous consisting largely of scientific and expert opinion. It also has been reviewed at length in the opinion of the district judge who concluded that the operation of the dam in any normal, usual and reasonable way would not substantially affect the down-stream navigability of the Kanawha or Ohio Rivers; and in our opinion the weight of the evidence bearing on this issue clearly supports the finding made. Of course the mere construction of the dam apart from its operation could have at the best only very temporary effect on the downstream flow of water pending the filling of the storage reservoir behind the dam. It is not the plaintiff's contention that the dam must necessarily be operated in such a way as to prejudice down stream navigability, because it is conceded in the briefs that the proper operation of the dam in accordance with the conditions of the proposed license and the rules and regulations of the Commission and the War Department would even be of benefit to navigation. The contention is that the size and capacity of the dam, in relation to the average volume of flow of the stream, is such that the only reasonable inference is that the dam will be operated in a way to impair down-stream navigability. It is pointed out that the plans for the dam provide for a draw down area of 27 feet with hydro-electric machinery of 104,000 h. p., and a capacity for water consumption of 9,000 cubic feet per second; and that the average annual flow of the New River at the point of the dam is only a little more than 3,000 cubic feet per second.
3694 The capacity of the reservoir or storage pool for water behind the dam is said to be 100,000 acre-feet. It is also pointed out that this hydro-electric dam is only one link in a large electric light and power generation and distribution system of the Appalachian Company whose public service extends interstate over a distance of 100 miles or more. From these facts it is argued that the cost of the dam could be economically justified only on the assumption that it would function in the whole system to furnish power at that time of the day and week when the power demand upon the Appalachian system is at its peak, or, as it is expressed, the dam will be operated on a "peak" basis; and it is further said that this means operation in which during about eight hours of the day five days a week the power machinery will be used to its full capacity of 9,000 cubic feet per second and will discharge that amount into the river below the dam,

while during the remaining hours of the day for five days a week, and probably all of Saturday and Sunday, there will be no operation of the dam for the generation of electricity, and no discharge of water into the river below the dam. The ultimate deductions made in the argument are that in the low water seasons the consumption and discharge of water will be cut off entirely until the reservoir is filled, thus depriving the Kanawha and Ohio Rivers of a material part of their water supply from New River; and when the dam is operated the alternate shutting down of the plant with no discharge of water and the release of water during the hours of operation at the rate of 9,000 cubic feet per second will cause "power waves" which will have an adverse effect upon navigation in the Kanawha by causing there fluctuations or oscillations in the stream.

The defendant denies the reasonableness of these assumptions as to the method of operation of the power dam, and very definitely says that it has no intention to so operate it, and that the assumed method would be abnormal and impracticable. 3695 It explains that the large maximum capacity for the use of 9,000 cubic feet per second flow is not designed to be used currently, but only as a potential reserve for temporary emergencies. The defendant realizes that by customary day by day operations it cannot use more than the average amount of the water flow, simply because the water will not be there to use; and therefore it must proportion its actual operations to the stream flow, occasionally drawing on the reservoir for the continuance of customary and usual operation, when the water flow in dry periods is abnormally low. The defendant does not deny that in its intended customary daily operation there will be a variable amount of water discharged from the dam, but it does deny that there will be such great variations as are assumed by the plaintiff; and it denies that the variable amount will have any adverse effect on down stream navigability. The defendant's stated position is that it fully realizes that it has no property right in the water as such, and is only entitled to a reasonable use thereof as riparian owner, which must be limited in such way that the rights of other riparian owners on the stream below and above will not be prejudiced. It points out that it will have a very large monetary investment in its project and that it would be economically very unwise and indeed foolish to operate its plant in such a way that the rights of others would be impaired and the defendant subjected to damages therefor; or to operate the plant so that it would be subject to a successful injunction suit for impairment of navigable capacity of downstream waters.

There is no reason to doubt the good faith of the defendant in its position so stated because it expressed its willingness to accept the minor-part license from the Commission containing, among other things, the condition that it as licensee should be liable for all damages occasioned by the operation of the project; and the condition that "whenever the flow at lock No. 2, Kanawha River, falls below 1400 second feet, the Licensee 3696 shall when so directed by the Secretary of War discharge in each 24 hours the natural flow of the river at the dam site during that period up to a discharge of 1150 acre feet. The discharge from the project shall at all times be regulated by such rules and regulations as the Secretary of War may prescribe to prevent undue interference with navigation on the Kanawha River."

The evidence of expert witnesses offered by the plaintiff on this issue was largely based on their assumptions as to the defendant's probable operation of the dam. The contentions in substance are that for considerable periods of time there would be no discharge of water from the dam in consequence of which the volume of water flow in the Kanawha and Ohio Rivers would be seriously diminished; and the discharge of water from the dam when made would be in such large quantities as to form block waves of 9,000 cubic feet per second which would cause much increased velocity of current in the Kanawha and fluctuations and oscillations of the water level which would impair its navigability. These contentions are refuted in the testimony of a number of witnesses for the defendant who were competent and experienced engineers in the construction and operation of hydro-electric plants. In this connection it is to be noted that the distance on the river from the Radford Dam to the head of navigation in the Kanawha is approximately 160 miles on a tortuous river coarse interspersed with numerous rugged ledges; and there is a recently constructed power dam at Hawks Nest on the New River a few miles up-stream from the Kanawha [24] which would naturally absorb any "power waves" from the Radford plant that remained after their 150 mile journey from Radford. In addition the government has recently constructed three large navigation and power dams on the Kanawha River known as the London, Marmet & Winfield Dams, with another now under construction at Gallipolis, Ohio, equipped with locks for 3697 navigation, as a result of which the Kanawha River is fully "canalized", that is, consists of a series of pools between the dams affording approximately uniform depth of water for navigation. These dams also have large power capacity and are operated under lease from the government by private interests. They directly discharge water consumed by power operations into the respective pools. There is also evidence to the effect that there is an abundant supply of water from tributaries of the New River and Kanawha River below Radford to supply any loss or waste of water in the pools of the Kanawha caused by the operation of the locks or otherwise. The purpose of the navigation dams on the Kanawha is to maintain an approximately uniform level of water. In these circumstances the district judge found that it was highly improbable that any operation of the Radford Dam would or could impair the navigability of the Kanawha and Ohio Rivers.

---

[24] See United States v. West Virginia, 295 U. S. 463.

There is still another factor to be considered in this connection, relating to the government's project for the Bluestone Dam in the New River without locks, approximately 150 feet high. The dead storage will rise about 66 feet, with 49 additional feet of useable draft water, leaving 35 feet to be reserved for freshets and flood control. The storage capacity is to be 245,000 acre-feet, about two and one-half times greater than the Radford Dam (85 miles up-stream), and the Bluestone Dam is to have a maximum hydraulic capacity of about 11,000 cubic feet per second. The primary purpose of this dam is for flood control with incidental power production. It seems quite evident that this Bluestone flood control project will remove any possibility of any impairment of navigable capacity of the Kanawha from the operation of the Radford Dam if the latter were otherwise possible.

It will also be recalled that in his report of December 29, 1925 to the Power Commission, Gen. Taylor, then Chief Engineer of the War Department, after reviewing the data upon the subject, said:

3698 "Therefore, so far as can be predicted from available data and records it would not be possible to operate the proposed project so as to adversely affect navigation on the Kanawha River under the existing project.

"I, therefore, report that in my opinion New River in its present condition is not a navigable stream and that navigation on the Kanawha River will not be adversely affected by the proposed power development."

The Commission apparently rejected Gen. Taylor's opinion as to the effect on the Kanawha River, although it does not clearly appear what other evidence it had before it on the subject, except possibly the report as to the effect of waves from power dams on certain California rivers (which was determined to be inadmissible in the district court for lack of proof as to similarity of conditions).

On this and other evidence too detailed to elaborate here, the district judge found that there would be no reasonable likelihood of adverse effect on the navigability of the Kanawha or other navigable waters of the United States; and we find no sufficient reason in the case to conclude that he was wrong in this finding. On this issue the plaintiff had the burden of proof to establish its contention that the operation of the Radford Dam would affect the navigable capacity of down-stream navigable waters. The leading case on this point is United States v. Rio Grande Dam & Irrigation Co., 174 U. S. 690. The suit there was to enjoin the defendant company from constructing a dam across the Rio Grande River in New Mexico at a point where the river was not navigable, but it was alleged the maintenance of the dam would impair the capacity of the down-stream river where it was navigable. The government's case was based on section 10 of the Rivers and Harbors Act of September 19, 1890 (later somewhat amended by the 1899 Act on which this present suit is based). The Supreme Court said:

> "Of course, when such proceedings are instituted it
> 3699 becomes a question of fact whether the act sought to be enjoined is one which fairly and directly tends to obstruct (that is, interfere with or diminish) the navigable capacity of a stream. It does not follow that the courts would be justified in sustaining any proceeding by the Attorney General to restrain any appropriation of the upper waters of a navigable stream. The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact."

The plaintiff was not entitled to the injunction in this case unless it established an existing or presently threatened impairment of navigable capacity of the Kanawha; and where the defendant in such a case evidently in good faith denies any intention to commit an injury, the plaintiff must show that the injury sought to be avoided by the injunction will be necessarily or practically certain, and not merely the probable, result of the acts whether intended or not. Connecticut v. Massachusetts, 282 U. S. 660, 674; Missouri v. Illinois, 180 U. S. 208, 248; Blease v. Transit Co., 4 Cir. 50 F. 2d. 852, 856; Mayer v. Somerville Water Co., 82 N. J. Eq. 572; Pennsylvania v. Sun Co., 290 Pa. 404, 413.

The plaintiff also contends that even if there would be no impairment of the navigable capacity of the Kanawha, nevertheless it is entitled to the injunction because there will be an impairment of interstate navigation between Glenlyn on the New River in Virginia, and Hinton in West Virginia. We are not impressed by this contention. Glenlyn is about five miles upstream from the Virginia-West Virginia line. In 1912 it had a population of only 500. The railroad along the river reached Glenlyn in 1883. There is no present navigation of the river between Glenlyn and Hinton and there has been none for probably 25 years. It is said that there was considerable keelboat navigation of the river between Glenlyn and Hinton in previous 3700 years; but we are disposed to believe from the evidence that this is an overstatement. There are serious obstacles to navigation on the river between Glenlyn and the state line, including Shumate's Falls and Wylie's Falls at or near the state line. Probably any substantial transportation on the river in earlier times was from Round Bottom, below these difficult rapids, to Hinton. The federal improvement work never reached upstream to Glenlyn but stopped four or five miles below it. A light draft steamer built at Hinton was unable to get upstream more than about 15 miles. In 1930 the District Engineer of the War Department reported that the New River was not navigable at Glenlyn. In these circumstances, it would not be justifiable to issue an injunction to restrain an obstruction to the purely theoretical navigation of New River between Glenlyn and Hinton, especially where there is no satisfactory proof that the operation of the defendant's dam will in fact impair even possibly existing present capacity for navigation, and where there is no likelihood of future navigable use of the river. Of course if the defendant's dam is so operated in the future as to impair navigation, if any at that point, it may well be proper then for the courts to intervene. It is also again significant here that the government's Bluestone Dam will destroy any possibility of navigation from Glenlyn to Hinton.

There is also a contention by the plaintiff that the Radford Dam may in some way impair the efficiency of the Bluestone Dam for flood control, and thus operate prejudicially on navigation of the lower river. The district judge considered and rejected this contention as based on insufficient evidence, and we find no good reason to reach a contrary conclusion. It would seem the Radford Dam would be a help rather than a hindrance in this respect; and if not an injunction may later be appropriate.

The effect of the Federal Power Act on the case. 3701 While nearly all of the evidence related to the two issues above discussed, the major part of the legal argument in this case has revolved around the proper construction and application of the Federal Water Power Act of 1920, and as amended in 1935. It is contended by general and special counsel for the Power Commission that even if New River at Radford is not navigable waters of the United States, and the operation of the dam will have no adverse effect on the navigable capacity of down-stream waters, nevertheless the defendant must be enjoined from constructing the dam because it has not obtained a license from the Power Commission. It is argued that the Power Act is an exercise by Congress of a much wider jurisdiction over streams than was asserted by the Rivers and Harbors Acts of 1890 and 1899; and that in the Power Act Congress has given the Commission jurisdiction to prevent, except by its license granted on the conditions specified by the Commission, the erection of any bridge, dam or other structure on rivers and streams, whether navigable or not, where the interests of interstate commerce are concerned, whether they relate to navigation or not. In connection with this view it is said in the briefs "Thus the primary purpose of the legislation was the control of water power development, not of navigation." This argument is based upon the language of section 23 of the Act of 1920. But before examining this contention we notice two preliminary points based on the Act.

In the first place, it is argued that in this proceeding the findings of the Commission with respect to navigability and the effect of the dam on navigability, and on interstate commerce, are conclusive if supported by substantial evidence, which is asserted to be the case here. It is not disputed that the case can be judicially considered de novo, but it is said that the ordinary rule that findings of an administrative tribunal must be accepted, if supported by substantial evidence, must control the decision here on the facts. In our view this contention is not applicable 3702 to the present case. Section 23 does not provide for a "hearing" by the Commission when a declaration of intention to build a dam is filed, but only for an "investigation" by the Commission. Nor does the Act provide for any judicial review of the findings made. Nor is this case a statutory proceeding by way of appeal from or review of the Commission's action. Assuming that the finding of the Commission is a relevant fact for the consideration of the court, and that it is entitled to careful and respectful consideration as the opinion of a body informed by experience, nevertheless it cannot properly be regarded as controlling judicial determination on the record in the case. Clearly the decision of the district court involved a constitutional question of the jurisdiction of the Commission in relation to the distribution of state and federal power, and of riparian property rights of the defendant. This, we understand, is not disputed so far as the action of the district court was invoked under the Rivers and Harbors Act; and it seems equally clear that the same must be true with respect to any jurisdiction of the Commission in this case. In that view it is clear that the district judge was required to determine the question of fact de novo on the record made at the trial before him. Crowell v. Benson, 285 U. S. 58, 59; St. Joseph's Stock Yards Co., v. United States, 298 U. S. 38, 51; B. and O. R. R. Co. v. United States, 298 U S. 349, 364.

It is also suggested that the defendant is estopped to question the findings of the Commission because it submitted itself to the action of the Commission in requesting a finding that the Commission was without jurisdiction and in applying for a minor-part license; but we do not think this view is tenable as the United States has in no way been prejudiced thereby, and the defendant throughout has clearly enough stated its legal position to the effect that the Commission did not have jurisdiction. There can be no proper waiver of constitutional rights in such a situation; nor do we think it was the intention of
3703 Congress that there should be; Buck v. Kuykendall, 267
U. S. 307, 316, 317; Ashwander v. T. V. A., 297 U. S. 288; nor do we think that Standard Oil Co. v. United States, 283 U. S. 235 (cited by the plaintiff), relating to the election of remedies under the Interstate Commerce Act by a shipper, is applicable here.

If the public hearing granted by the Commission in 1926 and above referred to is to be regarded as a hearing in the sense of due process, and therefore the defendant is to be affected by the finding of the Commission that the interests of interstate commerce would be affected by the dam, we could hardly conclude that the finding was based on substantial evidence, in view of the fact that the only evidence then introduced was the report the opinion of Gen. Taylor to the contrary. At the hearing counsel for the defendant inquired whether further or other evidence was to be considered by the Commission and if so, indicated his desire to be informed of it. Nothing was then said to indicate that the Commission desired or would consider other evidence. It is now said by counsel for the Commission that it did have available, and must have considered other information upon the subject to be found in various official reports, public documents, and Acts of Congress, many of which were offered in evidence by the plaintiff in this case.[25] But as these matters were not brought to the attention of the Company at the hearing, it is not perceived how they could be regarded as evidence affecting it in the sense of due process. Interstate Commerce Commission v. Louisville & Nashville Railroad Co., 227 U. S. 88, 91; Morgan v. United States, 304 U. S. 1, 14, 15, 19. For the

---

[25] It is also pointed out that the Commission had 21 affidavits filed by the Dam Company tending to support non-navigability; and certain protests filed by individuals. These do not seem to affect the matter.

same reasons we do not think that the subsequent declaration or finding of the Commission on October 12, 1932, can be regarded
as in any way affecting the rights of the defendant, be-
3704 cause it was made ex parte without notice or hearing. It
is not meant to suggest that the Commission at any time intentionally proceeded arbitrarily, or without proper regard to the rights of the Dam Company, or that its proceeding was inappropriate to the "investigation" directed by the Act; but only that its finding, to the extent based on information obtained informally and ex parte, and not brought out at the notified hearing where it would be subject to cross-examination and possible refutation, cannot properly be considered as consistent with due process, if sought to be made conclusive on the defendant. The reasonable assumption would seem to be that the procedure followed was adopted as appropriate to an "investigation" by the Commission, rather than a "hearing" with the legal implications thereof. See Norwegian Nitrogen Company v. United States, 288 U. S. 294, 317.

Attention is called to the definition of navigable waters contained in section 3 (16 U. S. C. s. 796) of the Water Power Act.[26] It is apparently not contended that the definition expands the scope of the term beyond the previous judicial decisions applying it under the Rivers and Harbors Act and in other cases (Alabama Power Co. v. Gulf Power Co., 283 F. 606, 614); but it is said that the statutory definition has crystallized the judicial definition on three points, of which one is said to be particularly applicable here—that is, that navigability should be determined in reference to the stream in its actual condition,
whether "natural or improved". The observation is then
3705 made that the district judge in his opinion apparently im-
plied that the federal improvements on New River were not to be considered in determining its navigability. But we do not understand the opinion to proceed on that basis.

We come now to the Commission's present construction of section 23 of the Water Power Act of 1920 which reads:

"Projects not affecting navigable water; necessity for Federal license. Any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined in this chapter as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States, may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this chapter. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream in compliance with State laws."

---

[26] "'Navigable waters' means those parts of streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States, and which either in their natural or improved condition, notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage, are used or suitable for use for the transportation of persons or property in interstate or foreign commerce, including therein all such interrupting falls, shallows, or rapids; together with such other parts of streams as shall have been authorized by Congress for improvement by United States or shall have been recommended to Congress for such improvement after investigation under its authority."

We have italicized the clause on which the construction is based. The view contended for is that this clause, as a part of the whole section, gives the Commission jurisdiction over dams proposed to be constructed on nonnavigable waters, irrespective of the effect of the dam on navigable waters of the United States, whenever the Commission finds after investigation that "the interests of interstate or foreign commerce would be affected by such proposed construction;" that is to say, if the dam is to be constructed
3706 in a stream not a navigable water of the United States
and will have no effect on navigation, nevertheless it may not be constructed without a license from the Commission if it will affect interstate commerce in some other way not related to navigation. Specific application of this construction is given to the instant case in the contention that although New River at Radford is found to be not navigable waters of the United States and the dam will not affect down-stream navigable capacity, nevertheless the Radford Dam may not be constructed without a license from the Commission because (1) the river at or above Radford has years heretofore been used for keelboat transportation of goods for delivery to the railroad at Radford for carriage in interstate commerce and might possibly be similarly used hereafter, and (2) the dam is intended to transmit electric power outside of Virginia. The construction flows from the general view of the purpose of the Act expressed by counsel for the Commission in their brief when they say: "Thus the primary purpose of the legislation was the control of water power development, not of navigation". We do not think this broad construction of the Act based on the interstate commerce power, to the

extent that it is dissociated from navigation, is tenable either on the basis of statutory construction or constitutional authority. Alabama Power Co. v. Gulf Power Co., 283 F. 606, 613.

As a matter of statutory construction. It will be noted that the section leaves it optional with the proponent of the project to apply to the Commission for a determination. On the plaintiff's construction we have therefore the following possible divergent results dependent upon whether the option is exercised or not. Where the option is not exercised and the Commission is not consulted (and therefore makes no finding as to interstate commerce) the remedy of the United States is to bring an injunction proceeding to abate the dam, in which event it will be necessary for the government to show either that the river is
3707 navigable water of the United States or the dam would affect navigable capacity. But in the event the project owner elects to consult the Commission upon the subject and it finds that interstate commerce would be affected in some way not related to navigation, then the government could successfully maintain the injunction suit on the basis of the Commission's finding alone without proof of the effect of the project on navigation.

But apart from this, a reading of the Water Power Act of 1920 as a whole indicates that it was intended to assert control (where federal property was not concerned) only where the interests of navigation, as an incident of interstate commerce, were affected.[27] (See New Jersey v. Sargent, 269 U. S. 328, 336). Prior to the Water Power Act we are not aware of a successful assertion of authority by Congress over non-navigable waters within a state, (not involving public property of the United States) except where the interests of interstate commerce flowing from navigation were concerned. This was the extent of authority indicated in the Rio Grande case, supra.[28] Over navigable waters of the United States Congress directly has juris-

---

[27] The title to the Act reads "An Act to create a Federal Power Commission; to provide for the improvement of navigation; the development of water power; the use of the public lands in relation thereto, and to repeal section 18 of the River and Harbor Appropriation Act, approved August 8, 1917, and for other purposes." Section 18 of the Act of 1917 (Ch. 49, 40 Stat. 269) repealed by the Water Power Act had created the Water Ways Commission to formulate plans to develop water resources for navigation, etc., and, among other things, to investigate "questions relating to the development, improvement, regulation, and *control of navigation as a part of interstate and foreign commerce,* including therein", etc. [Italic supplied.]

[28] It may be noted that that case arose under section 10 of the Rivers and Harbors Act of 1890 which prohibits "the creation of any obstruction, not affirmatively authorized by law, to the navigable capacity of *any waters in respect of which the United States has jurisdiction.*" In the 1899 Act the wording was slightly changed to read "the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the *waters of the United States* is hereby prohibited." [Italic supplied.]

3708 diction to prevent obstructions to navigation: but over non-navigable waters within a state, where the riparian rights are not owned by the government itself, the only authority or jurisdiction of Congress flows from the interstate commerce power which, with respect to rivers and streams as such, is limited to the protection of navigation of other streams. Beyond this federal control over non-navigable streams is the same as, but no greater than, over state highways on land not usable in interstate transportation.

Section 4 (d) of the 1920 Act authorized the Commission to issue licenses for the purpose of constructing, operating and maintaining dams, etc.,

"necessary or convenient for the development and improvement of navigation, and for the development, transmission, and utilization of power across, along, from or in any of the navigable waters of the United States, or upon any part of the public lands and reservations of the United States (including Territories), or for the purpose of utilizing the surplus water or water power from any Government dam, except as herein provided: * * * Provided, further, that no license affecting the navigable capacity of any navigable waters of the United States shall be issued until the plans of the dam or other structure affecting navigation have been approved by the Chief of Engineers and the Secretary of War. Whenever the contemplated improvement is, in the judgment of the commission, desirable and justified in the public interest for the purpose of improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, a finding to that effect shall be made by the commission and shall become a part of the records of the Commission." (Italics supplied).[29]

Section 11 provides for the inclusion of conditions to promote navigation where the dam is constructed "in any of the navigable waters of the United States." Section 18 provides for the
3709 operation of navigation facilities constructed in connection with licensed dams. Apart from section 23 the provisions of the Act, relating to the authority over the construction of power dams, seems to be clearly based on the interstate commerce power with respect to navigation. Section 23 was added as amendment 58 in the course of a long legislative history; and its wording and punctuation may be lacking in entire clarity, but it seems quite unlikely that in this merely permissive amendment it was the intention of Congress to confer on the Commission jurisdiction over streams in matters affecting interstate com-

---

[29] Some of the wording was changed by the 1935 amendment, and the section became 4 (e) of the new Act. See 49 Stat. 840; 16 U. S. C., s. 797 (e).

merce but not related to navigation, especially as Congress had not previously asserted such a power.

It is contended that the 1935 amendment to section 23 supports the construction contended for. The only change in the comparable part of the section was to make the filing of the declaration obligatory instead of optional. The wording of the clause on which the construction contended for is based was not changed. We do not attach the significance to the amendment that is claimed for it. Nor do we think it should be given a retroactive effect. It was passed after the institution of this suit and more than a year after the beginning of the construction of the dam.

The construction now put upon section 23 by counsel for the Commission seems to be much broader than that advanced in the district court. There it seems to have been limited to the contention that the Commission had jurisdiction over nonnavigable streams only where the proposed structure would affect the navigable capacity of the river down-stream, that is in this case the Kanawha. After extended consideration the district judge reached the conclusion that the effect of the section was only to provide a convenient method of determining, in advance of the construction of the dam, the status of a stream of doubtful navigability; and that the Commission had no jurisdiction over nonnavigable streams. The opinion referred at some length
3710 to the legislative history of the section when offered as
amendment 58, and also to early expressions of the Commission shortly after its first organization, in support of that view. We take a partly different view of the effect of the section with respect to nonnavigable streams.

The wording of section 23 which requires application, rather than construction, is "any stream * * * over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several states". It is clear that the Commission is given authority by this section only over a stream "over which Congress has jurisdiction" under the interstate commerce power. We think this modifying clause has no uncertainty of meaning in view of the legal history of the subject matter. Over what streams does Congress have jurisdiction by virtue of the interstate commerce power? Ever since Gibbons v. Ogden and The Daniel Ball, supra, it has been clearly understood that Congress does have such jurisdiction over interstate navigable waters; and by section 10 of the Rivers and Harbors Act of 1890 (26 Stat. 454) this jurisdiction was logically and properly extended to nonnavigable rivers which were tributaries of navigable interstate rivers to the extent that "the creation of any obstruction, not affirmatively authorized by law, to

the navigable capacity of *any waters in respect of which the United States has jurisdiction*" is prohibited. In the 1899 Act (30 Stat. 1151) on the same subject the wording of the underscored phrase was slightly changed to read "the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of *any of the waters of the United States* is hereby prohibited". [Italics supplied.] Section 9 of the Rivers and Harbors Act of 1899 also provided that dams and certain other structures should not be constructed in any "navigable river, or other navigable water of the United States" until the consent of Congress has been obtained and the plans approved by the Chief of Engineers and by the Secretary of War. It
3711 will thus be noted that prior to the Water Power Act of 1920 Congress had asserted jurisdiction over interstate navigable waters, and also over streams tributary thereto, to the extent mentioned, by prohibiting any structures in interstate navigable waters and in non-navigable tributaries, if the latter affected navigable capacity of interstate navigable waters, unless the consent of Congress was first obtained. One of the purposes of the Water Power Act was to authorize the Commission to license dams in navigable waters of the United States in lieu of an Act of Congress; and in our opinion one of the purposes of section 23, which was an amendment to the original Act, was to likewise take care of the case of a proposed structure in a non-navigable tributary of an interstate navigable stream. Before the Water Power Act it was not safe to construct a dam in a non-navigable stream, where there was any doubt whether navigable capacity of down-stream waters might be affected, without an Act of Congress; and section 23 was added to the Act to provide a convenient administrative procedure to determine this doubt from the standpoint of the government, so that the project owner would know the position of the government in the matter. If the Commission found that interstate commerce would not be affected in the respect mentioned, then the project owner was permitted by the section to proceed without a license; but if the Commission found otherwise, then the stated position of the government was that he could not proceed without a license and if he did so it was at the risk of being enjoined. But as the authority of the government to forbid the structure was necessarily dependent upon the fact that it would impair navigation, the government could succeed in the suit only on proof of that fact de novo, as it is a jurisdictional requisite to the power to control the use of private property without compensation.

In their briefs counsel for the Commission have now called to our attention certain earlier legislative history

3712 of the Act in support of their contention that the proper construction of section 23 was to give the Commission full jurisdiction with respect to both navigable and nonnavigable streams wherever any interests of interstate commerce would be affected; but we are not persuaded that this earlier history tends to support that view. The Water Power Act had a long and interesting legislative history in the course of which many amendments were proposed which reflected diverse views upon the subject, and we do not think it would be a safe basis for interpretation of the final form of section 23 to impress upon it argumentative inferences from numerous former amendments.

The broad construction of the section now contended for runs counter to established legal principles. Where the interests of navigation are not involved (and where the United States does not itself possess property rights) the control of the use of the flowing water and the rights therein of riparian owners are subject to the laws of the several states. In this case under the laws of Virginia the defendant Company has the full riparian rights of ownership including the right to the reasonable use of the waters flowing past its land for the development of power, and has a license from the State of Virginia to construct and operate the dam under its general Act for the development of water power resources of the State. If the river were federally navigable the rights of the riparian owners would of course be fully subject to the federal servitude in the interests of navigation; but the riparian owner on a non-navigable stream is entitled to reasonable use of the flowing waters (not impairing downstream navigable capacity) subject to no easement in favor of navigation; and this is a property right which cannot be taken from him without just compensation. United States v. Cress, 243 U. S. 316; Carpenter v. Gold, 88 Va. 551; United States v. River Rouge, 269 U. S. 411, 418; Lynchburg v. Mitchell, 114 Va. 3713 229; Holyoke Co. v. Lyman, 15 Wall. 505, 506. The power of Congress over interstate commerce is, of course, plenary, and private property may be taken for a public use in connection therewith; but only subject to the just compensation provided for in the 5th Amendment; and to prohibit the defendant company from the exercise of its riparian rights in the case, where no interests of navigation are involved, would seem to be a taking of private property without due process required by that Amendment. While Congress may impair the effectiveness of executory contracts which interfere with the exercise of the interstate commerce power, we are not aware of any authority which would justify the taking of private property without just compensation as an exercise of the regulation of commerce. Radio Comm. v. Nelson Bros., 289 U. S. 266, 282; Virginian Ry.

v. Federation, 300 U. S. 515, 558; Interstate Commerce Commission v. Oregon-Washington R. Co., 288 U. S. 15, 41; Monongahela Nav. Co. v. United States, 148 U. S. 312, 336.

We therefore cannot adopt the plaintiff's construction of section 23 that the Commission has jurisdiction over non-navigable streams under the interstate commerce clause irrespective of the interests of navigation. It is argued that if the river in the vicinity of Radford is locally navigable (even though not navigable interstate) and if goods can be carried on the river there to the railroad for further carriage in interstate commerce, then Congress has the power to regulate the river as an instrumentality of interstate commerce. As there is no such commerce on the river, and has been none for many years, with no likelihood of any in the future, the contention seems only theoretical. But apart from this the proposition is not sound in our opinion. We know of no authority to support it, and it runs counter to the established principles above stated. If the river is not navigable interstate, its control and use (except that down-stream navigability of other waters of the United States may not be impaired), is subject to the laws of the State, and not of 3714 the federal government. If it can be assumed that the suggested possibility of keelboat use of the river would be of sufficient importance to be worthy of regulation by Congress as a part of interstate commerce, and therefore the keelboats themselves and the rates charged by them, could be subjected to federal regulation as in the case of the railroads, it does not follow that the use of the river, which is subject to state laws and control, could likewise be so regulated. Congress could of course purchase or condemn the river or riparian rights thereon and convert it into a highway for or instrumentality of interstate commerce, but only upon payment of just compensation. To prohibit the use of the river for a dam or other purpose lawful under state laws, irrespective of navigation, would be taking property without compensation. The Daniel Ball, 10 Wall. 557, 562 (supra), is referred to in support of the plaintiff's contention, but we do not so read it. There a vessel was held subject to the navigation laws requiring a license, because she was operated on a navigable river of the United States within the definition then given and always since followed. It was held no defense that she did not herself ply interstate when her carriage was of goods destined for interstate transportation in connection with railroads. So here it may be assumed that Congress could validly require the keelboats to be licensed; but that is quite a different proposition from asserting federal control over state waters and denying the exercise of property rights thereon without compensation.

The construction now contended for by the Commission will obviously have a very important effect on the rights of the States of Virginia and West Virginia. Both states by their respective Attorneys General have filed briefs as amici curiae in opposition thereto. The question is of great importance to them because it is said that there are many non-navigable mountain streams in the two states which though useless for purposes of navigation are of great value in the development of hydro-electric 3715 power; and both states years ago legislated upon the subject of water power development.[30] The statutes of both states have provisions generally similar to the conditions in the federal statute with respect to rates and "recapture" at the end of a fifty-year license period. Both states contend that with respect to such matters they have full power and control as internal affairs of the state reserved to them under the 10th Amendment. Reduced to simplest form, the vital question is whether the states or the national government ultimately are entitled to become the owner of these hydro-electric power plants on nonnavigable waters. Both states take the position that New River is not navigable, either in Virginia or West Virginia, and both deny that the Federal Power Commission has any constitutional authority to impose its regulatory license on the Radford Dam or any other dam on the New River. In the brief for the State of Virginia the seriousness of the Commission's contention as it affects the State is stated as follows:

> "The Federal Power Act, if construed as contended for by the appellant, amounts to a virtual prohibition of the development of Virginia's water powers by private investors, as well as by the State itself."

And it is further pointed out that the mere construction of the plant and the generation of electricity therein does not of itself constitute interstate commerce, but is within the local control of the State. Utah Power & Light Co. v. Pfost, 286 U. S. 165, 181.

Both States contend, as does also the defendant in this case, that whether the river is navigable or not, the conditions of the license not related to navigation cannot validly be imposed by the Commission because they relate to matters within the 3716 control of the State. The Supreme Court has not yet passed upon this question arising under this important federal Act, although it was apparently raised in two cases which have been dismissed for want of jurisdiction. United States v. West Virginia, 295 U. S. 463; New Jersey v. Sargent, 269 U. S.

---

[30] See Michie's Code of Virginia, 1936, ss. 3581 (1 to 16); West Virginia Acts of 1915, Ch. 17.

328.[31] As we think the district judge correctly found that New River was not navigable, it is unnecessary to determine that question here. There is no challenge in this case to the full power of the United States to impose such conditions with respect to dams erected in streams over which it has full property jurisdiction; nor is there any question in this case as to the right of a State to impose such conditions with respect to hydro-electric plants erected under its authority. Fox River Paper Co. v. Railroad Comm. of Wisconsin, 274 U. S. 651.

With respect to federally navigable waters the regulatory authority of Congress is plenary; but with respect to non-navigable waters, where a structure therein may prejudicially affect other navigable waters, the power of Congress is protective and preventive rather than directly regulatory; and in the latter case, as between the federal and state governments we are of the opinion that the Power Commission has no valid authority to impose conditions which in effect give the ultimate right of ownership of hydroelectric projects in state waters to the United States and thus take it from the state. If the United States wishes to acquire the property for a proper federal purpose, it must pay just compensation therefor. Of course when the electric power locally produced is transmitted in interstate commerce it comes within the proper field of control of the federal government under the interstate commerce power, with
3717 respect to which Congress has recently very fully legislated in the Federal Power Act of August 26, 1935, 49 Stat. 853, now codified as Parts 2 and 3, ss. 824, et seq. of 16 U. S. C.

It is apparent that the issues of law and fact in this case have taken a much wider range than the essential controversy between the Commission and the Company. There is obviously no real dispute between the parties as to the construction of the dam itself as affecting navigation. The plans for the structure have been approved from the standpoint of navigation; and with respect to possible effect on navigation from operations of the dam, the Company expressed its willingness to accept a license which subjected it to all proper conditions affecting navigation. Whether the Company operates a dam under a license with such conditions or without a license is of no great important with respect to the actual operation of the dam because, as a matter of law, it must be operated with due observance of the rights of other riparian owners on the stream, and also in a way that will not prejudice navigable capacity of other down-stream waters; and if the Company fails at any time in its duties in this respect, the government as well as other riparian owners would be clearly entitled to appropriate injunctive relief. The only dispute between the parties was as to the power of the Commission to insist on financial and economic conditions which had no relation to navigation.

---

[31] The Water Power Act was held constitutional as an act for improvement of navigation in Alabama Power Co. v. Gulf Power Co., 283 F. 606 (D. C. Al[illegible]; and in Missouri v. Union El. L. & P. Co., 42 F. 2d. 692 (D. C. Mo.); see also Henry Ford & Son, Inc., v. Little Falls Fibre Co., 280 U. S. 369; United States v. Central Stockholders, etc., 43 F. 2d. 977 (D. C. Calif.).

In these circumstances the court is asked to issue an injunction on the theory of protecting a navigation which the action of the government clearly shows needs no such protection. It appears the dam is now nearing completion. The alternative prayer of the bill is for a mandatory injunction to require the removal of the dam, which is obviously not really desired by anybody. The only practical effect of the issuance of the injunction at this time would be to force the defendant Company, in lieu of removal of the dam, to accept a license with conditions as to property rights which, under the facts of the case, are properly 3718 subject to the regulatory laws of the State and not of the federal government. The issuance of an injunction by a court of equity is an extraordinary remedy which should not be granted when, under all the circumstances of the case, it would seem inequitable to do so.

We conclude, therefore, that the judgment in this case must be Affirmed.

Dissenting opinion

Parker, Circuit Judge, Dissenting:

This suit was instituted by the United States, under the provisions of the Rivers and Harbors Act and the Federal Power Act, to enjoin the erection and operation of a power dam in New River near Radford, Virginia, otherwise than under a license from the Federal Power Commission. The defendant is constructing at the site mentioned one of the thirty water power plants in this country of exceeding 100,000 horse power. In 1925, the New River Development Co., the predecessor of defendant, filed with the Commission "declaration of intention" to construct the dam, pursuant to sec. 23 of the Federal Water Power Act (16 U. S. C. A. 817). In 1926, defendant, having acquired the property of the New River Development Company and taken an assignment of the "declaration of intention," applied to the Commission for a license under the act authorizing the construction of the project. In 1927, the Commission, having made an investigation, found that New River in the part involved was not "navigable waters" within the definition of the Water Power

Act, but that "the interests of interstate or foreign commerce" would be affected by the construction, and thereupon tendered defendant a standard or major form license in accordance with
the provisions of the act (16 U. S. C. A. 803). This license
3719 defendant refused to accept. In 1930, defendant requested
the Commission to reconsider its action taken in 1927 and to disclaim jurisdiction over the proposed development or, alternatively, to issue a "minor part" license pursuant to sec. 10 (i) of the act. In 1931, this request of defendant was denied, a standard form license was tendered and it was ordered that defendant not proceed with construction until it should have received and accepted such license. In 1932, the Commission re-examined the question of the navigability of New River and found it to be navigable from Wilson's Creek north, which includes the site of the proposed dam.

Defendant sued the members of the Commission to enjoin the enforcement of the provisions of the Water Power Act with respect to the project, but we held that the District Court was without jurisdiction to entertain that suit. Appalachian Electric Power Co. v. Smith, 4 Cir. 67 F. 2d 451. Defendant then began the construction of the dam and this suit was instituted by the United States to enjoin its construction or operation without the acceptance of the license which the Power Commission had tendered. The court below held that the New River was not navigable; that the erection and operation of the dam would not impair the navigable capacity of other waters; and that, even if the latter were not the case, no license is required under the act for the erection of a dam in waters which are not navigable. The bill of complaint was accordingly dismissed; and the United States has appealed.

There has been much argument as to the proper interpretation of the Federal Power Act as to construction of this character; but I think that the meaning of the act is clear. Prior to the passage of the act, the Rivers and Harbors Acts of 1890 and 1899, 26 Stat. 454 and 39 Stat. 1151 (33 U. S. C. A. 401 et seq.) forbade the construction, without the consent of Congress, of any bridge, dam, etc., in any navigable water of the United States or the creation of any obstruction to the navigable capacity of
the waters of the United States. In United States v. Rio
3720 Grande Dam and Irrigation Company, 174 U. S. 690, it was
held that the construction of a dam in a non-navigable portion of a river which would interfere with the navigable capacity of the navigable portion was forbidden by this legislation and that for that reason the construction of such a dam would be enjoined in a suit by the United States. One of the purposes

of the Federal Water Power Act of 1920, as amended by the Federal Power Act of 1935, was to clothe the Federal Power Commission with authority to grant licenses for the construction of dams which could not be constructed under existing law without the authority of Congress. As to dams in navigable waters, authority was granted by sec. 4 (d) of the act. There still remained, however, the obstruction to navigable capacity which might arise from construction in nonnavigable streams, and which was forbidden by sec. 10 of the Rivers and Harbors Act; and to take care of this situation the following provision was inserted in section 23 of the Act of 1920, viz:

"That any person, association, corporation, State or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several states, may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this Act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws."

3721 The purpose of this was to give any person about to construct a dam or other project in a nonnavigable stream opportunity to have determined, in advance of construction, the question as to whether such project would affect the interests of interstate or foreign commerce. If so, a license would be granted, as in the case of a project constructed in navigable waters. If not, the project might be constructed without license. As the power of the United States to forbid such construction in any case arises from the power to prevent the obstruction of navigable waters which are highways of commerce, the finding that the interests of interstate or foreign commerce will or will not be affected necessarily means that the structure will or will not impair the navigable capacity of any navigable waters in such way as to affect such commerce. The impairment of a theoretical navigable capacity would not constitute a basis for requiring a license if the interests of commerce were not affected; but the interests of commerce would be affected within the meaning of the act if there were an impairment of navigable capacity which would affect commerce. The amendment of this section made by the Act of 1935, instead of leaving the declaration of intention optional, requires that it be filed in all cases where the construction, while in a nonnavigable stream, will affect the interests of interstate or foreign commerce by its effect on the navigability of other waters. One proposing a construction which will have no such effect does not, of course, come within the provisions of the act.

Three questions, therefore, arise for our consideration upon the appeal: (1) whether New River at the site of the proposed construction is a navigable stream; (2) if not, whether the proposed construction will affect the navigability of waters of the United States which are navigable; and (3) whether, in either case, the requirement of the license tendered the defendant is within the power of Congress. I think that all of these questions should be answered in the affirmative.

THE NAVIGABILITY OF NEW RIVER

In considering the navigability of New River, we may disregard the portions above Allisonia, Virginia, and below Hinton, W. Va.; and, as to these portions, it may be assumed that the stream is non-navigable. I think, however, that the 110 mile stretch extending across the Appalachian Plateau from Allisonia to Hinton is clearly shown to be navigable. The 26 mile stretch above Hinton to Wylie's Falls, Va. and the 25 mile stretch above Radford are unquestionably navigable and were so found by the court below. They were improved for purposes of navigation by the federal government in the 1880s; and the evidence shows that they were used for purposes of navigation before as well as after these improvements were made. The intervening stretch between Wylie's Falls and Radford was not used to the same extent; but the evidence shows that substantial use was made of it and the conclusion is justified that it was not used to a greater extent because it was paralleled by a railway which furnished a more desirable means of transportation. The stretches above Hinton and above Radford were used as means of transportation to the railways at those points; but after the Cripple Creek branch of the N. & W. Railway was built in the '80s paralleling the river above Radford, it took the traffic from the river, and even this stretch, which had been improved by the government, was used but little.

The river throughout this 110 mile stretch has an abundance of water. The average stream flow at the site of defendant's project a few miles above Radford is 3,211 cubic feet per second and the

drainage area of the river at this point is 2,400 square miles. River vessels can navigate in water having a rate of flow of 5 or 6 miles per hour, whereas the rate of flow of this river is one mile per hour in the pool water and not exceeding a
3723 maximum of 4.4 miles per hour in the channels of the falls
or rapids. It is true of the unimproved portion of the river between Radford and Wylie's Shoals, as it is of the improved portions, that 85 per cent of the distance consists of pools of a navigable depth of several feet, whereas the rapids or shoals which account for the remainder of the distance are traversed by natural channels, having a minimum depth of approximately two feet even in low water. These channels have been deepened and widened in the stretches above Hinton and Radford to which we have referred. The average slope of the river is approximately four feet per mile throughout this entire distance and is no greater in the unimproved portion than in the portions that have been improved. There are a number of shoals; but the percentage of shoal water is no greater and the obstruction no more formidable between Radford and Wylie's Shoals than in the portions of the river which were improved and which were held navigable by the court below. So far as the natural condition of the river is concerned, therefore, I can see no difference in navigability between the portion between Radford and Wylie's Shoals and the stretches above Hinton and Radford.

There can be no question as to the substantial character of the commerce which was carried down the river over the stretches above Radford and Hinton. The boats used in this commerce were bateaux or keel boats having an average length of 60 feet, a width of 6 to 8 feet and a draft of two feet, and capable of carrying a load of 20,000 to 27,000 pounds. There were 17 of these keel boats operating at one time above Hinton and eight above Radford. Lumber and staves in large quantities were carried down the river for shipment by rail at Hinton and pig iron for shipment at Radford. Operation of steamboats was attempted, but was not successful. As to the intervening stretch, there is abundant evidence of operation of keel boats on it before the building of the railroad from Glen Lyn to Radford.
3724 The witness Anderson testified (469)[32] to moving his father's
household goods down the river from Eggleston Springs to True in 1879. The witness Collins testified (321–6) to trips with his father down the river from Radford to Hinton and of stops on the trips at the Narrows and at Crump's Bottom, also that he had seen cross ties and staves brought by boat from the Narrows to Hinton, and that he had rafted timber and logs down

---

[32] References are to Vol. 2 of appellant's appendix.

the river. The witness Dickenson (420–25) testified as to supplies being carried up the river by boat from Hinton to Shumate's Falls and thence by wagon to Glen Lyn. The witness Flannagan testified that the keel boats plied up and down the river from Hinton to Allisonia (303–6). The witness Helvey testified to grain being carried by boat up the river from the horseshoe to Radford and of the use of boats in the river (458–460). The witness Hoover testified to shipping supplies by boat from Hinton to the camp of the railroad contractors at East River or Glen Lyn (447). The witness Linkous, when a boy and living at Pepper Tunnel below Radford, had seen boats going up and down the river operated by former slaves whose names he remembered. He remembered also selling eggs to the boatmen and their custom of blowing a bugle as they passed (311). The witness Martin who lived at Eggleston testified to working in a boat on the river and carrying it up the river to Radford and selling it (465). The witness Price who lived near Tom's Creek when a boy saw boats going up and down the river loaded with coal, corn, wheat, crated chickens, hogs and produce of all sorts (401–405). The witness Skeen, a Confederate veteran, testified that while camped at the Narrows he saw boats going up and down the river, bringing provisions to the commissary at the Narrows (399). The witness Snidow who lived at Pembroke six miles below Eggleston testified to seeing the boats operating
3725 on the river during the Civil War, and of the management of the boats by a Captain Burke, and of how the boats, 4 or 6 in number, were loaded with grain and sent down the river (364–6). The witness Snodgrass who lived at Eggleston saw boats operated in the river and saw them bring supplies down the river to the railroad contractors (370–3). The witness Snyder saw boats operated between Radford, Eggleston and the Narrows during the Civil War loaded with supplies for the soldiers. He testified also that after the War his father operated a boat, going as far down the river as Hinton (346–50). The witness Webb who lived at the Horse Shoe on New River saw boats going up and down the river and heard the boatmen say that they went as far as Hinton (327). He testified that for several years after the Civil War the barges were operated by hired hands and hauled wheat and lumber (328). The witness Coleman operated a steamboat for six or seven months from Pepper's Ferry to Pepper's Tunnel (306). The witness Jones testified to bringing logs by raft or loose down the river from Narrows to Hinton (378). The witness Medley testified to working in bataux in the river from Hinton to Mercer's salt works and from there to Radford, of bringing fertilizer from Glen Lyn to the salt works, of bringing staves from Wylie's Island, and of moving a man's household

goods up the river to Radford (412–13). The witness Owen testified to carrying the government boats which had been engaged in the river work above Radford down the river to Hinton where they were sold (337). The witness Peters testified to hauling tobacco by boat from Glen Lyn to Hinton for shipment by rail (390). He also testified that he worked on the river in boats for 16 or 18 years, that in the Spring he would go up the river to Glen Lyn to get fertilizer, and that while the N. & W. R. R. was in process of construction he went up nearly every week (385). The witness E. M. Smith testified to working on river boats for 9 years and carrying groceries and other merchandise to Glen Lyn and carrying lumber, staves, tobacco
3726 and tanbark down stream (428). The witness Weiss testified to the operation of one of the keel bottom boats by his brother and of his hauling staves and other things from Glen Lyn to Hinton (331).

The foregoing testimony is not contradicted nor discredited, and I do not understand that the District Judge rejected it. On the contrary he accepted it but failed to appraise it properly, saying: "It is not meant to say that continuous movement of such boats between Hinton and the vicinity of Radford was impossible or did not occur. There is evidence which indicates that it did occur, but there is a vagueness about the extent to which it occurred and indications that such trips were irregular, were attended with difficulty and formed no appreciable part of any commercial transportation which took place on the river." To my mind this testimony establishes beyond question not only the navigable capacity of the river for the purposes of useful commerce, but also that it was in fact navigated and used as a highway of commerce. That a considerable portion of the commerce was interstate in character does not admit of doubt; but, even if this were not true, the use made of the stream shows conclusively that it was capable of serving as a highway for such commerce between Allisonia and Hinton for river boats of light draft, such as were undoubtedly in regular use on the river prior to the coming of the railroads.

The fact that Congress has dealt with this portion of New River as a navigable water of the United States, while not conclusive, is a circumstance of great weight to be considered by the court. U. S. v. Brewer Elliott Mule Co., 249 F. 609, 618. And contemporaneous reports made to Congress show unquestionably the navigable character of the stream. Thus the report of Colonel, then Major, Craighill attached to the report of the Secretary of War in 1873 quotes the following from a report made in 1819 by Moore and Briggs who made a survey

3727 of the river for 54 miles above Hinton under the auspices
of the Board of Public Works of the State of Virginia:

"This is truly a noble river. Notwithstanding it was represented to us as being remarkably low, yet it afforded (July 1819) a superabundance of water for every purpose of internal navigation. The fall in this part of the river, considering the mountainous country it passes through, is comparatively moderate. The principal falls are the Bull Falls, McCaniel's, Anderson's, Wiley's, Neilley's, and Peter's Mountain Falls—none of which have been improved in the least degree, yet we ascended them all with our boat, though in two or three instances with considerable difficulty, after taking out our baggage, stores, &c."

Col. Craighill's report shows that keel boat traffic existed on the river at that time and recommended improvement of the channel for navigation particularly with reference to connection with the intersecting interstate railroads. He states:

"But little has been done in the way of improving the river since the time of Moore and Briggs, though an effort is said to have been made in that direction by the confederate government during the late war. Mr. Hutton states that the keel boats now used draw about 12 inches when two-thirds loaded. By the construction of slight deflectors or dams of rock and brush, both of which materials abound, the volume of the water may be concentrated and the depth over the shoals increased from the present average of about 12 inches to about 2 feet, without too much increase of velocity of current. Some of the falls, which are almost always vertical and of an average height of about 4 feet, could be greatly improved by blasting sluices through them, about 30 feet in width, and of an average length of 50 feet. It is to be observed that the falls have in many cases natural chutes or sluices through them, susceptible, also, of such improvement as that just indicated.

"What has been said above refers to a keel boat naviga-
tion, but the pressure for the improvement of this river
3728 is increased by the development of the railroads which
intersect it and afford the means of rapid transport east
and west for the commodities to be procured along and near the
stream. There is a demand for the steam navigation."

The Hutton report attached to the report of Col. Craighill contains a mile by mile description of the character of the stream from the Lead Mines to Hinton, a distance of 128 miles, and refers in the following terms to the commerce on the river and the extent of the improvement contemplated:

"The present system of transportation on this portion of the river is by keel boats which carry from two to three tons, and are rowed or floated down the river and poled up. An expenditure of $100,000 would greatly ameliorate the condition of the river for this trade, and enable the trips to be made with so much more certainty as to induce a considerable increase of trade."

The report of the Chief of Engineers for the year 1877 showed the existence of keel boat traffic, and that its improvement above Radford (New River Bridge) was for the purpose of facilitating traffic connecting with the interstate railroad which crossed the river at that point. The report states:

"The first appropriation for the work was $15,000, August 14, 1876; but it was not made available until May 1877. As this appropriation was insufficient for a general improvement, it seemed necessary to confine what should be done at present to a limited portion of the river, and to that scheme which involved the least expense, viz, *for the keel boats now in use*, it being the understanding that what is first done in the smaller improvement should be arranged with a view to its utilization and adaptation some future day, when the means provided shall suffice to enter upon the improvement of the river for light steamboats.

"It seemed also expedient that the first portions of 3729 the river treated should be in the vicinity of New River Bridge, in order to facilitate communication of at least a portion of the country through which the river flows with an existing outlet east and west—the Virginia and Tennessee Railroad—which is itself in connection with the whole system of rail and water intercommunication of the country." [Italics supplied.]

The report of the Chief of Engineers for the year 1880 contains the following statement:

"In August, 1878, it was decided to commence work at once on the section of the river immediately above the mouth of Greenbrier, at Hinton, in West Virginia, as the indications of immediate usefulness of the improved river in that section seemed greater than in the section worked over by Captain Cuyler. The operations near Hinton were placed under the supervision of Mr. A. M. Scott, and vigorously continued until near the end of November, 1878. The work was resumed in June, 1879, under Col. William Proctor Smith. The reports of Mr. Scott and Colonel Smith in the annual report for 1879, and hereto appended, give the detailed history of the progress made up to June 30, 1880. A steamboat has been built at Hinton and runs on the river, taking advantage of the improvement as high as it has been carried above that point, about 15 miles. The bateaux have much greater ease in navigation and can carry larger loads."

The work done by the government was in three divisions: the Lower or Greenbrier division, extending 86½ miles from Hinton to Radford, the Middle or New River Bridge division extending 43 miles above Radford, and the Upper or Lead Mines division, extending for 62 miles. The last named division was far above the section of the river with which we are dealing and was the section referred to in the Craighill report recommending abandonment of the work and quoted by the court below. The reports show that on the lower and middle divisions there was substantial traffic, which was increased as a result of the work done. The following statement is contained in a report of 1881:

3730 "On the lower division there are thirteen keel boats and a small side-wheel steamboat, 75 feet long, 10 feet wide, and 3 feet deep, with another 100 feet long and 15 feet wide being built. Four of the keel boats run up to Shumate's Falls, 28 miles, carrying supplies to the New and East River Railroads.

"On the middle division there are eight keel boats and parties are about to build a small tugboat and a light-draught steamboat to carry ores down to New River Bridge.

"The tables following show that of the freight shipped from the stations on the Chesapeake and Ohio Railway, which are outlets to the river on the lower division, 70 per cent is from New River, an increase over 1880 of 36½ percent.

"The shipments from the various stations on the Norfolk and Western Railroad show an increase of 33 per cent. The shipments by river to New River Bridge Station began too late in December for any freight to be sent by rail."

The following is in a report of 1883:

"It has hardly been practicable to accomplish at any one of the very many points needing improvement all that has been desirable, but the worst places have been worked upon to the greatest extent, and efforts thus been made to increase the available navigability of the river over as long stretches as possible, and to increase the facilities for access of the greatest number to the railroads touching the river, and thus connecting with the eastern and western markets districts otherwise much isolated and hitherto dependent on teaming to railroad stations over long and bad roads.

"Should work be resumed, it will be found difficult to collect and organize as efficient a force as that which has been disbanded and necessarily scattered. To replace such a machine takes time and money.

"The number of large boats on the river for carrying freight has increased to twenty-five. The following im-

3731 portant facts are taken from the report of the superintending engineer:

"Of the freight sent from Hinton in 1882, 95 per cent came from New River, an increase over 1881 of 46 per cent.

"Of the freight received at Hinton in 1882, 43 percent went up the river; 24½ percent increase on shipments from Hinton in 1882 over 1881; 9 per cent increase on freight received at Hinton in 1882 over 1881.

* * * * *

"The navigation of the river not being continuous as yet, it is practically a feeder to the railroads which cross it and run along portions of it. It has also been of much use in carrying materials and supplies to the railroads while in process of construction near it. It is probable that when the river is fully improved boats will transport one-third of the products of the fine agricultural country through which it flows, and seven-eighths of those of the mines, exclusive of coal."

To the report of the Secretary of War made in 1913 is appended a report of the District Engineer who investigated the feasibility of further improvement of the river, containing the following statement:

"Above Glen Lynn the river is paralleled most of the way by two railroads, and there is no river commerce. From Hinton to Glen Lyn, a distance of 30 miles, there is some commerce, consisting of lumber, staves, sand, gravel, and also some grain, hay, farm products, and miscellaneous merchandise. No statistics are on hand, but I am informed that the commerce at Hinton amounts to about two railroad carloads per day, and, as Hinton is the only town on this 30-mile section, this is some measure of its amount. This estimate of two carloads a day is thought to be excessive and is believed to be true only at times. In 1883 there were about 17 keel boats in this traffic, and there are said to be 10 or 12 such boats now on the river. These keel boats, as they are called, are the popular boats for this traffic, having an average length of 60 feet, width of 6 to 8 feet, and carrying 20,000 to 27,000 pounds. Their draft is generally about
3732 2 feet. The commerce is altogether local. During the winter season, from December 1 to April 1, the roads are in poor condition, and the inhabitants experience difficulty in transportation of supplies. The section from Glen Lyn to Hinton lies almost entirely in Summers County and only traverses about one-half of it. Summers County had a population, at the last census, of 18,420. Probably no more than 2,000 or 3,000 people at most are in any way dependent upon this section of the river.

The improvement of the river would probably cause a small increase in commerce, but not a very large one, as there is nothing to move."

In the light of this evidence I do not think that a finding of navigability can be avoided. The question is not whether modern steamboats are using or can use the river, but whether it is susceptible of use by any sort of craft used for commercial purposes. As said by the Supreme Court in The Montello, 20 Wall. 430, 441:

"It would be a narrow rule to hold that in this country, unless a river was capable of being navigated by steam or sail vessels, it could not be treated as a public highway. The capability of use by the public for purposes of transportation and commerce affords the true criterion of the navigability of a river, rather than the extent and manner of that use. If it be capable in its natural state of being used for purposes of commerce, no matter in what mode the commerce may be conducted, it is navigable in fact, and becomes in law a public river or highway. Vessels of any kind that can float upon the water, whether propelled by animal power, by the wind, or by the agency of steam, are, or may become, the mode by which a vast commerce can be conducted, and it would be a mischievous rule that would exclude either in determining the navigability of a river. It is not, however, as Chief Justice Shaw said (21 Pickering, 344) "every small creek in which a fishing skiff or gunning canoe can be made to float at high water which is deemed navigable, but, in order to give it the character of a navigable stream, it must be generally and commonly useful to some purpose of trade or agriculture."

The fact that shoals and rapids in the river made navi-
3733 gation difficult and prevented the adoption of modern
agencies of navigation is not conclusive of non-navigability.
The same situation confronted the court in The Montello, supra,
where the court said:

"The learned judge of the court below rested his decision against the navigability of the Fox River below the De Pere Rapids chiefly on the ground that there were, before the river was improved, obstructions to an unbroken navigation. This is true, and these obstructions rendered the navigation difficult, and prevented the adoption of the modern agencies by which commerce is conducted. But with these difficulties in the way commerce was successfully carried on, for it is in proof that the products of other States and countries were taken up the river in its natural state from Green Bay to Fort Winnebago, and return cargoes of lead and furs obtained. And the customary mode by which this was done was Durham boats. As early as May, 1838, a regular line of these boats was advertised to run from Green Bay to the Wisconsin portage. (Doty v. Strong, 1 Pinney, 316). But there were difficulties in the way of rapid navigation even with Durham boats, and these difficulties are recognized in the Ordinance of 1787, for not only were the 'navigable waters' declared free, but also the 'carrying-places' between them, that is, places where boats must be partially or wholly unloaded and their cargoes carried on land to a greater or less distance. Apart from this, however, the rule laid down by the district judge as a test of navigability cannot be adopted, for it would exclude many of the great rivers of the country which were so interrupted by rapids as to require artificial means to enable them to be navigated without break. Indeed, there are but few of our fresh-water rivers which did not originally present serious obstructions to an uninterrupted navigation. In some cases, like the Fox River, they may be so great while they last as to prevent the use of the best instrumentalities for carrying on commerce, but the vital and essential point is whether the natural navigation of the river is such that it affords a channel for useful commerce. If this be so the river is navigable in fact, although its navigation may be encompassed with difficulties by reason of natural barriers, such as rapids and sand-bars."

3734 And the fact that the river has been used for purposes of commerce establishes its navigability, even though its use may have been discontinued as a result of more improved methods of transportation. What was said by the Supreme Court in Economy Light and Power Co. v. United States, 256 U. S. 113, 123, is conclusive of this point. The Court said:

"We concur in the opinion of the Circuit Court of Appeals that a river having actual navigable capacity in its natural state and capable of carrying commerce among the States, is within the power of Congress to preserve for purposes of future transportation, even though it be not at present used for such commerce, and be incapable of such use according to present methods, either by reason of changed conditions or because of artificial obstructions. And we agree that the provisions of sec. 9 of the Act of 1899 (30 Stat. 1151) apply to such a stream. The act in terms applies to 'any * * * navigable river, or other navigable water of the United States'; and, without doing violence to its manifest purpose, we cannot limit its prohibition to such navigable waters as were, at the time of its passage, or now are, actually open for use. The Desplaines River, after being of practical service as a highway of commerce for a century and a half, fell into disuse, partly through changes in the course of trade or methods of navigation, or changes in its own condition, partly as the result of artificial obstructions. In consequence, it has been out of use for a hundred years; but a hundred years is a brief space in the life of a nation; improvements in the methods of water transportation or increased cost in other methods of transportation may restore the usefulness of this stream; since it is a natural interstate waterway, it is within the power of Congress to improve it at the public expense; and it is not difficult to believe that many other streams are in like condition and require only the exertion of federal control to make them again important avenues of commerce among the States. If they are to be abandoned, it is for Congress, not the courts, so to declare. The policy of Congress is clearly evidenced in the Act of 1899, and, in the present case at least, nothing remains but to give effect to it."

3735 Certainly the New River between Allisonia, Va. and Hinton, W. Va. is as clearly navigable as was the Fox River held navigable in The Montello, supra, or the Desplaines River held navigable in Economy Light and Power Co. v. United States, supra, or the sections of the Green, Grand and Colorado Rivers, held navigable in United States v. Utah, 238 U. S. 64, or the Tennessee River at the site of the Wilson dam, held navigable in Ashwander v. Tennessee Valley Authority, 297 U. S. 288, 328. In the case last cited the court adverted to obstructions at various points because of "shoals, reefs and rapids" and to the fact that in its present condition the river was not adequately improved for commercial navigation and the traffic on it was small, but held it navigable nevertheless. Little light is thrown on the case by the decisions in Leovy v. United States, 177 U. S. 621 or United States v. Doughton, 4 Cir. 62 F. 2d 936. In the first of these cases, the Supreme Court dealt with Red Pass, a crevasse caused by the overflow of water from the Mississippi, upon which no commerce of any sort had ever been conducted. In the second, this court dealt with Wilkerson's Creek as to which the same situation existed.

But there is another and equally valid reason why the New River must be held a navigable water of the United States at the site of the proposed dam. Whatever may be found as to other portions of the river, there can be no question that the dam is located on a portion which is navigable, which has been improved for navigation by the federal government, and which has been used as a highway for interstate commerce through connection with the interstate railway which crosses the river at Radford. Whether this navigable stretch of the river extends into another state or not, therefore, it furnishes in connection with the railroad a highway of interstate commerce, has been used for that purpose and is a

water of the United States subject to the control of Congress for that reason. In the Daniel Ball, 10 Wall. 557, the navigation
3736 laws were applied to a steamboat operating on the Grand River entirely within the State of Michigan. It was contended that the vessel was not subject to the navigation laws even though operated upon a navigable river of the United States, because she did not carry merchandise beyond the boundaries of the state and was not operated in connection with any line of vessels or railway. It was held, however, that the vessel was subject to the control of Congress, because the articles that she carried were moving in an interstate journey. The court said:

"In this case it is admitted that the steamer was engaged in shipping and transporting down Grand River, goods destined and marked for other States than Michigan, and in receiving and transporting up the river goods brought within the State from without its limits; but inasmuch as her agency in the transportation was entirely within the limits of the State, and she did not run in connection with, or in continuation of, any line of vessels or railway leading to other States, it is contended that she was engaged entirely in domestic commerce. But this conclusion does not follow. So far as she was employed in transporting goods destined for other States, or goods brought from without the limits of Michigan and destined to places within that State, she was engaged in commerce between the States, and however limited that commerce may have been, she was, so far as it went, subject to the legislation of Congress. She was employed as an instrument of that commerce; for whenever a commodity has begun to move as an article of trade from one State to another, commerce in that commodity between the States has commenced. The fact that several different and independent agencies are employed in transporting the commodity, some acting entirely in one State, and some acting through two or more States, does in no respect affect the character of the transaction. To the extent in which each agency acts in that transportation, it is subject to the regulation of Congress."

It is the movement of commerce interstate which makes the commerce clause of the Constitution applicable. Any instru-
3737 mentality of such commerce is subject to the control of Congress; and a body of water, even though entirely within the limits of a state, falls within the principle if interstate commerce moves over it. Here the stretch of the river for 25 miles above Radford furnishes a highway for such commerce. Congress recognized the fact and expended money in its improvement. And Congress has done nothing to surrender the control which it thus saw fit to exercise.

I am familiar with the statement of the rule as to navigability which contains the expression that "they constitute navigable waters of the United States * * * when they form in their ordinary condition by themselves, or by uniting with other waters, a continued highway over which commerce is or may be carried on with other states or foreign countries in the customary modes in which such commerce is conducted by water." I do not think, however, that this statement was intended to limit the power of Congress over a stream which is in fact a highway of interstate commerce moving partly by rail. There can be no question as to the power of Congress over an intrastate railroad over which interstate commerce moves. Colorado v. United States, 271 U. S. 153. And there can be no difference in principle with respect to a stretch of water wholly within a state which serves as a highway for interstate commerce. A different question would be presented if an intrastate stretch of water capable of use in interstate commerce had never been used for that purpose. Here, however, the waterway has been used in connection with a railway as a highway of interstate commerce and to that end has been improved by Congress through expenditure of moneys of the United States.

THE EFFECT ON NAVIGATION

The power project of defendant is one of the larger projects of the country. The dam is 110 feet high) with a draw down of 27 feet, and the machinery has capacity for utilizing a
3738 flow of 9,000 cubic feet of water per second, or approximately three times the average flow of the stream. Peak load or near peak load operation is contemplated, i. e. the water will be permitted to flow through the turbines for only a part of each twenty-four hours to take care of the higher demand for electricity which exists for only part of the day. This necessarily means that the flow of the stream will be almost entirely shut off for a portion of the day and the volume of water released will be greatly in excess of normal stream flow while the turbines are operating. This will cause waves in the stream below the dam which will persist far down the river and will even cause the rise and fall of the Kanawha at the head of navigation on that river. In dry weather when the flow is low, it will be possible to shut off the stream flow for long periods and affect the navigability to a marked degree.

The quesiton as to whether the operation of the dam will affect the navigable capacity of an interstate stream, disregarding the navigable capacity at the dam site, is easily disposed of if regard be had to the interstate stretch of the river between Glen Lyn, Va., or Wylie's Falls, Va., and Hinton, W. Va. That this stretch of the river is navigable does not seem to me to admit of doubt.

Millions of feet of lumber and staves were transported over it, and it was improved by the federal government. The improvement extended from Hinton, W. Va. to beyond the Virginia line at Wylie's Falls. That there was commerce on the river as far up as Glen Lyn is proven beyond all reasonable doubt and is referred to in the government reports. Whatever may be the effect of the operation of the dam on the Kanawha, there can be no question that it will affect the navigability of New River from Glen Lyn to Hinton. Counsel for defendant admit this but contend that the stretch of the river is not navigable. As stated, however, I think that the showing as to its navigability is beyond question.

And I think that we must consider the effect which the 3739 operation of the dam might have upon the navigability of the Kanawha. It is said that this need not be considered because of the rectifying effects of the dams farther down stream and of the Bluestone flood control project, the construction of which is virtually assured. The power of Congress to control the construction of a dam which may affect the navigation of a stream is not affected by the existence of dams lower down stream, for these might be removed. The servitude in the interest of navigation must be determined by consideration of the stream in its natural condition. United States v. Cress, 243 U. S. 316. A corollary of this is that the power of Congress to control stream flow of navigable streams is not impaired as the result of construction which may render the exercise of the power unnecessary. It is argued, also, that it would not be wise from the standpoint of its own interests for defendant to operate its dam in such way as to interfere with the navigable capacity of the streams below; but the fact that the structure is of such character that it is capable of being operated so as to affect navigation brings it within the regulatory power of Congress. It is clear that, in such case, the government need not depend upon the wisdom or public spirit of private persons to protect the interests of navigation but may itself take action which will guarantee their protection.

But more important than any of the other effects which the construction and operation of the dam will have on the navigability of navigable waters is the effect that it will have upon navigation in the Ohio River as a result of effecting means of controlling flood waters in the Kanawha. One of the most important enterprises of the federal government is flood control in the Ohio. While this is important from the standpoint of protecting navigation in the Ohio, and while federal power in the premises is based upon this consideration, its importance to the people of the United States far transcends the mere matter of navigation in view of the tremendous loss of life and 3740 property which these floods entail. To adequately control the floods, the federal government must provide for flood control in the various tributaries of the Ohio; and control is nowhere more important than in the New and Kanawha Rivers, which pour into the Ohio waters from a large portion of the mountainous section of Virginia and West Virginia. It appears from the record that the New River furnishes at ordinary times nearly one-fourth of the stream flow of the Ohio below the mouth of the Kanawha; and in rainy season flood waters from the mountains pour down New River through the Kanawha and into the Ohio in tremendous volume. To aid in the control of these flood waters, dams in the New River are imperative; and the Bluestone project near Hinton is being undertaken primarily as a means of flood control. Other dams above Bluestone, if properly constructed and operated, will aid in flood control and will affect navigation in the Ohio in that way.

It is argued that the dam of defendant can be of aid in flood control, and this is no doubt true; but the argument concedes that the construction and operation of the dam will affect navigation since it will affect flood control. Whether the effect will be favorable or not depends upon how the dam is operated. In the operation of flood control dams, the object is to keep the pond as low as possible at all times so as to provide readily available storage for flood waters when they come. In the operation of power dams, the object is to keep the pond as nearly full as possible at all times so as to have maximum power available. It is clear, therefore, that the construction and operation of power dams can vitally affect flood control in the river; and that, when the construction of such dams is permitted in a river where flood control is as important as it is in New River, they should be subject to the control of the federal government so that they can be operated in connection with the purely flood control dams, as a unitary system.

3741 THE POWER OF CONGRESS TO REQUIRE THE LICENSE

In the Power Act, Congress substituted administrative for direct legislative and judicial control, i. e. instead of forbidding absolutely the construction of dams in navigable waters or dams which would affect the navigable capacity of navigable waters, it set up an administrative tribunal and authorized it to license the construction of such dams when found to be in the public interest. There can be no question as to the power of Congress to prohibit absolutely the construction of operation of dams which will interfere with navigation in a navigable stream whether the dam itself be located in a stream which is navigable or non-navigable. United States v. Rio Grande Dam & Irrigation Co., 174 U. S. 690. The existence of private rights is no more an impediment to the exercise of federal power in the one case than in the other; for, in either case, private rights are held subject to the paramount power of Congress to protect the public interest in interstate commerce, by forbidding any construction that would interfere therewith. Nor does this involve infringement of the rights of the states protected by the Tenth Amendment to the Constitution. As said by the Supreme Court in the Rio Grande case, where rights were asserted under a law of New Mexico to divert waters of the Rio Grande in the non-navigable section of the river:

"Although this power of changing the common law rule as to streams within its dominion undoubtedly belongs to each State, yet two limitations must be recognized: * * *. Second, that it is limited by the superior power of the general government to secure the uninterrupted navigability of all navigable streams within the limits of the United States. In other words, the jurisdiction of the general government over interstate commerce and its natural highways vests in that government the right to take all needed measures to preserve the navigability of
3742 the navigable water courses of the country even against any state action.

* * * * *

"It is urged that the true construction of this act limits its applicability to obstructions in the navigable portion of a navigable stream, and that as it appears that although the Rio Grande may be navigable for a certain distance above its mouth, it is not navigable in the Territory of New Mexico, this statute has no applicability. The language is general, and must be given full scope. It is not a prohibition of any obstruction to the navigation, but any obstruction to the navigable capacity, and anything, wherever done or however done, within the limits of the jurisdiction of the United States which tends to destroy the navigable capacity of one of the navigable waters of the United States, is within the terms of the prohibition. Evidently Congress, perceiving that the time had come when the growing interests of commerce required that the navigable waters of the United States should be subjected to the direct control of the National Government, and that nothing should be done by any State tending to destroy that navigability without the explicit assent of the National government, enacted the statute in question. And it would be to improperly ignore the scope of this language to limit it to the acts done within the very limits of navigation of a navigable stream."

But the power of Congress is not limited to prohibition of obstructions to interstate commerce. Possessing full power of control in the premises, it may intrust to an administrative agency the regulation and licensing of structures which it has the power to prohibit. And I see no objection to exacting as a condition of the licenses granted a requirement as to the rates to be charged for electric power to be manufactured by the licensees or an option on the part of the government to purchase either at cost or market value. The water power of the streams of the country is one of the most valuable of the natural resources of the people. It does not belong as a matter of private right to the owners of power sites, but can be enjoyed by them only
3743 if the government consents to the obstruction or interference with the streams involved in the erection of dams. It is but fitting that the government, which holds its power for the benefit of the whole people, prescribe as a condition of its consent to the erection of such dams that the people shall derive a benefit from the concessions granted, to the extent of being accorded reasonable rates upon the product of the enterprise. And, since no one can forsee the future, or prophesy to what extent such obstructions may become undesirable from the standpoint of the public interest, it is proper that the license for their maintenance be limited and that provision be made for their purchase by the public. The exaction of the right on the part of the government to acquire the project upon the terms contained in the license is in no sense a denial of due process, but is the price exacted by the government for the granting of a permission which it has the right to withhold. Fox River Paper Co. v. Railroad Commission of Wisconsin, 274 U. S. 651. Nor is it any objection that ownership by the government of the power project may result from such acquisition. If the government may build a power project itself in connection with regulating the navigability of streams, as held in Ashwander v. United States, 297 U. S. 288, there can be no objection to its licensing another to build the project with a view of subsequent acquisition by the government.

If the stream at the dam site be held navigable, there can be no question as to the power of Congress to construct a dam and power project there in aid of navigation. Ashwander v. Tennessee Valley Authority, supra. And it is equally clear that, even if it be nonnavigable, it may construct such dam and power project for purposes of flood control in streams below. United States v. West Virginia Power Co., 4 Cir. 91 F. 2d 611. What the government may thus do itself, it may license a private corporation to do upon such terms and conditions as, in the opinion of Congress, the public interest may require.

3744 Much has been said about the effect of the findings of the Federal Power Commission, but I do not think it necessary to go into this. Assuming that the questions thus raised are jurisdictional and go to the constitutional validity of the action of the Commission, so that they are subject to full review under the doctrine of Crowell v. Benson, 285 U. S. 22, I think that the record before the court below fully justifies the Commission's action and that the injunction prayed by the government should be awarded. As a practical matter, this does not mean, of course, that the defendant will be enjoined from constructing or operating the dam, but merely that, as a condition of such construction and operation, it be required to accept the license tendered by the Commission.

There are certain facts in this case which cannot be overlooked. Defendant is constructing one of the thirty largest power dams in the United States, and is constructing it at a place where the river unquestionably has been used as a highway of interstate commerce and has been improved for that purpose by the expenditure of federal funds. The river at the site of the dam has been found a navigable water of the United States by a commission appointed by Congress to deal with such matters and acting under oath in the discharge of a public duty. Even if the river be held nonnavigable at the site of the dam, there can be no question but that the operation of the dam will affect the navigability of the stream between Glen Lyn, Va. and Hinton, W. Va., which is navigable within any test which the Supreme Court has prescribed. And, in addition to all this, the construction of dams in New River will vitally affect flood control in the Ohio and thereby affect navigation in that great highway of commerce. Under such circumstances, I cannot agree that the federal government is without power to require a license of defendant as a condition of the construction of the dam, or that the government must await actual interference with existing commerce before taking action.

3745 In United States Circuit Court of Appeals,
Fourth Circuit

No. 4460

UNITED STATES OF AMERICA APPELLANT

vs.

APPALACHIAN ELECTRIC POWER COMPANY, A CORPORATION,
APPELLEE

Appeal From the District Court of the United States for the Western District of Virginia

Decree

Filed and Entered November 6, 1939

This cause came on to be heard on the transcript of the record from the District Court of the United States for the Western District of Virginia, and was argued by counsel.

On consideration whereof, it is now here ordered, adjudged, and decreed by this Court that the decree of the said District Court, in this cause, be, and the same is hereby, affirmed.

November 6th, 1939.

JOHN J. PARKER,
Senior Circuit Judge.

December 11, 1939, petition of appellant for a stay of the mandate is filed.

In United States Circuit Court of Appeals

Order staying mandate

Filed December 13, 1939

Upon motion filed by the Appellant, and good cause having been shown, it is ordered that the mandate of this Court upon the decree entered on November 6, 1939, in the above entitled matter be and it is hereby stayed until the final disposition 3746 of this cause by the Supreme Court of the United States, or until February 6, 1940, if no petition for a writ of certiorari is filed by that time.

JOHN J. PARKER,
John J. Parker,
Senior Circuit Judge.

DEC. 12, 1939.

3747

In United States Circuit Court of Appeals

Order as to use of original transcript of record

Filed December 30, 1939

It appearing to the Court that the appellant in the above-entitled case has applied to the Clerk of this Court for a certified transcript of the record for use in the Supreme Court of the United States on an application for a writ of certiorari to this Court, and it further appearing that counsel for the appellant desire that the Clerk, in making up said transcript of the record, use the original transcript of the record filed in this Court in this cause, it is now therefore ordered by this Court, that the Clerk of this Court, in making up the certified transcript of record for use in the Supreme Court of the United States on the application of the appellant for a writ of certiorari to this Court in this cause, be, and he is hereby authorized to use and incorporate therein the original transcript of record filed in this Court, and add thereto copies of the proceedings in this Court in said cause. The said original transcript of record shall be returned to this Court after the case is finally disposed of in the Supreme Court.

John J. Parker,
Senior Circuit Judge.

December 29, 1939.

3748 [Clerk's certificate to foregoing transcript omitted in printing.]

3749

Supreme Court of the United States

Order allowing certiorari

Filed March 4, 1940

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Fourth Circuit is granted.

And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.

The Chief Justice took no part in the consideration and decision of this application.

3750 In Supreme Court of the United States

Stipulation as to printing of record

Filed March 8, 1940

It is hereby stipulated and agreed by and between the counsel for the respective parties in the above entitled action that the following numbered pages[33] of the typewritten transcript of the record as originally certified by the Clerk of the United States District Court for the Western District of Virginia to the United States Circuit Court of Appeals for the Fourth Circuit, and thereafter certified to this Court by the Clerk of said United States Circuit Court of Appeals for the Fourth Circuit, may be omitted from the record to be printed for this Court:

Pages 519–521 (testimony of P. H. McGrath).
Page 522 (testimony of D. H. Kauffelt).
Pages 523–4 (testimony of J. J. Green).
Pages 1441–52 (testimony of E. A. Sherman).
Pages 1453–76 (testimony of C. L. Forsling).
Pages 1477–1509 (testimony of Dr. H. T. Cory).
3751 Pages 1821–34 (testimony of Dr. F. F. Barnes).
Pages 3127–3163 (Exhibits A, B, and C of Exhibit 90).
Page 3498 (Exhibit 239).
Pages 3499–3564 (Exhibit 240).
Dated March 5, 1940.

Francis Biddle,
Solicitor General,
Counsel for Petitioner.
Fraser M. Horn,
Wendell W. Forbes,
Counsel for Respondent.

[File endorsement omitted.]

[Endorsement on cover:] File No. 44081. U. S. Circuit Court of Appeals, Fourth Circuit. Term No. 674. The United States of America, Petitioner vs. Appalachian Electric Power Company. Petition for a writ of certiorari and exhibit thereto. Filed January 26, 1940. Term No. 674 O. T. 1939.

---

[33] It is understood that the page numbers herein referred to are those inserted (by stamp) by the Clerk of the United States District Court for the Western District of Virginia rather than those numbers which appeared on the pages of said typewritten transcript of the record when it was filed in said District Court.

129

FILE COPY

Office - Supreme Court, U. S.
FILED
JAN 26 1940
CHARLES ELMORE CROPLEY
CLERK

40-2459

Sup. Ct.

No. [redacted] 12

In the Supreme Court of the United States

October Term, 1939

United States of America, petitioner

v.

Appalachian Electric Power Company

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

INDEX

Page
Opinions below 1
Jurisdiction 2
Questions presented 2
Statutes involved 3
Statement 5
    1. Prior proceedings 5
    2. Salient facts as to navigability 7
Specification of errors to be urged 14
Reasons for granting the writ 15
    1. Constitutionality of the Power Act 16
    2. Navigability of the New River 18
    3. Effect upon the interests of interstate commerce 22
Conclusion 24
Appendix 25

CITATIONS

Cases:
- *Appalachian Electric Power Company* v. *Smith*, 4 F. Supp. 6, 67 F. (2d) 451, certiorari denied, 291 U. S. 674 7
- *Arizona* v. *California*, 283 U. S. 423 20
- *Ashwander* v. *Valley Authority*, 297 U. S. 288 20
- *The Daniel Ball*, 10 Wall 557 22
- *Economy Light & Power Co.* v. *United States*, 256 U. S. 113 20
- *Fox River Co.* v. *Railroad Commission*, 274 U. S. 651 18
- *Hurley* v. *Kincaid*, 285 U. S. 95 18
- *Leovy* v. *United States*, 177 U. S. 621 21
- *The Montello*, 20 Wall. 430 20
- *Oklahoma* v. *Texas*, 258 U. S. 574 21
- *Tempel* v. *United States*, 248 U. S. 121 20
- *United States* v. *Chandler-Dunbar Co.*, 229 U. S. 53 17
- *United States* v. *Cress*, 243 U. S. 316 21
- *United States* v. *Oregon*, 295 U. S. 1 21
- *United States* v. *Rio Grande Dam and Irrigation Co.*, 174 U. S. 690 .... 17, 21
- *United States* v. *Utah*, 283 U. S. 64 20

Statutes:
- Rivers and Harbors Act of 1899, c. 425, 30 Stat. 1121, 1151 (U. S. C., Title 33, Secs. 401, 403, 406):
    - Sec. 9 .... 3, 25
    - Sec. 10 25
    - Sec. 12 3

Statutes—Continued.
Page
Act of June 23, 1930, c. 572, 46 Stat. 797 6
Federal Water Power Act of 1920, as amended by the Federal Power Act of 1935, c. 687, 49 Stat. 803, 838 (U. S. C., Title 16, Secs. 791–817):
  Sec. 3 .... 3, 7, 16, 20, 26
  Sec. 4 .... 3, 27
  Sec. 6 .... 3, 29
  Sec. 10 .... 3, 4, 6, 13, 15, 16, 29
  Sec. 14 .... 4, 34
  Sec. 23 .... 4, 5, 16, 17, 22, 23, 36
Miscellaneous:
  36 Op. A. G. 355 6

In the Supreme Court of the United States

OCTOBER TERM, 1939

No. ——

UNITED STATES OF AMERICA, PETITIONER

v.

APPALACHIAN ELECTRIC POWER COMPANY

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

The Solicitor General, on behalf of the United States of America, prays that a writ of certiorari issue to review the judgment of the United States Circuit Court of Appeals for the Fourth Circuit, affirming a decree of the United States District Court for the Western District of Virginia, dismissing petitioner's bill of complaint.

OPINIONS BELOW

The opinion of the District Court (I, 78–163)[1] is reported in 23 F. Supp. 83. The opinions of the

---

[1] References to the record are to the printed appendices to the parties' briefs in the court below. Roman numerals I to VII refer to the indicated volume of the Government's appendices, VIII to X to that of the respondent. Volume XI refers to the separately printed proceedings in the court below. A certified copy of the complete typewritten transcript of record has been filed with the Clerk of this Court.

Circuit Court of Appeal (XI, 3–64) have not yet been reported.

JURISDICTION

The decree of the Circuit Court of Appeals sought to be reviewed was entered on November 6, 1939. The jurisdiction of this Court is invoked under Section 240 (a) of the Judicial Code, as amended by the Act of February 13, 1925.

QUESTIONS PRESENTED

1. Whether respondent's project, a dam and hydroelectric plant constructed in New River, is in navigable waters of the United States, within the meaning of Section 9 of the Rivers and Harbors Act of 1899 and Section 3 (8) of the Federal Power Act.[2]

2. Whether respondent's project will obstruct the navigable capacity of waters of the United States within the meaning of Section 10 of the Rivers and Harbors Act of 1899 or affect the interests of interstate commerce within the meaning of Section 23 of the Federal Power Act.

3. Whether the licensing provisions of the Federal Power Act are constitutional, whether applied

---

[2] An additional question, presented for precautionary purposes only, is whether the amendments to the Federal Water Power Act of 1920 found in the Federal Power Act of 1935 are applicable to respondent's project. It is immaterial in the broad discussion of this petition whether the original sections or the amended sections be made the point of reference. In the interests of simplicity, we shall, therefore, refer simply to the "Federal Power Act."

to a project located in navigable waters, or to a project which affects interstate commerce and is located in nonnavigable waters over which Congress has jurisdiction under the commerce clause.

STATUTES INVOLVED

The pertinent provisions of the Rivers and Harbors Act of 1899, the Federal Water Power Act of 1920, and the Federal Power Act are in the record (I, 205–229; VII, 1339–1355); those most immediately involved are set out in the Appendix, *infra*, pp. 25–37. The major provisions may be summarized as follows:

Section 9 of the Rivers and Harbors Act of 1899 provides that no dam shall be built across a navigable river or other navigable water of the United States without the consent of Congress. Section 10 of that Act forbids the creation of any obstruction, not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States. Section 12 provides for removal of structures erected in violation of these provisions by court injunction in a suit instituted by the Attorney General.

Section 4 of the Federal Power Act provides for the issuance of a license by the Federal Power Commission for the construction of a hydroelectric dam in navigable waters of the United States, defined in Section 3 (8) of the Act, or in waters over which Congress has jurisdiction under the commerce clause. The licenses, under Section 6, are to be issued for not more than 50 years. They shall, under Section 10, include, *inter alia,* the following conditions: the project shall be the best adapted for navigation, power development, and other beneficial uses; the project shall be maintained in good repair and operated in the interests of navigation; a specified rate of amortization shall be maintained after the twentieth year out of any excess return upon the actual investment, for the purpose of reducing the net investment; annual charges to meet its administration expenses shall be paid the United States; excessive profits, unregulated by state authority, shall be expropriated to the United States. Section 10 (i) also provides for a so-called minor part license, in which the Commission may waive the conditions in a license for a minor part of a complete project or for projects of less than 100 horsepower capacity. Under Section 14, the United States, on two years' notice, can take over any project the license for which has expired, on condition that it pay the licensee its net investment in the property (not to exceed its fair value).

Section 23 of the 1920 Act provided that persons intending to construct a dam in a stream which is not navigable waters of the United States, but over which Congress has jurisdiction under the commerce clause, may file a declaration of intention with the Commission. If investigation by the Commission shows that construction of the project will affect the interests of interstate commerce, a license under the Act is required; if it does not so find, the construction can proceed without a license. The Federal Power Act of 1935 amended this section to make filing a declaration of intention compulsory. It also made numerous amendments to the details of the other sections which were broadly summarized above.[3]

STATEMENT

The petitioner instituted suit on May 6, 1935, to enjoin respondent from constructing or operating a dam and hydroelectric plant in the New River, just above Radford, Virginia, except under a license to be issued by the Federal Power Commission (I, 1–24). After answer and trial, the District Court entered a decree dismissing the bill (I, 170–171). The Circuit Court of Appeals affirmed, Circuit Judge Parker dissenting (XI, 3–64).

1. *Prior proceedings.*—On June 26, 1925, respondent's predecessor filed with the Commission, under Section 23 of the Federal Power Act, a Declaration of Intention (II, 1099–1100) to construct a project on New River near Radford, Virginia. The declaration in September 1926 was assigned to respondent (I, 136). On August 30, 1926, respondent filed an application for a license (II, 1134; IX, 571–572).

The Commission, after investigation and two hearings, found on June 1, 1927, that the New

---

[3] The Appendix, *infra*, pp. 26–37, contains a comparative print of the relevant sections, showing their wording under both the 1920 and 1935 Acts.

River, at the site of the project, was not navigable waters of the United States, but that the project would affect interests of interstate or foreign commerce and that a standard form license was required for its construction (I, 138). The respondent declined to accept such a license, but declared its willingness to accept a minor part license, containing only conditions relating to the protection of navigation. Upon request of the respondent, the question whether the Commission had the power to grant such a license was submitted to the Attorney General (I, 139), who rendered an opinion that it was within the discretionary power of the Commission; his reason was that such an interpretation of Section 10 (i) of the Act was necessary "to avoid serious questions regarding the constitutionality of the Act" (I, 140; 36 Op. A. G. 355, 361).

On April 3, 1931, the newly constituted Commission,[4] after a further hearing, reaffirmed its previous finding that the project would affect interests of interstate or foreign commerce, and denied the application for a minor-part license (I, 140). On October 12, 1932, the Commission passed a resolution in which it recited that, in order to clarify the effect of its order of April 3, 1931, and from the evidence earlier submitted, it found New River navigable waters within the definition of Section 3 of the Act (I, 141).

---

[4] In 1930 Congress amended the Federal Water Power Act (c. 572, 46 Stat. 797), changing the Commission from an *ex officio* cabinet Commission to an independent agency of five Commissioners.

On June 8, 1931, respondent filed suit in the United States District Court for the Western District of Virginia to enjoin the members of the Federal Power Commission. This was ultimately dismissed for want of jurisdiction over the defendants. *Appalachian Electric Power Company* v. *Smith,* 4 F. Supp. 6, 67 F. (2d) 451 (C. C. A. 4th), certiorari denied, 291 U. S. 674.

The respondent thereupon proceeded with the construction of the dam, and the petitioner brought this suit to enjoin that construction without a license from the Federal Power Commission.

2. *Salient facts as to navigability.*[5]—The New River has its source in North Carolina and flows north through Virginia and West Virginia. There it joins the Gauley River to form the Kanawha River which flows into the Ohio River (I, 87). From the North Carolina-Virginia state line to its junction with the Gauley, a distance of 252 miles, the average slope of the New is 7.1 feet per mile (I, 88). Above Allisonia, Virginia, and below

---

[5] We think neither the District Court nor the majority of the Circuit Court of Appeals has fairly presented the facts in this case. However, we are in the large content to accept the basic or evidentiary facts as found by the courts below, except for occasional clarification by reference to uncontested facts of record and to instances where the majority of the court below went beyond both the findings of the District Court and the plain content of the record.

Hinton, West Virginia, the average slope is 8 feet per mile (VIII, 178) and 11 feet per mile (III, 2, 4), respectively, and the river flows over several sizable falls and turbulent rapids (I, 88–89); we do not urge that it is navigable except in the intermediate reach of 110 miles between Hinton and Allisonia (see XI, 22, 47).[6] There the average slope is 4/4 feet per mile (II, 613, 694; III, 2–4).[7] The river flows, characteristically, through pools of still water separated by shoals or rapids (I, 89). The volume of its flow is subject to large variation, ranging, at Radford, from a record low of 521 cubic feet per second in 1930 to an estimated record high of 155,000 second-feet in 1876, but its average flow at that point is 3,200 second-feet and there is no dispute but that the volume of water is sufficient to support navigation (I, 91).

Early exploration expeditions navigated the New River, but their accounts also describe the difficulties and portages caused by the rapids (I, 96). Commercial navigation by means of keelboats followed the Civil War (I, 96); these are flat-bottomed boats about 7 feet wide and 60 feet long, with a draft of 2 feet and capacities estimated from 2 to

---

[6] For this reason, we ask the Court to note that the more vivid descriptions of the District Court and the Circuit Court of Appeals do not relate to the stretch argued, here or in the court below, to be navigable.

[7] The District Court preferred, as an alternative phrasing of this uncontested fact, to find the slope to be "fairly uniform at from 5 to 8 feet per mile" (I, 89).

12 tons (I, 98). To facilitate their use, Congress between 1876 and 1886 appropriated a total of $112,000 for the improvement of New River by clearing channels through the shoals in order to provide at low water a channel 30 feet wide and 2 feet deep (I, 97). The work was done between Hinton, West Virginia, and Wiley's Shoals, Virginia, and between Radford and Allisonia, Virginia; although it was included in the improvement project, nothing was done on the intervening stretch. A small balance, allocated for improvement above Allisonia, was returned to the Treasury because further expenditure would be inexpedient. (I, 98.) Neither court below denied that the stretches above Hinton and Radford were navigable (I, 99–101; XI, 22–23); indeed, in 1883 there were 17 keelboats operating above Hinton and 8 above Radford (I, 100). They held, however, that the intervening 55-mile reach, from Radford to approximately the West Virginia line, was not navigable (I, 99; XI, 22–23).

But this stretch was not impossible of navigation.[8] Some 23 Government witnesses testified to navigation on the intervening reach;[9] their evidence was corroborated by 7 witnesses for the respondent, each of whom recalled one or more instances of commercial traffic on this reach,[10] while only 3 witnesses offered by respondent could recall no traffic on that part of the river.[11] The District Court recognized that there was some keelboat traffic on this reach but yet found it nonnavigable because of the probable infrequency and irregularity of that traffic and the difficulty under which it was conducted (I, 99). It also relied upon the reports of Army engineers which stated, in general, that navigation on the river was not continuous and no attempt would be made to improve it to that

---

[8] The court below (XI, 22–23) in contrast to the District Court, which was silent (see I, 88–92, 99), declared the physical characteristics of this reach not conducive to navigation. Circuit Judge Parker differed (XI, 47–48). The majority opinion relied chiefly upon evidence of natural obstructions appearing in the mile-by-mile survey made in 1873 (Government Ex. 31; II, 607, 614–621) and in respondent's photographs of this section of the river (X, 17–107), the majority of which were taken at extreme low stage of water (II,

---

776-778, 788-789). It ignored: the equally formidable obstacles to easy navigation shown by the survey in the admittedly navigable stretches above Hinton and Radford (II, 614-621); respondent's photographs of the navigable reach above Radford (VI, 5-12), also taken at extreme low flow (II, 788-789); and the Government's aerial photographs showing the river at mean flow (V, 29-71).

[9] Flannagan, II, 303-6; Coleman, II, 306; Linkous, II, 310-11; Collins, II, 321-326; Webb, II, 326-330; Weiss, II, 331-32; Owen, II, 338-339; Snyder, II, 346-50; Snidow, II, 364-66; Snodgrass, II, 370-73; James, II, 377-378; Peters, II, 383-384; Skeen, II, 399; Price, II, 401-5; J. R. Smith, II, 405-11; Medley, II, 411-413; Dickinson, II, 420-25; E. M. Smith, II, 428-9; Reed, II, 436-39; Hoover, II, 447; Helvey, II, 458-60; Martin, II, 465; and Anderson, II, 469-470.

[10] Buckland, II, 759-60; Lilly, II, 760-62; Talbot, II, 764-65; Gerald, II, 766-67; Osborne, II, 773-74; Adair, VIII, 287; Knode, VIII, 317.

[11] Spangler, C. R., VIII, 266-70; Spangler, W. H., VIII, 270-77; Hundley, VIII, 330-33.

extent (I, 99, 101). The unimproved stretch between the state line and Radford, however, was paralleled by a railroad after 1883, and there was neither occasion for the admittedly difficult navigation nor intention by the engineers to undertake work less necessary than in the two stretches which were not so paralleled (I, 100, 101, 103, 104; II, 712–713).

The project will have an undoubted effect upon the navigability of the New River in the reach above Hinton (see XI, 59). While commercial navigation has virtually ceased (I, 111), there should be no dispute that New River is navigable from Hinton to Glen Lyn, Virginia.[12] The normal operation of the project, the District Court concluded, will have no appreciable adverse effect upon the navigable capacity of the Kanawha River (I, 127, 132). But the hydraulic capacity of the generators will be 9,000 second-feet while the average stream flow is only 3,200 second-feet (I, 122, 91), and the project could be operated so as to send great "power waves" down the river as a result of alternating impounding and release of water, particularly in times of low water (I, 123–124). The District Court found, however, that even if such an operation were undertaken, there would be no substantial adverse effect upon the navigability of the Kanawha (I, 125), because the effect of the power waves would be absorbed by the London, Marmet, and Winfield dams in the Kanawha and by the Hawk's Nest and proposed Bluestone dams in the New River (I, 126–129).

---

[12] The dissenting judge states this was proved beyond doubt (XI, 59); the majority and the District Court are vague as to whether the navigable stretch reaches into Virginia (XI, 23, 25; I, 97, 98, 101). In addition to the testimony showing that the navigable stretch reached at least to Shumate's Falls, Virginia, just below Glen Lyn (II, 383–4, 405–11, 411–13, 420–25, 428–9, 436–39, 447, 759–60, 760–62; VIII, 287), see reports of the Army engineers for the year 1882 (II, 677) and for the year 1912 (II, 700).

The respondent's project will have an unquestioned bearing on the flood-control plans of the Government but, the District Court held, its effect is likely to be beneficial because in general any dam offering a controlled release of water helps overcome floodwaters (I, 130).

The District Court dismissed the complaint, and the court below affirmed. The decision of the majority and the opinion of the minority on the issues presented for review by this Court are:

(a) Navigable waters of the United States are interstate streams used or capable of use for valuable, substantial, and permanent commerce, capable of promoting commerce to a substantial degree in their natural and ordinary condition (XI, 13–15); at a later point the majority indicated that an actual present navigation was necessary (XI, 31); the dissenting opinion declared that no more was necessary than susceptibility to commercial use, whether or not that use was difficult, inconsiderable or had been abandoned (XI, 54–57). (b) New

River, apart from two intrastate stretches of 25 or 30 miles each, is not navigable (XI, 15–26); the dissent held the intervening stretch of 55 miles also navigable (XI, 47–54) and that in any event the stretch above Radford was navigable waters of the United States because the river traffic moved in interstate commerce over railroad connections (XI, 57–58).

(c) Normal and reasonable operation of the dam will not impair the navigability of the Kanawha or Ohio River, particularly in view of the downstream dams (XI, 26–30); the dissenting judge thought it unnecessary that Congress rely upon the self-restraint of respondent or the construction of other dams to insure the maintenance of the navigable capacity of the Kanawha (XI, 59–60). (d) The effect upon the navigable capacity of New River between Glen Lyn, Virginia, and Hinton need not be considered because that commerce has been abandoned and was nev extensive (XI, 30–31); the minority viewed the navigability of that reach as beyond question (XI, 59). (e) The dam will aid rather than interfere with the Government's flood-control program (XI, 31); the dissenting judge thought that whether the dam would aid, and the extent of any benefit, depended upon the method of its operation and that it should therefore be controlled by the Government (XI, 60–61).

(f) It is unnecessary to consider whether the economic and regulatory conditions of Section 10, other than those relating to navigation, can be imposed on projects located in navigable waters

(XI, 42); the opinion, however, implies, if it does not hold, that such conditions are invalid (XI, 14, 40). (g) Projects located in non-navigable streams can constitutionally be subjected only to conditions designed to protect navigation (XI, 43). The dissenting judge thought the constitutional power to impose other conditions clear in either case (XI, 61–63).

SPECIFICATION OF ERRORS TO BE URGED

The court below erred:

1. In holding that New River, at the site of respondent's project and from Hinton, West Virginia, to Allisonia, Virginia, is not navigable waters of the United States.

2. In failing to hold that New River above Radford, Virginia, is navigable waters of the United States because navigation in that reach connected with interstate railroad transportation.

3. In failing to hold that New River between Hinton, West Virginia, and Glen Lyn, Virginia, is navigable waters of the United States, and that respondent's project would affect the navigable capacity of this stretch.

4. In holding, because of respondent's probable method of operation and the rectifying effect of downstream dams, that respondent's project will not affect the navigable capacity of the Kanawha or Ohio River.

5. In holding that respondent's project will aid flood-control work while failing to hold that the

project for that reason affects the interests of interstate commerce or that the extent of the aid depends upon the manner of operation.

6. In holding or implying that the license provisions of the Federal Power Act, so far as they go beyond the control or protection of navigation, are unconstitutional as applied to a project located in navigable waters of the United States.

7. In holding that these license provisions are unconstitutional as applied to a project which affects the interests of interstate commerce and navigation, although located in a stream not navigable waters of the United States.

8. In holding or assuming that the case must be considered without regard to the amendments to the Federal Water Power Act of 1920 found in the Federal Power Act of 1935.

9. In affirming the decree of the District Court.

REASONS FOR GRANTING THE WRIT

The bill of complaint asks that respondent be enjoined from constructing or operating its project save under a license to be issued by the Federal Power Commission. The dam will be 130 feet high, will have a hydraulic capacity of 9,000 cubic feet per second, and will be one of the nation's larger hydroelectric plants (I, 122; XI, 44, 63). Under the decision below, respondent has been held free of the regulatory provisions provided by Section 10 for licenses issued under the Federal Power Act and has been held immune from the recapture clause of Section 14 of the Act.

In dismissing the complaint, the courts below have erroneously decided important questions relating to the interpretation and constitutionality of the Act and have revised long-settled rules as to the test of navigable waters. A number of other issues were presented to and decided by the courts below. We think the decision of some, if not all, of these issues was erroneous. But, in the interests of confining the case to a reasonable compass, we urge as error only the three major questions discussed below.[13]

1. *Constitutionality of the Power Act.*—The decision below undertakes to hold or declare unconstitutional important provisions of the Federal Power Act. The decision that New River is not navigable water of the United States within Section 3 (8) of the Act should have made unnecessary any decision as to the constitutionality of the license conditions required by Section 10 as applied to a project located in navigable waters of the United States. Yet the majority opinion below, while undertaking to leave that question open (XI, 42), contains a plain inference (XI, 40, 14) that

---

[13] An additional question may bear upon the consideration of, or be contained within, the main questions. To err on the side of caution, we also urge specifically that this controversy is governed by the amendments to the Federal Water Power Act of 1920 contained in the Federal Power Act of 1935 (see XI, 37–38).

no conditions to the licenses can validly be imposed except those which relate to the control of navigation. The decision that the project would not affect the interests of interstate commerce under Section 23 should similarly have made unnecessary any consideration of the license conditions as applied to a project for which a license was required under that section. Yet the majority opinion seems to have ruled squarely that the conditions relating to the recapture of the plant at the end of the license period are unconstitutional, even if the project were to be considered as affecting interstate commerce under Section 23 (XI, 43).

If the project were in navigable waters of the United States or affected interstate navigation or commerce, there would be no question of the power of Congress wholly to forbid its construction. *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53; *United States* v. *Rio Grande Dam and Irrigation Co.,* 174 U. S. 690. We should have thought it clear that neither the due process clause nor the elusive concept of unconstitutional conditions would prevent Congress from withholding its prohibition and allowing the project to be constructed, but only upon the prescribed conditions. *Fox River Co.* v. *Railroad Commission,* 274 U. S. 651. And, since Congress could itself construct the project or authorize its agent to do so, it would seem evident that within the ambit of its commerce powers it could prescribe the conditions upon which respondent could construct the project. Finally, the various regulatory provisions are well within the powers Congress could in any event exercise over a hydroelectric plant sending electricity into interstate commerce.[14]

2. *Navigability of the New River.*—On the assumption that each of the navigable stretches of the New River was wholly intrastate,[15] the court below held New River not to be navigable waters of the United States because the intervening reach of 55 miles from Radford to the Virginia-West Virginia border was nonnavigable. The court below reached this conclusion on the grounds that the evidence as to navigation over this reach was based on the recollection of aged witnesses (a ground not relied upon by the district court), that the trips could be made only in times of *unusually* high

---

[14] The recapture provisions of Section 14 are an arguable exception but, if they should not be thought to be included in the purely regulatory powers of Congress, apart from the license provisions, recapture would seem to point to a suit under the Tucker Act, if the property should in truth be taken 50 years in the future, rather than a present charge of unconstitutionality. Compare *Hurley* v. *Kincaid*, 285 U. S. 95.

[15] The assumption is inaccurate, since the reach above Hinton, which was plainly navigable and was improved for navigation by the Federal Government, extended for one to two miles into Virginia (VIII, 4; XI, 23, 59; see, also, note 12, *supra*, p. 11).

water,[16] and then with difficulty and danger, and that the keelboat traffic lasted for only a few years prior to the coming of the railroads (XI, 24–25). Neither the court below nor the District Court disputed the accuracy of the facts summarized by the dissenting opinion of Circuit Judge Parker[17] (XI, 48–49). These show a substantial, though doubtless irregular, commerce over this intervening reach. The critical question is whether a decision of navigability can be avoided because the interstate traffic was irregular, difficult, and had not been long continued.

---

[16] This finding, not made by the District Court, has only fugitive support in the record and is contradicted by a wealth of evidence. Only one trip was said to have been made at unusually high water (VIII, 248); the river was actually only 12 to 18 inches above mean flow (VII, 1194–5, 1198–9). On the other hand, not one of the 30 witnesses (*supra*, pp. 9–10) testified that traffic on this reach of the river took place or was possible only during periods of *unusually* high water. To the contrary, see: Collins, II, 324; Flannagan, II, 304–5; Snodgrass, II, 371–2; Peters, II, 393–5; J. R. Smith, II, 406–7, 408, 410; E. M. Smith, II, 428–9; Reed, II, 438; Buckland, VIII, 282; Knode, VIII, 317. It is true that some of these witnesses recalled that passage of the "several difficult falls" (XI, 23) was difficult and at times impossible at low stages. But this was also true of the admittedly navigable reaches prior to their improvement (Report of Chief of Engineers, II, 656). The report submitted to Congress by the War Department in 1912 stated that navigable depths of 2 feet over the controlling bars between Radford and Hinton would ordinarily be found (II, 698).

[17] His opinion contains the applicable record references, to Appendix II of appellant's brief.

The decisions of this Court make it plain that the federal waters are those which are navigable and not only those which are easily navigable. The Fox River was not non-navigable because rapids and sand bars prevented unbroken navigation. *The Montello,* 20 Wall, 430, 441–443. The Desplaines River was held navigable although it had carried no commerce for a century. *Economy Light & Power Co.* v. *United States,* 256 U. S. 113, 123; see *Arizona* v. *California,* 283 U. S. 423, 452–454. The Green, Grand, and Colorado rivers were held navigable although sand bars, rapids, high velocities, and floodwaters made their use difficult; on the Grand River the rapids had been negotiated only by lumber rafts and a 5-mile reach of the Colorado which had borne no commercial traffic whatever was nevertheless held navigable because of the similarity of its physical characteristics with those of other reaches held navigable. *United States* v. *Utah,* 283 U. S. 64, 79, 89. Although shoals, reefs, and rapids obstructed navigation, and although it was not adequately improved for commercial navigation, the Tennessee River was held navigable in *Ashwander* v. *Valley Authority,* 297 U. S. 288, 328–329; see *Tempel* v. *United States,* 248 U. S. 121, 123–124. These decisions apply *a fortiori* here, for Section 3 (8) of the Act comprehensively defines navigable waters to include all parts of streams "which either in their natural or improved condition, notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage, are used or suitable for use for the transportation of persons or property in interstate or foreign commerce."

The majority of the court below undertook to import additional restrictions upon what constitutes a river navigable in fact. There must, in its view, be water-borne commerce which is valuable, commonly used, and of a substantial and permanent nature (XI, 14–15, 22, 25). It cited opinions of this Court in which each of these adjectives had been used. *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 699; *Leovy* v. *United States*, 177 U. S. 621; *United States* v. *Cress*, 243 U. S. 316, 321; *Oklahoma* v. *Texas*, 258 U. S. 574, 591; *United States* v. *Oregon*, 295 U. S. 1, 23. But none of these decisions related to rivers on which there had been appreciable commercial navigation;[18] adjectives culled from *dicta* cannot be accumulated to override the actual decisions of this Court.

---

[18] In the *Rio Grande* case the navigation consisted of logs and rafts which could be floated only in times of temporary high water (174 U. S. at 699). The *Leovy* case dealt with a crevasse from the Mississippi, over which oyster fishermen sometimes traveled, but which had never been used to carry freight or passengers and which had since closed into a mere marsh (177 U. S. at 627). In *Oklahoma* v. *Texas* the Red River was shown to have sufficient water for navigation only during temporary periods of high water, and that since the cessation of all navigation the river had become even shallower (258 U. S. at 587–590). The *Oregon* case dealt with lakes which had been used only for sporadic, non-commercial boating and which frequently dried up entirely (295 U. S. at 20–23). The *Cress* case dealt with a wholly different issue.

The decision below serves to import confusion into the definition of navigable waters. Moreover, apart from the more general question, neither court below denied that New River is navigable at the site of the project, from Radford upstream for 25 miles. They found the waters not to be navigable waters of the United States simply because of the difficulties of navigation over the interstate reach downstream. But, as the dissenting opinion points out (XI, 57–58), this navigable water connects with a railroad at Radford and the water traffic, consisting principally of pigiron from upstream furnaces, was continued by railroad into interstate commerce (I, 101). The waters are therefore navigable waters of the United States for purposes, at the least, of fixing the boundaries of the regulatory powers exercised by Congress. See *The Daniel Ball,* 10 Wall. 557.

3. *Effect Upon the Interests of Interstate Commerce.*—Even if the courts below were correct in finding New River not to be navigable waters of the United States, the Commission license would be required under Section 23 of the Act if the project were found by the Commission to affect the interests of interstate commerce. The majority of the court below held that the section related only to an adverse effect on downstream navigation and that the project would have no such effect (XI, 34–43, 26–31).

But, even apart from the effect on the New River itself,[19] the project will have its effect upon the navigation upon the Kanawha and Ohio rivers. We may assume the lower courts were correct in holding as a fact that the "power waves" in the river flow, resulting from the normal operation of the dams, will be substantially dissipated before they reach the Kanawha River (I, 123–130; XI, 26–30). But each of these decisions was based, in whole or in part, upon three postulates of law; that Section 23 applies only when the effect upon downstream navigable capacity is adverse; that it applies only when the intended and probable operation of the project will interfere with downstream navigation; and that the Section is inapplicable where this effect is avoided through absorption of the waves by downstream dams. None of these propositions is correct. The differences in terminology between Section 23 and Section 10 of the Rivers and Harbors Act of 1899 show that an adverse effect upon navigable capacity is not the only condition to the operation of Section 23. And the regulatory powers granted by Congress to the Commission do not evaporate because the respondent proposes to operate its project in an unobjectionable manner, nor because other dams, constructed by or under the authority of the United States, will neutralize any adverse effect of the project.

---

[19] The navigable stretch above Hinton reaches to Glen Lyn, Virginia (*supra*, p. 11). The respondents in the court below did not deny the effect upon the navigability of this stretch of the river, but denied its navigability (see XI, 59); neither the District Court nor the majority below, on the other hand, questioned the navigability of this reach of the New River (*supra*, p. 9).

The dam, in addition, will plainly affect the flood-control plans for the Ohio River and its tributaries. We need not, after the flood of 1937, demonstrate the national interest—in terms of the general welfare and in terms of interstate navigation and commerce—of flood control in the Ohio River basin. The New River is the largest single tributary of the Ohio and is subject to extreme floods (I, 91). A dam operated for flood-control purposes must have a comparatively empty reservoir; one operated for power purposes must have a comparatively full reservoir. The project of respondent, as the dissenting opinion below points out (XI, 60–61), should be subject to the control of the United States to insure adequate recognition of the flood control as well as of the power production capacities of the project.

CONCLUSION

For these reasons, it is respectfully submitted that this petition for a writ of certiorari should be granted.

Francis Biddle,
Solicitor General.

David W. Robinson, Jr.,
General Counsel,
Federal Power Commission.

January 1940.

APPENDIX.

The Rivers and Harbors Act of 1899, c. 425, 30 Stat. 1121, 1151 (U. S. C., Title 33, Secs. 401, 403):

> SEC. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further,* That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.
>
> SEC. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the

waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same.

Federal Water Power Act of 1920, c. 285, 41 Stat. 1063, as amended by the Federal Power Act of 1935,[1] c. 687, 49 Stat. 838 (U. S. C., Title 16, Secs. 791–817):

SEC. 3. [That] The words defined in this section shall have the following meanings for the purposes of this Act, to wit:

* * * * *

(*8*) "Navigable waters" means those parts of streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States, and which either in their natural or improved condition, notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage, are used or suitable for use for the transportation of persons or property in interstate or foreign commerce, including therein all such interrupting falls, shallows, or rapids; together with such other parts of streams as shall have been authorized by Congress for improvement by the United States or shall have been recommended to Congress for such improvement after investigation under its authority.

---

[1] Matter in brackets was contained in the Federal Water Power Act of 1920, but eliminated in the amendments made by the Federal Power Act of 1935; italicized matter was added by the latter act. Changes in capitalization and punctuation are, where possible, indicated by italics only.

* * * * *

SEC. 4. [That] The Commission is hereby authorized and empowered—

* * * * *

[d] (*e*) To issue licenses to citizens of the United States, or to any association of such citizens, or to any corporation organized under the laws of the United States or any State thereof, or to any State [,] or municipality for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power-houses, transmission lines, or other project works necessary or convenient for the development and improvement of navigation [,] and for the development, transmission, and utilization of power across, along, from or in any of the [navigable waters of the United States] *streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several* States, or upon any part of the public lands and reservations of the

United States (including Territories), or for the purpose of utilizing the surplus water or water power from any Government dam, except as herein provided: Provided, That licenses shall be issued within any reservation only after a finding by the Commission that the license will not interfere or be inconsistent with the purpose for which such reservation was created or acquired, and shall be subject to and contain such conditions as the Secretary of the department under whose supervision such reservation falls shall deem necessary for the adequate protection and utilization of such reservation: Provided further, That no license affecting the navigable capacity of any navigable waters of the United States shall be issued until the plans of the dam or other structures affecting navigation have been approved by the Chief of Engineers and the Secretary of War. Whenever the contemplated improvement is, in the judgment of the Commission, desirable and justified in the public interest for the purpose of improving or developing a waterway or waterways for the use or benefit of interstate or [of] foreign commerce, a finding to that effect shall be made by the Commission and shall become a part of the records of the Commission: Provided further, That in case the Commission shall find that any Government dam may be advantageously used by the United States for public purposes in addition to navigation, no license therefor shall be issued until two years after it shall have reported to Congress the facts and conditions relating thereto, except that this provision shall not apply to any Government dam constructed prior to [the passage of this Act] *June 10, 1920*: *And provided* *further,* That upon the filing of any application for a license which has not been preceded by a preliminary permit under subsection [e] *(f)* of this section, notice shall be given and published as required by the proviso of said subsection.

* * * * *

SEC. 6. [That] *L*icenses under this [Act] *Part* shall be issued for a period not exceeding fifty years. Each such license shall be conditioned upon acceptance by the licensee of all the terms and conditions of this Act and such further conditions, if any, as the Commission shall prescribe in conformity with this Act, which said terms and conditions and the acceptance thereof shall be expressed in said license. Licenses may be revoked only for the reasons and in the manner prescribed under the provisions of this Act, and may be altered or surrendered only upon mutual agreement between the licensee and the Commission after [ninety] *thirty* days' public notice. *Copies of all licenses issued under the provisions of this Part and calling for the payment of annual charges shall be deposited with the General Accounting Office, in compliance with section 3743, Revised Statutes, as amended (U. S. C., title 41, sec. 20).*

* * * * *

SEC. 10. [That] All licenses issued under this [Act] *Part* shall be on the following conditions:

(a) That the project adopted, including the maps, plans, and specifications, shall be such as in the judgment of the Commission will be best adapted to a comprehensive [scheme of] *plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce,* *for the* improvement and utilization [for the purposes of navigation,] of water-power development, and [of] *for* other beneficial public uses, *including recreational purposes;* and if necessary to secure such [scheme] *plan* the Commission shall have authority to require the modification of any project and of the plans and specifications of the project works before approval.

(b) That except when emergency shall require for the protection of navigation, life, health, or property, no substantial alteration or addition not in conformity with the approved plans shall be made to any dam or other project works constructed hereunder of *an installed* capacity in excess of one hundred horsepower without the prior approval of the Commission; and any emergency alteration or addition so made shall thereafter be subject to such modification and change as the Commission may direct.

(c) That the licensee shall maintain the project works in a condition of repair adequate for the purposes of navigation and for the efficient operation of said works in the development and transmission of power, shall make all necessary renewals and replacements, shall establish and maintain adequate depreciation reserves for such purposes, shall so maintain and operate said works as not to impair navigation, and shall conform to such rules and regulations as the Commission may from time to time prescribe for the protection of life, health, and property. Each licensee hereunder shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto, constructed under the license, and in no event shall the United States be liable therefor.

(d) That after the first twenty years of operation, out of surplus earned thereafter, if any, accumulated in excess of a specified reasonable rate of return upon the [actual, legitimate] *net* investment of a licensee in any project or projects under license, the licensee shall establish and maintain amortization reserves, which reserves shall, in the discretion of the Commission, be held until the termination of the license or be applied from time to time in reduction of the net investment. Such specified rate of return and the proportion of such surplus earnings to be paid into and held in such reserves shall be set forth in the license.

(e) That the licensee shall pay to the United States reasonable annual charges in an amount to be fixed by the Commission for the purpose of reimbursing the United States for the costs of the administration of this [Act] *Part*; for recompensing it for the use, occupancy, and enjoyment of its lands or other property; and for the expropriation to the Government of excessive profits until the respective States shall make provision for preventing excessive profits or for the expropriation thereof to themselves, or until the period of amortization as herein provided is reached, and in fixing such charges the Commission shall seek to avoid increasing the price to the consumers of power by such charges, and *any* such charges [for the expropriation of excessive profits] may be adjusted from time to time by the Commission as conditions may require: Provided, That when licenses are issued involving the use of Government dams or other structures owned by the United States or tribal lands embraced within Indian reservations the Commission shall, *subject to the approval of the Secretary of the Interior in the case of such dams or structures in reclamation projects and, in the case of such tribal lands, subject to the approval of the Indian tribe having jurisdiction of such lands as provided in section 16 of the Act of June 18, 1934 (48 Stat. 984)*, fix a reasonable annual charge for the use thereof; and such charges may *with like approval* be readjusted *by the Commission* at the end of twenty years after the [beginning of operations] *project is available for service* and at periods of not less than ten years thereafter [in a manner to be described in each license] *upon notice and opportunity for hearing*: Provided further, That licenses for the development, transmission, or distribution of power by States or municipalities shall be issued and enjoyed without charge to the extent such power is sold to the public without profit or is used by such State or municipality for State or municipal purposes, except that as to projects constructed or to be constructed by States or municipalities primarily designed to provide or improve navigation, licenses therefor shall be issued without charge; and that licenses for the development, transmission, or distribution of power for domestic, mining, or other beneficial use in projects of not more than one hundred horsepower *installed* capacity may be issued without charge, except on tribal lands within Indian reservations; but in no case shall a license be issued free of charge for the development and utilization of power created by any Government dam and that the amount charged therefor in any license shall be such as determined by the Commission. *In the event an overpayment of any charge due under this section shall be made by a licensee, the Commission is authorized to allow a credit for such overpayment when charges are due for any subsequent period.*

(f) That whenever any licensee hereunder is directly benefited by the construction work of another licensee, a permittee, or of the United States of a storage reservoir or other headwater improvement, the Commission shall require as a condition of the license that the licensee so benefited shall reimburse the owner of such reservoir or other improvements for such part of the annual charges for interest, maintenance, and depreciation thereon as the Commission may deem equitable. The proportion of such charges to be paid by any licensee shall be determined by the Commission. *The licensees or permittees affected shall pay to the United States the cost of making such determination as fixed by the Commission.*

Whenever such reservoir or other improvement is constructed by the United States the Commission shall assess similar charges against any licensee directly benefited thereby, and any amount so assessed shall be paid into the Treasury of the United States, to be reserved and appropriated as a part of the special fund for headwater improvements as provided in section 17 hereof.

Whenever any power project not under license is benefited by the construction work of a licensee or permittee, the United States or any agency thereof, the Commission, after notice to the owner or owners of such unlicensed project, shall determine and fix a reasonable and equitable annual charge to

be paid to the licensee or permittee on account of such benefits, or to the United States if it be the owner of such headwater improvement:

(g) Such other conditions not inconsistent with the provisions of this Act as the Commission may require.

(h) That combinations, agreements, arrangements, or understandings, express or implied, to limit the output of electrical energy, to restrain trade, ~~or~~ to fix, maintain, or increase prices for electrical energy or service are hereby prohibited.

(i) In issuing licenses for a minor part only of a complete project, or for a complete project of not more than one hundred horsepower *installed* capacity, the Commission may in its discretion waive such conditions, provisions, and requirements of this [Act] *Part,* except the license period of fifty years, as it may deem to be to the public interest to waive under the circumstances: *Provided,* That the provisions hereof shall not apply to annual charges for the use of lands within Indian reservations.

* * * * *

SEC. 14. [That] *Upon* not less than two years' notice in writing from the Commission the United States shall have the right upon or after the expiration of any license to take over and thereafter to maintain and operate any project or projects as defined in section 3 hereof, and covered in whole or in part by the license, or the right to take over upon mutual agreement with the licensee all property owned and held by the licensee then valuable and serviceable in the development, transmission, or distribution of power and which is then dependent for its usefulness upon the continuance of the license, together with any lock or locks or other aids to navigation constructed at the expense of the licensee, upon the condition that before taking possession it shall pay the net investment of the licensee in the project or projects taken, not to exceed the fair value of the property taken [,] plus such reasonable damages, if any, to property of the licensee valuable, serviceable, and dependent as above set forth but not taken, as may be caused by the severance therefrom of property taken, and shall assume all contracts entered into by the licensee with the approval of the Commission. The net investment of the licensee in the project or projects so taken and the amount of such severance damages, if any, shall be determined by [agreement between] the Commission [and the licensee, and in case they can not agree, by proceedings in equity instituted by the United States in the district court of the United States in the district within which any such property may be located:] *after notice and opportunity for hearing.* [Provided, That] Such net investment shall not include or be affected by the value of any lands, rights-of-way, or other property of the United States licensed by the Commission under this Act, by the license [,] or by good will, going value, or prospective revenues; [Provided further, That] *nor shall* the values allowed for water rights, rights-of-way, lands, or interest in lands [not] be in excess of the actual reasonable cost thereof at the time of acquisition by the licensee: Provided, That the right of the United States or any State or municipality to take over, maintain, and operate any project licensed under this Act at any time by condemnation proceedings upon payment of just compensation is hereby expressly reserved.

* * * * *

SEC. 23. * * *

* * * * *

(b) *It shall be unlawful for any person, State, or municipality, for the purpose of developing electric power, to construct, operate, or maintain any dam, water conduit, reservoir, power house, or other navigable works incidental thereto across, along, or in any of the navigable waters of the United States, or upon any part of the public lands or reservations of the United States (including the Territories), or utilize the surplus water or water power from any Government dam, except under and in accordance with the terms of a permit or valid existing right-of-way granted prior to June 10, 1920, or a license granted pursuant to this Act.* [That] Any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce [between] *with* foreign nations and among the several States [may in their discretion] *shall before such construction* file declaration of such intention with the Commission, whereupon the Commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not [proceed with such construction] *construct, maintain, or operate such dam or other project works* until it shall have applied for and shall have received a license under the provisions of this Act. If the Commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws.

U. S. GOVERNMENT PRINTING OFFICE: 194

FILE COPY

[illegible]
CLERK

[illegible]

INDEX

Page
Opinions below — 1
Jurisdiction — 1
Questions presented — 2
Statutes involved — 2

Statement:

- 1. New River — 5
- 2. Prior proceedings — 7
- 3. This suit — 13

Specification of errors to be urged — 18
Summary of argument — 19
Argument — 28

- I. New River at the site of respondent's project is navigable water of the United States — 29
  - A. The definition of navigable waters of the United States — 30
  - B. The Allisonia-Radford and Wiley's Shoals-Hinton stretches — 35
  - C. The Radford-Wiley's Shoals stretch — 38
    - 1. Actual navigation — 39
      - (a) Early navigation — 41
      - (b) Engineers' reports — 42
      - (c) Testimony as to navigation
      - (d) The legal criteria of the courts — 47
        below — 55
    - 2. Suitability for navigation — 59
      - (a) Actual navigation as evidence of suitability for navigation — 61
      - (b) Physical characteristics — 62
        - (i) Sufficiency of water flow — 62
        - (ii) Velocity of the current — 63
        - (iii) Channel through natural obstructions — 65
  - D. The Allisonia-Radford stretch as a channel of interstate commerce — 73

Argument—Continued. Page

II. Respondent's project must be licensed because it will obstruct navigable capacity and affect the interests of interstate commerce 76

  A. The operation of the project will obstruct the navigable capacity of navigable waters of the United States 76

    1. The project will impair the navigable capacity of New River between Hinton, West. Virginia, and Glen Lyn, Virginia 79

    2. The project will impair the navigable capacity of the Kanawha and Ohio Rivers 81

      (a) The undisputed evidence 81

      (b) The compensatory effect of downstream dams 85

      (c) Respondent's intended method of operation 88

  B. The unlicensed construction and operation of respondent's project is in violation of Section 23 of the Federal Power Act 88

    1. Preliminary Questions of Construction 89

      (a) The section applies to non-navigable waters 89

      (b) The 1935 amendments apply 91

    2. Section 23 applies even though the effect on navigable capacity be beneficial rather than adverse 93

      (a) The project will have at least a beneficial effect 93

      (b) Section 23 applies if the project will have a beneficial effect 94

    3. The project will affect the flood control plans for the Ohio Valley 101

      (a) Section 23 applies if the project affects the interests of flood control 102

      (b) The Ohio Valley flood-control program 106

      (c) The effect of respondent's project upon the flood-control program 109

Argument—Continued. Page
- III. The challenged provisions of the Federal Power Act are constitutional 113
  - A. The constitutional background of the Federal Water Power Act of 1920 114
  - B. The scope of the licensing power under the commerce clause 121
    - 1. Congress has power to prohibit the project or to require the license 122
      - (a) If the project impairs navigable capacity 122
      - (b) If the project affects navigable capacity or flood control 123
    - 2. The terms of the license 127
  - C. There is no invasion of the rights of the States 131
    - 1. The Tenth Amendment is inapplicable 132
    - 2. The Act safeguards national interests and does not invade fields reserved to the States 133
  - D. There is no taking without just compensation 134
    - 1. There is no taking of power rights 136
    - 2. The recapture provision is valid 136
      - (a) Respondent cannot now raise the question 137
      - (b) The recapture provision is a valid condition to the license 139
      - (c) The recapture provision is valid even if there were no power to forbid construction 141

Conclusion 144

Appendix A 145

Appendix B 178

Appendix C 185

CITATIONS

Cases:

Abie State Bank v. *Bryan*, 282 U. S. 765 93

Anniston Mfg. Co. v. *Davis*, 301 U. S. 337 27, 138, 139

Appalachian Electric Power Co. v. *Smith*, 4 F. Supp. 6, aff'd, 67 F. (2d) 451, certiorari denied, 291 U. S. 674 12, 13, 120

Arizona v. *California*, 283 U. S. 423 32, 57, 119, 130

Ashwander v. *Tennessee Valley Authority*, 297 U. S. 288 25, 33, 67, 119, 138

Cases—Continued.

Page
Austin v. *The Aldermen*, 7 Wall. 694 126
Berea College v. *Kentucky*, 211 U. S. 45 126
Blake v. *McClung*, 172 U. S. 239 130
Brewer Oil Co. v. *United States*, 260 U. S. 77 30
Brooks v. *United States*, 267 U. S. 432 126
California Oregon Power Co. v. *Cement Co.*, 295 U. S. 142 120
Caminetti v. *United States*, 242 U. S. 470 127
Carpenter v. *Wabash Ry. Co.*, No. 230, October Term, 1939 93
Daniel Ball, The, 10 Wall. 557 .... 22, 74
Dayton-Goose Creek Ry. Co. v. *United States*, 263 U. S. 456 143
Driscoll v. *Edison Co.*, 307 U. S. 104, No. 509, October Term, 1938 .... 28, 143
Duplex Co. v. *Deering*, 254 U. S. 443 92
Economy Light Co. v. *United States*, 256 U. S. 113 .... 21, 22, 32, 33, 57, 58, 59, 62, 66
Edison Co. v. *Labor Board*, 305 U. S. 197 125
Electric Bond Co. v. *Commission*, 303 U. S. 419 .... 27, 125, 138
Everard's Breweries v. *Day*, 265 U. S. 545 34
Farmers' Bank v. *Minnesota*, 232 U. S. 516 126
Fox River Co. v. *Railroad Commission*, 274 U. S. 651 .... 28, 130, 141
Georgia Ry. Co. v. *Decatur*, 262 U. S. 432 140
Gibbons v. *Ogden*, 9 Wheat. 1 .... 127, 140
Gooch v. *United States*, 297 U. S. 124 126
Green Bay & Canal Co. v. *Patten Paper Co.*, 172 U. S. 58 131
Greenleaf Lumber Co. v. *Garrison*, 237 U. S. 251 123
Hatch v. *Reardon*, 204 U. S. 152 126
Helvering v. *Davis*, 301 U. S. 619 134
Hinderlider v. *La Plata Co.*, 304 U. S. 92 134
Hipolite Egg Co. v. *United States*, 220 U. S. 45 126
Hurley v. *Kincaid*, 285 U. S. 95 .... 27, 139
Kansas v. *Colorado*, 206 U. S. 46 134
Kentucky Whip & Collar Co. v. *Illinois Central R. Co.*, 299 U. S. 334 127
Labor Board v. *Jones & Laughlin*, 301 U. S. 1 34
Leovy v. *United States*, 177 U. S. 621 .... 19, 40
Liggett v. *Lee*, 288 U. S. 517 126
McCulloch v. *Maryland*, 4 Wheat. 316 121
Montello, The, 20 Wall. 430 .... 21, 22, 33, 57, 59, 64, 66
Mulford v. *Smith*, 307 U. S. 38 133
New Jersey v. *Sargent*, 269 U. S. 328 128
North Bloomfield Gravel Mining Co. v. *United States*, 88 Fed. 664 122
Oklahoma v. *Texas*, 258 U. S. 574 40
Oklahoma v. *Woodring*, Orig., No. —, October Term, 1939 .... 102, 108, 133
Oregon & Cal. R. R. v. *United States*, 238 U. S. 393 130
Paducah v. *Paducah Ry. Co.*, 261 U. S. 267 140
Pennsylvania v. *Wheeling & Belmont Bridge Co.*, 18 How. 421 92

Cases—Continued.

Page

Power Mfg. Co. v. *Saunders*, 274 U. S. 490 — 138

Public Service Co. v. *St. Cloud*, 265 U. S. 352 — 141

Public Utilities Commission v. *Attleboro Steam & Elec. Co.*, 273 U. S. 83 — 125

Purity Extract Co. v. *Lynch*, 226 U. S. 192 — 34

Railroad Commission of Wisconsin v. *Chicago, B. & Q. R. Co.*, 257 U. S. 563 — 34, 122

Railroad Retirement Board v. *Alton R. Co.*, 295 U. S. 330 — 131

Roberts v. *New York City*, 295 U. S. 264 — 28, 140

Ruddy v. *Rossi*, 248 U. S. 104 — 130

Ruppert v. *Caffey*, 251 U. S. 264 — 34

Shields v. *Utah Idaho Central R. R. Co.*, 305 U. S. 177 — 14

Shreveport Rate Cases, 234 U. S. 342 — 34, 122

Smith v. *Illinois Bell Telephone Co.*, 282 U. S. 133 — 92

Southern Iowa Electric Co. v. *Chariton*, 255 U. S. 539 — 140

Stephenson v. *Binford*, 287 U. S. 251 — 130

Terral v. *Burke Construction Co.*, 257 U. S. 529 — 130

Texas & N. O. R. Co. v. *Railway Clerks*, 281 U. S. 548 — 30

Thornton v. *United States*, 271 U. S. 414 — 127

Union Pacific R. R. Co. v. *Public Service Commission*, 248 U. S. 67 — 138

United States v. *Bekins*, 304 U. S. 27 — 133

United States v. *Chandler-Dunbar Co.*, 229 U. S. 53 — 136, 140

United States v. *Cress*, 243 U. S. 316 — 124

United States v. *Eighty Acres of Land*, 26 F. Supp. 315 — 120

United States v. *546.03 Acres*, 22 F. Supp. 775 — 120

United States v. *Griffin*, 58 F. (2d) 674 — 120

United States v. *Lowden*, No. 343, October Term, 1939 — 131

United States v. *Lynah*, 188 U. S. 445 — 139

United States v. *O'Donnell*, 303 U. S. 501 — 30

United States v. *Oregon*, 295 U. S. 1 — 40

United States v. *Rio Grande Irrigation Co.*, 174 U. S. 690 — 25, 40, 62, 76, 81, 120, 122, 123

United States v. *The Schooner Peggy*, 1 Cranch 103 — 92

United States v. *Sponenbarger*, No. 72, October Term, 1939 — 108

United States v. *Utah*, 283 U. S. 64 — 21, 32, 33, 57, 61, 66, 120

United States v. *West Virginia Power Co.*, Law No. 13, S. D. W. Va — 110

United States v. *West Virginia Power Co.*, 91 F. (2d) 611 — 110, 120

Utah Power & L. Co. v. *Pfost*, 286 U. S. 165 — 125

Water Power Co. v. *Water Commissioners*, 168 U. S. 349 — 58

Wisconsin v. *Duluth*, 96 U. S. 379 — 33

Wisconsin v. *Illinois*, 278 U. S. 367 — 123

Wisconsin Railroad Commission v. *Chicago, B. & Q. R. R. Co.*, 257 U. S. 563 — 34, 122

Yearsley v. *Ross Construction Co.*, No. 156, October Term, 1939, decided Jan. 29, 1940 — 139

Constitution and Statutes: Page
Tenth Amendment to the Constitution — 132
Rivers and Harbors Act of March 3, 1899, c. 425, 30 Stat. 1121:
  Sec. 9 — 3, 14, 145
  Sec. 10 — 3, 5, 14, 22, 76, 81, 88, 89, 92, 95, 96, 98, 146
  Sec. 12 — 3
Act of September 19, 1899, c. 907, Sec. 10, 26 Stat. 426, 454 — 81
Reclamation Act of 1902, c. 1093, 32 Stat. 388 — 117, 120
Federal Water Power Act of June 10, 1920, c. 285, 41 Stat. 1063:
  Sec. 3 — 10
  Sec. 4 — 5, 15
  Sec. 9 — 135, 149
  Sec. 19 — 156
  Sec. 20 — 135, 157
  Sec. 22 — 135
  Sec. 23 — 3, 7, 10, 95
  Sec. 27 — 135
Boulder Canyon Project Act, c. 42, 45 Stat. 1057 — 120
Tennessee Valley Authority Act, c. 32, 48 Stat. 58 — 120
Federal Water Power Act of 1920, c. 285, 41 Stat. 1063, as amended by the Federal Power Act of August 26, 1935, c. 687, 49 Stat. 803:
  Sec. 3 — 2, 19, 31, 32, 33, 34, 39, 65, 71, 74, 75, 135, 146
  Sec. 4 — 3, 4, 15, 135, 147
  Sec. 6 — 4, 137, 149
  Sec. 7 — 120, 135
  Sec. 10 — 4, 17, 103, 104, 128, 130, 135, 137, 150
  Sec. 14 — 4, 129, 135, 137, 144, 154
  Sec. 17 — 135
  Sec. 23 — 2, 4, 15, 16, 17, 22, 23, 24, 76, 89, 90, 92, 97, 98, 100, 102, 103, 104, 105, 111, 112, 144, 158
  Sec. 201 — 159
  Sec. 205 — 161
  Sec. 206 — 164
  Sec. 207 — 164
  Sec. 208 — 165
  Sec. 209 — 165
  Sec. 301 — 167
  Sec. 302 — 169
  Sec. 306 — 170
  Sec. 307 — 170
  Sec. 313 — 174
  Sec. 314 — 176
Flood Control Act of 1936, c. 688, Sec. 1, 49 Stat. 1570 — 105
Flood Control Act of 1937, c. 877, 50 Stat. 876 — 107
Flood Control Act of 1938, c. 795, 52 Stat. 1215 — 107
Bonneville Project Act, c. 720, 50 Stat. 731 — 120

Miscellaneous:	Page
Army Engineers, Report on Tennessee River, H. Doc. No. 328, 71st Cong., 2d Sess., pp. 64–75, 91–95	116
Brief in support of response to rule to show cause in *Oklahoma* v. *Woodring*, No. —, Orig., this Term	108, 120
Supplemental Brief for petitioner in *United States* v. *Sponenbarger*, No. 72, this Term	108
H. Flood Control Com. Doc. No. 1, 75th Cong., 1st Sess., pp. 1–6, 12	107
48 Cong. Rec. 11796	117, 118
49 Cong. Rec. 2702	119
49 Cong. Rec. 3056, 3057	119
53 Cong. Rec. 2639	119
53 Cong. Rec. 2650	119
79 Cong. Rec. 9053	98
Engineers, Chief of, Annual Report for 1876	64
Engineers, Chief of, Annual Report for 1883	37
Engineers, Chief of, Annual Report for 1939, Part I, Vol. 2	106
Horton and Jackson, *Ohio Valley Flood of March–April 1913*, pp. 44–45, 85–86, 90	106
H. Doc. No. 427, 57th Cong., 2d Sess	117
H. Doc. No. 1350, 60th Cong., 2d Sess	117
H. Doc. No. 91, 74th Cong., 1st Sess	110
H. Doc. No. 306, 74th Cong., 1st Sess	106, 108
House Hearings before the Committee on Flood Control, 75th Cong., 1st Sess., June 1937	107, 108
H. Rep. No. 910, 66th Cong., 2d Sess	96
H. Rep. No. 1318, 74th Cong., 1st Sess	91, 97, 98
36 Op. A. G. 355	11
President Roosevelt, Message of, vetoing Rainy River Bill (1908), S. Doc. No. 438, 60th Cong., 1st Sess	117
President Roosevelt, Message of, and accompanying Report of National Conservation Commission (1909), S. Doc. No. 676, 60th Cong., 2d Sess., Vol. I, pp. 6, 44–45; Vol. II, pp. 171–177	116
President Roosevelt, Veto Message on James River Bill 71 (1909), H. Doc. No. 1350, 60th Cong., 2d Sess., pp. 5–8	116
President Taft, Message of, vetoing Coosa River Bill, 48 Cong. Rec. 11796	117, 118
Report of National Resources Committee, *Energy Resources and National Policy* (1939)	116
S. 2796, 74th Cong., 1st Sess	97
S. Doc. No. 438, 60th Cong., 1st Sess	118
S. Doc. No. 469, 62d Cong., 2d Sess., pp. 42–43	116
S. Rep. No. 1131, 62d Cong., 3d Sess	118
S. Doc. 246, 64th Cong., 1st Sess	113

Miscellaneous—Continued. Page
S. Rep. No. 180, 66th Cong., 1st Sess. 96, 119
S. Rep. No. 621, 74th Cong., 1st Sess. 91, 97
Tennessee Valley Authority, Annual Reports:
1938 108
1939 108

In the Supreme Court of the United States

OCTOBER TERM, 1939

No. 674

THE UNITED STATES OF AMERICA, PETITIONER
v.
APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

BRIEF FOR THE PETITIONER

OPINIONS BELOW

The opinion of the United States District Court for the Western District of Virginia (R. 101–154) is reported in 23 F. Supp. 83. The opinions of the Circuit Court of Appeals (R. 2880–2922) are reported in 107 F. (2d) 769.

JURISDICTION

The judgment of the Circuit Court of Appeals was entered on November 6, 1939 (R. 2880). The petition for a writ of certiorari was filed on January 26, 1940, and was granted on March 4, 1940 (R. 2944). The jurisdiction of this Court rests on Section 240 (a) of the Judicial Code, as amended by the Act of February 13, 1925.

QUESTIONS PRESENTED

1. Whether respondent's project, a dam and hydro-electric plant constructed in New River, is in navigable waters of the United States, within the meaning of Section 9 of the Rivers and Harbors Act of 1899 and Section 3 (8) of the Federal Power Act.[1]

2. Whether respondent's project will obstruct the navigable capacity of waters of the United States within the meaning of Section 10 of the Rivers and Harbors Act of 1899, or affect the interests of interstate commerce within the meaning of Section 23 of the Federal Power Act.

3. Whether the licensing provisions of the Federal Power Act are constitutional, whether applied to a project located in navigable waters, or to a project which affects interstate commerce and is located in nonnavigable waters over which Congress has jurisdiction under the commerce clause.

STATUTES INVOLVED

The pertinent provisions of the Rivers and Harbors Act of 1899 and the Federal Water Power Act of 1920 as amended by ~~and~~ the Federal Power Act of 1935 are printed in Appendix A (*infra*, pp. 145–177). The provisions of the Federal Water Power Act and the Federal Power Act are given in a comparative print in the appendix to the petition for a writ of certiorari (pp. 26–37). The major statutory provisions pertinent to this case may be summarized as follows:

---

[1] An additional question, presented for precautionary purposes only, is whether the amendments to the Federal Water Power Act of 1920 found in the Federal Power Act of 1935 are applicable to respondent's project. In the interests of simplicity we shall in this brief refer simply to the "Federal Power Act." (See *infra*, pp. 91–92.)

Section 9 of the Rivers and Harbors Act of 1899 provides that no dam shall be built across a navigable river or other navigable water of the United States without the consent of Congress. Section 10 of that Act forbids the creation of any obstruction, not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States. Section 12 provides for removal of structures erected in violation of these provisions by court injunction in a suit instituted by the Attorney General.

Section 4 (e) of the Federal Power Act provides for the issuance of a license by the Federal Power Commission for the construction of projects on streams over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several states.[2] The licenses, under Section 6, are to be issued for not more than 50 years. They shall, under Section 10, include, *inter alia,* the following conditions: the project shall be the best adapted for navigation, power development, and other beneficial public uses; the project shall be maintained in good repair and operated in the interests of navigation; amortization reserves shall be maintained after the twentieth year of operation out of any excess return upon the actual investment, for the purpose of reducing the net investment; annual charges to meet administration expenses shall be paid the United States; excessive profits, unregulated by state authority, shall be expropriated to the United States. Section 10 (i) also provides for a so-called minor part license, in which the Commission may waive the conditions in a license for a minor part of a complete project or for projects of less than 100-horsepower capacity. Under Section 14, the United States, on two years' notice, may take over any project the license for which has expired, on condition that it pay the licensee its net investment in the property (not to exceed its fair value).

---

[2] Originally this section provided for the issuance of licenses for projects on "navigable waters of the United States," and Section 23 of the original Act prohibited the construction of projects without a license on nonnavigable waters over which Congress has jurisdiction under its authority to regulate commerce, if the person desiring to construct the project filed a declaration of intention, and the Commission found that the project would affect the interests of interstate or foreign commerce.

Section 23 (b) of the Act prohibits the construction, maintenance, or operation of an unlicensed project on any navigable waters of the United States. It also requires that any person desiring to construct a project on a nonnavigable stream, but one over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several states, must[3] file a declaration of intention with the Commission. Then, if the Commission finds that the project would affect interests of interstate or foreign commerce, such person may not construct or operate the project without a license.

STATEMENT

1. *New River.*—The New River has its source in North Carolina and flows north through Virginia and West Virginia. It joins the Gauley River in West Virginia to form the Kanawha River which flows into the Ohio River (R. 106–107).

The more significant points and distances[4] are the following: Shortly after the river crosses the North Carolina-Virginia state line, Wilson Creek enters the New River (at mile 252), thence New

---

[3] Prior to the 1935 amendments, there was no express prohibition in the Act against the construction, maintenance or operation of a project on a nonnavigable stream without a license. The prohibition against the construction was contained in Section 10 of the Rivers and Harbors Act, and the licensing was provided in Section 4 of the Federal Water Power Act. Also, prior to the 1935 amendments, the filing of a declaration of intention for the construction of a project on a nonnavigable stream was discretionary.

[4] The points and distances are taken from the profile of New River introduced into evidence by petitioner as Exhibit 196 (I, 2).

Throughout this brief references to exhibits which are not reproduced in the printed record but which are found in the volumes submitted to the Court on the petition for a writ of certiorari will be referred to by the Roman number of the volume then submitted. The volume numbers refer to the one volume of charts (I) and to the four volumes of photographs (II–V).

River flows in an easterly direction for approximately 25 miles, and there turns in a northeasterly direction. It passes through Allisonia, Virginia (at mile 173.5), through Radford, Virginia (at mile 145), then again changes its course to a northwesterly direction and crosses the Virginia-West Virginia state line at Roundbottom Branch (at mile 87.5). It passes through Hinton, West Virginia (at mile 62.4), and after it becomes the Kanawha River at the mouth of the Gauley (at mile 0) it flows for 97 miles to its confluence with the Ohio River.[5]

The issue of navigability in this Court relates to the 111-mile stretch between Allisonia, Virginia (at mile 173.5) and Hinton, West Virginia (at mile 62.4). This stretch of the river may be divided into three sections. The first section is the 28-mile stretch from Allisonia, Virginia to Radford, Virginia, which had been improved by the United States between the years 1876 and 1883 by a channel 2 feet deep at low water and varying in width from 30 to 10 feet (R. 2402). The second section is the 56-mile stretch between Radford, Virginia (at mile 145) and Wiley's Shoals, Virginia (at mile 89.1), which has never been improved and is in its natural condition. The third section is the 27-mile stretch between Wiley's Shoals, Virginia (at mile 89.1) and Hinton, West Virginia (at mile 62.4) which, like the first section, had been improved with a channel 2 feet deep at low water and 50 feet wide (R. 2402).

---

[5] A map showing the course of New River and the principal locations involved in this case is inserted in the envelope attached to the back cover of this brief. The map is based upon Exs. 1 and 196 (I, 1, 2), and maps accompanying the reports of the Army Engineers (R. 2295) and the United States Geological Survey Quadrangle Sheets (I, 8 and Ex. 518, R. 2754).

2. *Prior Proceedings.*—On June 26, 1925, the New River Development Company, respondent's predecessor, filed with the Commission a declaration of intention (Ex. 88, R. 2469) to construct a project on New River near Radford, Virginia. The project was to consist of a dam and power plant located (at mile 152) about one mile above Little River and about 7 miles above the town of Radford. The power plant was to have an installed capacity of 60,000 kilowatts or 80,000 horsepower, with a yearly output of 200,000,000 kilowatt hours. It was intended to utilize New River for respondent's reservoir for a distance of approximately 20 miles upstream, a stretch having a fall of 110 feet.

This declaration of intention was filed pursuant to Section 23 of the Federal Water Power Act of 1920. The Commission [6] instituted an investigation as to whether New River at the site of the project was navigable, and as to whether the project would affect the interests of interstate commerce. The Commission designated the United States Corps of Engineers of the War Department to make a report on the declaration. On August 20, 1925, the

---

[6] It then consisted of three *ex officio* cabinet officers: the Secretaries of War, Interior, and Agriculture.

Chief of Engineers submitted his report (Ex. 92, R. 2517) in which he concluded: (1) that New River was navigable water of the United States, and (2) that the project, if not properly regulated, could have an adverse effect on navigation during low-water stages in the Kanawha River. The Commission itself instituted an examination into the effect of power projects upon downstream navigable capacity on the Pit and Sacramento rivers in California (Ex. 103, 104; R. 2625–8).

The declarant then filed a memorandum with the Commission (Ex. 106, R. 2635) criticizing the report of the Chief of Engineers; it also filed affidavits of residents in the vicinity of Radford, Virginia, to the effect that New River was not navigable (Ex. 99, R. 2556–84), and requested (Ex. 106–B, R. 2635) that the matter be re-submitted to the Chief of Engineers. The Chief of Engineers then made another report, dated December 29, 1925 (Ex. 97, R. 2527). In this report the Chief of Engineers was of the opinion (1) that New River was not navigable, and (2) that navigation on the Kanawha would not be adversely affected by the proposed power development. On March 2, 1926, a hearing was held (R. 2584) before the entire Commission. Arguments were presented by counsel for the Declarant and for the State of Virginia.[7]

---

[7] Counsel for the Declarant stated at that hearing that he had engineering witnesses present and that he would like to introduce evidence, "if the Commission wants to hear the testimony," but he "imagined" that the Commission did not desire to hear any evidence (Ex. 100, R. 2604).

Before the Commission made any finding, the New River Development Company assigned its declaration of intention to the respondent, and the latter was substituted as the declarant in the proceeding (R. 2471). In order to expedite matters, the respondent, at the suggestion of the Commission's Executive Secretary, filed an application for a license (Ex. 90, R. 2471), with the understanding that the application might be withdrawn should it be determined that the project need not be licensed under the Federal Water Power Act. Both the declaration of intention and the application were made the subject of the hearing which took place at Radford, Virginia, on October 28, 1926 (R. 2604–24). In the course of or shortly after the hearing at Radford, a number of persons engaged in interstate commerce filed protests that their interests would be affected unless the project were regulated[8] (R. 2612–21). The respondent at this hearing was given an opportunity to be heard but, while filing a brief, declined to introduce evidence (R. 2619–24).

---

[8] These included: the Public Service Commission of West Virginia, which protested the grant of any license which did not provide for regulated stream flow (R. 2612); representatives of Kanawha River Shippers (Ex. 124, R. 2641); two railways, claiming interference with a bridge and a power plant (R. 2613–16); and a downstream hydroelectric plant (R. 2616–18).

The Commission on June 1, 1927 found:[9] (1) that New River at the site of the project was not navigable water of the United States within the meaning of Section 3 of the Federal Water Power Act, but (2) that the project would affect interests of interstate or foreign commerce under Section 23 of the Act (Ex. 91, R. 2494). On July 1, 1927, a standard form license was tendered to the respondent (R. 2650–63).

The respondent declined to accept the license. It questioned the constitutionality of the license provisions contained in the statute, and signified its willingness to accept a license containing only such conditions as would protect the navigability of the Kanawha River, but not the other provisions of the license or the conditions prescribed in the Act, especially those relating to rates, accounts, and recapture (R. 2500–06). The respondent requested that the Commission refer the question of its right to issue a minor part license to the Attorney General for an opinion (R. 2497). On July 21, 1930, the matter was submitted to the Attorney General (R. 2779). The question, as submitted, was based on the assumption that New River was neither navigated nor navigable in fact (Ex. 531, R. 2779). The Attorney General, on September 22,

---

[9] The findings were based upon the above engineers' reports, upon the public records referred to in these reports, and upon the transcript of the oral hearings; all of these were available to the respondent.

1930, concluded (36 Op. A. G. 355; R. 2885) that under Section 10 (i) of the Act the Commission might in its discretion waive the statutory conditions of the license and that it was not required to insert in a license any conditions which in its judgment were not necessary or appropriate to utilize the waters of New River in the protection or development of navigation on the Kanawha River. He assigned, as his reason for this interpretation of Section 10 (i) of the Act, that it was necessary "to avoid serious questions regarding the constitutionality of the Act" (R. 2885). The respondent then requested action on its application for a minor part license.

While this matter was pending before the Commission, Congress on June 23, 1930, passed an Act (46 Stat. 797) to reorganize the Federal Power Commission as an independent agency of the Government, consisting of five commissioners appointed by the President with the advice and consent of the Senate. The *ex officio* cabinet commission was, on December 22, 1930, supplanted by the independent Commission. It was for this reason that, on November 25, 1930, shortly prior to this reorganization, the cabinet Commission declined to take any action, favorable or adverse, on the respondent's application for a minor part license (R. 2506–07).

After establishment of the Commission as an independent agency, a further hearing, on the respondent's request, took place on February 16 and

17, 1931 (R. 2508). No evidence was introduced, but briefs were filed by various interested parties and arguments were heard, mainly on the question whether the Commission could grant a minor part license for respondent's project. On April 3, 1931, the Commission issued an opinion and order (Ex. 91, R. 2509), declaring that the evidence clearly sustained the finding that "the proposed construction would affect the interests of interstate and foreign commerce." The Commission, therefore, reaffirmed its former finding to that effect, and found it unnecessary to make any finding concerning the navigability of New River. The Commission denied the application for a minor part license and ordered that the respondent not proceed with the construction of the project without a standard form license.

On June 8, 1931, the respondent filed suit in the United States District Court for the Western District of Virginia against the Commissioners of the Federal Power Commission, to remove a cloud on the title of their lands cast by the Commission's order, and to enjoin the Commissioners from interfering with the construction of the project. The District Court dismissed the complaint on the merits, sustaining both the result reached by the Commission and the adequacy of its procedure. *Appalachian Electric Power Company* v. *Smith et al.*, 4 F. Supp. 6, 25. On appeal, the Circuit

Court of Appeals for the Fourth Circuit held that the bill should have been dismissed for want of jurisdiction over the persons of the defendants, 67 F. (2d) 451. This Court denied certiorari. 291 U. S. 674.

On October 12, 1932, the Commission passed a resolution in which it found that "New River from the mouth of Wilson Creek, Virginia, north, is navigable waters within the definition thereof, as set forth in Section 3 of the Federal Water Power Act." This action was taken, as shown by the recitals in the resolution, to remove any misapprehension caused by respondent's argument that the order of April 3, 1931, constituted a reaffirmation of the original view that New River was nonnavigable (Ex. 91, R. 2513–15).

3. *This Suit.*—The respondent, upon termination of its suit against the members of the Commission, proceeded with the construction of the dam. Petitioner brought this suit in the United States District Court for the Western District of Virginia to enjoin that construction without a license from the Federal Power Commission. The bill of complaint (R. 4–19, 19–38) may be characterized as consisting of two counts, the first charging violation of the Rivers and Harbors Act of 1899 and the second charging violation of the Federal Water Power Act of 1920.

The bill alleged that New River from Wilson Creek in Virginia to its mouth in West Virginia, including the site of the project, was navigable water of the United States, and that construction of the project without express statutory authority was in violation of Section 9 of the Rivers and Harbors Act (R. 5). It also alleged that the project would impair the navigable capacity of navigable waters of the United States on the New, Kanawha, and Ohio Rivers, and that, therefore, the construction of the project without affirmative consent of Congress was in violation of Section 10 of the Rivers and Harbors Act (R. 11–12).

The bill further alleged that the project was located on navigable water of the United States, and that the construction without a license from the Commission was in violation of Section 4 (d) of the Federal Water Power Act (R. 13–15). It also charged that the Commission, acting upon respondent's declaration of intention, had found[10] that the project would affect interests of interstate or foreign commerce and that the construction without a license was therefore in violation of Section 23 of the Federal Water Power Act.[11]

---

[10] The Government urged in the lower courts that the Commission's finding, if supported by substantial evidence, was conclusive. We submit this contention is correct. See *Shields* v. *Utah Idaho Central Railroad Co.*, 305 U. S. 177. We did not, however, seek certiorari from the contrary rule of a court below (R. 2910–11), because it seemed necessary to reduce the issues in this case to a reasonable compass and because of the peculiar features of the proceedings before the Commission in this particular case.

The respondent's answer, *inter alia,* denied that New River constituted navigable water of the United States (R. 39). It denied that either the construction or the operation of the project would impair the navigable capacity of any navigable water of the United States (R. 40). The answer alleged that the requirement of a standard form license for the project in question was in excess of the powers of Congress under the Commerce Clause, was violative of the Tenth Amendment, and amounted to a taking of respondent's property without due process of law in violation of the Fifth Amendment to the Constitution (R. 55).

---

[11] Shortly after this complaint was filed, Congress amended the Federal Water Power Act, which became known as the Federal Power Act. As has been indicated (*supra*, p. 3), there was no express prohibition in the Federal Water Power Act, prior to its amendment, against the construction, maintenance, and operation of a project on a navigable stream without a license. But Section 4 (d) authorized the Commission to issue licenses for such projects, otherwise prohibited by the Rivers and Harbors Act. After amendment, Section 23 (b) of the Federal Power Act expressly made it unlawful to construct, maintain, or operate an unlicensed project on navigable waters of the United States. In that section, as amended, the filing of a declaration of intention for the construction of projects on nonnavigable waters over which Congress has jurisdiction under its authority to regulate commerce became obligatory, rather than discretionary. Thus the acts of the respondent, which were alleged to be in violation of Sections 4 (d) and 23 of the Federal Water Power Act, were now in violation of Sections 4 (e) and 23 (b) of the Federal Power Act.

At the conclusion of a lengthy trial, the District Court rendered an opinion (R. 101–154), in which he held for the respondent. The District Court also filed a series of rather general "findings of fact and conclusions of law," set out "in accordance with the views expressed in its written opinion rendered herein, and in addition to the matter therein stated" (R. 154–157).

So far as material to the issues presented by this petition, the District Court ruled: (a) New River at the site of respondent's project is not a navigable water of the United States (R. 110–126, 155–156). (b) The normal and probable operation of respondent's power plant will not impair the navigable capacity of the Kanawha River (R. 127–136, 156). (c) Section 23 of the Federal Power Act does not contemplate that the Commission should require licenses for projects located on nonnavigable waters, but merely that declarants could obtain a ruling as to the navigability of doubtful streams; and that, if the Section required a license for projects on nonnavigable streams, it would offer grave constitutional doubts (R. 142–151, 156–157).

The court issued a decree unqualifiedly dismissing the complaint (R. 157). In the opinion, however, the court stated that the United States, if and when the project in question should be so operated as to interfere with the navigable capacity of the

Kanawha or any other navigable water, could assert its right to compel a removal of the structure or such modification of its operation as might be necessary (R. 153).

From this decree, petitioner appealed to the Circuit Court of Appeals. That court, in an opinion delivered by Judge Chesnut, affirmed the decree of the District Court. Judge Parker dissented. The decision of the majority (Judge Parker dissenting on each point), so far as relevant here, may be summarized as follows: (a) "Navigable waters of the United States" are interstate streams used or capable of use in their natural condition for an actual, valuable, substantial, and permanent commerce (R. 2891-93). New River, except for the two intrastate stretches of 25 miles each above Hinton and Radford, is not navigable (R. 2893-2904). (b) If the project is in nonnavigable water, a license is required under Section 23 only if downstream navigable capacity would be impaired (R. 2916-18). Normal and reasonable operation of the project would not impair the navigable capacity of the Kanawha and Ohio Rivers, especially since any adverse effect from the influence of power waves caused by the operation would be rectified by existing or proposed dams (R. 2904-08). The effect upon the navigable capacity of New River between Glenlyn, Virginia, and Hinton, West Virginia, need not be considered, because navigation in this section had been abandoned and was never extensive (R. 2908–09). The project would aid rather than interfere with the Government's flood-control program (R. 2909). (c) It is unnecessary to consider the doubtful (R. 2891–92, 2918–19) question of the power to impose the economic and regulatory conditions of Section 10, other than those relating to navigation, on projects located in navigable waters (R. 2920–21). Projects located in nonnavigable streams can constitutionally be subjected only to conditions designed to protect navigation (R. 2921–22).

SPECIFICATION OF ERRORS TO BE URGED

The court below erred:

1. In holding that New River, at the site of respondent's project and from Hinton, West Virginia, to Allisonia, Virginia, is not navigable waters of the United States.

2. In failing to hold that New River above Radford, Virginia, is navigable waters of the United States because navigation in that reach connected with interstate railroad transportation.

3. In failing to hold that New River between Hinton, West Virginia, and Glenlyn, Virginia, is navigable waters of the United States, and that respondent's project would affect the navigable capacity of this stretch.

4. In holding, because of respondent's probable method of operation and the rectifying effect of downstream dams, that respondent's project will not affect the navigable capacity of the Kanawha or Ohio River.

5. In holding that respondent's project will aid flood-control work while failing to hold that the project for that reason affects the interests of interstate commerce or that the extent of the aid depends upon the manner of operation.

6. In holding (or implying) that the license provisions of the Federal Water Power Act, so far as they go beyond the control or protection of navigation, are unconstitutional as applied to a project located in navigable waters of the United States.

7. In holding that these license provisions are unconstitutional as applied to a project which affects the interests of interstate commerce and navigation, although located in a stream which is not navigable waters of the United States.

8. In holding or assuming that the case must be considered without regard to the amendments to the Federal Water Power Act of 1920 found in the Federal Power Act of 1935.

9. In affirming the decree of the District Court.

SUMMARY OF ARGUMENT

I

The issue of navigability is one of law; particularly since, with minor exceptions, we have no quarrel with the description of the basic facts of the river made by the lower courts, the question of navigability is open to full examination here. *Leovy* v. *United States*, 177 U. S. 621, 628.

A. Section 3 (8) of the Federal Power Act contains a comprehensive definition of the particular characteristics which show navigability; in this it codifies the decisions of this Court. It compels the conclusion that under the undisputed facts New River is navigable water of the United States.

B. We urge that an interstate stretch of 111 miles between Allisonia, Virginia, and Hinton, West Virginia, is navigable. The upper and lower sections of this stretch, above Allisonia and Radford, respectively, are very plainly navigable. This is the inferential finding of each of the courts below. Contemporaneous reports and oral testimony show the former existence of a very substantial navigation in these reaches, which were improved by the United States.

C. The only substantial issue, then, is navigability of the intervening 56-mile stretch from Radford to Wiley's Shoals, which remains in its natural condition.

1. The actual navigation on this stretch far exceeded the amount required under the decisions of this Court to show an appreciable commercial navigation. The engineers' reports from 1872 until 1899 speak of an existing navigation, which reached throughout the Allisonia-Hinton stretch. Army officials relying upon actual navigation, were consistently of the view that New River is navigable until the second report of Major General Taylor on December 29, 1925. The views of the Engineer Corps since that date cannot, of course, be accorded the weight of the contemporaneous reports of actual navigation. In any event, the record is re-

markably full with respect to eyewitness testimony as to navigation over the intervening 56-mile section; some 26 witnesses testified that they had seen commercial navigation within this reach. This testimony is not only uncontradicted but is corroborated by the majority of the respondent's witnesses.

The courts below minimized but did not deny this actual navigation. Instead, they introduced novel qualifications to the definition of navigable waters, each of which is contradicted by the decisions of this Court. It is unimportant that actual navigation has been abandoned, *Economy Light Co. v. United States*, 256 U. S. 113, 124, that it was difficult, *The Montello*, 20 Wall. 430, 443, or that it was irregular, *United States* v. *Utah*, 283 U. S. 64, 79, 82.

2. Even had there not been this actual navigation upon New River, it must yet be held navigable because of its suitability to navigation. *United States* v. *Utah*, 283 U. S. 64, 82. Certainly, even if the actual navigation were insufficient to prove navigability, it is incontestable evidence of suitability for navigation. Moreover, the physical characteristics of the Allisonia-Wiley's Shoals stretch are such that it must be found suitable for navigation. It is conceded that the waterflow is sufficient. The undisputed slope of this stretch is 4.4 feet per mile, and the uncontradicted evidence of velocity shows the stream to be well within the limits of navigability. The courts below placed their chief emphasis

upon the natural obstructions to navigation. This fact, however, cannot defeat the conclusion of navigability. *The Montello,* 20 Wall. 430, 442–443; *Economy Light Co. v. United States,* 256 U. S. 113, 122. In any event, the mile-by-mile survey upon which the court below relied shows equally formidable obstacles in the stretches the navigability of which seems beyond question. And both courts ignored the evidence, obtained by actual measurement, of the channels through each of the natural obstructions. If this be considered, it is evident that the river had a navigable channel through all of the shoals and that unloading or portage could not be necessary at more than one or two places.

D. Finally, the stretch of New River between Allisonia and Radford is navigable water of the United States because interstate commerce moved over this stretch of the river and then by way of rail transportation into other states. Both Section 3 (8) of the Federal Power Act and the regulatory powers of Congress reach to interstate transportation, whether only by water or by water and rail. *The Daniel Ball,* 10 Wall. 557.

II

A. Even if New River were nonnavigable, an unlicensed construction is forbidden under Section 10 of the Rivers and Harbors Act and under Section 23 of the Federal Power Act. By respondent's own evidence, its project will result in "power waves" sent downstream. For 7½ hours at night and 34 hours over week ends, the waterflow will be shut off entirely; for several hours a day it will be two or three times the average flow of the stream.

This will admittedly impair the navigable capacity of the river between Hinton, West Virginia, and Glen Lyn, Virginia. Respondent contests the navigability of this stretch of the river but, as indicated above, there can be no serious doubt as to its navigability.

During low water periods, New River at the site of respondent's project contributes as much as 38% of the flow of the Ohio and as much as 70% of the flow of the Kanawha, which are admittedly navigable streams. Even on respondent's own evidence, the intermittent operation of its project would in times of low water impair the navigable capacity of these streams. The courts below avoided this conclusion by reliance upon the compensatory effect of downstream dams and upon the findings as to respondent's intended method of operation. But neither factor can serve to take respondent out of the regulatory powers exercised by Congress.

Even if there were no actual impairment of navigable capacity, a license would nevertheless be required under Section 23 of the Federal Power Act. That section requires a license for projects in non-navigable waters which affect the interests of interstate commerce.

2. These interests are affected if the project has a beneficial as well as if it has an adverse affect upon navigable capacity. Such is the proper construction of Section 23, and any other rule would leave the regulatory powers over navigable capacity dependent upon the uncontrolled willingness of the respondent to continue its operation in a manner which would be beneficial.

3. Moreover, Section 23 requires that a project be licensed if it would affect the national interests of flood control. Flood control is intimately related to navigation and navigable capacity and, whatever the full scope of Section 23, is plainly included in the interests of interstate commerce of which the section speaks. The Ohio Valley flood-control program is chiefly dependent upon a system of tributary reservoirs; their efficacy inevitably depends upon a coordinated program. If respondent remains free to store or release the waters according to its interests in power development its reservoir may be an obstacle to the flood-control program and, certainly, its beneficial effects are markedly less than if it were part of a synchronized program for the valley as a whole.

III

A. The constitutional issues raised by respondent and discussed by the courts below can properly be understood only against the constitutional background of the Federal Water Power Act of 1920. For two decades the executive and legislative branches of the Government had sought to find a way by which the water-power resources of the nation could be developed without injury to the public; any acceptable program would have to include provision for navigation, irrigation, flood control, and power—interests which if unregulated are contradictory rather than harmonious. The United States would, of course, have power itself to build the projects and to operate them in a manner to serve the largest good. *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288; *United States* v. *Rio Grande Irrigation Co.,* 174 U. S. 690. But this alternative was rejected in favor of allowing private interests to develop the water power resources, subject to regulation by the Government. Certainly, the constitutional power to accomplish the necessary protection of the national resources cannot be less because Congress chose to act through private agents instead of directly.

B. (1) Congress has conceded power under the commerce clause to forbid an unlicensed construction of the project if it be located in navigable waters, and the *Rio Grande* case demonstrates an equal power if there be an impairment of downstream navigable capacity. There is an equal power, too, if the project beneficially affects downstream navigable capacity or has a substantial bearing upon the flood-control program. A beneficial project, after abandonment or under different method of operation, may produce an adverse effect. The riparian owner, even on a nonnavigable stream, has no power against the commerce powers of Congress to *alter* its natural flow. Moreover, respondent as a distributor of electric energy in interstate commerce, is subject to the prohibitory powers of Congress and has no standing to complain of the license requirement, whatever might be the rights of one who operated only intrastate. Finally, even though the stream is nonnavigable, its waters are themselves instrumentalities of interstate commerce. Their volume and their flow are matters which affect downstream states as fully as Virginia and which are beyond the competence of any single state to control. They, are therefore, a movement in interstate commerce subject to the regulatory power of Congress.

(2) There can be no successful attack upon the terms of the license as beyond the commerce powers of Congress. Its terms are reasonable conditions to exact as the condition upon which Congress will relax its prohibition against construction of the project.

C. (1) The Federal Power Act constitutes no invasion of the rights of the states. The Tenth Amendment by its terms is inapplicable once the challenged provisions have been shown to be within the commerce powers of Congress. (2) But even if such a limitation were to be placed upon the commerce clause, the development and conservation of the waters and the power resources of the country is a national rather than a local interest. Since the Government could admittedly condemn the project, there can be no invasion of states' rights because of the possibility of ultimate ownership of the project.

D. Nor is there any taking of respondent's property without just compensation. (1) Since there is power to prohibit altogether, there can be no complaint that respondent's power rights are taken by the license, which in any event simply regulates their use.

(2) The attack on the recapture clause cannot now be considered. Until end of the 50 year license period it is only speculative whether the United States will choose to take over the project and whether the net investment will at that time be less than the fair market value of the project. When the recapture provisions are sought to be exercised, respondent will have a wholly adequate remedy, either in the administrative hearing and judicial review provided by the Act (*Anniston Mfg. Co.* v. *Davis,* 301 U. S. 337) or in the Court of Claims (*Hurley* v. *Kincaid,* 285 U. S. 95); its fears of estoppel to urge its constitutional claims are unfounded (*Electric Bond Co.* v. *Commission,* 303 U. S. 419).

But even if the question may now be considered, the recapture provisions are valid. At the end of the license period, when there will be no Congressional permission to operate, the value of respondent's project will be its junk value, far less than the net investment allowed by the Act. *Roberts* v. *New York City,* 295 U. S. 264. In any event, the recapture provisions are simply the price which respondent must pay to obtain the privilege of construction and operation which otherwise is validly forbidden by Congress. *Fox River Co.* v. *Railroad Commission,* 274 U. S. 651. But even if there were no power to prohibit the project, the net investment allowed respondent by the Act is all that the Constitution can require. This argument is developed in the brief for the United States, *amicus curiae,* in *Driscoll* v. *Edison Co.,* 307 U. S. 104, No. 509, Oct. Term, 1938. It would seem to apply equally to a complaint of confiscation in recapture as to the complaint of year-by-year confiscation in the course of rate fixing.

ARGUMENT

The basic issue in this case is whether the respondent must accept a standard form license from the Federal Power Commission for the construction and operation of its hydroelectric project on New River. The Federal Power Act requires such a license, and the Rivers and Harbors Act forbids construction of the project, if it is located on navigable waters of the United States. So, too, a license is required if the project will obstruct the navigable capacity of waters of the United States or will affect the interests of interstate commerce. If any one of these conditions obtains, a license is required by the statutes and the remaining question is one of constitutionality.

I

NEW RIVER AT THE SITE OF RESPONDENT'S PROJECT IS NAVIGABLE WATER OF THE UNITED STATES

The navigability of New River at the site of respondent's project has been in sharp controversy throughout this litigation. The issue is primarily one of law: what constitutes a navigable stream under the statutes? Alternatively phrased, the questions involve conclusions of fact or mixed questions of law and fact. The important thing is that the ultimate finding of navigability is a question for this Court, and not a simple physical or historical fact, with which the appellate court has no proper concern. Here, if the legal principles be settled, there is little difficulty in their application to the facts of this case. With minor exceptions, we have no quarrel with the description of the basic facts of the river made by the lower courts. We differ as to the legal question of their weight and relevance to the issue of navigability. The controversy in this Court, then, is almost wholly one of law and is not influenced by the familiar rule that this Court will require a showing of clear error before it reexamines questions of fact after concurrent findings by the lower courts.[1]

Thus, this Court has frequently considered the question of navigability by way of reexamination of the conclusions of the triers of fact. Where the issue relates to the basic or evidentiary facts, it is true, concurrent findings of navigability will not be disturbed except on clear error. *Brewer Oil Co.* v. *United States,* 260 U. S. 77, 86. But where the general conclusion of navigability is the object of attack, neither a jury verdict nor concurrent findings preclude an independent reexamination. *Leovy* v. *United States,* 177 U. S. 621, 628; *The Montello,* 20 Wall. 430, 442; compare *Arizona* v. *California,* 283 U. S. 423, 452.

We shall first discuss the statutory definition of navigable waters of the United States. Against this background we shall show the specific content given each of the criteria of navigability by the decisions of this Court and the application of that criterion to the facts of this case.

A. THE DEFINITION OF NAVIGABLE WATERS OF THE UNITED STATES

The problem of defining the characteristics which make a river navigable water of the United States is easier in this case than in any which has hitherto come before the Court. This is because Congress has itself supplied a quite precise enumeration of the relevant factors. Section 3 (8) of the Federal Power Act, *infra*, p. 146, provides:

---

[1] *United States* v. *O'Donnell,* 303 U. S. 501, 508; *Texas & N. O. R. Co.* v. *Railway Clerks,* 281 U. S. 548, 558.

> "navigable waters" means those parts of streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States, and which either in their natural or improved condition notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage, are used or suitable for use for the transportation of persons or property in interstate or foreign commerce, including therein all such interrupting falls, shallows, or rapids, together with such other parts of streams as shall have been authorized by Congress for improvement by the United States or shall have been recommended to Congress for such improvement after investigation under its authority;

This definition was largely ignored by the lower courts.[2] But it is the necessary point of departure for any discussion of navigability under the Federal Power Act, whether viewed as a codification of the decisions of this Court,[3] as a Congressional synthesis and weighting of the factors relevant to navigability, or as an independent definition of the powers Congress considered granted it by the commerce clause.

---

[2] The District Court in discussing the law of navigability (R. 122–126) wholly disregarded Section 3 (8); the Circuit Court of Appeals (XI, 34) gave the section only cursory attention, and that during its discussion of "the effect of the Federal Power Act on the case" rather than in its discussion of navigability as such (XI, 34).

The definition in Section 3 (8) repays close attention. The first clause, defining navigable waters as "those parts of streams * * * over which Congress has jurisdiction under its authority to regulate commerce * * * among the several States," shows the wide extent to which Congress intended the Federal Power Act to reach. The succeeding clauses are an enumeration of the specific circumstances which Congress determined to be sufficient to support its power.

The basic foundation of the federal jurisdiction is that the stream be "used[4] or suitable for use[5] for the transportation of persons or property in interstate or foreign commerce". If the stream has in fact been used for navigation of a consequential character, it follows without more that the river is navigable; and, if the navigation was the transportation of persons or property in interstate or foreign commerce, that the river is navigable water of the United States.

---

[3] In discussing the specific clauses of the statutory definition, the decisions of this Court which adopt the same criteria are placed in the margin. A more detailed discussion of the decisions is found in the application of the statutory standard to the facts of this case.

[4] The use may be past as well as present, *Arizona* v. *California*, 283 U. S. 423, 453–454; *Economy Light Co.* v. *United States*, 256 U. S. 113, 123, and need not be a large or commercially important use, *United States* v. *Utah*, 283 U. S. 64, 79, 89; *Economy Light Co.* v. *United States*, *supra*.

[5] *United States* v. *Utah*, 283 U. S. 64, 82.

Only if the river has not in fact been navigated to any substantial degree do the other facets of the definition become material. If the question is whether the stream is suitable for navigation, Section 3 (8) in terms puts aside a number of considerations which might otherwise be urged to defeat a finding of navigability. The navigable capacity of streams is to be determined "either in their natural or improved condition."[6] A finding of navigability is not defeated because of "interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage".[7] Finally, streams which otherwise might not be navigable under these standards are navigable, for the purposes of the Federal Power Act, if they "have been authorized by Congress for improvement by the United States or shall have been recommended to Congress for such improvement after investigation under its authority."[8]

---

[6] *Ashwander* v. *Tennessee Valley Authority*, 297 U. S. 288, 328; cf. *Wisconsin* v. *Duluth*, 96 U. S. 379.

[7] *The Montello*, 20 Wall. 430, 442–443; *United States* v. *Utah*, 283 U. S. 64, 86; *Economy Light Co.* v. *United States*, 256 U. S. 113, 122.

[8] See *Ashwander* v. *Tennessee Valley Authority*, 297 U. S. 288, 328, 329–330.

Even if this statutory definition went somewhat beyond the boundaries indicated in the decisions, it would yet be well within the power of Congress to fix the precise boundaries of its commerce clause jurisdiction which is to be exercised in this Act. Navigable streams are instrumentalities or avenues of interstate commerce; it would seem evident that Congress has power to define the character of the streams which require federal control, and thus to implement its constitutional grant of power by appropriate definition. *Everard's Breweries* v. *Day,* 265 U. S. 545, 560; cf. *Purity Extract Co.* v. *Lynch,* 226 U. S. 192; *Ruppert* v. *Caffey,* 251 U. S. 264. Even if the definition went somewhat beyond interstate commerce itself, it could hardly be denied that the waters described in Section 3 (8) have an existing or potential effect upon interstate commerce; their regulation therefore may be sustained as a control of matters which otherwise would offer a substantial threat to interstate commerce. *Shreveport Rate Cases,* 234 U. S. 342; *Wisconsin Railroad Commission* v. *Chicago, B. & Q. R. R. Co.,* 257 U. S. 563; *Labor Board* v. *Jones & Laughlin,* 301 U. S. 1, 37–38. Under any view, the question is not the accuracy of the definition but its application in this case. But, as we have suggested and as the detailed discussion of the cases will show, Section 3 (8) is in truth simply a crystallization or codification of the criteria which define navigable waters of the United States as they have already been formulated by the decisions of this Court.

B. THE ALLISONIA-RADFORD AND WILEY'S SHOALS-HINTON STRETCHES

We do not urge that New River in its entirety is navigable, and confine our argument to the 111-mile stretch of the river between Allisonia, Virginia (at mile 173.5) and Hinton, West Virginia (at mile 62.4). If this interstate stretch of the river is navigable, respondent's project (at mile 152) is constructed in navigable waters of the United States.

The 111-mile stretch can, in turn, be divided into three sections: (1) a 28-mile section from Allisonia to Radford (at mile 145); (2) a 56-mile section from Radford to Wiley's Shoals, Virginia (at mile 89.1); and (3) a 27-mile section from Wiley's Shoals to Hinton. This division is indicated because we feel there can be no real issue as to the navigability of the upper and lower sections, above Radford and Hinton, respectively, and that the only serious issue as to navigability relates to the intervening 56-mile section between Radford and Wiley's Shoals.

Neither court below denied that the upper and lower sections of this stretch of the river were navigable; although they did not in terms hold them navigable, this is the clear inference of their discussion (R. 114, 115, 126; 2900-04). The District Court disposed of the question of navigability of the river as a whole by stating that the substantial commerce was confined to these two reaches.[9] The majority of the court below adopted the same approach, and found nonnavigability because of its view of the evidence relating to the intervening 56-mile stretch (R. 2900–04). Thus, it found that the physical characteristics of this stretch differed from those above Hinton and Radford (R. 2900–01), that the bulk of the commercial traffic was confined to these stretches (R. 2900–03), and that the Government had not improved the intervening reach (R. 2902–04). Judge Parker said that the two stretches "are unquestionably navigable and were so found by the court below" (R. 2925–26).

---

[9] It said (R. 114, 115):

"* * * The evidence indicates that the use of these boats was local, by which it is meant that they were not used in continuous trips throughout the course of the river but were used on separated stretches of the river where conditions made their use permissible and desirable. The range of their movement was determined by the extent of the pools and the absence of steep shoals in that particular section of the river. For example, from Hinton upward for 23 or 24 miles the river has the least gradient in its course, about 4 feet per mile, with considerable pool water and few precipitous shoals. The same conditions obtain to a more or less extent on the section of the river for 25 or 30 miles above Radford. It was in these separated stretches of the river that practically all of the bateaux navigation took place and only on them that there was any appreciable trade or commerce by boat. * * *

* * * * *

"* * * it is clear, I think, that in each instance the traffic was purely intrastate. It occurred in two widely separated stretches of the river, one over a distance of 25 miles or more entirely in Virginia, and the other over approximately the same distance in West Virginia; and between the two was a stretch of about 60 miles over which there was no appreciable commercial traffic, and little of any sort."

The Annual Report of the Chief of Engineers for 1883 showed that 17 keelboats[10] were operating in the stretch above Hinton and 8 keelboats and one small steamer in the stretch above Radford (R. 2397–2400). In the preceding year, the report mentions, the product of 9 sawmills above Hinton was shipped by keelboat,[11] as well as "the most of the tobacco, grain, &c., from that part of Mercer County" (R. 2399). Above Radford, some 1,156 tons of pig iron alone were shipped by keelboat (R. 2399). In the same year, of the 12,532 tons of freight sent from or received at the Cheaspeake & Ohio Railway at Hinton, 9,953 tons was river traffic (R. 2400). The testimony of some 36 witnesses showed commercial traffic in the stretch above Hinton, and that of 27 witnesses showed it in the stretch above Radford.[12] The subsequent diminution of traffic on these stretches is to be explained by the construction of railroads[13] (R. 2407, 2425–26, 2428–29, 2431).

---

[10] Keelboats are 50 to 70 feet long with a width of 6 to 8 feet and a draft of about 2 feet, having a carrying capacity of 2 to 3 up to 10 to 12 tons (R. 113–114).

[11] This included 2,000,000 feet of lumber, 1,800,000 oil barrels, 100,000 pipe staves, and 40 carloads of walnut and locust (R. 2399).

[12] Their testimony is tabulated, with record references, in Appendix B, *infra*, p. 178, and is shown in graphic form on the inset opposite p. 48, *infra*.

New River between 1877 and 1882 was improved under Congressional appropriations, totalling $112,000, in three stretches,[14] two of which are in the 111-mile stretch now in issue (R. 113). The river was improved for 26½ miles above Hinton, to Wiley's Shoals, to provide a channel 50 to 75 feet wide and 2 feet deep at low water and for 29¼ miles above Radford to provide a channel 10 to 30 feet wide and 2 feet deep at low water (R. 2402).

It seems, therefore, plain beyond dispute that the 28-mile stretch from Allisonia to Radford and the 27-mile stretch from Wiley's Shoals to Hinton are navigable. The succeeding section of this brief will discuss the intervening 56-mile stretch from Radford to Wiley's Shoals. If, as we contend, this stretch also is navigable, the site of respondent's project is in navigable waters of the United States.

C. THE RADFORD-WILEY'S SHOALS STRETCH

The District Court held that respondent's project was not located in navigable waters of the United States because the 56-mile stretch of New

---

[13] Thus, in the Glen Lyn-Hinton stretch, there is no paralleling railroad (I, 6) and as late as 1912 there were said to be 10 or 12 keelboats (R. 2423–24).

[14] It is important to note that the stated futility of the improvement related to the third stretch, above the Radford-Allisonia stretch and reaching upstream from Austinville (at mile 100) rather than to any part of the 111-mile stretch here in issue (see, *e. g.*, R. 2757–59).

River between Radford (at mile 145) and Wiley's Shoals at mile 89.1) was nonnavigable (R. 111–126). The majority of the court below agreed (R. 2892–2904), with Judge Parker dissenting (R. 2925–36). We submit that this stretch of the river is plainly navigable, whether viewed in the light of the actual navigation which took place or in the light of its physical characteristics and suitability for navigation. This argument, it will be observed, does not contradict any concurrent finding of fact made by the courts below[15] but simply seeks to give those facts their proper emphasis, to establish their legal relevance, in the light of the settled principles defining navigable waters.

1. Actual Navigation

No other single factor can be so nearly conclusive in demonstrating navigability.[16] If there has in fact been actual navigation of appreciable extent, it is impossible to argue that the stream is nonnavigable. The definition in Section 3 (8) of the Federal Power Act, accordingly, declares that navigable waters are those which "are used * * * for the transportation of persons or property".

---

[15] In the few places where we take issue with a statement of fact, as opposed to the legal weight ascribed to it, by either court below, the statement is not only contradicted by the indisputable facts of record but also is not concurred in by the other court.

[16] *Non constat*, of course, that the absence of navigation is conclusive of nonnavigability, since its absence may be explained on a number of other grounds.

And the decisions of this Court express the same incontestable proposition (*infra*, pp. 56–59). The controversy before this Court on this question, as we understand respondent's position, is simply as to the extent and character of the navigation necessary to demonstrate the navigability of a body of water.

The extent of the actual navigation must, of course, be appreciable if it is to foreclose any doubt as to navigability.[17] But, so long as it meets this simple test, no more is or can be necessary. The only question, then, is whether the navigation over the Radford-Wiley's Shoals stretch was, as a matter of law, appreciable. If so, the stretch is navigable under the self-evident proposition that a stream which has been navigated is navigable.

---

[17] Thus, actual navigation in several cases has been held insufficient to establish navigability. In *United States* v. *Rio Grande Irrigation Co.*, 174 U. S. 690, 699, the navigation consisted of logs and rafts which could be floated only in times of temporary high water. *Leovy* v. *United States*, 177 U. S. 621, 627, dealt with a crevasse from the Mississippi, over which oyster fishermen sometimes traveled, but which had never been used to carry freight or passengers and which had since closed into a mere marsh. In *Oklahoma* v. *Texas*, 258 U. S. 574, 587–590, the navigation was only exceptional and the Red River was shown to have sufficient water for navigation only during temporary periods of high water, and that since the cessation of all navigation the river had become even shallower (258 U. S. at 587–590). *United States* v. *Oregon*, 295 U. S. 1, 20–23, dealt with lakes which had been used only for sporadic, noncommercial boating and which frequently dried up entirely.

(a) *Early navigation.*—The first account of navigation on New River, according to the District Court, is that of an exploration trip in 1742; thereafter a number of expeditions navigated the river over the reach now in issue (R. 111–112). It is true that the trips were difficult, and that portages were necessary (R. 112), but the important fact is that they were made. It is true, also, that New River was never extensively used as a route to the west and the north (R. 1581–92). But it is necessary in this connection to remember that below Hinton, the Kanawha Falls, 18 feet high, stand in the way of access to the Kanawha River.

In July 1819, Moore and Briggs surveyed the river for the Virginia Board of Public Works. The survey covered something over 55 miles of the river above Hinton.[18] They reported (R. 2308):

> This is truly a noble river. Notwithstanding it was represented to us as being remarkably low, yet it afforded a superabundance of water for every purpose of internal navigation. The fall in this part of the river, considering the mountainous country it passes through, is comparatively moderate. The principal falls are the Bull falls, MacDaniel's, Anderson's, Wiley's, Neilley's, and Peter's mountain falls: none of which has ever been improved in the least degree;

---

[18] It began at the mouth of Greenbrier River (at mile 64) and went to the mouth of Sinking Creek (at mile 119) (R. 2308).

> yet we ascended them all with our boat; though, in two or three instances, with considerable difficulty, after taking out our baggage, stores, etc.

The surveyors concluded, from their mile-by-mile survey, that the needed improvements (necessary on 27 of the 56 miles) would cost $10,400 (R. 2308–11).

(b) *Engineers' reports.*—There have been many reports on New River by the Corps of Engineers of the United States Army. The first was in 1872 and the last in 1930. The conclusions as to navigability are by no means consistent, but the actual extent of the navigation emerges with some clarity. It is these reports which the court below said constituted "the most reliable evidence in the case" (R. 2897–98).

N. H. Hutton, Assistant Engineer, surveyed the river in 1872 between Hinton (mile 62.4) and Lead Mines (mile 190). His report makes it plain that the river was then navigated, although of course not without difficulty. He said (R. 2288):

> The present system of transportation on this portion of the river is by keelboats which carry from two to three tons, and are rowed or floated down the river and poled up. An expenditure of $100,000 would greatly ameliorate the condition of the river for this trade, and enable the trips to be made with so much more certainty as to induce a considerable increase of trade.

Subsequent reports confirm the existence of a considerable navigation. The Chief of Engineers in 1878 reported (R. 2326):

> The plan adopted for the improvement of this river contemplates a channel-way 30 feet wide and 2 feet deep below the lowest water, *suited for the keelboats now in use,* * * *. [Italics added.]

The Chief of Engineers in 1880 saw the improvement as one "for the benefit of the bateaux now in use and for very light steamboats" (R. 2360–61); the keelboats after the improvement were said to "have much greater ease in navigation and can carry larger loads" (R. 2363, 2366).

The reports indicate that, while the commerce was concentrated around Hinton and Radford (R. 2366), the navigable channel, though at times tortuous or difficult, ran "throughout this distance" from above Allisonia to Hinton[19] (R. 2370; see, also, R. 2394, 2406–07). The chief effect of the improvement was to facilitate already existing navigation. Thus, the Assistant Engineer in 1881 reported (R. 2373):

---

[19] The Chief of Engineers in 1882, it is true, reported that (R. 2384; see, also, R. 2396, 2407):

"The navigation of the river not being continuous as yet, it is practically a feeder to the several railroads which cross it and run along portions of it. * * *"

It is immaterial whether the navigation was not "continuous" in the sense that it was interrupted by low water (R. 2366, 2385–86) or in the sense that regular commerce was concentrated around Hinton and Radford (R. 2366). In either case, the existence of a Radford-Hinton commerce, whatever its feasibility in the few months of low water or whatever the irregularity of commercial trips in this sparsely settled region, seems indisputable.

> Four lines of keelboats, eight in all, now run regularly on this part of the river, the improvement enabling them to carry two-thirds more freight than formerly; for instance, 1,500 feet of lumber used to be a load; now it is 4,500 feet.

The improvement, the Engineers reported, "has had reference to a navigation by the boats now in use on the river" (R. 2381).

In 1899 the Chief of Engineers explained the cessation of improvement and the decline in navigation (R. 2429):

> Work was carried on under these appropriations until 1889, when it was suspended on account of changed conditions which lessened the usefulness of the river as a means of transportation, such as the great development of the railroad systems paralleling the river.

He continued, however, to state that the river was navigable (R. 2429). The Chief of Engineers in 1900 made a similar ruling, in substantially the same language [20] (R. 2431). The Secretary of War and the Chief of Engineers in [illegible]08 (R. 2457–58) and the Assistant Secretary of War in 1912 (R. 2453) were of the same opinion.

---

[20] In that year Congress consented to the construction of a dam above the reach here urged to be navigable on condition the owners make at their own expense any modification required by the Secretary of War in the interests of navigation on the river (R. 2441–47). Two other authorizations, containing similar conditions, were enacted in 1911 (R. 2452–53).

The Board of Engineers in 1912, however, reported that "there is no navigation on the reach between Radford and Glenlyn"; this seems to have been because "the country adjacent is sparsely settled" and this stretch of the river "is paralleled for most of the way by two railroads"[21] (R. 2419–20; see, also R. 2421–23, 2425–26).

On August 20, 1925, Major General Taylor, Chief of Engineers, reported to the Federal Power Commission that New River was navigable and that respondent's project would affect the navigable capacity of the New and Kanawha rivers (R. 2517–21). His survey of the earlier reports led to the conclusion (R. 2521):

> From the above facts it is established that New River has been under Federal improvement for navigation, that navigation has actually existed and that the river was physically capable of interstate navigation al-

---

[21] It continued (R. 2420):

"There is very little commerce on this river at present, and as there are no commercial or mining industries of importance, no material increase could be expected even if it were improved. Physical conditions are such that it could not be improved for useful navigation except at prohibitive cost. The board, therefore, reports, concurring with the views of the district officer and the division engineer, that it is not advisable for the United States to undertake the improvement of New River from Radford, Va., to Hinton, W. Va."

> though very light draft. The fact that navigation does not exist at present is not understood to change the legal status of the stream. * * * If free from any control by the United States it would be difficult to ascertain authoritatively that the proposed development would be in general accord with the most beneficial utilization of the water for navigation, water power, flood control and other beneficial public uses. It is obvious that such utilization is essential to the best interests of commerce. Therefore, while the navigable capacity of the stream is limited, this office must report that no sufficient reason is seen why the Federal Power Commission should not exercise jurisdiction over the proposed project.

However on December 29, 1925, Major General Taylor, acting on the request of respondent's predecessor transmitted by the Commission, reconsidered this opinion and ruled New River to be non-navigable, and that there would be no adverse effect upon downstream navigation (R. 2727–33). The conclusion as to navigability was based not upon any new survey of the river but upon the physical characteristics of the river as shown by the surveys of 1872 and 1879 (see *infra,* pp. 62–73), upon the discontinuation of the improvement work and upon the plainly incorrect statement (R. 2531) that—

> Continuous navigation on the river has never been possible, and whatever commerce

> has existed has been altogether local, apparently confined to the 25-mile section in West Virginia ending at Hinton.

On November 11, 1930, Major General Brown, Chief of Engineers, declined to reconsider this last opinion because "It is my opinion that New River is not navigable at any point in its course" (Ex. 539-B, R. 2795-96).

It will thus be seen that the War Department from 1872 through August 20, 1925, was of the opinion that New River was navigable. After December 29, 1925, it was of the view that the river was nonnavigable, because of its physical characteristics and its impression of the extent of the actual navigation during the period 1870-1900. Certainly as to the last, the reports contemporaneous with the navigation are alone entitled to weight.

(c) *Testimony as to navigation.*—The record is remarkably full with respect to eyewitness testimony as to navigation over the Radford-Wiley's Shoals section of the river. The testimony covered, roughly, a 25-year period from the Civil War to about 1885. The witnesses of necessity were old men. Because of this the District Court found "there is a vagueness about the extent to which it [the navigation] occurred" (R. 114), and the majority of the court below declared "such testimony has inherent infirmities" (R. 2901-02). But it seems evident that the age of the witnesses and the fact that the navigation occurred half a century before lends weight to their testimony, particularly since this testimony was uncontradicted (see *infra,* pp. 49–51). If the recollection of aged men is so full, the actual navigation must have been even more extensive. Since it occurred half a century before, there is, of course, some vagueness about the particulars, but there is no vagueness about the existence of navigation, or that its cessation resulted from construction of a paralleling railroad (R. 205–6, 262, 304, 340, 469).

The inset on the opposite page gives a graphic summary of the testimony as to actual, observed navigation on New River. Where the testimony does not indicate the origin or destination of the navigation, it is represented by a point with an arrow indicating the direction.[22] The testimony upon which the chart is constructed is impressive. The tabulation of this testimony, printed as Appendix B. *infra,* p. 178, indicates that 62 witnesses testified as to navigation over the river. Some 26 witnesses testified that they had seen navigation within the Radford-Wiley's Shoals reach,

---

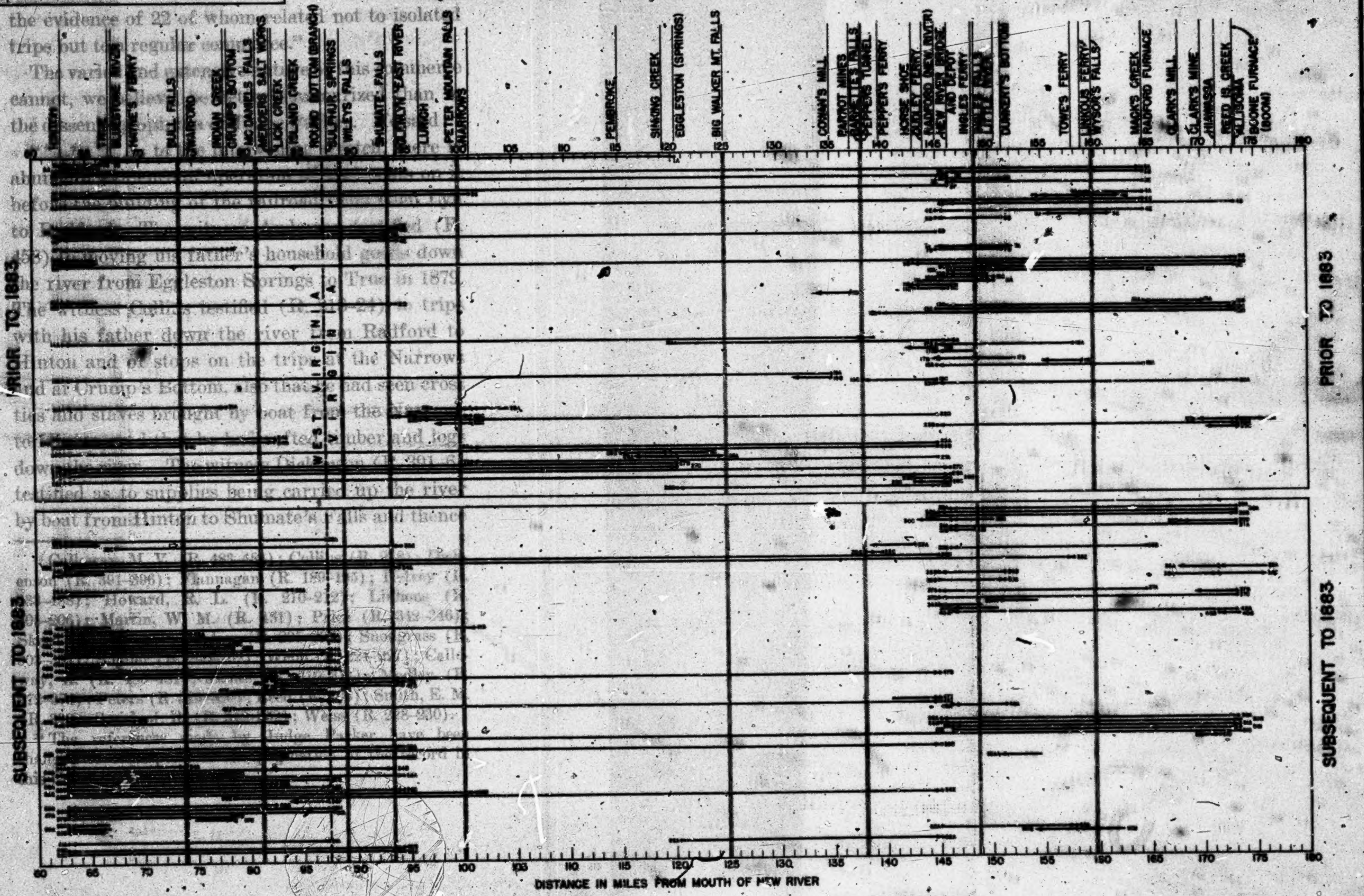
[22] Since the courts below intimated that natural obstructions made navigation impracticable, we have also included in the chart the principal obstructions on New River between Hinton, West Virginia, and Allisonia, Virginia. These are Bull Falls, McDaniel's Falls, Wiley's Falls, Shumate Falls, Peter Mountain Falls, Big Walker Mountain Falls, Barnette's Falls, Ingles Falls, and Wysor's Falls.

UNITED STATES
V.
APPALACHIAN ELECTRIC POWER CO.
NO. 674, OCTOBER TERM, 1939

COMMERCIAL NAVIGATION ON NEW RIVER BETWEEN HINTON, WEST VIRGINIA AND ALLISONIA, VIRGINIA

LEGEND
NAVIGATED DISTANCE INDEFINITE
NAVIGATION BETWEEN GIVEN POINTS
DIRECTION OF TRAVEL
1A, 1B, ETC. REFERS TO TESTIMONY IN [illegible]

APPENDIX B



PREPARED BY THE FEDERAL POWER COMMISSION the evidence of 22 of whom related not to isolated trips but to a regular commerce.[23]

The varied and extensive nature of this commerce cannot, we believe, be better summarized than in the dissenting opinion of Judge Parker. He said:[24]

"* * * As to the intervening stretch, there is abundant evidence of operation of keel boats on it before the building of the railroad from Glen Lyn to Radford. The witness Anderson testified (R. 458) to moving his father's household goods down the river from Eggleston Springs to True in 1879. The witness Collins testified (R. 218-24) to trips with his father down the river from Radford to Hinton and of stops on the trips at the Narrows and at Crump's Bottom, also that he had seen cross ties and staves brought by boat from the Narrows to Hinton, and that he had rafted timber and logs down the river. The witness Dickenson (R. 391-6) testified as to supplies being carried up the river by boat from Hinton to Shumate's Falls and thence by wagon to Glen Lyn. The witness Flannagan testified that the keel boats plied up and down the river from Hinton to Allisonia (R. 189–96). The witness Helvey testified to grain being carried by boat up the river from the horseshoe to Radford and of the use of boats in the river (R. 433–5). The witness Hoover testified to shipping supplies by boat from Hinton to the camp of the Railroad contractors at East River or Glen Lyn (R. 416). The witness Linkous, when a boy and living at Pepper Tunnel below Radford, had seen boats going up and down the river operated by former slaves whose names he remembered. He remembered also selling eggs to the boatmen and their custom of blowing a bugle as they passed (R. 205–6). The witness Martin who lived at Eggleston testified to working in a boat on the river and carrying it up the river to Radford and selling it (R. 451). The witness Price who lived near Tom's Creek when a boy saw boats going up and down the river loaded with coal, corn, wheat, crated chickens, hogs, and produce of all sorts (R. 346–8). The witness Skeen, a Confederate veteran, testified that while camped at the Narrows he saw boats going up and down the river, bringing provisions to the commissary at the Narrows (R. 339–40). The witness Snidow, who lived at Pembroke, six miles below Eggleston testified to seeing the boats operating on the river during the Civil War, and of the management of the boats by a Captain Burke, and of how the boats, 4 or 6 in number were loaded with grain and sent down the river (R. 295–7). The witness Snodgrass who lived at Eggleston saw boats operated in the river and saw them bring supplies down the river to the railroad contractors (R. 303–5). The witness Snyder saw boats operated between Radford, Eggleston, and the Narrows during the Civil War loaded with supplies for the soldiers. He testified also that after the War his father operated a boat, going as far down the river as Hinton (R. 260-5). The witness Webb who lived at the Horse Shoe on New River saw boats going up and down the river and heard the boatmen say that they went as far as Hinton (R. 225). He testified that for several years after the Civil War the barges were operated by hired hands and hauled wheat and lumber (R. 226). The witness Coleman operated a steamboat for six or seven months from Pepper's Ferry to Pepper's Tunnel (R. 198). The witness James testified to bringing logs by raft or loose down the river from Narrows to Hinton (R. 311). The witness Medley testified to working in bateaux in the river from Hinton to Mercer's salt works and from there to Radford, of bringing fertilizer from Glen Lyn to the salt works, of bringing staves from Wylie's Island, and of moving a man's household goods up the river to Radford (R. 372–3). The witness Owen testified to carrying the government boats which had been engaged in the river work above Radford down the river to Hinton where they were sold (R. 245-6). The witness Peters testified to hauling tobacco by boat from Glen Lyn to Hinton for shipment by rail (R. 327). He also testified that he worked on the river in boats for 16 or 18 years, that in the Spring he would go up the river to Glen Lyn to get fertilizer, and that while the N. & W. R. R. was in process of construction he went up nearly every week (R. 321). The witness E. M. Smith testified to working on river boats for 9 years and carrying groceries and other merchandise to Glen Lyn and carrying lumber, staves, tobacco, and tanbark downstream (R. 398). The witness Weiss testified to the operation of one of the keel bottom boats by his brother and of his hauling staves and other things from Glen Lyn to Hinton (R. 228-9)."

---

[23] Calloway, M. V. (R. 483-484); Collins (R. 218); Dickenson (R. 391-396); Flannagan (R. 189-195); Helvey (R. 433-438); Howard, R. L. (R. 210-212); Linhous (R. 205-206); Martin, W. M. (R. 451); Price (R. 342-346); Skeen (R. 339-341); Sindow (R. 295-297); Snodgrass (R. 303-304); Snyder (R. 260-262); Webb (R. 2[illegible]4-227); Calloway, R. (R. 480-481); James (R. 310-311); Medley (R. 372-374); Peters (R. 319-320); Reed (R. 406); Smith, E. M. (R. 398); Smith, J. R. (R. 348-352); Weiss (R. 228-230).

[24] The references made by Judge Parker have been changed to correspond to the pagination of the record in this Court.

The testimony as to actual navigation on the Radford-Wiley's Shoals stretch probably relates to times prior to 1883, for in that year completion of the Norfolk & Western Railroad paralleling the river between Glen Lyn and Radford "about cut the boat business out" in that section of the river.[25]

This extensive testimony of navigation over the Radford-Wiley's Shoals stretch stands uncontradicted. Only 3 witnesses offered by respondent could recall no traffic on that part of the river;[26]

---

[25] Skeen (R. 340); see, also, Snodgrass (R. 304); Snyder (R. 262); Linkous (R. 205-6); A. G. Flannagan (R. 469).

[26] Spangler, C. R. (R. 1498-9); Spangler, W. H. (R. 1503-9); Hundley (R. 1643-9).

this, of course, does not stand in contradiction of the affirmative testimony as to the existence of an actual navigation. Indeed, this evidence of actual navigation was corroborated by 7 witnesses for the respondent, each of whom recalled one or more instances of commercial traffic on this reach.[27]

The majority of the court below sought to avoid the force of this testimony by stating that the "trips could be made only at particular times when there was unusually high water" (R. 2902–03). The District Court intimated no such qualification to this extensive record of navigation, and the record is wholly barren of support for the statement.

The only trip alleged to have been made at unusually high water, i. e., at "5 to 6 feet flood tide" "between the 15th and 20th of September 1901" (VIII, 248) is actually shown by the records of the United States Geological Survey to have been made with the river at from 13 to 19 inches above the stage during mean flow.[28] On the other hand, not one of the 30 witnesses testified that traffic on this reach of the river took place or was possible only during periods of *unusually* high water.[29] It is true that some of these witnesses recalled that passage of "several difficult falls" referred to by the court below (R. 2900–01), i. e., Shumate's Falls, Peter Mountain Falls, and Walker Mountain Falls, was difficult and at times impossible at low stages. But this was also true of the undoubtedly navigable reaches prior to their improvement (Report of Chief of Engineers, R. 2361). It is likewise true of many other navigable streams, for example, the Tennessee River and its navigable tributaries (H. Doc. 328, 71st Cong., 2d Sess., pp. 1–2, 6, 10, 83–4, 214–7). Furthermore, it must be noted that this finding in the majority opinion, that the trips between Radford and the West Virginia line by boats with maximum draft of 2 feet took place only during periods of *unusually* high water, cannot possibly be reconciled with the report submitted to Congress by the War Department in 1912 to the effect that navigable depths of 2 feet over the controlling bars between Radford and Hinton would ordinarily be found (R. 2422).

---

[27] Buckland (R. 1514–5); Lilly (R. 1517–23); Talbot (R. 1541–3); Gerald (R. 1547–55); Osborne (R. 1651–54); Adair (R. 1525–6); Knode (R. 1572).

[28] Water Supply Paper No. 536 (Govt. Exs. 68–83, Original, p. 26) shows the discharge to have ranged between 6,000 and 7,550 second-feet during this period. A Geological Survey rating table (Govt. Ex. 67, Original) shows the mean discharge (R. 109) to be equivalent to a stage of 2.7 feet, one of 6,000 second-feet to a stage of 3.8 feet, and one of 7,500 second-feet to a stage of 4.3 feet.

Finally, as late as July 1936, during summer low water (R. 1194–7), the river was navigated from Hinton, West Virginia, to Allisonia, Virginia, and return by a motorboat drawing from 2½ to 3 feet of water when operating at full speed[30] (R. 1195). The crew, unfamiliar both with the channel and an outboard motor, propelled the boat by poles or by getting out and pulling it only twice for a distance of 200 feet on the downstream trip (R. 1197–8) and on the upstream trip only 17 times for a total distance of 1 to 1¼ miles[30a] (R. 1198, 1221–22). No portage whatever was made upstream or downstream, either of the boat or equipment (R. 1195–96). On this trip the witness counted 50 boats between Hinton and Narrows, Virginia (at mile 101); these were mostly rowboats, but there were also several ferries and motorboats (R. 1198–9).

---

[29] To the contrary see: Collins (R. 220–1); Flannagan (R. 189–90, 195); Snodgrass (R. 203–4); Peters (R. 331–3); J. R. Smith (R. 249–52, 361); E. M. Smith (R. 398–9); Reed (R. 407); Buckland (R. 1516–7); Knode (R. 1572).

The Radford-Wiley's Shoals section of the river thus has borne a varied and an extensive navigation. No more can possibly be necessary to show that this part of the river is navigable.

(d) *The legal criteria of the courts below.*—The courts below minimized but did not deny this actual navigation. Instead, they introduced novel qualifications to the definition of navigable waters. The

---

[30] The boat was a survey boat, 16 feet long, 5 feet wide, and equipped with an outboard motor; it drew 8 to 10 inches of water when not equipped with a motor (R. 1194). The boat carried 5 men and their equipment on this trip (R. 1194).

[30a] Shortly thereafter the same boat, equipped with a propeller guard, navigated without difficulty to the Bull Falls section (at mile 74) through which it had been necessary to pull the boat on the previous trip when the propeller had been left unguarded (R. 947–9, 1220–21, 1227).

District Court relied upon: (1) the irregularity of the commerce; (2) its difficulty; and (3) the fact that it formed no appreciable part of the river's commerce.[31] The majority of the court below advanced somewhat different legal standards.[32] The actual navigation, it ruled, was to be disregarded because of: (1) its difficulty and danger; (2) there was no established trade or commerce over this part of the river; and (3) the commerce lasted for only a few years and has been abandoned for the last 50 years.[33] These limitations upon the doctrine of navigable waters are, we submit, wholly unwarranted.

First, it is wholly unimportant that the actual navigation has been abandoned. The DesPlaines River had been out of use for a century, "but a hundred years is a brief space in the life of a nation," and if federal control of navigable waters is to be abandoned "it is for Congress, not the courts, so to declare." *Economy Light Co.* v. *United States, supra,* 124. And in *Arizona* v. *California,* 283 U. S. 423, 453–454, the Court said:

---

[31] It said (R. 114): "there is a vagueness about the extent to which it occurred and indications that such trips were irregular, were attended with difficulty and formed no appreciable part of any commercial transportation which took place on the river."

[32] A novel statement of fact, that the trips could be made only in periods of unusually high water, has been shown to be wholly without support in the record (*supra*, pp. 53–54).

[33] It said (R. 2903): "that such trips could be made only at particular times when there was unusually high water; that even then navigation was not only difficult but also dangerous; that while the boats at times may have carried some country produce there was nothing like an established trade and commerce between Radford and points in West Virginia; and that the duration of such use of the keelboats was for a few years only and has been nonexistent for more than 50 years."

> Commercial disuse resulting from changed geographical conditions and a congressional failure to deal with them, does not amount to an abandonment of a navigable river or prohibit future exertion of federal control.

Second, it is quite immaterial that the navigation be accomplished with difficulty or even danger, so long as there was actual navigation. Navigation on the high seas, since times immemorial, has been a difficult and dangerous occupation, yet it cannot be said that the seas are not navigable. In passing on the navigability of the Fox River, in *The Montello,* 20 Wall. 430, 443, this Court stated:

> * * * the river is navigable in fact, although its navigation may be encompassed with difficulties by reason of natural barriers, such as rapids and sand-bars.

Third, the irregularity of the commercial trips, or the absence of an established trade route, plainly is irrelevant to the question of navigability. Trips which occur only when there is a sufficient commercial demand prove navigability as completely as those which move on regular schedule. *United States* v. *Utah,* 283 U. S. 64, settles that regularity of the traffic, or the existence of an established trade route is unnecessary. The lumber rafts floated on the Grand River (283 U. S. at 79) could hardly have moved on a regular schedule; the Green and Colorado Rivers were wholly unused for navigation over a 17-year interval and thereafter were used chiefly for the sporadic traffic involved in trips for exploration, pleasure, and mineral prospecting, and only occasionally for commercial carriage (283 U. S. at 82).

Fourth, the District Court's view that the commerce over the relevant stretch must be an appreciable part of the river's total commerce is obviously unsound. The issue is the navigability of the Radford-Wiley's Shoals stretch, and the substantiality of its commerce, not the commercial importance of its traffic as compared to other navigable parts of the river.

Finally, respondent seems to suggest (Br. in Opp. 13) that the character of the boats used on New River may bear upon the question of its navigability. But the size or character of the vessels is, of course, immaterial. In *Economy Light Co.* v. *United States,* 256 U. S. 113, 117, this Court found the DesPlaines River navigable because supplies needed by the early settlers had been carried by canoes and other boats of reasonably large capacity but light draft. Indeed, in *Water Power Co.* v. *Water Commissioners,* 168 U. S. 349, 359, the questioned part of the Mississippi River was held navigable because it had been used for floating logs and rafts. And in *The Montello,* 20 Wall. 430, 441–442, the Fox River was held navigable because it was used by boats substantially similar to those used on the New River.[34]

2. Suitability for Navigation

Even if, however, the voluminous evidence of the actual navigation on this stretch of the river were to be disregarded, the conclusion would yet be compelled that it is navigable, because it is susceptible of or suitable to navigation.

Section 3 (8) of the Federal Power Act defines navigable waters as those—

> which either in their natural or improved condition notwithstanding interruptions * * * by falls, shallows, or rapids compelling land carriage, are * * * suitable for use for the transportation of persons or property * * *.

If the stream, then, is capable of being used for transportation, either in its natural condition or after improvement, it is navigable.

The reason for this broad definition, going beyond the historical fact of actual navigation, is well stated in the 1891 report of Colonel Craighill, recommending complete discontinuation of the improvement work on New River (compare *Econ-*

---

[34] The Fox River carried Durham boats. These were vessels of from 70 to 100 feet long and 12 feet broad; they drew, when loaded, some 2 to 2½ feet of water, and were drawn by animals (20 Wall. at 441).

omy Light Co. v. *United States,* 256 U. S. 113, 124). The Colonel said (Ex. 43; R. 2413):

> Here attention may be called to the effect of the changing conditions which sometimes arise and New River is a striking illustration of it. In a country rich in minerals and agricultural products a natural waterway may be of the greatest value, especially if there be no competing railroads and the cost of its improvements be not very great. In course of time competing railroads are built, the topography being favorable. If the expense of the improvement of the river be great and the available money little, the railroads will take the business and the river becomes comparatively unimportant. This has for some years been the situation in the New River country, especially the upper portion.
>
> In time, as population increases and great mining, manufacturing, and agricultural industries become enlarged, the importance of the natural waterway again increases to such an extent as to justify a higher style of improvement, and in many instances the construction of canals is also found advantageous. This condition has been reached in several of the great European States, and will be in time in the United States.
>
> New River has, however, not reached this stage. It is at present in the second stage of comparative unimportance.

Accordingly, if there had been no appreciable commercial navigation on this stretch of the New

River, the question of its navigability would then turn upon its suitability for navigation. As the Court in *United States* v. *Utah,* 283 U. S. 64, 82, said of navigation in another sparsely settled region:

> The question of that susceptibility in the ordinary condition of the rivers, rather than of the mere manner or extent of actual use, is the crucial question * * *.

The issue, then, is whether the Radford-Wiley's Shoals stretch of New River has susceptibility for navigation. It is easily resolved by application of settled rules to the substantially undisputed facts of this case.

(a) *Actual navigation as evidence of suitability for navigation.*—Even if we were to assume that the courts below were right in holding that the commercial traffic in the Radford-Wiley's Shoals section was too small to be appreciable, we submit that the conceded traffic on this stretch is complete proof of its *suitability* for commercial navigation. A few trips between Allisonia and Hinton would not, of course, show an appreciable commercial navigation. But they would demonstrate *suitability* for navigation.

Judge Parker, after showing that there had been substantial commercial transportation in this stretch, stated as follows (R. 2928):

> the use made of the stream shows conclusively that it was capable of serving as a

highway for such commerce between Allisonia and Hinton for river boats of light draft, such as were undoubtedly in regular use on the river prior to the coming of the railroads.

(b) *Physical characteristics.*—Suitability of a stream for navigation is determinable from such physical characteristics as (i) the sufficiency of water flow, (ii) the velocity of the current and (iii) the existence of a channel of sufficient width and depth to permit the passage of the means of navigation through such natural obstructions as may be found in the stream.

(i) *Sufficiency of water flow.*—If the stream be navigable only in exceptional periods of high water, it is not navigable. *United States* v. *Rio Grande Irrigation Co.,* 174 U. S. 690, 699. On the other hand, there need not be a sufficiency of water throughout all seasons of the year. *Economy Light Co.* v. *United States,* 256 U. S. 113, 122.

There should in this case be little question as to the sufficiency of the waterflow. The lowest known flow at Radford, Virginia, at this point was 521 cubic feet per second on September 6, 1930 (R. 551). The greatest flows known at this point occurred in 1878 and 1916 and were estimated to be, respectively, about 155,000 and 146,000 second-feet (R. 551). The average flow at Radford over a period of 28 years ending in 1935 was 3,211 second-feet (R. 109, 551.)

The District Court found (R. 109):

> From these figures it will appear that, while the flow in New River is subject to wide variation, the river carries a large volume of water in the course of a year. There is no denial that the volume of water passing through the stream over any extended period would be sufficient for purposes of substantial navigation provided other conditions obtained which made it available for that purpose.

The court below seems to have been of the same view (see R. 2895–96, 2900–01), and respondent has not either below or in this Court, argued that the waterflow was insufficient for navigation.

(ii) *Velocity of the current.*—For a stream to be navigable, it must of course have a current velocity low enough for practicable navigation. *United States* v. *Utah,* 283 U. S. 64, 80.

The degree of slope of the various parts of New River is not in issue. It varies considerably between its source and its mouth.[35] The north fork of the river in North Carolina has a slope of as much as 31.5 feet per mile. The slope from Hinton, West Virginia, to the mouth of the river is 11.1 feet per mile. The average slope from Wilson Creek (at mile 252) to the mouth of the river is 7.1 feet per mile. But the slope in the Allisonia-

---

[35] The data as to the slope of the river are taken from Ex. 196 (I, 2).

Hinton stretch is only 4.4 feet per mile. The average slope in the Allisonia-Radford section is 5 feet per mile; in the Radford-Wiley's Shoals section it is 4.4 feet per mile; and in the Wiley's Shoals-Hinton section it is 3.8 feet per mile.

It is evident that there is nothing in the slope of the Radford-Wiley's Shoals stretch to make it nonnavigable.[36] It is 0.6 feet per mile less than the slope of the Allisonia-Radford section, the navigability of which seems beyond dispute (*supra*, pp. 35–38). It is barely more than half the slope of the upper 18 miles of the Fox River, 8 feet per mile,[37] which was found navigable in *The Montello*, 20 Wall. 430.

Moreover, the uncontradicted evidence shows that river navigation is practicable at current velocities of 5 to 6 miles per hour (R. 927). The District Court made no finding on the velocity of the current in the Radford-Wiley's Shoals stretch. The Circuit Court of Appeals made a general finding, with reference to the river as a whole, that the river had a "relatively rapid current" (R. 2893). At the same time the court found that the pools "of comparatively still water" were separated by rapids and shoals where the stream velocity varied from 3 to 5 miles per hour (R. 2894–96). It must follow, from the court's own findings, that the stretch was navigable so far as current velocity is concerned.

---

[36] The lower courts were not wholly fair in their discussion of the slope of the river. The District Court, in stating that the slope of the river above Radford and Hinton was about 4 feet per mile, drew an implied contrast between these stretches and the intervening reach (R. 114). The court below confined its discussion to the fact that the slope was "very much greater than the average in many places" (R. 2900–01), and that the entire river had a slope of 7.1 feet per mile (R. 2895).

[37] See Annual Report of Chief of Engineers for 1876, Part II, p. 235.

The velocity of the current was measured by petitioner's witness Gerdes for each of the natural channels or sluiceways through the 41 rapids and shoals between Radford and Wiley's Shoals. The results are set forth in the table at p. 70, *infra.* It will be noted that the velocities in these more difficult places varied from as little as 1.1 mile per hour to a maximum of 4.4 miles per hour, and that there were only four places where the velocity exceeded 4 miles per hour. In these circumstances it cannot be said that the velocity of the current was so swift as to render navigation impracticable.

(iii) *Channel through natural obstructions.*—The courts below, and respondent, place much emphasis upon the natural obstructions to navigation, and conclude that the rapids and shoals preclude navigability (R. 108). This we think is wholly erroneous.

1. The premise of the courts below is erroneous as a matter of law. In Section 3 (8) of the Federal

Power Act, Congress provided that streams shall be deemed navigable "notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage". It is settled even apart from Section 3 (8) that the mere existence of obstructions, even though they wholly destroy continuous navigation, does not make a stream nonnavigable. In *The Mantello,* 20 Wall. 430, 442–443, where the Fox River was held navigable, this Court noted that there were rapids and falls, with carrying places for distances of as much as two miles. And in *Economy Light Co.* v. *United States,* 256 U. S. 113, 122, this Court said:

> Navigability, in the sense of the law, is not destroyed because the watercourse is interrupted by occasional natural obstructions or portages.

And in *United States* v. *Utah,* 283 U. S. 64, 86, the Court held that the sand bars in the Grand and Green Rivers did not destroy their navigability.[38] The stretch of New River under consideration here comes well within these rules.

---

[38] It said (p. 86): "Recognizing the difficulties which are thus created, the Master is plainly right in his conclusion that the mere fact of the presence of such sandbars causing impediments to navigation does not make a river non-navigable. It is sufficient to refer to the well-known conditions on the Missouri River and the Mississippi River. The presence of sandbars must be taken in connection with other factors making for navigability."

This Court has recognized that navigability is not destroyed because improvement may be necessary. In *Ashwander* v. *Tennessee Valley Authority*, 297 U. S. 288, 329, it said:

> While, in its present condition, the Tennessee River is not adequately improved for commercial navigation, and traffic is small, we are not at liberty to conclude either that the river is not susceptible of development as an important waterway, * * *

2. The court below placed much emphasis upon the mile-by-mile survey of the river made by N. H. Hutton in 1872[39] and contained in the Craighill report of that year (R. 2282–87). The stretch between Radford and Wiley's Shoals,[40] it is true, contains some rather formidable descriptions. The most extreme of the eleven examples quoted by the court below (R. 2900–01; from R. 2285) are:

> 67th mile. Shoals continue for 1,600 feet; then a short pool and Walker's Mount Falls, where the river falls 5 feet in 500 feet, over two ledges of shale and metamorphic limestone.

---

[39] This report contains the following statement: "It will be understood that in each mile, except to the extent named, the river affords a good navigation and an average depth of 5 feet at low water stages" (Ex. 31, R. 2282).

[40] This stretch (mile 145 to mile 89.1) represents the 46th to 102nd mile in this report, since it took the Lead Mines (at mile 190) as the starting point.

> 68th mile. Continuous ledges of 4,000 feet; fall, 8 feet.
>
> * * * * *
>
> 92nd mile. Peter's Mountain Falls, where river falls 4½ feet in 1,300 feet, over a succession of limestone ledges; terminating in an abrupt fall of 5 feet.

But equally formidable obstacles stood in the way of easy navigation on the Allisonia-Radford and Wiley's Shoals-Hinton stretches, the navigability of which seems beyond question. From the same survey, the following descriptions of the Allisonia-Radford stretch are to be noted (R. 2283):

> 25th mile. Allison's Falls occur at the beginning of this mile, where the river falls 3 feet in 300 feet over a ledge of red shale.
>
> * * * * *
>
> 29th mile. River falls 8 feet over a succession of nine ledges of shale.
>
> * * * * *
>
> 31st mile. Wysor's Falls, where river falls 7 feet over two sets of ledges, both about 800 feet wide.

And in the Wiley's Shoals-Hinton stretch the survey is equally calculated to discourage boatmen. It says (R. 2286-87):

> 104th mile. Commences with shallow riffle, 600 feet long, over bowlders and

> gravel, and following this occurs Wiley's Falls, where the river falls 4 feet in 10 feet, over a limestone ledge about 50 feet wide.
>
> * * * * *
>
> 109th mile. Swift water and riffles over bowlders for three-fourths of a mile, terminating with a fall of 3 feet over a limestone ledge 200 feet wide; several large detached rocks below falls.
>
> * * * * *
>
> 119th mile. Bull Falls, ledge 3 feet high; blasting for 100 feet, and rapids 300 feet long below, over pebbles and bowlders.
>
> 120th mile. Four ledges 250 feet long over all, ending fall of 3 feet over a ledge 20 feet thick.

The Hutton survey, if its description of obstacles in the Radford-Wiley's Shoals stretch were conclusive of nonnavigability, would demonstrate equally that the obviously navigable stretches are nonnavigable. It is plain that one must look further to answer the question of navigability.

3. The answer is found in the important fact of channels through the shoals and rapids, a factor which the courts below wholly ignored.

Petitioner's witness Gerdes made actual measurements of the channels through each of the natural obstructions between Radford and Wiley's Shoals. The measurements were made at low water (R. 906). His testimony (R. 914–926) may be tabulated as follows:

Measurement of width and depth of channels and velocity of currents

Mile	Name	Width (feet)	Depth (feet)	Miles per hour
89.1	Wiley's Shoals	24	2 to 4	1.9.
90.9	Shoal No. 2	24	3 or more	2.8 to 3.6.
91.3	Shoal No. 3	18	2.5	2.3.
92.8	Shumate's Falls	16 to 40	2.1 to 3	1.9 to 3.5.
94.1	East River Shoals	30	2.5 to 3	2.5.
97.5	Rich Creek Shoals	28	2.2	2.4.
100.0	Peter Mountain Falls	15	2	2.9 to 4.3.
103.0	Shoal No. 8	40	2.6	3.2.
104.3	Shoal No. 9	30	2.6	4.4.
106.2	French Mill Shoal	33	2.3	2.9.
107.0	Shoal No. 11	18	2.6	1.2 to 2.3.
108.2	Henley French Shoal	18	2.2	3.4.
109.3	Shoal No. 13	28	4	2.3 to 3.
110.0	Shoal No. 14	30	3	3.3.
111.0	Shoal No. 15	20	2	2.6.
111.8	Snidow's Ferry Shoal	40	2.6	1.1.
113.0	Walker's Creek Bar	23	2.2	3.1.
114.7	Little Stony Creek Bar	35	2.6	3.3.
118.0	Snidow's Falls	16 to 30	2.3 to 4	2.5 to 3.9.
119.2	Sinking Creek Bar	30	2	2.1.
119.7	Upper Sinking Creek Shoal	20	3	2.8 to 3.4.
120.7	Eggleston's Shoals	18	1.8	2.9.
121.5	Shoal No. 23	16	2.6	4.4.
123.1	Shoal No. 24	40	2.3	2.6.
123.3	Shoal No. 25	30	3	1.8.
123.5	Shoal No. 26	16	2.1	2.
124.6	Big Walker's Mountain Falls	16 to 30	3 to 4	4.2.
125–127	Sifford's Falls	8	1 to 8	1 to 2.
127.2	Sifford's Shoals	10	1 to 2	1.4.
130.3	White Thorn Ferry Shoal	20	1.5	2.4.
134.0	Shoal No. 31	20	2.3	3.2.
136.6	Shoal No. 32	28	2.2	1.4.
138.0	Barnette's Falls	15	2	2.8.
139.7	Lower Pepper Falls	18	2.4	3.7.
140.3	Upper Pepper Falls	30	2	2.3.
141.8	Shoal No. 36	60	3	3.9.
142.8	Shoal No. 37	40	2.1	2.3.
143.4	Shoal No. 38	35	2.5	3.
143.9	Shoal No. 39	25	2.5	2.8.
144.2	Shoal No. 40	30	2	2.3.
145.0	Shoal No. 41	20	2	2.5.

From these measurements it will be seen that there are but two places—Sifford's Falls and Sifford's Shoals (miles 125 through miles 127.2) where the channel, at low water, has minimum widths of from 8 to 10 feet, just enough to permit the passage of boats 8 feet wide. In all of the other natural obstructions the channel was amply wide to permit the passage of such boats. The minimum depths of the channel in these natural obstructions was more than 2 feet, except that at Eggleston Shoals (mile 120.7) it was 1.8 feet, and at Sifford's Falls and Sifford's Shoals (miles 125 through 127.) it was from 1 to 2 feet. The worst that can be said about the width and depth of the channel at low water in this 56-mile stretch is that some unloading or portage would probably be required at low water at two places.

Thus the natural obstructions in this stretch of the river would not defeat a finding of navigability. In Section 3 (8) of the Federal Power Act, Congress laid down a standard, similar to that judicially evolved, for the application of the general rule that natural obstructions are only evidence of nonnavigability, but do not necessarily establish nonnavigability. According to this standard, (i) none of the natural obstructions in this stretch are relevant, because they do not interrupt the navigable parts; (ii) resolving all doubts against the Government, only two of the natural obstructions may be regarded as interruptions between the navigable parts of the stream; and (iii) none of the natural obstructions marks the end of navigability but at the most merely offer a temporary obstruction to navigation.

4. Again ignoring the channel, the court below relied upon respondent's photographs to establish nonnavigability (R. 2899–2901). These photographs (Vol. IV) were admittedly taken to show the worst places in the river (R. 1700, 1702, 1768, 1835), and many were admittedly taken at a time of extremely low water (R. 2259–60, 1700, 1768, 1775). But they are subject to a still greater vice; since they were taken from the water's edge, they cannot show the channels through the rapids or shoals. In consequence, the photographs of the Allisonia-Radford and the Wiley's Shoals-Hinton stretches (Plates 5–12 and 34–39, respectively, of Vol. IV) seem to show a nonnavigable river equally with the critical stretch between Radford and Wiley's Shoals (Plates 13–33 of Vol. IV).

The real condition as to navigability can, in truth, be determined only from the petitioner's aerial photographs (Vol. III). These give graphic evidence that the river is in fact navigable throughout the contested stretch.[41]

---

[41] A detailed comparison of the photographs is fruitful. The photographs of respondent which show the worst places on the Radford-Wiley's Shoals stretches are set off against the corresponding aerial photographs of the Government.

Vol. V		Vol. III	
Respondent's Photograph No.:		Aerial Photograph No.:	
17–21	Wiley's Falls	58	Wiley's Falls
26–28	Shumate's Falls	57	Shumate's Falls
36–44	Peter's Mountain Falls	54	Peter's Mountain Falls
90–101	Walker Mountain Falls and Sifford's Shoals	46	Walker Mountain Falls and Sifford's Shoals

Appendix C, *infra*, pp. 185–195, contains a mile-by-mile index of all photographs.

It thus seems clear that the Radford-Wiley's Shoals stretch is navigable. This conclusion is required whether one looks to the evidence of actual navigation or to the physical characteristics of the river in this section. Since the Allisonia-Radford and Wiley's Shoals-Hinton stretches are navigable, it follows that New River is navigable from Allisonia, Virginia, to Hinton, West Virginia. Since this 111-mile stretch is interstate, it results that the site of respondent's project is in navigable waters of the United States.

D. THE ALLISONIA-RADFORD STRETCH AS A CHANNEL OF INTERSTATE COMMERCE

There is, finally, still another reason why the site of respondent's project is in navigable waters of the United States. The 28-mile stretch of New River between Allisonia and Radford, as we have shown (*supra,* pp. 35–38), is navigable. Respondent's project is located in this stretch and is, therefore, located in navigable waters of the United States even though the river below Radford were nonnavigable. This is because the Allisonia-Radford stretch was the avenue of an interstate commerce which moved by boat to Radford and was there transshipped in interstate commerce by railroad. The court below considered this contention only theoretical, since there was no present commerce, and unsound in any event, since the United States cannot regulate use of a river (in contrast to the vessels) unless it affords interstate *water* transportation (R. 2919–20). Judge Parker, on the other hand, said that so long as there be an interstate movement of goods, whether by water or by water and rail, the water is subject to the regulatory jurisdiction of Congress (R. 2935–37).

There will, we think, be no dispute but that a substantial commercial traffic was formerly shipped downstream to Radford and out of the state by railroad (see *supra,* p. 37; see e. g. R. 244). The District Court so found (R. 115) and the court below by plain inference concurred (R. 2902–03, 2919–20). The only question, then, is whether a water-rail movement in interstate commerce is sufficient to make the waters navigable waters of the United States.

Section 3 (8) settles this issue. It declares that navigable waters means "those parts of streams * * * over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States, and which * * * are used or suitable for use for the transportation of persons or property in interstate or foreign commerce". In this broad definition there is no qualification that the transportation be wholly by water; there is simply the requirement that it move in interstate commerce.

This rule represents but a slight extension of the decision in *The Daniel Ball,* 10 Wall. 557. There this Court held a steamer, operating intrastate, subject to the federal navigation laws because her goods moved in interstate commerce after transshipment over railroad or other vessels. The Court said (p. 565):

> She was employed as an instrument of that commerce; for whenever a commodity has begun to move as an article of trade from one State to another, commerce in that commodity between the States has commenced. The fact that several different and independent agencies are employed in transporting the commodity, some acting entirely in one State, and some acting through two or more States, does in no respect affect the character of the transaction. To the extent in which each agency acts in that transportation, it is subject to the regulation of Congress.

If Congress can regulate the vehicle of such an interstate commerce, by the same token it can regulate the avenue of that commerce; each is an instrumentality of interstate commerce.

On principle, the protection which Congress is authorized to extend over navigable waters must be the same whether they are channels of interstate commerce wholly by water or by water and rail. Admittedly, Congress can and does regulate an interstate waterway or an interstate railroad. Certainly nothing in the Constitution could be said to prevent regulation of an interstate route composed in part of water and in part of railroad. And Section 3 (8) defines navigable waters of the United

States in terms which obviously are broad enough to require this water-rail route for interstate commerce through Radford be included. It follows that the Allisonia-Radford stretch must, even apart from the navigability of the Radford-Hinton stretch, be taken to be navigable waters of the United States.

II

RESPONDENT'S PROJECT MUST BE LICENSED BECAUSE IT WILL OBSTRUCT NAVIGABLE CAPACITY AND AFFECT THE INTERESTS OF INTERSTATE COMMERCE

We have shown that New River at the site of respondent's project is navigable water of the United States. But even if that were not so, respondent must nevertheless obtain a license from the Federal Power Commission before its project can be constructed or operated. Without such a license, respondent's project is forbidden: first, by Section 10 of the Rivers and Harbors Act, as an obstruction to the navigable capacity of waters of the United States; and, second, by Section 23 of the Federal Power Act, as affecting the interests of interstate commerce.

A. THE OPERATION OF THE PROJECT WILL OBSTRUCT THE NAVIGABLE CAPACITY OF NAVIGABLE WATERS OF THE UNITED STATES.

Section 10 of the Rivers and Harbors Act prohibits the creation of any obstruction to the navigable capacity of any of the navigable waters of the United States unless affirmatively authorized by Congress. *United States* v. *Rio Grande Irrigation*

Co., 174 U. S. 690, 708–709. The respondent's project, we submit, will impair the navigable capacity of New River (between Hinton, West Virginia, and Glen Lyn, Virginia), of the Kanawha River, and of the Ohio River. The respondent does not dispute that the operation of the project will impair the navigable capacity of this section of New River, but denies that this section constitutes navigable water of the United States. Respondent does not dispute that the Kanawha and Ohio Rivers are navigable waters of the United States, but denies that the operation of the project will obstruct their navigable capacity.

The respondent's project will include a reservoir having a usable storage capacity of 100,000 acre-feet; the power plant will have a hydraulic capacity of 9,000 cubic feet per second (R. 1245–47, 2028). This large capacity must be contrasted with the stream flow at that point. On the average, it exceeds 9,000 second-feet for only 12 days a year (R. 94, 551). The average flow is 3,211 second-feet, and is in excess of 3,000 second-feet for only 141 days of each year (R. 94, 551). The average summer flow is 1,810 second-feet, and the average flow during the lowest month is only 1,400 second-feet.[1]

---

[1] U. S. G. S. Water Supply Papers Nos. 698, 713, 728, 743, 758 (Orig. Ex. 65–83, 85–87). Average summer flow covers the months of July, August, and September of the years 1930–1935, and average flow during the lowest month covers the lowest of these three months for those years (July 1930; September 1931, 1932, and 1933; July 1934; August 1935).

It is apparent that the project cannot be operated continuously at full capacity. Since the project is to be interconnected with other hydroelectric and steam plants in respondent's system, operation on a "peak load basis" is the only feasible means of operation. Respondent's evidence[2] was that its normal week day operation would involve 7½ hours of complete shut-down, and 6 hours when the discharge would be more than 6,000 second-feet, including one hour when the discharge would be 9,000 second-feet.[3] In addition, the plant will be shut down entirely for a period of at least 34 hours over week ends (R. 795–803, 1456–57, 2039). These ir-

---

[2] Since the evidence as to the extent to which "peaking" operations would be practiced is in conflict, we shall confine ourselves to respondent's witnesses and evidence.

[3] Defendant's Exhibit 594 (I, 11) shows the following discharges:

Time:	*Second-feet of discharge*
12:00– 6:30 A. M	0
6:30– 7:00 A. M	600
7:00– 8:00 A. M	2, 500
8:00– 9:00 A. M	4, 900
9:00–10:00 A. M	7, 100
10:00–11:00 A. M	9, 000
11:00–12:00 Noon	8, 100
12:00– 1:00 P. M	6, 000
1:00– 2:00 P. M	7, 400
2:00– 3:00 P. M	6, 200
3:00– 4:00 P. M	2, 900
4:00– 5:00 P. M	2, 300
5:00– 7:00 P. M	1, 000
7:00– 8:00 P. M	3, 300
8:00– 9:00 P. M	4, 900
9:00–10:00 P. M	3, 700
10:00–11:00 P. M	600
11:00–12:00	0

regular flows will, of course, produce variations in the stage or level of the water, known as "power waves," in the stream below the dam. They obviously will tend to impair the navigable capacity below; the only question is as to the extent of this impairment.

1. The Project Will Impair the Navigable Capacity of New River Between Hinton, West Virginia, and Glen Lyn, Virginia

There is no dispute as to the impairment of the navigable capacity of the section of the river between Hinton, West Virginia, and Glen Lyn, Virginia. New River at the site of the project contributes 70 perecnt of the average summer flow and 72 percent of the average low summer flow at Glen Lyn.[4] The intermittent variations in the flow of the water past the dam will vary the stage of water in the Hinton-Glen Lyn stretch from as much as a foot and a half below to several feet above the normal water level (R. 2468). These variations in water level will completely destroy the navigable capacity of this stretch of the river. This stretch is suitable for navigation of keelboats drawing 2 feet of water. If, during any substantial period, the water depth, which is ordinarily between 2 and 3 feet, is reduced to a depth of 6 inches to 1 foot, it is obvious that the vessels could not be navigated.

---

[4] The average summer flow at Glen Lyn is 2,580 second-feet, and the average low summer flow is 1,940 second-feet. Compare the data, *supra*, p. 77, for the flow at the project site. The source of both series of data is given in footnote 1, *supra*, p. 77.

The dispute here relates to the question whether New River is navigable water of the United States. The navigability of this stretch of the river seems beyond controversy (see R. 2937–38). In 1882, the Chief of Engineers reported that four keelboats ran up to Shumate Falls, Virginia, just below Glen Lyn, carrying supplies to the railroads there (R. 2383). Colonel Craighill, at about the same time, reported five keelboats running over the same stretch (R. 2893). The Government improved the channel from Hinton through Wiley's Falls and through Wiley's Shoals (at mile 89.1) and there is a slack water pool from that point to Shumate Falls (I, 2). Some 23 witnesses testified to commercial navigation over the stretch downstream from Glen Lyn and from Shumate Falls.[5]

The majority of the court below, while it minimized this actual navigation, chose rather to emphasize the natural obstructions between Glen Lyn and the West Virginia line; these are Wiley's Falls and Shumate Falls (R. 2909). But Wiley's Falls has an improved channel, and Shumate Falls has a natural channel of 16 to 40 feet wide and 2.1 to 3 feet deep at low water, where the maximum current velocity is 1.9 to 3.5 miles per hour (*supra*, p. 70). In addition, the majority said that there has been no keelboat navigation between Glen Lyn and Hinton for probably 25 years (R. 2909). But abandonment of navigation, as this Court has ruled, does not destroy navigability (*supra,* pp. 56–57). And Section 10 of the Rivers and Harbors Act forbids the creation of an obstruction "to the navigable capacity" of waters of the United States, not simply of an obstruction to existing navigation. See *United States* v. *Rio Grande Irrigation Co.,* 174 U. S. 690.[6]

---

[5] See the graphic inset opposite p. 48, and the table in Appendix B, pp. 178–184.

It follows that, since the operation of the project will impair the navigable capacity of an interstate navigable stream, a license from the Federal Power Commission is required. The succeeding sections of this part of the brief show that the same result is required if attention is directed to rather broader considerations than the Glen Lyn-Hinton stretch.

2. The Project Will Impair the Navigable Capacity of the Kanawha and Ohio Rivers

(a) *The undisputed evidence.*—Whatever may be the case during periods of normal flow, there can be little doubt as to the impairment of the navigable capacity of the Kanawha and Ohio rivers during the critical low-water periods. The undisputed evidence shows that during such periods New River at the site of respondent's project contributes as much as 70 percent of the flow of the Kanawha (R. 564), and as much as 38 percent of the flow of the Ohio River just below the mouth of the Kanawha (R. 559, 1421). These critical low-water periods are not infrequent, nor are they of very short duration.[7]

---

[6] There this Court said (p. 708), of the similar Section 10 of the Act of September 19, 1899, c. 907, 26 Stat. 426, 454: "The language is general, and must be given full scope. It is not a prohibition of any obstruction to the navigation, but any obstruction to the navigable capacity, and anything, wherever done or however done, within the limits of the jurisdiction of the United States which tends to destroy the navigable capacity of one of the navigable waters of the United States, is within the terms of the prohibition. * * *"

During dry periods the highly improved Kanawha is dependent principally on the flow of New River at the site of respondent's project, and the Ohio below the mouth of the Kanawha is dependent in a very substantial degree upon the same source. The Army Engineers have experienced great difficulty in maintaining the project depths for navigation on the Ohio during low-water periods. (R. 737–43, 1083–85, 1129, 1254). These conditions would be greatly aggravated if as much as 38 percent of the flow of the Ohio were shut off, as it will be for periods of at least 34 hours over week ends in the unregulated operation of respondent's project (*supra*, p. 78). In such circumstances, navigation on the Ohio will plainly be interfered with. Artificial manipulation of New River flows at Radford, similarly, will seriously affect channel depths and current velocities in the Kanawha at times when its flow is substantially below the yearly average, and when the entire flow of New River is necessary for navigation. At such times, abstracting from 50 to 70 percent of the flow of the Kanawha for a week end will necessarily mean substantial diminution in the navigable capacity of the river.

---

[7] For example, during a 119-day period in 1930, 22.5 percent of the flow of the Ohio immediately below the mouth of the Kanawha came from New River at the site of respondent's project (R. 562, 1425). Likewise, during the 8-day period between August 24 and August 31, 1918, the average flow of the Ohio immediately below the Kanawha was 5,945 second-feet (R. 1421) and the average flow of New River at respondent's dam site was 2,260 second-feet (R. 559), or 38 per cent.

Moreover, the intermittent variations in the water flow past the dam will produce "power waves," or variations in the water stages downstream. How large the power waves will be, and how far they will persist downstream, can be estimated by a comparison with the wave tests conducted in 1930. These tests were made by releasing various flows from respondent's Buck and Byllesby Dams near Ivanhoe (mile 194) and observing the persistence of the waves at various points on New River and the Kanawha River. Exhibit 227 (I, 12) shows the results of these wave tests, as the waves passed the gages located on the river at Ivanhoe, Radford, Hinton, and Lock No. 2.[8] All of the 18 test waves, as shown on this exhibit, persisted to a varying degree from the Buck plant down to Lock No. 2. According to respondent's expert witness, the approximate average amplitude, or change in water level, of the 18 waves was 5 feet 3 inches at Ivanhoe and had been reduced to an average amplitude of 5 inches at Lock No. 2 (R. 2055).

---

[8] Lock No. 2 was 10.7 miles below Kanawha Falls and 207 miles from the Buck plant; respondent's project is only 155 miles from the head of Kanawha navigation.

According to testimony for the respondent, the wave tests from Ivanhoe to Hinton would be comparable with the travel of waves from respondent's project to Kanawha Falls (R. 1938). The 1930 waves persisted at Hinton from 10 to 48 percent in amplitude, and from 33 to 49½ percent in volume (R. 2501). According to respondent's testimony, the persistence of waves from respondent's project at Radford to Lock No. 2 on the Kanawha would be from 10½ to 45 percent in amplitude and from 15 to 51 percent in volume (R. 1934–35). The 5-inch estimate is, accordingly, considerably too low as applied to power waves originating at Radford. Moreover, it should be noted that the Buck and Byllesby Reservoirs used in making the tests had a combined storage capacity of 2,900 acre-feet (Ex. 544), about 3 percent of the usable capacity of the reservoir of the Radford project. It was suggested by respondent's witness (R. 2094–95) that the waves released from these two reservoirs were not comparable in size with the waves which would come from the Radford project under peak-load operations. However, it is sufficient if we suppose that the variations in water level on the Kanawha caused by the intermittent variation in the water flow past respondent's project will be no greater than those shown in the 1930 wave tests, or 5 inches on the Kanawha.

This variation in the depth available for navigation on the Kanawha will constitute an interference with the navigable capacity of the stream. The reason is that barges like those operated on the Kanawha are usually loaded to capacity when navigable depths permit, and a variation of as little as 5 inches will mean that the barges must load at less than full capacity or be grounded (R. 2139–40, 2178–79).[9]

The courts below did not dispute these facts but ruled, first, that the power waves produced by the operation of the Radford project will be rectified by the existing and proposed dams; and, second, that respondent does not intend so to operate the project as to impair navigable capacity (R. 128–33, 2904–08). We submit that the ruling is erroneous as a matter of law.

(*b*) *The compensatory effect of downstream dams.*—These dams are: (1) the London, Marmet, and Winfield locks and dams on the Kanawha River, constructed and operated by the Government (R. 2690); (2) the Kanawha Falls dam of the Electro-Metallurgical Company;[10] (3) the Hawk's Nest dam 6 miles above the mouth of New River, constructed by the Electro-Metallurgical Company, and (4) the proposed Bluestone dam to be built by the Government two miles above Hinton.[11] It was supposed by the court below that these dams can be so operated as largely to compensate for any fluctuation in the water flow which respondent's project is apt to cause.

---

[9] The standard barge in use on the Kanawha is 26 feet wide and 135 feet long (R. 1088–89 and Ex. 145, p. 38). Six barges usually constitute a tow (R. 1089). The principal item of commerce is coal (R. 1089). A reduction of one-half foot in navigable depth would necessitate lessening the load by as much as 360 tons of coal per tow, or more than 50 tons per barge. (The amount of coal added to a tow to obtain a certain increase in draft is equivalent to the amount of water, 62.4 lbs. per cu. ft., displaced by the tow.)

But the argument that their construction takes respondent out of the jurisdiction of the Commission is not tenable. Its premise must be that the work done or authorized by the Federal Government, for the improvement of navigation together with other purposes, serves to oust its jurisdiction to protect navigable capacity. But plainly the United States does not lose control of the river by virtue of improving it.

A consequence of the respondent's reliance upon downstream dams, if the argument were accepted, must be that one upstream dam is barred from the regulatory jurisdiction of the Federal Government because its effects can be absorbed, but that several dams, the cumulative effects of which might not be absorbed, are not exempted. And, one may well wonder, which of the several dams in the last example would be considered exempt and which would be subject to the Commission's jurisdiction.

---

[10] This dam is constructed and operated under a War Department permit.

[11] This dam will be considerably the largest on the river; it will rise 150 feet and will have a usable storage capacity of 245,000 acre-feet (R. 1367–68).

It may be noted that the allusion of the court below to the fact that it is not to have locks (R. 2907) is misleading, since a barge-lift is to be provided (R. 1349–50; Ex. 200A, B, C).

Moreover, as Judge Parker pointed out, the downstream dams might be removed (R. 2937–38). Or, if not removed, their operation might be abandoned or radically altered.

Plainly enough, the effect of the respondent's project upon navigable capacity must be considered in the light of the stream in its natural condition and without regard to its modification by downstream dams.[12]

---

[12] Respondent (Br. in Opp. 19), and the courts below (R. 128, 2906–07), have each emphasized that the Government has installed power equipment in its Kanawha dams and permits hydroelectric development by its private lessee. If power development is permissible in the Kanawha itself, the argument runs, *a fortiori* it must be permissible at the site of respondent's project. But the Kanawha power developments aptly illustrate the need of federal control by which to reconcile the conflicting demands of navigation and power development. The Federal Power Commission license reserves full power in the District Engineer of the War Department to regulate the rate of discharge of water to prevent impairment of navigability by the operation of hydroelectric plants (by respondent's affiliate) (Ex. 191, Art. 16, R. 1256). Yet even the limited tolerance allowed the power lessee has been the subject of numerous complaints by navigators who have grounded their vessels during low flow periods (R. 2138–42, 2195–97).

(*c*) ***Respondent's intended method of operation.***—The question of respondent's intended or probable method of operation of its project is, we think, irrelevant to the jurisdiction of the Commission to require a license. Section 10 of the Rivers and Harbors Act does not contemplate exemption of those who can show an intention not to impair navigable capacity. In the first place the protection of navigable capacity is not to be left to the uncontrolled decisions of project operators. In the second place, none can be sure that the economic and technological circumstances will not become so changed that a different means of operation will be desired by the licensee. Little can be added to the statement of Judge Parker (R. 2938-39):

> the fact that the structure is of such character that it is capable of being operated so as to affect navigation brings it within the regulatory power of Congress. It is clear that, in such case, the government need not depend upon the wisdom or public spirit of private persons to protect the interests of navigation but may itself take action which will guarantee their protection.

B. THE UNLICENSED CONSTRUCTION AND OPERATION OF RESPONDENT'S PROJECT IS IN VIOLATION OF SECTION 23 OF THE FEDERAL POWER ACT

If, as we have shown, the respondent's project will impair the navigable capacity of navigable waters of the United States, then the construction, maintenance, and operation of the project is not only in violation of Section 10 of the Rivers and Harbors Act, but also of Section 23 of the Federal Power Act, for the "impairment of navigable capacity" forbidden by the former Act is also an effect on "the interests of interstate * * * commerce" within the meaning of the latter provision. But Section 23 will apply even though the interests of interstate commerce are affected otherwise than by impairment of downstream navigable capacity.

1. *Preliminary Questions of Construction*

(*a*) *The section applies to nonnavigable waters.*—In the lower courts respondent argued, that, if New River at the site of the project is not navigable waters of the United States, no license can be required, whatever the effect upon downstream navigable capacity and whatever the effect upon interests of interstate commerce. Under this contention, Section 23 of the Federal Water Power Act of 1920 merely provided a procedure by which one could determine in advance of construction whether the stream was navigable water of the United States.[13]

This is an untenable construction of Section 23, either as it read in 1920 or as amended in 1935. A comparative print[14] of the relevant parts of the section reads:

---

[13] While the District Court agreed with respondent (R. 143-8), the court below expressly rejected this extreme position (R. 2196-98).

> Any person * * * intending to construct a dam * * * in any stream * * * other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce * * * [may in their discretion] *shall before such construction* file declaration of such intention with the Commission, * * * and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person * * * shall not [proceed with such construction] *construct, maintain, or operate such dam or other project works* until it shall have applied for * * * a license under the provisions of this Act. * * *

Words could ~~not~~ be clearer that Section 23 applies to the construction of dams in streams "other than * * * navigable waters," and that a license under Section 23 is required, not if the Commission finds that Section 23 is inapplicable because the stream is navigable, but if it finds that "the interests of interstate or foreign commerce would be affected by such proposed construction."[15]

---

[14] The 1935 amendments added the italicized words and deleted those in brackets. A comparative print of the entire section is found in the Appendix to the petition for a writ of certiorari, pp. 36–37.

(*b*) *The 1935 amendments apply.*—The court below suggested that the 1935 amendments might be inapplicable because enacted after this suit was commenced[16] and a year after construction of the project began (R. 2916). But the 1935 amendments, if they have any effect relevant here, simply clarified the proper construction of the 1920 Act.

---

[15] The Committee reports on the 1935 amendments show the understanding of Congress with unmistakable clarity. The Senate report (No. 621, 74th Cong., 1st Sess., p. 47) said:

"Under the present provision anyone intending to undertake a project *on a nonnavigable tributary of a navigable stream* may in his discretion file such a declaration with the Commission. If the Commission finds that the interests of interstate commerce would be affected by the project, it is made unlawful to proceed without having secured a license. This provision is changed to make the filing of a declaration of intention mandatory in such cases. * * *" (Italics added.)

The House report (No. 1318, 74th Cong., 1st Sess., p. 26) said:

"Furthermore, the provision making discretionary the filing of applications for preliminary permits for the construction of projects *in the nonnavigable tributaries of navigable streams* is changed to make such applications mandatory. In this way, every person intending to construct a project which might affect navigation would be required to come to the Commission for a determination of the interests of the United States. This would greatly strengthen the act by enabling the Commission to maintain control over *all projects with which the Federal Government has any valid concern.* * * *" (Italics added.)

[16] The Federal Power Act of 1935 was approved on August 26, 1935. The bill of complaint in this case was filed

The license, whether under the 1920 or the 1935 language, is required, if the Commission "upon investigation * * * shall find that the interests of interstate or foreign commerce would be affected by such proposed construction." The 1935 amendments removed the anomaly by which a project operator might voluntarily bring himself within the jurisdiction of the Commission,[17] but left unchanged the Commission's powers after the declaration of intention was filed. Since respondent did in fact file a declaration of intention, it is a matter of no consequence whether its case be governed by the 1920 or the 1935 language.[18]

---

on May 6, 1935 (R. 4); the answer on June 7, 1935 (R. 38). Trial commenced on July 13, 1936.

[17] A hypothetical project might not obstruct navigable capacity under Section 10 of the Rivers and Harbors Act, yet affect the interests of interstate commerce under Section 23. Prior to 1935 a Commission license would be required only if the operator chose to file a declaration of intention. One may suppose that Congress then believed the severity of the sanctions against violation of the Rivers and Harbors Act would be sufficient to drive to the Commission those who should be licensed under Section 23.

[18] In any event, the rule is settled that litigation, particularly in a suit for injunction which operates *in futuro*, must be decided under the law at the time of the decree. *United States* v. *The Schooner Peggy*, 1 Cranch 103, 110; *Pennsylvania* v. *Wheeling & Belmont Bridge Co.*, 18 How. 421, 430, 431; *Duplex Co.* v. *Deering*, 254 U. S. 443, 464; *Smith* v. *Illinois Bell Telephone Co.*, 282 U. S. 133, 142–143,

2. *Section 23 Applies Even Though the Effect on Navigable Capacity Be Beneficial Rather Than Adverse*

(*a*) *The project will have at least a beneficial effect.*—While the respondent variously denied that the project will impair navigable capacity downstream, it did not deny, but on the contrary urged, that the project will have a beneficial effect on navigable capacity below. In its application for license the respondent maintained that the project "will tend to equalize seasonal variations to increase the minimum flow during low-water periods and reduce flood peaks below the project" (R. 2478). Its declaration of intention to construct this project stated that "the effect of the proposed project * * * will, in general, be beneficial" (R. 2637). Respondent urged in the court below (Br. 53), that the "project will at all times increase the average low-water flow below the dam site and in extreme dry years will increase it from a minimum of 600 second-feet to 1,230 second-feet, with substantial benefit to navigation as well as to power interests downstream."

161–162; *Abie State Bank* v. *Bryan*, 282 U. S. 765, 782; *Carpenter* v. *Wabash Ry. Co.*, No. 230, this Term, decided January 29, 1940. The respondent can hardly complain of a retroactive operation because it chose to proceed with the unlicensed construction of its project while the Commission was vigorously asserting that a license was necessary, particularly since the actual construction prior to the passage of the 1935 Act was negligible.

The Army engineers are of the same view. In his report of August 20, 1925 (Ex. 92, R. 2521), General Taylor stated that "proper regulation of the flow of the river would naturally be of benefit to navigation" and set forth the conditions which should be inserted in the license in order to protect the interests of interstate or foreign commerce.[19] The District Engineer, in his report on respondent's application for license, agreed (Ex. 98, R. 2551–52). The "308" report of the War Department is to the same effect.[20]

The Government does not dispute that the project, if properly regulated, will benefit navigation. It submits, however, that since that is so, Section 23 (b) of the Federal Power Act requires that the project be licensed.

(*b*) ***Section 23 applies if the project will have a beneficial effect.*** The court below assumed, without analysis of this issue, that Section 23 was applicable only if the project would obstruct, impair, or adversely affect the navigable capacity (R. 2904–08, 2916–19, 2921–22). We submit that this construction unwarrantedly narrows the plain scope of Section 23.

---

[19] His second report of December 29, 1925 (Ex. 97, R. 2527–32), General Taylor did not discuss any beneficial effect of the project, if regulated, upon navigation below.

[20] It states (Ex. 145, R. 2678–79, 2682):

"Reservoirs on the New River for power and control of flood waters can be operated to afford some beneficial effect on navigation on the main stem of the Kanawha and on the Ohio, and will reduce the heights of destructive floods on these streams. * * * Under effective and unified control these reservoirs can be operated to reduce the height of destructive floods on the Kanawha and Ohio Rivers to benefit navigation by reducing flash floods from these tributaries and to increase the low-water flow of the river in the interest of sanitation and navigation."

1. Section 10 of the Rivers and Harbors Act forbids "the creation of any obstruction * * * to the navigable capacity of any of the waters of the United States". Section 23 of the Federal Power Act, on the other hand, is markedly broader in its terms. A license from the Commission is required for a project on a nonnavigable stream "if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction." The contrast in terminology is unmistakable and compels the conclusion that Section 23 is applicable so long as there be *any* effect upon navigable capacity, whether it be adverse or beneficial.

The evident meaning of the statutory language is confirmed by its history. It appeared in the original Section 23 of the Federal Water Power Act of 1920, and was introduced by the Senate Committee on Commerce after the bill had passed the House.[21] The House bill provided for a license if the Commission found that the project would improve or develop an interstate waterway.[22] Under its terms a license would be required if the project would improve downstream navigable capacity but not if it would impair it (the project owner taking his chances on removal proceedings under Section 10 of the Rivers and Harbors Act). The plain purpose of the Senate amendment, substituting the inclusive term "affect the interests of interstate * * * commerce," was to require a license in either case.[23]

---

[21] The language was not used, so far as we can determine, in any of the many bills which preceded that which was enacted as the Federal Water Power Act of 1920.

---

[22] This part of the section as passed by the House read (Sen. Rep. No. 180, 66th Cong., 1st Sess., p. 19):

"As to all streams or parts of streams, other than streams the use of which is herein authorized to be licensed, over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States, permission is hereby given to construct dams therein: *Provided*, That any applicant who proposes to construct a dam in any such last mentioned stream or part of stream may at his option make application to the commission, *and if the contemplated improvement is, in the judgment of the commission, desirable and justified in the public interest for the purpose of improving or developing a waterway or waterways for the use or benefit of navigation in interstate or foreign commerce*, the applicant may receive a license under the conditions with all of the rights and privileges herein provided for streams or parts of streams used for the transportation of persons or property in interstate or foreign commerce in their ordinary, natural, or improved condition." (Italics added.)

[23] The report of the Senate Committee (*supra*, note 22) does not explain the change; the Conference report, in this regard simply paraphrases the statutory language (H. Rep. No. 910, 66th Cong., 2d Sess., p. 13). We have found no relevant discussion of this amendment in the debates.

In 1935 Section 23 was amended to make filing a declaration of intention compulsory. The Congressional committees seem to have entertained no doubt as to the correct interpretation of Section 23, either before or after its amendment.[24] And the prompt elimination of an amendment to Section 23, that it require a license only when "the interests of interstate or foreign commerce would be *directly* affected *or burdened* by such proposed construction," shows clearly the intent of Congress that *any* effect, whether beneficial or adverse, is sufficient to ground the Commission's jurisdiction.[25]

---

[24] The Senate Committee said (Sen. Rep. No. 621, 74th Cong., 1st Sess., p. 47):

"* * * Under this subsection with the two amendments here made every person intending to construct a project *which might conceivably affect any navigable waters* would be under the duty of coming to the Commission. The act would be greatly strengthened by enabling the Commission to preserve control over all projects with which the Federal Government has any valid concern." (Italics added.)

The House Committee said (H. Rep. No. 1318, 74th Cong., 1st Sess., p. 26):

"* * * In this way, every person intending to construct a project which might affect navigation would be required to come to the Commission for a determination of the interests of the United States. This would greatly strengthen the act by enabling the Commission to maintain control over all projects with which the Federal Government has any valid concern. * * *"

[25] The 1935 amendments were Title II of the Public Utility Act of 1935. The bill (S. 2796) was reported by the Senate Committee with Section 23, so far as here relevant, in its form as enacted. The addition of the italicized words

The interpretation of Section 23, adopted in the court below leads to absurd consequences. Section 10 of the Rivers and Harbors Act forbids the creation of any obstruction to downstream navigable capacity. Yet, according to the court below, the Commission is to investigate and if it finds that construction of the project would violate Section 10, it shall then issue a license. Obviously, however, if navigable capacity will be substantially impaired the Commission should ordinarily forbid the construction altogether. On any proper interpretation, the license quite plainly is to be issued only if the project while affecting navigable capacity is not unduly obstructive of that capacity; in other words, if the interests of water power development and navigation can be reconciled. This ordinarily will be the case where navigable capacity is improved by the project, but rarely if ever when it is substantially impaired.

2. One need not seek far to find the reasons which led Congress to include, as the condition to the Commission's jurisdiction, *any* effect, beneficial as well

---

quoted in the text was made on the floor of the Senate, on motion of Senator Pittman who announced the change as necessary to implement an amendment permitting states or municipalities to use water and power at a Government dam without permission of the Commission. The amendment was agreed to without objection. 79 Cong. Rec. 9053. The House Committee, without explanation, eliminated the italicized words. H. Rep. No. 1318, 74th Cong., 1st Sess., p. 42. The Senate accepted the House version, 79 Cong. Rec. 14473, without debate on this feature.

as adverse, upon navigable capacity.[26] When a project produces a beneficial effect on navigable capacity, for example, by increasing the navigable depths, such beneficial effect must be sustained, otherwise considerable harm to navigation may result. If a stream is suitable for transportation by boats drawing 6 feet of water and the navigable depth is increased to 7 feet, there is an immediate tendency to load the boats for 7-foot of navigation. If the 7-foot depths are not sustained, then the boats loaded to capacity will ground, and there will be an interference with interstate navigation. Thus continuance of a beneficial effect on navigation produced by the operation of the project may well require regulation, which, Congress has provided, shall be by means of a license under the Federal Power Act.

---

[26] This, it may be observed, was the view taken by respondent's predecessor, Appalachian Power Company, in its protest filed with the Federal Power Commission against the granting of a preliminary permit to the Eastern States Development Company for project No. 575, on New River (Ex. 247; R. 2749). There it stated; "Where the proposed project *beneficially affects such lower navigable capacity and thus the interests of interstate or foreign commerce, jurisdiction is conferred* upon the Commission (Section 4 (d) Federal Water Act). Works *injuriously* affecting the interests of interstate or foreign commerce (with respect to navigable capacity of navigable waters) are prohibited by the Act of March 3, 1899, Ch. 425, Section 10 (30 Stat. at L. 1151), and may be enjoined at the instance of the United States (see Opinion, Supra). It is within the latter class that this protestant contends the proposed diversion works fall."

This requirement of Government control in order to sustain a beneficial effect on interstate commerce is not peculiar to navigation. The same principle obtains generally. The regulation of railroads offers a close analogy. True, by the construction of an interstate railroad, interstate commerce is benefited, but that has never been a reason for arguing that, because the effect on interstate commerce is beneficial rather than adverse, interstate carriers should not come within the purview of the Interstate Commerce Act. The regulation is necessary so that the beneficial effect on interstate commerce should be sustained and enhanced.

The effect of the respondent's project, in short, will be beneficial or adverse according to the manner of operation. The project should be licensed because of the adverse effect on navigable capacity below; but, even if we should be wrong as to this, respondent's own evidence that the project will have a beneficial effect on navigable capacity below means that the project must be licensed under Section 23 of the Federal Power Act.

3. Respondent, as we have indicated, does not deny that its project will have, or could be so operated as to produce, a beneficial effect upon navigation; instead it suggests that this question may not be raised because the complaint charges only that the project will impair the navigable capacity. (Br. in Opp. 20.) But in five separate portions of the complaint, petitioner alleged facts or urged con-

tentions which implied an effect upon the interests of interstate commerce, as opposed to an impairment of navigable capacity.[27] The corresponding suggestion as to the argument in the court below is also wrong; the Government explicitly argued that, if licensed, respondent's project would produce a beneficial effect (Supp. Br. 118–121).

3. The Project Will Affect the Flood Control Plans for the Ohio Valley

The respondent's project will also affect the interests of interstate commerce through its effect upon the flood-control plans for the Ohio Valley.

---

[27] The bill states (R. 11–12, 16–18) (with italics added here):

"* * * the defendant *will be in a position to affect*, and at times to prevent any navigation. * * *"

"Said fluctuations so caused *will alter and modify the condition and capacity of the channel* of New and Kanawha Rivers * * * and will at times cause and create shoal places in said New and Kanawha Rivers. * * *"

"Said Act requires the working out by the Federal Power Commission of comprehensive plans for the improvement of such river systems providing for coordination of navigation, with water power and other beneficial uses; * * *"

"Insofar as the operation of the said Radford project shall be intermittent or inconstant and *not synchronized with other projects and developments* under the control of this plaintiff, it will interfere with existent and prospective commerce. * * *"

"The defendant is interfering with and obstructing the plans of the plaintiff for the development and protection of the natural resources of the Nation and *will prevent future development by the plaintiff in accordance with plans now formulated and to be formulated.* * * *"

The District Court rejected this basis for the Commission's jurisdiction because it conceived the United States to be without power to regulate in aid of flood control alone [28] and because the project would in fact be helpful for flood control (R. 133). The court below rested on the latter ground alone and seems definitely to have rejected the constitutional doubts of the District Court.[29] But, whether the project will be operated so as to benefit or to impede the flood-control program, the Federal Power Act contemplates use of the required license to ensure protection of the interests of flood control, and those interests cannot adequately be protected against or promoted by respondents' project unless it is subject to federal regulation.

(*a*) *Section 23 Applies if the Project Affects the Interests of Flood Control.* Section 23 of the Federal Power Act requires that a project in a non-navigable stream be licensed if the Commission finds "that the interests of interstate or foreign commerce would be affected by such proposed construction". This is far broader than the comparable provision in Section 10 of the Rivers and Harbors Act which forbids "the creation of any obstruction * * * to the navigable capacity of any of the waters of the United States". It is unnecessary for the purposes of this case to determine the full scope of Section 23, or whether "the interests of interstate or foreign commerce" embrace matters unconnected with navigation and waterways.[80] For flood control seems obviously to be within the broad language of Section 23, as shown both by other provisions of the Act and by its intimate relationship to the problems of navigation and waterways.

---

[28] It is unnecessary to develop the scope of the Government's power in respect to flood control (see brief in support of the return to the rule to show cause in *Oklahoma* v. *Woodring*, Original, No. ——, this Term, pp. 19–62), for the flood-control program will be shown to be an integral part of protecting navigation and navigable capacity (*infra*, pp. 106–12).

[29] It said (R. 2909):

"* * * The district judge considered and rejected this contention as based on insufficient evidence, and we find no good reason to reach a contrary conclusion. It would seem the Radford Dam would be a help rather than a hindrance in this respect; and if not an injunction may later be appropriate."

Section 10 (a) of the Federal Power Act requires that licenses be issued only upon condition—

> That the project adopted, including the maps, plans, and specifications, shall be such as in the judgment of the Commission will be best adapted to *a comprehensive plan* for improving or developing a waterway or waterways *for the use or benefit of interstate or foreign commerce,* for the improvement and utilization of water-power development,

---

[80] The Government so urged in the lower courts, which rejected the contention (R. 143–9, 2917–19). We think the ruling erroneous but this is immaterial here because, as we shall show, flood control plainly relates to navigation as well as to other interests of interstate commerce.

> *and for other beneficial public uses,* including recreational purposes; and if necessary in order to secure such plan the Commission shall have authority to require the modification of any project and of the plans and specifications of the project works before approval. [Italics added.]

Certainly, so long as the interests of interstate commerce are affected by means of a waterway, Section 10 (a) looks to their full protection. And flood control is indisputably a "beneficial public use" of an improved or developed waterway. If there were doubt, Section 10 (c) by providing for Commission regulations "for the protection of life, health, and property" would be specific authority for flood-control regulations. Since the Commission is authorized to promote the interests of flood control under Section 10, the interests of interstate commerce referred to in Section 23 must include those relating to flood control.[31]

More largely, even if one were sedulously to substitute throughout the Act the requirement that the project affect the interests of navigation rather than those of interstate commerce, Section 23 would yet include flood control as a ground of Commission jurisdiction. For flood control and navigation are inextricably linked; there cannot be safe navigation, or adequate navigable capacity, if it is subject to the ravages of uncontrolled floods.

---

[31] One of the provisions in the license tendered respondent (R. 2670) was:

"ARTICLE 14. The operations of the Licensee so far as they affect the use, storage, and discharge from storage of waters affected by the New River shall at all times be controlled by such reasonable rules and regulations as the Secretary of War may prescribe in the interests of navigation and as the Federal Power Commission may prescribe in the interests of flood control and of the fullest practicable use of said waters for power purposes."

The effect of flood waters upon navigation has been determined by Congress. Section 1 of the Flood Control Act of 1936 (c. 688, 49 Stat. 1570) declares that "It is hereby recognized that destructive floods upon the rivers of the United States, * * * impairing and obstructing navigation, * * * constitute a menace to national welfare".[32]

Finally, the effect of flood waters upon the Government's navigation improvements must be borne in mind. On the Ohio River, the United States has an investment of $206,000,000 in navigation improvements; and one of $32,000,000 on the Kanawha.[34] A destructive flood, by damaging terminal and other structures, washing banks, silting, and the like, can go far to jeopardize this great improvement upon which a large commercial traffic depends.

---

[32] The entire section deserves notice. It reads:

"It is hereby recognized that destructive floods upon the rivers of the United States, upsetting orderly processes and causing loss of life and property, including the erosion of lands, and impairing and obstructing navigation, highways, railroads, and other channels of commerce between the States, constitute a menace to national welfare; that it is the sense of Congress that flood control on navigable waters or their tributaries is a proper activity of the Federal Government in cooperation with States, their political subdivisions, and localities thereof; that investigations and improvements of rivers and other waterways, including watersheds thereof, for flood-control purposes are in the interest of the general welfare; that the Federal Government should improve or participate in the improvement of navigable waters or their tributaries, including watersheds thereof, for flood-control purposes if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected."

(*b*) *The Ohio Valley Flood Control Program.*—The annual floods on the Ohio have long since become a matter of national concern. After the 1913 flood, which caused damage in excess of $200,000,000, the construction of flood control reservoirs and local flood protection works was recommended as the best solution for the Ohio River flood problems.[35] It is improbable that flood control reservoirs could be constructed on the main stem of the Ohio River, because of the urban and industrial developments along the banks of the river. In 1935, therefore, the Chief of Engineers recommended[36] that the floods on the Ohio be controlled by means of dams and reservoirs on the tributaries of the Ohio. He submitted a plan for the construction of 39 dams located on the tributaries above Cincinnati; they were to provide 6,778,600 acre-feet of storage at a total cost of $211,000,000. Of these 39 reservoirs, 19 were to have storage capacities of less than 100,000 acre-feet, and ranging down to as low as 30,200 acre-feet.[37] These reservoirs, it was estimated, would reduce floods at Cincinnati and above by about 7 feet, while at some points and in some floods the reductions would be as much as 9 to 10 feet. The Flood Control Act of 1936 authorized the construction of a number of additional reservoirs, including 3 reservoirs on the New and Kanawha Rivers or their tributaries (the Big Bend, the Bluestone, and the Clendennen), as means for the control of floods on the Ohio.[38] After the 1937 flood, which caused damage in excess of $400,000,000 and greatly accentuated the necessity for the Ohio flood control program, the Army Engineers recommended the construction of 45 additional reservoirs on the tributaries of the Ohio to provide an aggregate storage of 11,261,000 acre-feet at a cost of $245,000,000.[39]

---

[34] These figures are set forth in the Annual Report of the Chief of Engineers, U. S. Army (1939), Part I, Vol. 2, pp. 1362, 1367, 1423.

[35] Horton and Jackson, *Ohio Valley Flood of March-April*, 1913, pp. 44-45, 85-86, 90.

[36] H. Doc. No. 306, 74th Cong., 1st Sess., pp. 3, 6, 11, and 38.

Congress then passed the Flood Control Acts of 1937 and 1938 (c. 877, 50 Stat. 876; c. 795, 52 Stat.

---

[37] This precludes any suggestion that a reservoir with gross capacity of 206,000 acre-feet and usable capacity of 100,000 acre-feet (R. 1245), like that of respondent's project, is too small to constitute a substantial factor in flood control.

[38] See H. Flood Control Com. Doc. No. 1, 75th Cong., 1st Sess., pp. 1-6, 12, and map opposite page 12.

[39] See Hearings before the Committee on Flood Control, H. R., 75th Cong., 1st Sess., June 1937, pp. 2-7, 16, 20, 23, 26, 28, 30-31, 39-40, 91-92.

1215), and the flood control program for the Ohio River Valley now entails the construction of 74 reservoirs and approximately 130 local protective works, with a total estimated cost of $640,000,000.[40]

Thus, the creation of a system of tributary reservoirs is the back-log of the Ohio River flood-control program. We do not suppose that any court is authorized to go behind the Congressional judgment that this is the best way to solve that gigantic problem;[41] certainly neither court below questioned the value of tributary reservoirs but simply denied that a Commission license was required on the ground that respondent's project would aid rather than harm the control of floods. The only remaining question, then, is whether the supposed beneficial effect of respondent's project—as compared with no dam at all—is sufficient to take it out of the Commission's jurisdiction.

---

[40] See Hearings before the Committee on Flood Control, H. R. 75th Cong., 1st Sess., June 1937, pp. 2-8, and H. Doc. No. 306, 74th Cong., 1st Sess., p. 11.

[41] The Annual Reports of the Tennessee Valley Authority show that the storage and retention of water in reservoirs during flood periods is an important factor in flood control and in the reduction of flood hazards. The Norris Dam reduced the 1936 flood on the Tennessee at Chattanooga by as much as 4 feet (1938 Report, pp. 14-15), and the Tennessee Valley Authority dams reduced substantially the water stages in the Tennessee, Ohio, and Mississippi Rivers in the 1936-1937 floods (*id.*, pp. 16-17). See also the 1939 Report, pp. 2, 8.

See, also, the brief in support of the response to the rule to show cause in *Oklahoma* v. *Woodring*, No. —, Orig., this Term, pp. 19-25; and the supplemental brief for the petitioner in *United States* v. *Sponenbarger*, No. 72, this Term, pp. 9-11.

(c) *The Effect of Respondent's Project Upon the Flood Control Program.*—We have shown that, even if respondent's project had an unreservedly beneficial effect upon the interests of interstate commerce, Section 23 would yet require a Commission license (*supra,* pp. 94–101). But, in fact, as Judge Parker noted (R. 2938–39), whether the effect of the project on flood control on the Kanawha and Ohio rivers is beneficial or adverse, and the extent of any benefit, will depend wholly upon whether respondent is subject to the jurisdiction of the Commission, whether it is operated as an isolated power reservoir or also as a part of an integrated flood control system.[42]

No one reservoir can by itself substantially reduce flood hazards. If and when constructed,[43] even the Bluestone Reservoir, which is planned to have a flood storage capacity several times as large as the power storage at respondent's project, will not be sufficient by itself to control the floods of the Ohio, or even to eliminate the damage on the Kanawha caused by the flood waters of New River.[44] The success of a flood control program depends entirely on the coordinated operation of a large number of reservoirs—the timing of retention and release of flood waters. If the reservoirs are properly integrated, flood flows may be retarded at one place until the crest has passed at another place, thus preventing synchronization of the flows which produce the extreme flood stages. Each of the reservoirs on the tributaries of the Ohio thus plays its part in the functioning of the coordinated reservoir system, but the whole effect of any one project cannot be ascertained apart from its role as a part of a system.

---

[42] There will be a double necessity for conscious efforts to aid flood control, since the effect of the reservoir if kept full would be to increase flood stages. This is because the full reservoir eliminates the "valley storage" of flood water which would otherwise occur as the river rose in depth; it was estimated, very roughly, that some 50,000 acre-feet would be lost if respondent's reservoir were full at the time of flood (R. 986–90, 1259).

[43] The construction of this dam and reservoir has been delayed for a number of years, it may be noted, by reason of the fact that respondent's subsidiary, the West Virginia

Even if respondent's probable operation of the project were such as would be likely to fit into the

---

Power Company, as owner of lands sought to be acquired in the condemnation proceeding, demurred to the Government's petition for condemnation. This demurrer was directed to be overruled by the Circuit Court of Appeals for the Fourth Circuit in *United States* v. *West Virginia Power Co.*, 91 F. (2d) 611, but on account of statutory amendments new condemnation proceedings were instituted and the matter is still pending in the courts. The major item of controversy is the constitutional power to condemn the land for a flood-control project. *United States* v. *West Virginia Power Co.*, Law No. 13, Southern District for West Virginia.

[44] See H. Doc. No. 91, 74th Cong., 1st Sess., pp. 69, 111, 118–119.

general flood control program, a Commission license would still be required under Section 23 to ensure that this would be the case. But in fact there is not likely to be any such dovetailing of respondent's interest in power development and that of the public in flood control.

There is an inherent conflict of interests between the operation of a dam and reservoir for power purposes and its operation for flood control purposes. For power purposes it is best to have the reservoir always filled to capacity. For flood control purposes it is at times desirable that the reservoir be drawn down to provide storage space for cushioning floods (R. 625–6, 986–90, 1259). It is to be expected that the respondent, unless subject to regulation, will operate the project in behalf of its own pecuniary interests, as a part of its interstate electric power system, and without regard to the interests of flood control and navigation. As respondent itself has declared, its project "is a power project and not a flood control project" (Br. in Opp. 22). And it would require a considerable optimism to believe that during flood times the release and storage of water from and in respondent's reservoir could be timed in relation to that in other reservoirs as well if respondent is uncontrolled as if it were subject to the coordinating authority of the Federal Government. Certainly the provisions of Section 23 were drafted for the very purpose of having governmental control take the place of an unenforcible faith in the coöperation and self-sacrifice of private operators of hydroelectric projects.

We may assume that the respondent is a public-spirited corporation and that it would not so operate the project as to contribute to floods and disaster. The fact remains that Congress has embarked upon a program of regulation, and respondent's plea for self-regulation should properly be addressed to Congress.

It follows that "the interests of interstate * * * commerce" must inevitably be affected by respondent's project, since without the control afforded by the license provisions there can be no assurance (1) that the reservoir will be drawn down during flood times, or (2) that the storage and release of water can be coordinated with the other tributary reservoirs in the Ohio Valley. Section 23, therefore, forbids the construction or operation of the project without a Commission license.[45]

---

[45] Respondent suggests (Br. in Opp. 22) that this question may not be raised because it was not alleged or argued below that the project would be beneficial to flood control. This seems simply a branch of its suggestion that beneficial effects upon navigable capacity cannot be relied upon in this Court, which we have already answered (*supra*, pp. 94–101). In any event, the complaint specifically alleges the comprehensive flood-control program of the Government (R. 16), and the issue was considered by both courts below.

III

THE CHALLENGED PROVISIONS OF THE FEDERAL POWER ACT ARE CONSTITUTIONAL

It is not easy to define the constitutional issues which are presented in this case. To err on the side of caution we shall meet each of the constitutional objections suggested by the courts below or argued by respondent in the court below.

Both the District Court and the Circuit Court of Appeals held that no license was required under the terms of the Federal Power Act. There was, therefore, no occasion for either court to consider the constitutional questions urged by respondent. Yet each court undertook to discuss what it felt to be the constitutional defects of the Act if it had been applicable. Both courts suggested that Congress had no constitutional authority to direct that conditions be placed in the Commission licenses which were unrelated to navigation (R. 150–51, 2891–92, 2919–20). The court below went still further, and declared that Congress could not control the exercise of water power rights by the riparian owner without paying just compensation (R. 2921–22). Finally, it intimated that the Act unconstitutionally invaded the rights of the states because, through the "recapture clause" of Section 14, it placed ultimate ownership of projects in nonnavigable waters in the United States rather than the states (R. 2921–22).

The respondent argued several additional propositions in the court below, none of which was noticed by either court. It urged that, if the stream were nonnavigable, there would be no power in Congress to require a license (Br. below, 62–67). It argued that for the federal government to exercise a regulatory control in matters unrelated to navigation was outside its powers and an invasion of the rights of the states (Br. below, 68–71). Finally, it contended that the provisions of the recapture clause violated the Fifth Amendment because they contemplated that property should be taken without just compensation (Br. below, 71–73).

These various constitutional objections, it may be noted at the outset, do not seem to us to present substantial questions if the project is located in navigable waters or impairs navigable capacity. The issues may be classified into three major contentions: (a) The licensing power is limited to navigable waters or to the protection of navigation. (b) The rights of the states have been invaded. (c) Just compensation is denied for the power rights and the recaptured project. After sketching the historical background and justification for the Act, we shall discuss these issues in the indicated order.

A. THE CONSTITUTIONAL BACKGROUND OF THE FEDERAL WATER POWER ACT OF 1920

It is unnecessary to develop the fact that the water power resources of the country are a rich national heritage. Since at least the beginning of the century, their adequate development and control have been recognized as a major problem of the United States. The problem is complicated by the diverse ends which the waters of the nation may serve. They may be used: (a) to develop navigation, usually requiring a regular flow of the maximum amount of water; (b) for irrigation, which commonly will draw off water during periods of low flow; (c) for power development, which ordinarily will be based upon the maximum practicable storage and which will cause a fluctuation in flow according to the fluctuation of demand for electric energy; and (d) for flood control, looking to a reservoir empty before the time of flood and a discharge based upon the location of the flood crest.

It is evident that a project designed to serve one of these purposes will not necessarily be of equal benefit to another. It is equally apparent, because of the limited number of sites, that the construction of one project precludes the construction of others, and that a proper development of a river requires an integrated plan in place of haphazard construction and operation. Finally, it is plain that of the alternative uses of the river only irrigation and, especially, power development will attract private capital. In the case of an uncontrolled private power development there would be real danger, first, of monopolization of the power resources of the nation through the limited number both of sites and of distribution systems and, second, of foreclosing utilization of the waterway for other equally important purposes.[1]

To reconcile the divergent ends, to assure the maximum practicable accomplishment of each purpose, a central authority with power coextensive at least with the length of river is plainly necessary. Particularly is this the case since the various purposes for which a project might be used are not at all irreconcilable, so long as there be only a limited use of the project for any single purpose. Indeed, the combination of several purposes in one project, and the allocation of joint costs among each, may make economically feasible a project for multiple purposes which would be uneconomic for any one. See Report of Army Engineers on Tennessee River, H. Doc. No. 328, 71st Cong., 2d Sess., pp. 64–75, 91–95; Report of National Resources Committee, *Energy Resources and National Policy* (1939) pp. 3–4, 12, 25–28, 275–79, 306–313.

The urgent necessity of proper federal control or development of the waters of the nation has been recognized for at least a generation. President Roosevelt in 1908 vetoed a bill authorizing construction of a dam in the Rainy River because authority should be withheld unless the project were part of "a consistent, unified plan" (Sen. Doc. No. 438, 60th Cong., 1st Sess., p. 2). The President in this message announced the conditions which would have to be in future bills if they were to escape his veto; these included the correlation of navigation and power and a limited franchise period.[2] President Taft in 1912 vetoed a bill authorizing a dam in the Coosa River for failure to meet these conditions (48 Cong. Rec. 11796 *et seq.*).

---

[1] Message of President Roosevelt and accompanying Report of National Conservation Commission (1909), Sen. Doc. No. 676, 60th Cong., 2d Sess., Vol. I, pp. 6, 44–45; Vol. II, pp. 171–177; Final Report of the U. S. National Waterways Commission, Sen. Doc. No. 469, 62d Cong., 2d Sess., pp. 42–43; Veto Message of President Roosevelt on James River Bill (1909), H. Doc. No. 1350, 60th Cong., 2d Sess., pp. 5–8.

Congress itself was not indifferent to these needs. The general dam Act of 1910 (c. 360, 36 Stat. 593), contained numerous restrictions upon the powers of persons authorized by Congress to construct dams, including (a) a direction to the Secretary of War, whose approval of plans was required, to consider the bearing of the project "upon a comprehensive plan" for the navigation and water power development of the waterway; (b) reasonable charges for the use of the privilege to construct the dam, and further charges to reimburse the Government for headwater work beneficial to the project; and (c) termination of the grant 50 years after approval of the project. This Act, imposing stringent and possibly uncertain obligations upon the project owner, prevented any very extensive development of the water power resources of the country; in the decade following its passage only 14 special acts were passed by Congress and only 2 projects actually constructed.[3] H. Rep. No. 61, 66th Cong., 1st Sess., p. 3.

---

[2] See, also, his veto of a Muscle Shoals bill in 1903. H. Doc. No. 427. 57th Cong., 2d Sess. On January 15, 1909, the President vetoed a bill for the construction of a dam in the James River which did not meet these conditions. H. Doc. No. 1350, 60th Cong., 2d Sess. For the same reason, President Taft in 1912 vetoed a bill authorizing a dam in the Coosa River. 48 Cong. Rec. 11796.

Some different scheme was plainly required, which would serve the ends of conservation and yet permit development of the nation's rivers. Throughout the period which preceded enactment of the Federal Water Power Act of 1920 the plans centered about two alternatives. The Government could forbid private development altogether and itself construct the projects or, on the other hand, it could license private capital to develop the streams subject to a carefully integrated system of regulation. The constitutional power was, naturally enough, viewed as the same in either case: the choice was simply between public or private agents.[4] The Federal Water Power Act of 1920 chose the more conservative of these alternatives and provided for private development under close federal supervision. The Senate Committee reported (S. Rep. No. 180, 66th Cong., 1st Sess., p. 3):

---

[3] With this should be compared the 124 major projects, representing an ultimate capacity of 6,780,000 horse power and an estimated cost of $756,000,000, which have been licensed by the Federal Power Commission. 1939 Annual Report of Federal Power Commission, p. 33.

[4] Message of President Roosevelt, vetoing Rainy River Bill, Sen. Doc. No. 438, 60th Cong., 1st Sess., p. 2; Message of President Taft, vetoing Coosa River Bill (48 Cong. Rec. 11796); Report of Sub-Committee of the Judiciary (Senators Knute Nelson, Elihu Root, and William E. Chilton) in response to S. Res. 44, S. Doc. No. 246, 64th Cong., 1st Sess., pp. 16–18; S. Rep. No. 1131, 62d Cong., 3d Sess., pp. 2–4 (approving Connecticut River Bill), with attached letter of

> Legislative action should be delayed no longer. We should do one of two things: We should pass legislation which will lead private capital and enterprise to develop these resources under such regulations as will give consumers good service and cheap power, or the Government itself should proceed to make this development. This bill proceeds on the theory of private development with ultimate public ownership possible. * * *

There can now be no question of the power of the United States to build a dam and reservoir in a navigable stream for the multiple purposes of aiding navigation, promoting irrigation and flood control, and utilizing the power resources which are incidentally developed and which make the project economically feasible. *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288; *Arizona* v. *California,* 283 U. S. 423. It would seem equally clear, although this Court has not squarely so held, that the United States is fully authorized to build a corresponding project in nonnavigable waters if it

---

Secretary of War Stimson, pp. 4–5; Senators Root (49 Cong. Rec. 3056, 3057), Newlands (49 Cong. Rec. 2702), Walsh (53 Cong. Rec. 2639), Husting (53 Cong. Rec. 2650) in the debates on the Connecticut River and Shields bills.

serves to protect or to improve downstream navigable capacity or to promote the interests of flood control. *United States v. Rio Grande Irrigation Co.*, 174 U. S. 690, 703, 706, 708–710; *United States v. Utah,* 283 U. S. 64, 75, 90.[5] This alternative solution of the basic problem has been accepted as the most satisfactory in a number of important instances,[6] and could of course have been followed with respect to this very project. See *United States* v. *West Virginia Power Co.,* 91 F. (2d) 611 (C. C. A. 4th), relating to the Bluestone project.

But there is no constitutional requirement that the federal government safeguard the national interests only by direct construction itself. Surely, it lies as fully within the federal power to license a private person as an agent for the federal purposes as to accomplish them directly. *McCulloch* v. *Maryland,* 4 Wheat. 316. As Judge Parker said below (R. 2942):

---

[5] See, also, *California Oregon Power Co.* v. *Cement Co.*, 295 U. S. 142, 159; *United States* v. *Eighty Acres of Land*, 26 F. Supp. 315, 320 (E. D. Ill.); *Appalachian Electric Power Co.* v. *Smith,* 4 F. Supp. 6 (W. D. Va.), affirmed on other grounds, 67 F. (2d) 451 (C. C. A. 4th), certiorari denied, 291 U. S. 674; *United States* v. *Griffin*, 58 F. (2d) 674 (W. D. Va.); *United States* v. *546.03 Acres*, 22 F. Supp. 775, 777 (W. D. Pa.). Cf. Brief in Support of Response to Rule to Show Cause in *Oklahoma* v. *Woodring*, No. —, Original, this Term, pp. 19-53.

[6] See, e. g., Reclamation Act of 1902, c. 1093, 32 Stat. 388; Boulder Canyon Project Act, c. 42, 45 Stat. 1057; Tennessee Valley Authority Act, c. 32, 48 Stat. 58; Bonneville Project Act, c. 720, 50 Stat. 731.

Section 7 (b) of the Federal Power Act directs the Commission to disapprove an application for development of a project which the Commission believes should be undertaken by the Government.

> What the government may thus do itself, it may license a private corporation to do upon such terms and conditions as, in the opinion of Congress, the public interest may require.

The remaining parts of this brief will dispose of the specific objections which have been made to this application of the Federal Power Act.

B. THE SCOPE OF THE LICENSING POWER UNDER THE COMMERCE CLAUSE

Respondent has objected to the licensing provisions of the Federal Power Act on the grounds that Congress under the commerce clause has (1) no power to require the license at all or (2) to require insertion of the terms of the license which do not relate to navigation. The lower courts have not noticed the first contention, and have expressed agreement with the second (R. 150–51, 2891–92, 2919–20). The question as to the exercise of the licensing power of Congress under the commerce clause, it must be emphasized, is simply whether it is a regulation of interstate commerce, of instrumentalities thereof, or of matters substantially affecting interstate commerce or its instrumentalities.

1. *Congress Has Power to Prohibit the Project or to Require the License*

Respondent has not contested the power to forbid construction of the project if New River be held navigable. This issue, then, relates only to the power of Congress to require a license under Section 23 of the Act before the project is constructed or operated.

(*a*) *If the project impairs navigable capacity.*—As we read the argument, respondent urges that the United States can exercise no power over projects in nonnavigable streams except to forbid impairment of downstream navigable capacity; the license, sanctioning an impairment, it seems to feel, contradicts the occasion for the exercise of federal power.

There can be no question of the power to forbid, or to compel modification of, a project in a nonnavigable stream which impairs lower navigable capacity. *United States* v. *Rio Grande Irrigation Co.*, 174 U. S. 690; compare *Shreveport Rate Cases*, 234 U. S. 342, 351–352; *Wisconsin Railroad Commission* v. *Chicago, B. & Q. R. R. Co.*, 257 U. S. 563, 588. There is an equal power to license such a project.[7] A project, which in the absence of regulation would obstruct or impair downstream navigable capacity may, under regulation by a license, be so constructed and operated that the impairment is minimized to the point where it no longer constitutes an unreasonable obstruction. See *Wisconsin* v. *Illinois,* 278 U. S. 367, 413. Indeed, under regulation, a project which would otherwise have adverse effects may even become beneficial to lower navigable capacity. Plainly, there is no conflict between the finding that an unregulated project will impair navigable capacity and a decision that a license should be issued. And the Commission might well find that the other public ends served by a project outweighed any impairment to navigable capacity (see *infra,* pp. 129–131); this is a decision which plainly Congress may leave to a public body rather than a private project operator. See *Greenleaf Lumber Co.* v. *Garrison,* 237 U. S. 251, 268.

---

[7] Prohibition by Congress of hydraulic mining, except under permission of a Federal commission and without compensation to the mine owners, above the navigable parts of the stream has been held valid. *North Bloomfield Gravel Mining Co.* v. *United States*, 88 Fed. 664 (C. C. A. 9th).

(*b*) *If the project affects navigable capacity or flood control.*—The result, we submit, is not changed even though the Court should hold the project not to be located in navigable water and not to impair navigable capacity.

1. The *Rio Grande* case would seem on principle to settle the power of Congress to prohibit the construction of unlicensed projects in nonnavigable streams even though their effect were to benefit rather than to obstruct navigable capacity. For, as we have shown (*supra,* pp. 99–100), under different methods of operation, or after abandonment, a beneficial project may become harmful.

But even apart from that case, the interests both of navigation and of flood control require a control by the United States of projects which are intimately related to those matters of national concern. The question is simply whether the paramount power of Congress under the commerce clause includes the power to prohibit construction save under a federal license.

Respondent's riparian rights go no further than "the enjoyment of the natural flow" of the stream. *United States* v. *Cress,* 243 U. S. 316, 321.[8] There is no right superior to the powers of Congress to *alter* the natural flow of the stream in a manner so greatly as to affect downstream navigable capacity or the program of flood control. The commerce powers of the United States do not reach to imposing a servitude on the natural flow of nonnavigable streams, but certainly they include the power to forbid an alteration in the natural flow save upon conditions designed to protect and foster the interests of interstate commerce. Respondent, it is true, urges that its alteration will benefit rather than impair navigable capacity. But this is a question which must be answered by Congress, not by respondent.

2. It is, however, unnecessary in this case to explore the scope of the riparian servitude to the commerce power, for respondent as an interstate

---

[8] This case, it is to be noted, while dealing with nonnavigable streams, does not distinguish between navigable and nonnavigable waters (p. 319).

public utility is in no position to complain of any prohibition against unlicensed construction of its project. For its project will send the bulk of its electric energy into interstate commerce (R. 2473), and will be part of an extensive interstate electric system, interconnected with other systems (R. 2739). It is, then, fully subject to the commerce powers of Congress quite without regard to the federal control of tributary streams. *Public Utilities Commission* v. *Attleboro Steam & Elec. Co.*, 273 U. S. 83, 86; *Utah Power & L. Co.* v. *Pfost*, 286 U. S. 165, 182; *Electric Bond Co.* v. *Commission*, 303 U. S. 419, 432–433. And, since Congress is authorized to regulate the interstate transmission of electricity (as it has done in Part II of the Federal Power Act), it has full power to license its generation for purposes of interstate sale. Any other rule would exempt the roundhouse and the terminal from federal control of interstate railroads.[9]

Respondent, then, is subject to the power of Congress to forbid unlicensed construction and operation of its hydroelectric plant designed to send electric energy into interstate commerce. It is accordingly without standing to complain of the statute, whatever might be the rights of a project operator whose business was wholly intrastate.

---

[9] *Utah Power & L. Co.* v. *Pfost*, 286 U. S. 165, is not opposed. The Court there held that the state had power to tax the generation of electric energy distributed in interstate commerce. This, of course, does not control the reach of the commerce powers of Congress. Cf. *Edison Co.* v. *Labor Board*, 305 U. S. 197.

Austin v. *The Aldermen,* 7 Wall. 694, 698-699; *Hatch* v. *Reardon,* 204 U. S. 152; *Berea College* v. *Kentucky,* 211 U. S. 45, 54; *Farmers' Bank* v. *Minnesota,* 232 U. S. 516, 530; cf. *Liggett* v. *Lee,* 288 U. S. 517, 535. The court below ignored this basis of constitutional power, and its broad dicta attempting to limit the commerce clause to navigation alone do violence to the salutary rule that constitutional decisions should not be made when unnecessary to dispose of the case.

3. Finally, the federal power for another reason reaches to control of respondent's project, whatever the navigability of New River at its site. For the waters do not always remain matters of concern to Virginia alone. Sixty-five miles after they leave respondent's turbines they flow into West Virginia; 180 miles later they reach Ohio. The waters, then, are more than intrastate waters; they are themselves an interstate movement. Whether they come in large or small volume, whether steadily or intermittently, whether they are peaceful waters or those which carry the devastation brought by floods, are matters which concern West Virginia and Ohio as fully as Virginia. The Constitution grants power to Congress in terms far too broad to exclude the interstate movement of waters when Congress can forbid or control the interstate movement of stolen automobiles, *Brooks* v. *United States,* 267 U. S. 432; impure foods, *Hipolite Egg Co.* v. *United States,* 220 U. S. 45; kidnapped persons, *Gooch* v. *United States,* 297 U. S. 124; convict-made goods,

Kentucky Whip & Collar Co. v. *Illinois Central R. Co.,* 299 U. S. 334; or women transported for immoral purposes, *Caminetti* v. *United States,* 242 U. S. 470. Indeed, the power to control the interstate movement of tributary streams would seem to follow *a fortiori* from these cases. Just as the ranging of cattle across state lines is interstate commerce, *Thornton* v. *United States,* 271 U. S. 414, 425, and may be regulated to prevent the spread of disease, so the movement of interstate waters is included in any definition of interstate commerce which is as broad as the purposes to be accomplished by the commerce clause. A movement, traffic, or intercourse which, within a state, is a proper object of state governmental power to regulate or promote becomes by the same token a proper object of federal power when the movement, traffic, or intercourse is "among the several states." *Gibbons* v. *Ogden,* 9 Wheat. 1. Certainly this is the case here. For the waters as they flow downstream can, on the one hand, be of immense benefit, through navigation, irrigation, and power development; on the other hand, in times of flood, they can carry incalculable devastation. Their benefits can be assured, and their dangers minimized, not by the uncoordinated action of individual states but only through a control which is coextensive with the entire river and, indeed, with the entire section of the nation.

2. *The Terms of the License*

Respondent urges that, even if the unlicensed construction of the project may be forbidden, Congress, under the commerce clause, has no constitutional power to impose conditions beyond those relating to navigation. This, it says, is the case whether New River be navigable or nonnavigable. The courts below have indicated agreement with this position (R. 150–51, 2891–92, 2919–20). The argument, we submit, cannot be accepted.

The conditions to the license which are found exceptionable as beyond the scope of the commerce clause (as distinguished from the due process objections which are considered in a later section) are those which do not relate to the protection of navigation, but instead seek to assure conservation and regulation of the use of water resources and to permit ultimate recapture of the project by the United States. See *New Jersey* v. *Sargent*, 269 U. S. 328, 336. These conditions, so far as they would affect respondent's project, may be summarized as follows: The project shall in the judgment of the Commission be the best adapted to a comprehensive plan for the improvement of navigation and "for the improvement and utilization of water-power development". Sec. 10 (a). The licensee shall maintain the hydroelectric plant in adequate repair, and shall maintain adequate depreciation reserves for that purpose. Sec. 10 (c). The licensee after the twentieth year of operation shall maintain amortization reserves out of surplus accumulated in excess of a specified reasonable rate of return, the reserves to be applied to reduction of net investment. Sec. 10 (d). The licensee shall pay reasonable annual charges to reimburse the United States for the cost of administration. Sec. 10 (e). Combinations to restrain trade or fix the price of electricity are forbidden. Sec. 10 (f). Upon two years notice the Government after expiration of the license period may take over the project upon payment of the net investment, not to exceed the fair value of the project; the net investment, to be determined after hearing, is not to include good will, going value, prospective revenues, or increment in land values. Sec. 14.

The other provisions of the Act which are challenged as unrelated to navigation will not affect respondent's project, since they apply only in the absence of state regulation. Respondent's objections to the provisions designed to implement the recapture clause are largely objections of due process, and are treated below. So far as there is any complaint that these provisions, or those relating to the conservation of water resources, lie outside the boundaries of the commerce clause, it is easily answered by reference to the power of Congress to forbid the construction or operation of the project (*supra*, pp. 122–127), and to impose reasonable conditions to the grant of the privilege.

Since, whether the waters be navigable or nonnavigable, Congress has power to forbid the construction or operation of a project (*supra*, pp. 122–127), it can impose reasonable conditions to the grant of the privilege.

We have sketched the large and interrelated public purposes to be accomplished through control of the waters of the nation, and the insistence of contemporary statesmen that they be exploited, whether by the Government or by its licensed agents, only in a manner which woud ensure the realization of these purposes (*supra*, pp. 114–121). The Constitution surely does not defeat their expectations, or characterize as unreasonably remote to commerce the conditions designed to secure these ends.

Since, as Judge Parker observed (R. 2941–42), the Government could itself construct the project, the conditions which it requires of its licensees cannot possibly be the accomplishment of a forbidden end. Compare ***Blake* v. *McClung*,** 172 U. S. 239; ***Terral* v. *Burke Construction Co.*,** 257 U. S. 529. The license provisions fall, therefore, well within the settled powers of government. Analogies lie ready to hand in the decisions of this Court. The United States can, of course, condition the use of its public land in any manner that it chooses. ***Arizona* v. *California*,** 283 U. S. 423, 464; ***Ruddy* v. *Rossi*,** 248 U. S. 104; ***Oregon & Cal. R. R.* v. *United States*,** 238 U. S. 393, 421–422. The state can regulate the rates of private contract carriers who choose to use its highways. ***Stephenson* v. *Binford*,** 287 U. S. 251. It can condition the erection of a dam in its rivers by regulatory and recapture provisions directed at the hydroelectric plant of the dam owner. ***Fox River Co.* v. *Railroad Commission*,** 274 U. S. 651. Again, Congress can condition its consent to a railroad consolidation by requiring retirement pensions for the employees. *United States* v. *Lowden,* No. 343, this Term; compare *Railroad Retirement Board* v. *Alton R. Co.,* 295 U. S. 330.

Since, whether respondent's project is located in navigable or in nonnavigable waters, the United States has power to forbid its construction, it has therefore full power to condition its permission with regulatory provisions designed to serve public ends, and this whether or not the conditions are directly related to navigation as such. See *Green Bay &c. Canal Co.* v. *Patten Paper Co.,* 172 U. S. 58, 80.

C. THERE IS NO INVASION OF THE RIGHTS OF THE STATES

Respondent has urged that the Federal Power Act, in providing economic and financial regulation of the licensees, and in making it possible for ultimate ownership of the project to vest in the United States, invades the rights of the states in violation of the Tenth Amendment. The states of Virginia and West Virginia,[10] as *amici curiae*, have made similar contentions. The majority of the court below did not pass on this question so far as it relates generally to the conditions of the license which do not pertain to navigation, but suggested its agreement with the contention that if the project was not located in navigable waters of the United States, the power of recapture was a state rather than a federal power (R. 2920–22). We submit that, whether the respondent's project is located in navigable water or whether, although in nonnavigable water, it affects the interests of interstate commerce, there is no invasion of the rights of the states.

---

[10] It is to be noted that West Virginia at one point viewed the Federal Power Act as protecting rather than invading its rights. It appeared before the Commission (Ex. 125, R. 2643) and protested against the issuance of any license to the respondent, except upon the condition that there would be no restriction of the continuous use of the river for power purposes or navigation at points downstream within the State of West Virginia.

1. *The Tenth Amendment Is Inapplicable*

It has been shown that the provisions of the Federal Power Act which are here assailed constitute a valid exercise of the powers granted to Congress to regulate interstate commerce. This disposes of the argument that the Act violates the Tenth Amendment, which merely provides that:

> The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

Language could not express more clearly that the Amendment does not reserve to the states any power which is "delegated to the United States by the Constitution," nor indicate more plainly that the Amendment does not limit the scope of any power which is delegated to the United States. The Amendment has no independent operation. It comes into effect only after a determination that an Act of Congress is not authorized under the granted powers.

These propositions seem self-evident. In any event, an elaborate argument to this end has been presented by the Government in each of the last two terms, *United States* v. *Bekins*, 304 U. S. 27, No. 757, Oct. Term, 1937, Br. pp. 47–66; *Mulford* v. *Smith*, 307 U. S. 38, No. 505, Oct. Term, 1938, Br. pp. 120–138, and a somewhat more compressed argument during the present Term, *Oklahoma* v. *Woodring*, Orig., No. —, Br. pp. 54–63. It seems unnecessary, at least within the same Term, again to present that argument.

2. *The Act Safeguards National Interests and Does Not Invade Fields Reserved to the States*

But even if one could find a limitation upon Federal powers in the Tenth Amendment, or in the lurking implications of the Federal system, the Federal Power Act lies far within the permissible boundaries of the federal powers.

Enough has already been said, in discussing the genesis of the Federal Water Power Act of 1920 (*supra*, pp. 114–121), to show that the development and control of the water resources of the country has long been recognized as a national problem. Indeed, no other conclusion would be possible. The rivers flow past or along state boundaries, their navigability in one state often depends as much upon upstream conditions in another state as those in the state through which the stream is flowing.

If floods in Pennsylvania and Ohio are to be reduced, the tributaries in West Virginia and Virginia must be controlled. If downstream lands in arid regions are to be irrigated, the water appropriations in upstream states must be controlled.[11] If the development of hydroelectric energy is to be accomplished without injury to these interstate concerns, the state or states in which the dam chances to be built cannot have the sole voice in its control.

It is unnecessary to labor the point. For it is evident that the ruling of the Court in *Helvering* v. *Davis,* 301 U. S. 619, in regard to old age pensions, applies *a fortiori* here. The Court said (p. 644):

> The problem is plainly national in area and dimensions. Moreover, laws of the separate states cannot deal with it effectively. Congress, at least, had a basis for that belief. * * *

It seems abundantly clear that the Federal Power Act deals with a problem which spreads far beyond the boundaries of the states and can be solved by the national government alone.[12]

---

[11] For this reason this Court in the apportionment of the waters of an interstate stream has evolved a " 'federal common law' upon which neither the statutes nor the decisions of either State can be conclusive." *Hinderlider* v. *La Plata Co.*, 304 U. S. 92, 110; *Kansas* v. *Colorado*, 206 U. S. 46.

[12] It may be noted in passing that Congress has been completely solicitous of states' rights in the Federal Power

The apprehension over ultimate ownership of the project which the court below expressed (R. 2921–22) is somewhat premature, since it is merely an option to be exercised half a century in the future. But, even if it be assumed that the United States will in truth be the ultimate owner of the project, there is in this no invasion of Virginia's rights. The court below (R. 2920-21) and respondent (Br. below 71–73) in terms recognize the Government's power itself to build the project or to take the project by eminent domain (*supra*, p. 119–120). It follows without more that there is no invasion of the rights of the states if the United States elects instead to secure an option to take over the project 50 years in the future.

Act. Persistently throughout the Act, states, their subdivisions, and their regulatory agencies, are given every privilege or power which is not plainly inconsistent with the purposes of the Act. See Sections 3 (7), 4 (c), 4 (f), 7 (a), 10 (e), 14, 17 (a), 20, 22, 27. In particular, Section 9 (b) provides that applicant for a license must show satisfactory evidence of compliance with the requirements of the laws of the state or states within which the proposed project is to be located with respect to the bed and banks of the stream and to the appropriate diversion and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing electric power. Likewise, one of the conditions of the license, under Section 19, is that any licensee which is a public utility must abide by such reasonable regulations of the services to be rendered to customers or consumers of power and the rates and charges of payment therefor as may from time to time be prescribed by any duly constituted agency of the state in which the service is rendered or the rate charged.

D. THERE IS NO TAKING WITHOUT JUST COMPENSATION

1. *There Is No Taking of Power Rights*

Respondent has argued that the riparian owner on a nonnavigable stream is subject to no servitude to navigation, and that to restrict his power rights by the Commission license is to take property without payment of just compensation; the court below seems to agree (R. 2919). There is no contention that the Federal Power Act receives an unconstitutional application in this regard if respondent's project is located in navigable waters.

The short answer is that Congress has power to forbid an unlicensed project, even if it is in nonnavigable waters, so long as it affects navigable capacity or interacts upon the flood control program. Moreover, the respondent's riparian rights are limited to the *natural* flow of the stream (*supra*, p. 124) and do not include the right at will to impound and release instrumentalities of interstate commerce so important to downstream commerce and to flood control as the waters of New River (*supra*, pp. 126–127). There can, then, be no claim that just compensation is due for the restrictions Congress has placed upon respondent's use of its rights to develop power in New River. See *United States* v. *Chandler-Dunbar Co.*, 229 U. S. 53.

2. *The Recapture Provision Is Valid*

Respondent has urged that, even if all else be valid, the recapture provision is unconstitutional because without the payment of just compensation it will be confiscatory of its property. Neither court below noticed the argument.

Section 6 of the Federal Power Act provides that licenses shall be issued for not more than 50 years. Section 14 authorizes the United States, upon two years' notice after the license period, to take over the project upon payment of the net investment in the project, not to exceed the fair value. The net investment, to be determined after hearing, is not to include the value of the license, good will, going value, or any increment in land value. Under Section 10 (d) the licensee after the twentieth year of operation shall maintain amortization reserves out of surplus accumulated in excess of a reasonable rate of return, the reserves to be applied to the reduction of net investment.

(*a*) *Respondent cannot now raise the question.*—It is unnecessary in this proceeding to consider the validity of the recapture provision, because respondent will have an adequate remedy if its constitutional rights should ever in fact be invaded.

It may be that the possibility of future recapture has an effect upon respondent's present values or plans. But the fact remains that until expiration of the license period, it is only speculative (1) whether the United States will choose to take over the project, and (2) whether the net investment will be less than the fair value. No man can venture to predict the prevailing social viewpoint, the economic value of respondent's project, the technological obsolescence of present-day hydroelectric plants, and the price levels which will obtain half a century in the future. Any constitutional decision, then, must be directed at a statute which may never be applied to respondent. See *Anniston Mfg. Co.* v. *Davis*, 301 U. S. 337, 355; *Ashwander* v. *Tennessee Valley Authority*, 297 U. S. 288, 324–325; *Arizona* v. *California*, 283 U. S. 423, 462; *Electric Bond Co.* v. *Commission*, 303 U. S. 419, 443.

If, half a century in the future, the recapture provisions should in fact be invoked, and if respondent should still be of the opinion that they are unconstitutional, it will have at that time wholly adequate remedies by which to obtain whatever it may be entitled to as just compensation. Section 6 of the Federal Power Act, it is true, provides that the license "shall be conditioned upon acceptance by the licensee of all the terms and conditions of this Act." But, if respondent should be correct in its assertion that the recapture provision is unconstitutional, the license which is imposed upon respondent need not be read as a contractual assent to its provisions, and need not operate as an estoppel against a subsequent challenge. *Union Pacific R. R. Co.* v. *Public Service Commission*, 248 U. S. 67; *Power Mfg. Co.* v. *Saunders*, 274 U. S. 490. Therefore, if this Court were to postpone consideration of the recapture provision because of its speculative operation and application, there could be no question of estoppel by respondent when and if the provision were applied. *Electric Bond Co.* v. *Commission*, 303 U. S. 419, 435.

At the time of any recapture, respondent would have available either of two adequate remedies.

The net investment which would be paid respondent is, under Section 14, to be "determined by the Commission after notice and opportunity for hearing." Under Section 313 (b), respondent would be empowered to obtain judicial review of the Commission's determination. Both before the Commission and in the courts it could urge all of the constitutional, legal, and factual reasons for receiving the amount to which it felt entitled. *Anniston Mfg. Co.* v. *Davis,* 301 U. S. 337, 345–346.

But if for any reason this remedy were inadequate—so that respondent's property were taken for less than the constitutional obligation of just compensation—an implied contract would arise and would permit suit in the Court of Claims. *United States* v. *Lynah,* 188 U. S. 445, 465–466; *Hurley* v. *Kincaid,* 285 U. S. 95, 104–105; *Yearsley* v. *Ross Construction Co.,* No. 156, this Term, decided January 29, 1940. Thus, in either event, respondent would have a full opportunity at the time of recapture, if any, to press its charge of confiscation.

(*b*) *The recapture provision is a valid condition to the license.*—But, even if respondent can at this time raise the constitutional validity of the recapture provision, it is apparent that it is a valid condition to the license.

1. We have shown that Congress, whether the project be located in navigable waters, or impairs navigable capacity, or affects the interests of interstate commerce, has power to forbid its unlicensed construction or operation (*supra,* pp. 122–127).

Since there is power to prohibit construction or operation, there is of course an equal power to grant a franchise or a license for a limited period. *Gibbons* v. *Ogden,* 9 Wheat. 1. At the end of the license period, the structure can no longer be maintained or operated. It then can have no more than a junk value. Cf. *Roberts* v. *New York City,* 295 U. S. 264, 284–285. The net investment contemplated by the Federal Power Act is far in excess of the junk value of the plant. And there can be no claim for reimbursement for water power rights, the development of which the United States can and has forbidden. Cf. *United States* v. *Chandler-Dunbar Water Power Co.,* 229 U. S. 53.

2. There can, in any event, be no charge of confiscation. The recapture provisions are simply the price which respondent must pay to obtain a privilege otherwise denied it; if the contract is harsh (as it obviously is not), respondent had the simple expedient of not constructing the project.[13] Such is the settled rule with the wholly analogous power of municipalities to condition the terms of their franchises. *Southern Iowa Electric Co.* v. *Chariton,* 255 U. S. 539, 542; *Paducah* v. *Paducah Ry. Co.,* 261 U. S. 267, 273; *Georgia Ry. Co.* v. *Decatur,* 262

---

[13] This argument, the Court will note, is alternative to that advanced above with respect to respondent's power to challenge the recapture provision when and if the Government seeks to take the project over (*supra,* p. 138). If that argument should be rejected, and respondent permitted to raise the question now, the present argument would seem without more to be established as correct.

U. S. 432, 438–439; *Public Service Co.* v. *St. Cloud*, 265 U. S. 352, 355–356.

The precise question, indeed, appears settled by *Fox River Co.* v. *Railroad Commission*, 274 U. S. 651, 657. There this Court upheld the power of Wisconsin to require a 30-year license of every dam operator, conditioned upon liability to surrender of the project to the State or to a municipality at the end of the license period; the licensee was to be paid the then reproduction cost of the dam and plant and the value of dam site and flowage rights as of the time prior to the license. Because, as we have indicated, of the State's power to forbid construction, the Court held the recapture provision "the price which plaintiffs must pay to secure the right to maintain their dam" (p. 657).

(c) The recapture provision is valid even if there were no power to forbid construction. Even if respondent can now raise the question, and even if the Court should hold that Congress has no power to forbid construction or operation of the project, the recapture provision is nevertheless valid.

1. Even if we assume that Congress would be without power to forbid construction of the dam or operation of the hydroelectric plant, this gives respondent no privilege to distribute the electric energy in interstate commerce. Congress can, therefore, forbid the interstate movement of electric energy from respondent's generators. To obtain this privilege, respondent as an interstate public utility must accept a license from the Fed-

eral Power Commission, just as an interstate railroad, motor carrier, or vessel must obtain a license or a certificate of public convenience and necessity from the appropriate federal authority. The recapture provision, then, is an appropriate contractual price to pay for receipt of that privilege, and is valid for the same reason that it is valid as applied to a project the construction of which can be forbidden under the commerce powers.[14]

2. But even if the respondent were not distributing electric energy in interstate commerce, the recapture provision would not fall. It directs, in Section 14, that from net investment there shall be excluded the value of the license, good will, and going value. These elements of value become worthless when the license is terminated (*supra*, p. 140). This leaves only the complaint that any increment in the value of respondent's property will not, under Section 14, be repaid in the event of recapture and the requirement, in Section 10 (d), that the net investment be reduced by amortization reserves built up, after the twentieth year, out of surplus

---

[14] We recognize that the Federal Power Act is not drafted on this approach, and does not require in Part II a license simply for the interstate sale of electricity. But, since this lies within the Congressional power, respondent cannot assert the rights of operators of hydroelectric projects who distribute only in intrastate commerce. The Act *does* require a license of respondent; and it cannot attack the constitutionality of that valid requirement because it considers the requirement adopts a faulty reason. See cases cited, *supra*, at pp. 125–126.

accumulated in excess of a specified reasonable rate of return on the net investment.

Respondent cannot challenge the amortization reserve requirement if it is built up out of the excess of its income over a reasonable rate of return. *Dayton-Goose Creek Ry. Co.* v. *United States,* 263 U. S. 456. Its attack, then, must be directed at the requirement that the reasonable rate of return be referred to the net investment value. The United States has recently urged at length that the equivalent "prudent investment" basis of valuation is constitutional. Brief *amicus curiae* in *Driscoll* v. *Edison Co.,* 307 U. S. 104, No. 509, Oct. Term, 1938, pp. 22–69. It seems unnecessary to repeat that argument here, and sufficient to refer to that brief to establish the constitutionality of such a method of valuation. Here, it may be noted, Congress has specifically provided for this method of valuation, and the arguments have augmented strength from that congressional determination.

That leaves only the complaint that the recapture provision denies just compensation because it does not provide payment for any increase in property values during the period of the license. But if one of the obligations of a public utility is to devote its property to the public use for a fair return upon its net investment, by the same token it is subject to public expropriation upon the same basis. If there is no confiscation from year to year, there can be none when the project is taken over at the end of the license period. Certainly this is the result when respondent, with knowledge of the provisions of Section 14, thereafter undertakes the construction of its project.

CONCLUSION

The decision of the court below, affirming the final decree of the District Court, should be reversed, with directions to enter a permanent injunction against construction, maintenance, or operation of the project without a license from the Federal Power Commission. This is required because the project is located in navigable waters of the United States, impairs the navigable capacity of waters of the United States, and affects the interests of interstate commerce. A license is therefore required by Sections 4 (e) and 23 (b) of the Federal Power Act, and neither this requirement nor any of the terms of the license is unconstitutional.

Respectfully submitted.

FRANCIS BIDDLE,
Solicitor General.
JOHN W. AIKEN,
WARNER W. GARDNER,
Special Assistants to the Attorney General.
DAVID W. ROBINSON, JR.,
General Counsel,
GREGORY HANKIN,
Special Counsel,
WILLARD W. GATCHELL,
Principal Attorney,
Federal Power Commission.

APRIL 1940.

APPENDIX A

STATUTES

The Rivers and Harbors Act of 1899, c. 425, 30 Stat. 1121, 1151 (U. S. C., Title 33, Secs. 401, 403):

> SEC. 9. That it shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further,* That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War.

SEC. 10. That the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same.

Federal Water Power Act of 1920, c. 285, 41 Stat. 1063, as amended by the Federal Power Act of 1935, c. 687, 49 Stat. 838 (U. S. C. Supp. V, Title 16, Secs. 791 *et seq.*):

PART I

* * * * *

SEC. 3. The words defined in this section shall have the following meanings for purposes of this Act, to wit:

* * * * *

(8) "navigable waters" means those parts of streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with for-

eign nations and among the several States, and which either in their natural or improved condition notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage, are used or suitable for use for the transportation of persons or property in interstate or foreign commerce, including therein all such interrupting falls, shallows, or rapids, together with such other parts of streams as shall have been authorized by Congress for improvement by the United States or shall have been recommended to Congress for such improvement after investigation under its authority;

* * * * *

SEC. 4. The Commission is hereby authorized and empowered—

* * * * *

(e) To issue licenses to citizens of the United States, or to any association of such citizens, or to any corporation organized under the laws of the United States or any State thereof, or to any State or municipality for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, powerhouses, transmission lines, or other project works necessary or convenient for the development and improvement of navigation and for the development, transmission, and utilization of power across, along, from, or in any of the streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States, or upon any part of the public lands and reservations of the United States (including the Territories), or for the purpose of utilizing the surplus water or water power from any Government dam, except as herein provided: *Provided,* That licenses shall be issued within any reservation only after a finding by the Commission that the license will not interfere or be inconsistent with the purpose for which such reservation was created or acquired, and shall be subject to and contain such conditions as the Secretary of the department under whose supervision such reservation falls shall deem necessary for the adequate protection and utilization of such reservation: *Provided further,* That no license affecting the navigable capacity of any navigable waters of the United States shall be issued until the plans of the dam or other structures affecting navigation have been approved by the Chief of Engineers and the Secretary of War. Whenever the contemplated improvement is, in the judgment of the Commission, desirable and justified in the public interest for the purpose of improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, a finding to that effect shall be made by the Commission and shall become a part of the records of the Commission: *Provided further,* That in case the Commission shall find that any Government dam may be advantageously used by the United States for public purposes in addition to navigation, no license therefor shall be issued until two years after it shall have reported to Congress the facts and conditions relating thereto, except that this provision shall not apply to any Government dam constructed prior to June 10, 1920: *And provided further;* That upon the filing of any application for a license which has not been preceded by a preliminary permit under subsection (f) of this section, notice shall be given and published as required by the proviso of said subsection.

* * * * *

SEC. 6. Licenses under this Part shall be issued for a period not exceeding fifty years. Each such license shall be conditioned upon acceptance by the licensee of all the terms and conditions of this Act and such further conditions, if any, as the Commission shall prescribe in conformity with this Act, which said terms and conditions and the acceptance thereof shall be expressed in said license. Licenses may be revoked only for the reasons and in the manner prescribed under the provisions of this Act, and may be altered or surrendered only upon mutual agreement between the licensee and the Commission after thirty days' public notice. Copies of all licenses issued under the provisions of this Part and calling for the payment of annual charges shall be deposited with the General Accounting Office, in compliance with section 3743, Revised Statutes, as amended (U. S. C., title 41, sec. 20).

* * * * *

SEC. 9. That each applicant for a license hereunder shall submit to the commission—

* * * * *

(b) Satisfactory evidence that the applicant has complied with the requirements of the laws of the State or States within which the proposed project is to be located with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes and with respect to the right to engage in the business of developing, transmitting, and distributing power, and in any other business necessary to effect the purposes of a license under this Act.

* * * * *

SEC. 10. All licenses issued under this Part shall be on the following conditions:

(a) That the project adopted, including the maps, plans, and specifications, shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes; and if necessary in order to secure such plan the Commission shall have authority to require the modification of any project and of the plans and specifications of the project works before approval.

(b) That except when emergency shall require for the protection of navigation, life, health, or property, no substantial alteration or addition not in conformity with the approved plans shall be made to any dam or other project works constructed hereunder of an installed capacity in excess of one hundred horsepower without the prior approval of the Commission; and any emergency alteration or addition so made shall thereafter be subject to such modification and change as the Commission may direct.

(c) That the licensee shall maintain the project works in a condition of repair adequate for the purposes of navigation and for the efficient operation of said works in the development and transmission of power, shall make all necessary renewals and replacements, shall establish and maintain adequate depreciation reserves for such purposes, shall so maintain and operate said works as not to impair navigation, and shall conform to such rules and regulations as the Commission may from time to time prescribe for the protection of life, health, and property. Each licensee hereunder shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto, constructed under the license, and in no event shall the United States be liable therefor.

(d) That after the first twenty years of operation, out of surplus earned thereafter, if any, accumulated in excess of a specified reasonable rate of return upon the net investment of a licensee in any project or projects under license, the licensee shall establish and maintain amortization reserves, which reserves shall, in the discretion of the Commission, be held until the termination of the license or be applied from time to time in reduction of the net investment. Such specified rate of return and the proportion of such surplus earnings to be paid into and held in such reserves shall be set forth in the license.

(e) That the licensee shall pay to the United States reasonable annual charges in an amount to be fixed by the Commission for the purpose of reimbursing the United States for the costs of the administration of this Part; for recompensing it for the use, occupancy, and enjoyment of its lands or other property; and for the expropriation to the Government of excessive profits until the respective States shall make provision for preventing excessive profits or for the expropriation thereof to themselves, or until the period of amortization as herein provided is reached, and in fixing such charges the Commission shall seek to avoid increasing the price to the consumers of power by such charges, and any such charges may be adjusted from time to time by the Commission as conditions may require: *Provided,* That when licenses are issued involving the use of Government dams or other structures owned by the United States or tribal lands embraced within Indian reservations the Commission shall, subject to the approval of the Secretary of the Interior in the case of such dams or structures in reclamation projects and, in the case of such tribal lands, subject to the approval of the Indian tribe having jurisdiction of such lands as provided in section 16 of the Act of June 18, 1934 (48 Stat. 984), fix a reasonable annual charge for the use thereof, and such charges may with like approval be readjusted by the Commission at the end of twenty years after the project is available for service and at periods of not less than ten years thereafter upon notice and opportunity for hearing: *Provided further,* That licenses for the development, transmission, or distribution of power by States or municipalities shall be issued and enjoyed without charge to the extent such power is sold to the public without profit or is used by such State or municipality for State or municipal purposes, except that as to projects constructed or to be constructed by States or municipalities primarily designed to provide or improve navigation, licenses therefor shall be issued without charge; and that licenses for the development, transmission, or distribution of power for domestic, mining, or other beneficial use in projects of not more than one hundred horsepower installed capacity may be issued without charge, except on tribal lands within Indan reservations; but in no case shall a license be issued free of charge for the development and utilization of power created by any Government dam and that the amount charged therefor in any license shall be such as determined by the Commission. In the event an overpayment of any charge due under this section shall be made by a licensee, the Commission is authorized to allow a credit for such overpayment when charges are due for any subsequent period.

(f) That whenever any licensee hereunder is directly benefited by the construction work of another licensee, a permittee, or of the United States of a storage reservoir or other headwater improvement, the Commission shall require as a condition of the license that the licensee so benefited shall reimburse the owner of such reservoir or other improvements for such part of the annual charges for interest, maintenance, and depreciation thereon as the Commission may deem equitable. The proportion of such charges to be paid by any licensee shall be determined by the Commission. The licensees or permittees affected shall pay to the United States the cost of making such determination as fixed by the Commission.

Whenever such reservoir or other improvement is constructed by the United States the Commission shall assess similar charges against any licensee directly benefited thereby, and any amount so assessed shall be paid into the Treasury of the United States, to be reserved and appropriated as a part of the special fund for headwater improvements as provided in section 17 hereof.

Whenever any power project not under license is benefited by the construction work of a licensee or permittee, the United States or any agency thereof, the Commission, after notice to the owner or owners of such unlicensed project, shall determine and fix a reasonable and equitable annual charge to be paid to the licensee or permittee on account of such benefits, or to the United States if it be the owner of such headwater improvement.

(g) Such other conditions not inconsistent with the provisions of this Act as the Commission may require.

(h) That combinations, agreements, arrangements, or understandings, express or implied, to limit the output of electrical energy, to restrain trade, or to fix, maintain, or increase prices for electrical energy or service are hereby prohibited.

(i) In issuing licenses for a minor part only of a complete project, or for a complete project of not more than one hundred horsepower installed capacity, the Commission may in its discretion waive such conditions, provisions, and requirements of this Part, except the license period of fifty years, as it may deem to be to the public interest to waive under the circumstances: *Provided,* That the provisions hereof shall not apply to annual charges for use of land within Indian reservations.

SEC. 14. Upon not less than two years' notice in writing from the Commission the United States shall have the right upon or after the expiration of any license to take over and thereafter to maintain and operate any project or projects as defined in section

3 hereof, and covered in whole or in part by the license, or the right to take over upon mutual agreement with the licensee all property owned and held by the licensee then valuable and serviceable in the development, transmission, or distribution of power and which is then dependent for its usefulness upon the continuance of the license, together with any lock or locks or other aids to navigation constructed at the expense of the licensee, upon the condition that before taking possession it shall pay the net investment of the licensee in the project or projects taken, not to exceed the fair value of the property taken, plus such reasonable damages, if any, to property of the licensee valuable, serviceable, and dependent as above set forth but not taken, as may be caused by the severance therefrom of property taken, and shall assume all contracts entered into by the licensee with the approval of the Commission. The net investment of the licensee in the project or projects so taken and the amount of such severance damages, if any, shall be determined by the Commission after notice and opportunity for hearing. Such net investment shall not include or be affected by the value of any lands, rights-of-way, or other property of the United States licensed by the Commission under this Act, by the license or by goodwill, going value, or prospective revenues; nor shall the values allowed for water rights, rights-of-way, lands, or interest in lands be in excess of the actual reasonable cost thereof at the time of acquisition by the licensee: *Provided,* That the right of the United States or any State or municipality to take over, maintain, and operate any project licensed under this Act

at any time by condemnation proceedings upon payment of just compensation is hereby expressly reserved.

* * * * *

SEC. 19. That as a condition of the license, every licensee hereunder which is a public-service corporation, or a person, association, or corporation owning or operating any project and developing, transmitting, or distributing power for sale or use in public service, shall abide by such reasonable regulation of the services to be rendered to customers or consumers of power, and of rates and charges of payment therefor, as may from time to time be prescribed by any duly constituted agency of the State in which the service is rendered or the rate charged. That in case of the development, transmission, or distribution, or use in public service of power by any licensee hereunder or by its customer engaged in public service within a State which has not authorized and empowered a commission or other agency or agencies within said State to regulate and control the services to be rendered by such licensee or by its customer engaged in public service, or the rates and charges of payment therefor, or the amount or character of securities to be issued by any of said parties, it is agreed as a condition of such license that jurisdiction is hereby conferred upon the commission, upon complaint of any person aggrieved or upon its own initiative, to exercise such regulation and control until such time as the State shall have provided a commission or other authority for such regulation and control: *Provided,* That the jurisdiction of the commission shall cease and determine as to each specific matter of regulation and control prescribed in this section as soon as the

State shall have provided a commission or other authority for the regulation and control of that specific matter.

SEC. 20. That when said power or any part thereof shall enter into interstate or foreign commerce the rates charged and the service rendered by any such licensee, or by any subsidiary corporation, the stock of which is owned or controlled directly or indirectly by such licensee, or by any person, corporation, or association purchasing power from such licensee for sale and distribution or use in public service shall be reasonable, nondiscriminatory, and just to the customer and all unreasonable discriminatory and unjust rates or services are hereby prohibited and declared to be unlawful; and whenever any of the States directly concerned has not provided a commission or other authority to enforce the requirements of this section within such State or to regulate and control the amount and character of securities to be issued by any of such parties, or such States are unable to agree through their properly constituted authorities on the services to be rendered or on the rates or charges of payment therefor, or on the amount or character of securities to be issued by any of said parties, jurisdiction is hereby conferred upon the commission, upon complaint of any person aggrieved, upon the request of any State concerned, or upon its own initiative to enforce the provisions of this section, to regulate and control so much of the services rendered, and of the rates and charges of payment therefor as constitute interstate or foreign commerce and to regulate the issuance of securities by the parties included within this section, and securities issued by the licensee subject to such regulations shall be allowed only for the bona fide purpose of financing and conducting the business of such licensee.

The administration of the provisions of this section, so far as applicable, shall be according to the procedure and practice in fixing and regulating the rates, charges, and practices of railroad companies as provided in the Act to regulate commerce, approved February 4, 1887, as amended, and that the parties subject to such regulation shall have the same rights of hearing, defense, and review as said companies in such cases.

In any valuation of the property of any licensee hereunder for purposes of rate making, no value shall be claimed by the licensee or allowed by the commission for any project or projects under license in excess of the value or values prescribed in section 14 hereof for the purposes of purchase by the United States, but there shall be included the cost to such licensee of the construction of the lock or locks or other aids of navigation and all other capital expenditures required by the United States, and no value shall be claimed or allowed for the rights granted by the commission or by this Act.

* * * * *

SEC. 23. * * *

(b) It shall be unlawful for any person, State, or municipality, for the purpose of developing electric power, to construct, operate, or maintain any dam, water conduit, reservoir, powerhouse, or other works incidental thereto across, along, or in any of the navigable waters of the United States, or upon any part of the public lands or reservations of the United States (including the Territories), or utilize the surplus water or water power from any Government dam, except under and in accordance with the terms of a permit or valid existing right-of-way granted prior to June 10, 1920, or a license granted pursuant to this Act. Any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States shall before such construction file declaration of such intention with the Commission, whereupon the Commission shall cause immediate investigation of such proposed construction to be made; and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not construct, maintain, or operate such dam or other project works until it shall have applied for and shall have received a license under the provisions of this Act. If the Commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws.

PART II. REGULATION OF ELECTRIC UTILITY COMPANIES ENGAGED IN INTERSTATE COMMERCE

DECLARATION OF POLICY; APPLICATION OF PART; DEFINITIONS

SECTION 201. (a) It is hereby declared that the business of transmitting and selling electric energy for ultimate distribution to the public is affected with a public interest, and that Federal regulation of matters relating to generation to the extent provided in this Part and the Part next following and of that part of such business which consists of the transmission of electric energy in interstate commerce and the sale of such energy at wholesale in interstate commerce is necessary in the public interest, such Federal regulation, however, to extend only to those matters which are not subject to regulation by the States.

(b) The provisions of this Part shall apply to the transmission of electric energy in interstate commerce and to the sale of electric energy at wholesale in interstate commerce, but shall not apply to any other sale of electric energy or deprive a State or State commission of its lawful authority now exercised over the exportation of hydroelectric energy which is transmitted across a State line. The Commission shall have jurisdiction over all facilities for such transmission or sale of electric energy, but shall not have jurisdiction, except as specifically provided in this Part and the Part next following, over facilities used for the generation of electric energy or over facilities used in local distribution or only for the transmission of electric energy in intrastate commerce, or over facilities for the transmission of electric energy consumed wholly by the transmitter.

(c) For the purpose of this Part, electric energy shall be held to be transmitted in interstate commerce if transmitted from a State and consumed at any point outside thereof; but only insofar as such transmission takes place within the United States.

(d) The term "sale of electric energy at wholesale" when used in this Part means a sale of electric energy to any person for resale.

(e) The term "public utility" when used in this Part or in the Part next following means any person who owns or operates facilities subject to the jurisdiction of the Commission under this Part.

* * * * *

RATES AND CHARGES; SCHEDULES; SUSPENSION OF NEW RATES

SEC. 205. (a) All rates and charges made, demanded, or received by any public utility for or in connection with the transmission or sale of electric energy subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.

(b) No public utility shall, with respect to any transmission or sale subject to the jurisdiction of the Commission, (1) make or grant any undue preference or advantage to any person or subject any person to any undue prejudice or disadvantage, or (2) maintain any unreasonable difference in rates, charges, service, facilities, or in any other respect, either as between localities or as between classes of service.

(c) Under such rules and regulations as the Commission may prescribe, every public utility shall file with the Commission, within such time and in such form as the Commission may designate, and shall keep open in convenient form and place for public inspection schedules showing all rates and charges for any transmission or sale subject to the jurisdiction of the Commission, and the classifications, practices, and regulations affecting such rates and charges, together with all contracts which in any manner affect or relate to such rates, charges, classifications, and services.

(d) Unless the Commission otherwise orders, no change shall be made by any public utility in any such rate, charge, classification, or service, or in any rule, regulation, or contract relating thereto, except after thirty days' notice to the Commission and to the public. Such notice shall be given by filing with the Commission and keeping open for public inspection new schedules stating plainly the change or changes to be made in the schedule or schedules then in force and the time when the change or changes will go into effect. The Commission, for good cause shown, may allow changes to take effect without requiring the thirty days' notice herein provided for by an order specifying the changes so to be made and the time when they shall take effect and the manner in which they shall be filed and published.

(e) Whenever any such new schedule is filed the Commission shall have authority, either upon complaint or upon its own initiative without complaint, at once, and, if it so orders, without answer or formal pleading by the public utility, but upon reasonable notice, to enter upon a hearing concerning the lawfulness of such rate, charge, classification, or service; and, pending such hearing and the decision thereon, the Commission, upon filing with such schedules and delivering to the public utility affected thereby a statement in writing of its reasons for such suspension, may suspend the operation of such schedule and defer the use of such rate, charge, classification, or service, but not for a longer period than five months beyond the time when it would otherwise go into effect; and after full hearings, either completed before or after the rate, charge, classification, or service goes into effect, the Commission may make such orders with reference thereto as would be proper in a proceeding initiated after it had become effective. If the proceeding has not been concluded and an order made at the expiration of such five months, the proposed change of rate, charge, classification, or service shall go into effect at the end of such period, but in case of a proposed increased rate or charge, the Commission may by order require the interested public utility or public utilities to keep accurate account in detail of all amounts received by reason of such increase, specifying by whom and in whose behalf such amounts are paid, and upon completion of the hearing and decision may by further order require such public utility or public utilities to refund, with interest, to the persons in whose behalf such amounts were paid, such portion of such increased rates or charges as by its decision shall be found not justified. At any hearing involving a rate or charge sought to be increased, the burden of proof to show that the increased rate or charge is just and reasonable shall be upon the public utility, and the Commission shall give to the hearing and decision of such questions preference over other questions pending before it and decide the same as speedily as possible.

* * * * *

FIXING RATES AND CHARGES; DETERMINATION OF COST OF PRODUCTION OR TRANSMISSION

Sec. 206. (a) Whenever the Commission, after a hearing had upon its own motion or upon complaint, shall find that any rate, charge, or classification, demanded, observed, charged, or collected by any public utility for any transmission or sale subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory or preferential, the Commission shall determine the just and reasonable rate, charge, classification, rule, regulation, practice, or contract to be thereafter observed and in force, and shall fix the same by order.

(b) The Commission upon its own motion, or upon the request of any State commission whenever it can do so without prejudice to the efficient and proper conduct of its affairs, may investigate and determine the cost of the production or transmission of electric energy by means of facilities under the jurisdiction of the Commission in cases where the Commission has no authority to establish a rate governing the sale of such energy.

FURNISHING OF ADEQUATE SERVICE

Sec. 207. Whenever the Commission, upon complaint of a State commission, after notice to each State commission and public utility affected and after opportunity for hearing, shall find that any interstate service of any public utility is inadequate or insufficient, the Commission shall determine the proper, adequate, or sufficient service to be furnished, and shall fix the same by its order, rule, or regulation: *Provided,* That the Commission shall have no authority to compel the enlargement of generating facilities for such purposes, nor to compel the public utility to sell or exchange energy when to do so would impair its ability to render adequate service to its customers.

ASCERTAINMENT OF COST OF PROPERTY

SEC. 208. (a) The Commission may investigate and ascertain the actual legitimate cost of the property of every public utility, the depreciation therein, and, when found necessary for rate-making purposes, other facts which bear on the determination of such cost or depreciation, and the fair value of such property.

(b) Every public utility upon request shall file with the Commission an inventory of all or any part of its property and a statement of the original cost thereof, and shall keep the Commission informed regarding the cost of all additions, betterments, extensions, and new construction.

USE OF JOINT BOARDS; COOPERATION WITH STATE COMMISSIONS

SEC. 209. (a) The Commission may refer any matter arising in the administration of this Part to a board to be composed of a member or members, as determined by the Commission, from the State or each of the States affected or to be affected by such matter. Any such board shall be vested with the same power and be subject to the same duties and liabilities as in the case of a member of the Commission when designated by the Commission to hold any hearings. The action of such board shall have such force and effect and its proceedings shall be conducted in such manner as the Commission shall by regulations prescribe. The board shall be appointed by the Commission from persons nominated by the State commission of each State affected, or by the Governor of such State if there is no State commission. Each State affected shall be entitled to the same number of representatives on the board unless the nominating power of such State waives such right. The Commission shall have discretion to reject the nominee from any State, but shall thereupon invite a new nomination from that State. The members of a board shall receive such allowances for expenses as the Commission shall provide. The Commission may, when in its discretion sufficient reason exists therefor, revoke any reference to such a board.

(b) The Commission may confer with any State commission regarding the relationship between rate structures, costs, accounts, charges, practices, classifications, and regulations of public utilities subject to the jurisdiction of such State commission and of the Commission; and the Commission is authorized, under such rules and regulations as it shall prescribe, to hold joint hearings with any State commission in connection with any matter with respect to which the Commission is authorized to act. The Commission is authorized in the administration of this Act to avail itself of such cooperation, services, records, and facilities as may be afforded by any State commission.

(c) The Commission shall make available to the several State commissions such information and reports as may be of assistance in State regulation of public utilities.

Whenever the Commission can do so without prejudice to the efficient and proper conduct of its affairs, it may upon request from a State make available to such State as witnesses any of its trained rate, valuation, or other experts, subject to reimbursement to the Commission by such State of the compensation and traveling expenses of such witnesses. All sums collected hereunder shall be credited to the appropriation from which the amounts were expended in carrying out the provisions of this subsection.

PART III. LICENSEES AND PUBLIC UTILITIES; PROCEDURAL AND ADMINISTRATIVE PROVISIONS

ACCOUNTS, RECORDS, AND MEMORANDA

SECTION 301. (a) Every licensee and public utility shall make, keep, and preserve for such periods, such accounts, records of cost-accounting procedures, correspondence, memoranda, papers, books, and other records as the Commission may by rules and regulations prescribe as necessary or appropriate for purposes of the administration of this Act, including accounts, records, and memoranda of the generation, transmission, distribution, delivery, or sale of electric energy, the furnishing of services or facilities in connection therewith, and receipts and expenditures with respect to any of the foregoing: *Provided, however,* That nothing in this Act shall relieve any public utility from keeping any accounts, memoranda, or records which such public utility may be required to keep by or under authority of the laws of any State. The Commission may prescribe a system of accounts to be kept by licensees and public utilities and may classify such licensees and public utilities and prescribe a system of accounts for each class. The Commission, after notice and opportunity for hearing, may determine by order the accounts in which particular outlays and receipts shall be entered, charged, or credited. The burden of proof to justify every accounting entry questioned by the Commission shall be on the person making, authorizing, or requiring such entry, and the Commission may suspend a charge or credit pending submission of satisfactory proof in support thereof.

(b) The Commission shall at all times have access to and the right to inspect and examine all accounts, records, and memoranda of licensees and public utilities, and it shall be the duty of such licensees and public utilities to furnish to the Commission, within such reasonable time as the Commission may order, any information with respect thereto which the Commission may by order require, including copies of maps, contracts, reports of engineers, and other data, records, and papers, and to grant to all agents of the Commission free access to its property and its accounts, records, and memoranda when requested so to do. No member, officer, or employee of the Commission shall divulge any fact or information which may come to his knowledge during the course of examination of books or other accounts, as hereinbefore provided, except insofar as he may be directed by the Commission or by a court.

(c) The books, accounts, memoranda, and records of any person who controls, directly or indirectly, a licensee or public utility subject to the jurisdiction of the Commission, and of any other company controlled by such person, insofar as they relate to transactions with or the business of such licensee or public utility, shall be subject to examination on the order of the Commission.

RATES OF DEPRECIATION

SEC. 302. (a) The Commission may, after hearing, require licensees and public utilities to carry a proper and adequate depreciation account in accordance with such rules, regulations, and forms of account as the Commission may prescribe. The Commission may, from time to time, ascertain and determine, and by order fix, the proper and adequate rates of depreciation of the several classes of property of each licensee and public utility. Each licensee and public utility shall conform its depreciation accounts to the rates so ascertained, determined, and fixed. The licensees and public utilities subject to the jurisdiction of the Commission shall not charge to operating expenses any depreciation charges on classes of property other than those prescribed by the Commission, or charge with respect to any class of property a percentage of depreciation other than that prescribed therefor by the Commission. No such licensee or public utility shall in any case include in any form under its operating or other expenses any depreciation or other charge or expenditure included elsewhere as a depreciation charge or otherwise under its operating or other expenses. Nothing in this section shall limit the power of a State commission to determine in the exercise of its jurisdiction, with respect to any public utility, the percentage rate of depreciation to be allowed, as to any class of property of such public utility, or the composite depreciation rate, for the purpose of determining rates or charges.

(b) The Commission, before prescribing any rules or requirements as to accounts, records, or memoranda, or as to depreciation rates, shall notify each State commission having jurisdiction with respect to any public utility involved, and shall give reasonable opportunity to each such commission to present its views, and shall receive and consider such views and recommendations.

* * * * *

COMPLAINTS

SEC. 306. Any person, State, municipality, or State commission complaining of any thing done or omitted to be done by any licensee or public utility in contravention of the provisions of this Act may apply to the Commission by petition which shall briefly state the facts, whereupon a statement of the complaint thus made shall be forwarded by the Commission to such licensee or public utility, who shall be called upon to satisfy the complaint or to answer the same in writing within a reasonable time to be specified by the Commission. If such licensee or public utility shall not satisfy the complaint within the time specified or there shall appear to be any reasonable ground for investigating such complaint, it shall be the duty of the Commission to investigate the matters complained of in such manner and by such means as it shall find proper.

INVESTIGATIONS BY COMMISSION; ATTENDANCE OF WITNESS; DEPOSITIONS

SEC. 307 (a) The Commission may investigate any facts, conditions, practices, or matters which it may find necessary or proper in order to determine whether any person has violated or is about to violate any provision of this Act or any rule, regulation, or order thereunder, or to aid in the enforcement of the provisions of this Act or in prescribing rules or regulations thereunder, or in obtaining information to serve as a basis for recommending further legislation concerning the matters to which this Act relates. The Commission may permit any person to file with it a statement in writing under oath or otherwise, as it shall determine, as to any or all facts and circumstances concerning a matter which may be the subject of investigation. The Commission, in its discretion, may publish or make available to State commissions information concerning any such subject.

(b) For the purpose of any investigation or any other proceeding under this Act, any member of the Commission, or any officer designated by it, is empowered to administer oaths and affirmations, subpena witnesses, compel their attendance, take evidence, and require the production of any books, papers, correspondence, memoranda, contracts, agreements, or other records which the Commission finds relevant or material to the inquiry. Such attendance of witnesses and the production of any such records may be required from any place in the United States at any designated place of hearing. Witnesses summoned by the Commission to appear before it shall be paid the same fees and mileage that are paid witnesses in the courts of the United States.

(c) In case of contumacy by, or refusal to obey a subpena issued to, any persons, the Commission may invoke the aid of any court of the United States within the jurisdiction of which such investigation or proceeding is carried on, or where such person resides or carries on business, in requiring the attendance and testimony of witnesses and the production of books, papers, correspondence, memoranda, contracts, agreements, and other records. Such court may issue an order requiring such person to appear before the Commission or member or officer designated by the Commission, there to produce records, if so ordered, or to give testimoney touching the matter under investigation or in question; and any failure to obey such order of the court may be punished by such court as a contempt thereof. All process in any such case may be served in the judicial district whereof such person is an inhabitant or wherever he may be found or may be doing business. Any person who willfully shall fail or refuse to attend and testify or to answer any lawful inquiry or to produce books, papers, correspondence, memoranda, contracts, agreements, or other records, if in his or its power so to do, in obedience to the subpena of the Commission, shall be guilty of a misdemeanor and, upon conviction, shall be subject to a fine of not more than $1,000 or to imprisonment for a term of not more than one year, or both.

(d) The testimony of any witness may be taken, at the instance of a party, in any proceeding or investigation pending before the Commission, by deposition, at any time after the proceeding is at issue. The Commission may also order testimony to be taken by deposition in any proceeding or investigation pending before it, at any stage of such proceeding or investigation. Such depositions may be taken before any person authorized to administer oaths not being of counsel or attorney to either of the parties, nor interested in the proceeding or investigation. Reasonable notice must first be given in writing by the party or his attorney proposing to take such deposition to the opposite party or his attorney of record, as either may be nearest, which notice shall state the name of the witness and the time and place of the taking of his deposition. Any person may be compelled to appear and depose, and to produce documentary evidence, in the same manner as witnesses may be compelled to appear and testify and produce documentary evidence before the Commission, as hereinbefore provided. Such testimony shall be reduced to writing by the person taking the deposition, or under his direction, and shall, after it has been reduced to writing, be subscribed by the deponent.

(e) If a witness whose testimony may be desired to be taken by deposition be in a foreign country, the deposition may be taken before an officer or person designated by the Commission, or agreed upon by the parties by stipulation in writing to be filed with the Commission. All depositions must be promptly filed with the Commission.

(f) Witnesses whose depositions are taken as authorized in this Act, and the person or officer taking the same, shall be entitled to the same fees as are paid for like services in the courts of the United States.

(g) No person shall be excused from attending and testifying or from producing books, papers, correspondence, memoranda, contracts, agreements, or other records and documents before the Commission, or in obedience to the subpena of the Commission or any member thereof or any officer designated by it, or in any cause or proceeding instituted by the Commission, on the ground that the testimony or evidence, documentary or otherwise, required of him may tend to incriminate him or subject him to a penalty or forfeiture; but no individual shall be prosecuted or subjected to any penalty or forfeiture for or on account of any transaction, matter, or thing concerning which he is compelled to testify or produce evidence, documentary or otherwise, after having claimed his privilege against self-incrimination, except that such individual so testifying shall not be exempt from prosecution and punishment for perjury committed in so testifying.

* * * * *

8

REHEARINGS; COURT REVIEW OF ORDERS

SEC. 313. (a) Any person, State, municipality, or State commission aggrieved by an order issued by the Commission in a proceeding under this Act to which such person, State, municipality, or State commission is a party may apply for a rehearing within thirty days after the issuance of such order. The application for rehearing shall set forth specifically the ground or grounds upon which such application is based. Upon such application the Commission shall have power to grant or deny rehearing or to abrogate or modify its order without further hearing. Unless the Commission acts upon the application for rehearing within thirty days after it is filed, such application may be deemed to have been denied. No proceeding to review any order of the Commission shall be brought by any person unless such person shall have made application to the Commission for a rehearing thereon.

(b) Any party to a proceeding under this Act aggrieved by an order issued by the Commission in such proceeding may obtain a review of such order in the Circuit Court of Appeals of the United States for any circuit wherein the licensee or public utility to which the order relates is located or has its principal place of business, or in the United States Court of Appeals for the District of Columbia, by filing in such court, within sixty days after the order of the Commission upon the application for rehearing, a written petition praying that the order of the Commission be modified or set aside in whole or in part. A copy of such petition shall forthwith be served upon any member of the Commission and thereupon the Commission shall certify and file with the court a transcript of the record upon which the order complained of was entered. Upon the filing of such transcript such court shall have exclusive jurisdiction to affirm, modify, or set aside such order in whole or in part. No objection to the order of the Commission shall be considered by the court unless such objection shall have been urged before the Commission in the application for rehearing unless there is reasonable ground for failure so to do. The finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive. If any party shall apply to the court for leave to adduce additional evidence, and shall show to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for failure to adduce such evidence in the proceedings before the Commission, the court may order such additional evidence to be taken before the Commission and to be adduced upon the hearing in such manner and upon such terms and conditions as to the court may seem proper. The Commission may modify its findings as to the facts by reason of the additional evidence so taken, and it shall file with the court such modified or new findings which, if supported by substantial evidence, shall be conclusive, and its recommendation, if any, for the modification or setting aside of the original order. The judgment and decree of the court, affirming, modifying, or setting aside, in whole or in part, any such order of the Commission, shall be final, subject to review by the Supreme Court of the United States upon certiorari or certification as provided in sections 239 and 240 of the Judicial Code, as amended (U. S. C., title 28, secs. 346 and 347).

(c) The filing of an application for rehearing under subsection (a) shall not, unless specifically ordered by the Commission, operate as a stay of the Commission's order. The commencement of proceedings under subsection (b) of this section shall not, unless specifically ordered by the court, operate as a stay of the Commission's order.

ENFORCEMENT OF ACT, REGULATIONS AND ORDERS

SEC. 314. (a) Whenever it shall appear to the Commission that any person is engaged or about to engage in any acts or practices which constitute or will constitute a violation of the provisions of this Act, or of any rule, regulation, or order thereunder, it may in its discretion bring an action in the proper District Court of the United States, the Supreme Court of the District of Columbia, or the United States courts of any Territory or other place subject to the jurisdiction of the United States, to enjoin such acts or practices and to enforce compliance with this Act or any rule, regulation, or order thereunder, and upon a proper showing a permanent or temporary injunction or decree or restraining order shall be granted without bond. The Commission may transmit such evidence as may be available concerning such acts or practices to the Attorney General, who, in his discretion, may institute the necessary criminal proceedings under this Act.

APPENDIX B

Commercial navigation on New River between Hinton, West Virginia, and Allisonia, Virginia

[Italics show interstate shipments]

PRIOR TO 1883

Name of witness	Points of navigation	Products transported	Record pages
1. Anderson, W. C.	(a) *Eggleston Springs* to *True*	Family and household goods.	458
	(b) True to Hinton	Lumber and freight of different kinds.	459
2. Calloway, M. V.	(a) Hinton from upstream	Lumber, staves, and tobacco.	482-5
	(b) *Hinton* to *Glen Lyn*	Construction materials	485
3. Collins, W.	(a) Between *Mack's Creek* and *Hinton*.	Wheat, corn, and merchandise.	218
	(b) Mack's Creek to New River.	do	218
	(c) *New River Bridge* to *Hinton*	do	218
	(d) Dunkert's Bottom to New River Bridge.	Logs and rafts	218
	(e) Mack's Creek Furnace to New River Depot.	Pig iron	219
	(f) *New River Depot* to *Hinton*	Miscellaneous cargo	218-9
	(g) *Narrows* to *Hinton*	Staves	219
4. Crowell, J. W.	(a) Mack's Creek to Linkous Ferry.	Family and family goods	251
	(b) Linkous Ferry up and down stream.	Shingles and other products.	253-4
	(c) *Mack's Creek* to *Hinton*	Government surplus property.	252
	(d) Boone Furnace to New River Depot.	Pig iron	253-4
	(e) Mack's Creek to Radford	Rafts and logs	254
5. Dalton, W. M.	(a) Linkous Ferry up and down stream.	Grain and lumber	455
	(b) Dunkert's Bottom to Radford.	Logs, rafts, corn, oats, and wheat.	454-5
6. Dickinson, J. H.	(a) *Glen Lyn* to *Hinton*	Tobacco, wheat, lumber, boating equipment, etc.	391-6
	(b) *Hinton* to *Glen Lyn*	Merchandise, shoes, sugar, coffee, etc.	395
	(c) *Hinton* to *Shumate Falls*	Supplies for railroad construction.	394-5
	(d) *Radford* to *Hinton*	Not specified	394
	(e) Glen Lyn downstream	Rafts and cross ties	395
	(f) Between Hinton and Crumps Bottom.	Merchandise	395-6

Commercial navigation on New River between Hinton, West Virginia, and Allisonia, Virginia—Continued

[Italics show interstate shipments]

PRIOR TO 1883

Name of witness	Points of navigation	Products transported	Record pages
7. Farmer, G. A	(a) Ingles Ferry up and down stream.	Not specified	428
	(b) Dunkert's Bottom to Radford.	Logs, ties, and lumber	430
8. Flanagan, A. G	(a) Hinton from upstream	Wheat and tobacco	466–7
	(b) Hinton upstream	Produce, merchandise, and store goods.	466–7
9. Flaunagan, J. W	(a) *Horse Shoe* up to Allisonia and down to *Hinton*.	Wheat, corn, groceries, lumber, and cross ties.	189
	(b) Allisonia to Horse Shoe	Siding plank	189–90
	(c) Blast furnaces to N. & W. R. R. Station.	Pig iron	189–90
10. Haley, J. D	(a) Mack's Creek to New River Bridge.	do	278
	(b) New River Depot from upstream.	Corn, wheat, hogs, lumber, and materials of that kind.	279–80
	(c) Little River to Radford	Weather boarding	279–80
11. Helvey, H. D	(a) Dudley Ferry to Mouth of Little River.	Lumber	438
	(b) Horse Shoe from upstream.	do	438
	(c) Horse Shoe to New River Bridge.	Corn	433
	(d) Parrot Mines downstream.	Coal	435
12. Hoover, J. H	(a) Hinton from upstream	Merchandise	416
	(b) *Hinton* to *Mouth of Fast River*.	1,000 bushels of meal	416
13. Howard, R. L	(a) Clark's Mine to Mack's Creek.	Iron ore	208
	(b) Boone Furnace to New River Depot.	Pig iron	208–9
	(c) Radford to Little Reed Island Creek.	Merchandise, groceries, etc.	211
	(d) Little Reed Island Creek to Pepper's Ferry.	Shingles	211
14. Linkous, E. H	(a) *Pepper's Tunnel* up and downstream as far as *Hinton*.	Produce	205–6
15. Martin, W. M	(a) Eggleston to New River Depot.	Coal	451
16. Meredith, E. C	(a) Towe's Ferry to Radford	Timber	270
	(b) Radford downstream	Tanbark	269
17. Meredith, L. T	(a) Downstream to Radford	Lumber, ties, and tanbark	267
	(b) Past Ingles Ferry from upstream.	Cordwood	268
	(c) Linkous Ferry downstream.	Lumber	268
18. Peterson, D. R	(a) Mack's Creek to Radford.	Pig iron, lumber, and ties	446

Commercial navigation on New River between Hinton, West Virginia, and Allisonia, Virginia—Continued

[Italics show interstate shipments]

PRIOR TO 1883

Name of witness	Points of navigation	Products transported	Record pages
19. Price, W.	(a) *Cowan's Mill to Hinton*	Coal, corn, wheat, chickens, hogs, and products of all sorts.	343
	(b) Cowan's Mill downstream.	Coal	344
	(c) Radford to Barnette's Falls.	Not specified	346
20. Roop, C. E.	(a) Allisonia to Radford	Lumber, wheat, corn, pig iron, and iron ore.	510-11
21. Skaggs, T. G.	(a) Between Hinton and Indian Creek.	Staves, lumber, etc	473
22. Skeen, H. S.	(a) Narrows from upstream and from downstream.	Supplies	340
	(b) Lurich from upstream	Straw and hay	340
	(c) Glenlyn to Narrows	Not specified	240
	(d) Radford to Lurich	Supplies for railroad under construction.	341
	(e) *Narrows* downstream toward *Hinton*.	Tobacco and produce	341-2
23. Smith, L. C.	(a) Allisonia up and downstream.	Corn, wheat, eggs, etc	438
	(b) Between Radford and Allisonia up and downstream.	Wheat, corn, and produce	439
	(c) Allisonia downstream	Lumber and shingles	441
24. Smith, L. M.	(a) Lick Creek to Hinton	Wheat, corn, lumber, staves, and tobacco.	410
	(b) Hinton to Lick Creek	Dry goods, tinware, bacon, merchandise, and supplies for N. & W. R. R. (picks, shovels, tools, and foodstuff).	410
	(c) Bull Falls to Hinton	Store products, bacon, etc.	410-11
25. Snidow, A. W.	(a) Radford to Narrows	Supplies for soldiers	295-6
	(b) *Radford* to *Hinton*	Supplies to railroad under construction in 1872.	295-6
	(c) Above Sinking Creek to Pembroke.	Timber boated or floated	297
26. Snodgrass, W. P.	(a) Eggleston up and downstream.	Not specified	302-5
27. Snyder, A. W.	(a) Radford to Narrows	Provisions for soldiers	261
	(b) *Eggleston* to *Hinton*	Farm products, flour, chickens, and eggs.	261-2
	(c) *Hinton* to *Eggleston*	Sugar, coffee, molasses, etc.	261-2
	(d) *New River Bridge* to *Hinton* up and downstream.	Farm products, flour, chickens, and eggs.	261-2

Commercial navigation on New River between Hinton, West Virginia, and Allisonia, Virginia—Continued

[Italics show interstate shipments]

PRIOR TO 1883

Name of witness	Points of navigation	Products transported	Record pages
28. Webb, G. M.	(a) *Horse Shoe* up as far as New River Bridge and down as far as *Hinton*.	Not specified	224-5
	(b) Horse Shoe to New River Bridge.	Wheat, 100 bushels a load.	225
	(c) New River Bridge to Horse Shoe.	Plaster	226
	(d) Radford to Eggleston Springs up and downstream.	Lumber and passengers	225

SUBSEQUENT TO 1883

Name of witness	Points of navigation	Products transported	Record pages
29. Allison, D. C.	(a) Reed Island Creek to New River Bridge.	Logs	306
30. Allison, H. B.	(a) Boone Furnace to Radford.	Pig iron	307
	(b) Radford to Mouth of Reed Island Creek.	Groceries, sugar, coffee, salt, etc.	307
	(c) Past New River downstream.	Sawed lumber and shingles.	307
	(d) Mouth of Reed Island Creek to Clark's Mill.	Rough logs	308
31. Breeding, A. S.	(a) Reed Island Furnace to New River Bridge.	Pig iron	238
	(b) Ingles Ferry to New River Bridge.	Rafted ties	239
32. Burks, Z. V.	(a) *Round Bottom Branch* to *Hinton*.	Lumber	423
	(b) Hinton upstream	Merchandise	424
	(c) *Mouth of Bluestone* to *Glenlyn*.	Steel	424
33. Coleman, T. W.	(a) Horse Shoe downstream	Coal and lumber	198
	(b) Mack's Creek to New River Depot.	Pig iron	198
	(c) Pepper's Ferry to Pepper's Tunnel.	Construction supplies	198
	(d) *Radford* to *Hinton*	Eggs and butter	200
	(e) Between *Hinton* and *Towe's Ferry*.	Passengers and miscellaneous merchandise.	203
34. Calloway, R.	(a) *Hinton* to *East River*	Miscellaneous merchandise and tobacco.	480-1
	(b) Downstream to Hinton	Supplies	481
35. Duncan, E.	(a) Downstream past Hiawassa.	Lumber and pig iron	271
	(b) Dunkert's Bottom to Radford.	Logs, cross ties	271

Commercial navigation on New River between Hinton, West Virginia, and Allisonia, Virginia—Continued

[Italics show interstate shipments]

SUBSEQUENT TO 1883

Name of witness	Points of navigation	Products transported	Record pages
35. Duncan, E	(c) Upstream past Hiawassa	Chickens, eggs, butter, etc.	272
	(d) Radford to Dunkert's Bottom.	Paint and supplies	273
36. Farley, E. N	(a) Hinton to Island Creek	Lumber, staves, merchandise, and switch ties.	400
	(b) Hinton from upstream	Rafts	400
37. Graham, J. G	(a) Mack's Creek to Radford	Timber and logs	235
	(b) Boone Furnace downstream.	Pig iron	235
	(c) Reed Island Creek to Radford.	do	235
38. Hartsock, E. P	(a) Little River from upstream.	Ties	207
39. Harvey, L	(a) Radford from upstream	Grain, bacon, lumber, pig iron, etc.	186
	(b) New River Depot from upstream.	Logs and rafts	186
40. Howard, J. H	(a) Boone Furnace to New River Depot.	Pig iron	335
	(b) Allisonia to Hiawassa	Stone	336
41. James, P. L	(a) Hinton from upstream	Timber, cross ties, logs, and staves.	310
	(b) *Narrows* to *Hinton*	Timber	311
42. Johnson, H. C	(a) Warford to Hinton	Railroad stock, switches, ties, car stock, and lumber.	437
43. Kenley, C. E	(a) *Round Bottom* to *Hinton*	Staves, lumber, pulpwood, hay, wheat, corn, tanbark, and rafts.	401
	(b) *Hinton* to *Round Bottom*	Groceries, etc	401
	(c) Indian Creek to Hinton	Rafts and lumber	402
	(d) Crumps Bottom to Hinton.	Rafts	402
44. Lane, D. L	(a) *Round Bottom* to *Hinton*	Lumber, staves, tanbark, shingles, pulpwood, sand, corn, and wheat.	396-7
	(b) *Hinton* to *Round Bottom*	Merchandise	[illegible]7
45. Lilly, E. W	(a) *Round Bottom* to *Hinton*	Lumber and produce	412, 415
	(b) Hinton upstream	Groceries	412
46. Martin, J. C	(a) *Round Bottom* to *Hinton*	Lumber	492-3
	(b) Between Mercers Salt Works and Hinton.	Staves, corn, tobacco, and merchandise.	492-3
47. Medley, J. A	(a) Hinton to Mercers Salt Works.	Not specified	372
	(b) *Mercers Salt Works* to *Radford*.	do	372
	(c) *Mercers Salt Works* to *Glenlyn*.	Merchandise	372
	(d) *Glen Lyn* to *Mercers Salt Works*.	Fertilizer, household goods, and merchandise.	373

Commercial navigation on New River between Hinton, West Virginia, and Allisonia, Virginia—Continued

[Italics show interstate shipments]

SUBSEQUENT TO 1883

Name of witness	Points of navigation	Products transported	Record pages
47. Medley, J. A	(e) Mercers Salt Works up and downstream.	Lumber, staves, tobacco, fertilizer, and merchandise.	373
	(f) *Round Bottom* to *Hinton*	Rafts	374
	(g) Hinton from upstream	Lumber and staves	375
	(h) Round Bottom from downstream.	Merchandise	377
	(i) Radford from downstream.	Not specified	382
	(j) *Crumps Bottom* to *Radford.*	Household goods	383
48. Micou, J	(a) Dunkert's Bottom to New River Bridge.	Small grain, corn, and wheat.	290-1
49. Miller, A. E	(a) Lick Creek to Hinton	Staves and lumber	487-8
	(b) Haynes Ferry to Hinton	do	489
	(c) Mercers Salt Works to Hinton.	do	490
50. Moore, R. H	(a) Boone Furnace to Radford.	Pig iron	450
	(b) Radford to Allisonia	Shovels, picks, sugar, and coffee.	449
51. Owen, J. E	(a) Allisonia to New River Depot.	Iron	244
	(b) New River Depot to Allisonia.	Bacon	244
	(c) *Allisonia* to *Hinton*	Not specified	244
	(d) Clark's ore bank to Hiawassa.	Pig iron	245
52. Peters, J. H	(a) *Hinton* to *Glenlyn*	Hardware, supplies, and merchandise for the N. & W. R. R.	320
	(b) *Hinton* to *Radford*	Merchandise	320
	(c) Hinton to Mercers Salt Works.	Groceries	320
	(d) *Glen Lyn* to *Hinton*	Fertilizer and tobacco	320
53. Redpath, T. C	(a) Downstream to Little River.	Timber, lumber, ties, logs, and car stock supplies.	274-5
54. Reed, J. W	(a) Between Hinton and Bull Falls.	Passengers, tobacco, groceries, dry goods, staves, and hay.	406
	(b) *Hinton* to *Shumate Falls*	Groceries and supplies for N. & W. R. R.	406
	(c) Hinton to Indian Creek	Not specified	407-8
55. Smith, E. M	(a) *Hinton* to *Glen Lyn*	Groceries and merchandise	398
	(b) *Round Bottom* to *Hinton*	Staves, lumber, tanbark, and tobacco.	398
56. Smith, J. R	(a) Hinton to Mercers Salt Works.	Not specified	348
	(b) *Hinton* to *Round Bottom*	do	348
	(c) *Hinton* to *Glen Lyn*	Fertilizer, etc	348
	(d) *Hinton* to *Narrows*	Not specified	348

Commercial navigation on New River between Hinton, West Virginia, and Allisonia, Virginia—Continued

[Italics show interstate shipments]

SUBSEQUENT TO 1283

Name of witness	Points of navigation	Products transported	Record pages
56. Smith, J. R	(e) *Crumps Bottom* to *Radford*	Household furniture	348–9
	(f) Round Bottom downstream.	Rafts	350
	(g) Mercers Salt Works to Hinton.	Passengers, staves, and lumber.	350–1
	(h) *Round Bottom* to *Hinton*	Tobacco	350
57. Starbuck, H. A	(a) *Sulphur Springs* to *Hinton*.	Lumber	390
	(b) Indian Creek to Hinton	Staves and lumber	390
	(c) Crumps Bottom from downstream.	Groceries, merchandise, and passengers.	390
58. Stover, I. C	(a) Hinton from upstream	Staves, cross ties, rafts, and lumber.	477–8
59. Tomkies, E. E	(a) Hinton from upstream	Staves, lumber, ties, corn, hogs, chickens, eggs, etc.	493–6
	(b) Hinton upstream	Merchandise, clothing, groceries, feed, and hardware.	495
60. Towe, W. H	(a) Radford to Towe's Ferry.	Merchandise, produce, sugar, coffee, oil, etc.	204
	(b) Past Towe's Ferry from upstream.	Logs	204
61. Wauhop, C. H	(a) *Round Bottom* to *Hinton*	Staves	460–1
62. Weiss, C. E	(a) Eggleston Springs to Radford.	Not specified	228
	(b) *Glen Lyn* to *Hinton* (up and down the river).	Staves, butter, eggs, potatoes, sand, etc.	231
	(c) *Hinton* to *Glen Lyn*	Family and workmen	231

APPENDIX C

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION I. HINTON, W. VA., TO WYLIE'S SHOALS, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
64	II	40			192	#1—At C. C. C. Camp near Hinton Ferry.
64.8			V	1	555	#127—View about 9 miles below Bull Falls.
66	II	40			203	#8A—New River Ferry.
66.4			V	2	555	#126—View about 7.4 miles below Bull Falls.
67-64.6	III	71			273	*Looking south at mile 64.6 about ½ mile above mouth of Greenbrier River.**
67.5	II	39			203	#3—Haynes Ferry.
67.5-69	III	70			273	*Looking southeast at mile 67.5.*
68.4			V	3	555	#125—View about 5.4 miles below Bull Falls.
68.4	II	39			192	#4—1½ miles above mouth of Bluestone River.
					192	#3—1½ miles above mouth of Bluestone River.
					192	#2—1 mile above mouth of Bluestone River.
69	II	38			192	#5—Pool looking upstream at Land Craft's eddy.
					192	#6—Pool looking downstream at Land Craft's eddy.
71	II	38			192	#7—Pool just above Bertha schoolhouse.
71			V	4	555	#124—View about 2.8 miles below Bull Falls.
70-73	III	69			273	*Long view at mile 69.9.*
70-73	III	68			273	*Looking southeast at mile 69.9.*
73.8			V	5	555	#123—View of Bull Falls.
73.8	II	38			154	#7—Bull Falls.
73.8	II	37			150	#3—Bull Falls.
					151	#4—At head of Bull Falls.
					152	#5—Bull Falls.
					153	#6—Bull Falls.
73.8	II	36			149	#2—Lower end of Bull Falls.
					192	#8—Pool just below Bull Falls rapid.
					192	#9—Bull Falls rapid.
					192	#10—Pool below Bull Falls rapid.

---

* Italics indicate aerial photographs.

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION I. HINTON, W. VA., TO WYLIE'S SHOALS, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
74-73	III	67			273	*Looking east-southeast at mile 73.2.*
74.1	II	35			203	#4—Bull Falls Ferry.
74.1			V	6	555	#122—View about 0.3 mile above Bull Falls.
76-74.3	III	66			273	*Looking east-southeast at mile 74.8.*
78	II	34			192	#14—Pool near mouth of Indian Creek.
					192	#15—Reefs at Indian Creek.
					192	#16—Reefs at Indian Creek.
78	II	35			192	#11—Pool above Warford's Ferry.
					192	#12—Pool above mouth of Indian Creek.
					192	#13—Pool toward mouth of Indian Creek—Just below mouth.
79-77	III	65			273	*Looking southeast at mile 76.8.*
79-78	III	64			273	*Mouth of Indian Creek looking east from opposite mile 78.*
80	II	34			192	#17—Harvey Falls rapid.
80	II	33			192	#18—Pool just above Harvey Falls rapid.
					192	#19—Rapid 1 mile below Anderson's Falls rapid.
					192	#20—Pool 1 mile below Anderson's Falls rapid.
80			V	7	555	#121—View of Harvey Falls about 6 miles above Bull Falls.
81-80	III	63			273	*Looking west at mile 79.7.*
81.3			V	8	555	#120—View of Anderson's Falls about 7.5 miles above Bull Falls.
82.6			V	9	555	#119—View about 8.8 miles above Bull Falls.
82.9	II	33			203	#5—Shanklin Ferry.
83			V	10	555	#118—View about 9.2 miles above Bull Falls.
83.5			V	11	555	#117—View about 9.7 miles above Bull Falls.
84-82	III	54A			273	*Looking southeast at mile 82.*
84-82	III	62			273	*Looking south-southeast at mile 82.2.*
85-82	III	61			273	*A longer view southeast at mile 83.2.*
86-83	III	60			273	*Looking east-southeast at mile 84.8.*
86.9			V	12	555	#116—View about 13.1 miles above Bull Falls.
87.2	II	32			203	#5B—Lawrence Ferry.
87.2			V	13	592	#113—View at Round Bottom Creek.
87.2			V	14	592	#111—View at Round Bottom Creek.
87.2			V	[illegible]	592	#110—View at Round Bottom Creek.
87.2			V	16	592	#109—View at Round Bottom Creek.
89-87	III	59			273	*Looking south-southeast at mile 86.7.*
89			V	17	555	#115—View of Wylie Falls.
89			V	18	555	#114—View of Wylie Falls.
89			V	19	592	#108—View of Wylie Falls.

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION I. HINTON, W. VA., TO WYLIE'S SHOALS, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
89			V	20	592	#107—View of Wylie Falls.
89			V	21	592	#106—View of Wylie Falls.
89	II	32			146	#1—Wylie Falls.
					192	#21—Wylie Falls.
89.1	II	32			146	#2—Wylie Shoals.
89.1	II	31			147	#1—Wylie Shoals.
90-88	III	58			273	*Looking southeast at mile 88.*

SECTION II. WYLIE SHOALS, VA., TO RADFORD, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
89.3			V	22	592	#105—View about 4.9 miles below Glen Lyn, Va.
89.7			V	23	592	#104—View about 4.5 miles below Glen Lyn, Va.
90			V	24	592	#103—View about 4.3 miles below Glen Lyn, Va.
90.8			V	25	592	#102—View about 3.5 miles below Glen Lyn, Va.
90.8	II	31			147	#2—Shoal No. 2.
					146	#3—Shoal No. 2.
92.8	II	30			192	#22—Pool looking below Shumate's Falls rapid.
					192	#23—Pool looking downstream below Shumate's Falls rapid.
93			V	26	592	#101—View of Shumate's Falls upstream.
93			V	27	592	#100—View of Shumate's Falls.
93			V	28	592	#99—View of Shumate's Falls.
93	II	31			146	#4—Shumate's Falls.
93	II	30			192	#24—Shumate's Falls rapids.
					192	#25—Panorama of Shumate's Falls.
93	II	29			147	#3—Rapid at Shumate's Falls.
93.2			V	29	592	#98—About 1 mile below Glen Lyn, Va.
94-91	III	57			273	*Looking south-southwest at mile 91.1.*
94.1	II	29			147	#4—East River Shoals.
94.2			V	30	549	#1—Looking down New River just above Glen Lyn, Va.
94.5			V	31	549	#2—At first bend above Glen Lyn, Va.
95-94	III	56			273	*Looking east at mile 94.*
96.3			V	32	549	#3—Just below Lurich.
97			II	33	592	#97—About 2.5 miles above Glen Lyn, Va.
97.5	II	29			147	#5—Rich Creek Shoals.
					146	#5—Rich Creek Shoals.
97-95	III	55			273	*Looking northeast at mile 95.1.*
98.5			V	35	549	#5—About 1 mile upstream from Rich Creek, Va.
100			V	34	549	#4—Looking up through The Narrows.

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION II. WYLIE SHOALS, VA., TO RADFORD, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
100			V	36	592	#96—View of The Narrows about 6 miles above Glen Lyn, Va.
100			V	37	592	#95—View of The Narrows about 6 miles above Glen Lyn, Va.
100			V	38	549	#6—Downstream portion of lower falls in The Narrows.
100			V	39	549	#7—Upstream portion of lower falls in The Narrows.
100			V	40	549	#8—Principal Falls in The Narrows.
100			V	41	549	#9—Principal Falls in The Narrows.
100			V	42	549	#10—Principal Falls in The Narrows.
100			V	43	549	#11—Principal Falls in The Narrows.
100			V	44	549	#12—Downstream portion of rapids upstream from the Principal Falls at The Narrows.
100			V	45	549	#13—Rapids upstream from the subject of photo 12.
100	II	28			147	#6—Rapids at Peter's Mountain Falls.
					192	#26—Pool looking downstream just below Peter's Mountain Falls rapid.
					192	#27—Peter's Mountain Falls rapid.
103	II	28			146	#6—Shoal No. 8.
100-99	III	54			273	*Looking southeast at mile 99.*
102-100	III	53			273	*Looking southeast at mile 100.*
104-102	III	52			273	*Looking east at mile 102; river in view to about mile 107.*
104.3	II	27			146	#7—Shoal No. 9.
104.8			V	46	549	#14—Rapids in New River at west end of Pearis Island at Bluff City, Va.
105.6			V	47	592	# 94—View from left bank, about .6 mile above Bluff City, Va.
105-106	III	51			273	*Looking northeast at mile 105.6.*
106	II	27			193	#2—Pool at Pearisburg Station.
106.5			V	48	592	#93—View from left bank, about 1.5 miles above Bluff City, Va.
106.6	II	27			146	#8—Shoal No. 10.
106.6			V	49	592	#92—View from left bank, about 1.6 miles above Bluff City, Va.
106.7			V	50	592	#91—View from left bank about 1.7 miles above Bluff City, Va.
106.8			V	51	592	#90—View from left bank, about 1.8 miles above Bluff City, Va.
106.9			V	52	592	#89—View from left bank, about 1.9 miles above Bluff City, Va.
106.9			V	53	592	#88—View from left bank, about 1.9 miles above Bluff City, Va.
107	II	27			146	#9—Shoal No. 11.
107			V	54	592	#87—View from left bank, about 2 miles above Bluff City, Va.

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION II. WYLIE SHOALS, VA., TO RADFORD, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
107.2			V	55	592	#86—View from left bank, about 2.2 miles above Bluff City, Va.
107.2			V	56	592	#85—View from left bank, about 2.2 miles above Bluff City, Va.
107.6			V	57	592	#84—View from left bank, about 2.6 miles above Bluff City, Va.
108.0			V	58	592	#83—View from left bank at Curve, Va.
109.0	II	26			146	#10—Shoal No. 12.
					146	#11—Shoal No. 13.
109.0			V	59	592	#82—View from left bank, about 4 miles above Bluff City, Va.
110.0			V	60	592	#81—View from left bank, about 4.7 miles above Bluff City Va.
110.0			V	61	592	#80—View from left bank, about 4.7 miles above Bluff City, Va.
110.5			V	62	592	#79—View from left bank, about 4.8 miles above Bluff City, Va.
110.5			V	63	592	#78—View from left bank, about 4.9 miles above Bluff City, Va.
111			V	64	549	#15—Curves of New River just below Klotz, Va.
111-112	II	26			146	#12—Shoal No. 15.
					146	#13—Snidow's Ferry Bar.
111.5			V	65	592	#77—View from Tipple of Virginia Limestone Co. at Klotz, Va.
111.8			V	66	549	#16—New River at Ripplemead, Va., looking upstream.
112-110	III	50			273	*Looking southeast at mile 110.3.*
112.5	II	25			193	#3—View of rapids and shoals ¾ mile above Ripplemead Bridge.
113-121	III	49			273	*Looking nearly east at mile 113.3. River visible almost to mile 121 just above Eggleston.*
114	II	25			193	#4—Pool just below rapids at Pembroke.
114.7	II	25			147	#7—Little Stony Creek Bar at Pembroke Highway Bridge from left bank.
					146	#14—Little Stony Creek Bar.
114.7			V	67	592	#76—View from bridge at Pembroke, Va.
115.7			V	68	592	#75—View from right bank, about 4.7 miles below Eggleston, Va.
115.9			V	69	592	#74—View from right bank, about 4.5 miles below Eggleston, Va.
116.0			V	70	592	#73—View from right bank, about 4.5 miles below Eggleston, Va.
116.3			V	71	592	#72—View from right bank, about 4.1 miles below Eggleston, Va.
117-115	III	49A			273	*Looking north-northeast from opposite mile 116.*

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION II. WYLIE SHOALS, VA., TO RADFORD, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
117-119	III	48			273	*Looking north-northeast at mile 116.3, showing bend in river about halfway between Eggleston and Pembroke.*
117.5			V	72	592	#71—View from right bank, about 2.9 miles below Eggleston, Va.
117.7			V	73	592	#70—View from right bank, about 2.7 miles below Eggleston, Va.
117.9			V	74	592	#69—View from right bank, about 2½ miles below Eggleston, Va.
118	II	24			147	#8—Rapid at Snidow's Falls—Main bar from right bank.
					147	#9—Rapid at Snidow's Falls—Upper end from left bank.
118.4			V	75	592	#68—View from right bank, about 2 miles below Eggleston, Va.
118.4			V	76	592	#67—View from right bank, about 2 miles below Eggleston, Va.
118.5			V	77	592	#66—View from right bank, about 1.9 miles below Eggleston, Va.
118.6			V	78	592	#65—View from right bank, about 1.8 miles below Eggleston, Va.
118.7			V	79	592	#64—View from right bank about 1.7 miles below Eggleston, Va.
118.7			V	80	592	#63—View from right bank, about 1.7 miles below Eggleston, Va.
119.4			V	81	592	#62—View from right bank, about 1 mile below Eggleston, Va.
119.4	II	24			147	#10—Lower Sinking Creek Bar from right bank.
119.6	II	23			146	#16—Upper, Sinking Creek Bar.
120-121	III	47			273	*Looking southeast at mile 119.1, Eggleston, Va.*
121	II	23			146	#18—Shoal No. 23.
					146	#17—Eggleston Shoals.
121			V	83	554	#60—View from right bank about a mile above Eggleston, Va.
121.3			V	82	592	#61—View from left bank, about 1.3 miles above Eggleston, Va.
123			V	84	554	#59—View from right bank about ¼ mile above Goodwin's Ferry.
123	II	23			146	#19—Shoal No. 24. View from left bank.
123.6	II	22			147	#13—Shoal No. 26 from right bank.
123.3	II	22			147	#12—Bear Spring Shoal from right bank.
123.1	II	22			147	#11—Shoal No. 24 from left bank.
124			V	85	549	#17—Rapids at Berton, Va. Stream flow is from viewer's right to left.
124			V	86	549	#18—Upper rock outcrop at rapids in New River at Berton, Va. Stream flow is from viewer's right to left.

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION II: WYLIE SHOALS, VA., TO RADFORD, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
124			V	87	549	#19—Lower outcrop at rapids in New River at Berton, Va. Stream flow is from viewer's right to left.
124			V	88	549	#20—Rock outcrops forming portions, further upstream of the rapids at Berton, Va. Flow is from viewer's right to left.
124			V	89	549	#21—Looking up New River from point upstream from the Rapids shown from No. 20.
125			V	90	549	#22—The Big Falls of New River in the Gap at the upstream boundary of Giles County. Flow is from viewer's right to left.
125			V	92	549	#24—Looking upstream at easterly portion of the Big Falls at the Gap.
125			V	93	549	#25—Looking upstream at central portion of the Big Falls in the Gap.
125			V	94	549	#26—Looking eastwardly across New River and slightly upstream at point just upstream from the Gap.
125			V	95	554	#58—View of Big Falls from the left bank.
125			V	96	554	#57—View of Big Falls from left bank, being approximately at the Pulaski-Giles County Line.
125	II	21			146	#21—Big Walker Mountain Falls.
128-124	III	46			273	*Looking south at mile 123.4; Gap mountain at left; Walker mountain at right; Cloyde Motuntain beyond.*
125.3			V	97	549	#27—Succession of rock outcrops at Dry Branch, looking upstream.
125.3			V	98	554	#56—View from left bank about ¼ mile above Big Falls.
126	II	21			147	#16—Submerged ledges of Sifford's "Falls."
126	II	21			147	#15—Submerged ledges of Sifford's "Falls"
126	II	21			147	#14—Lower portion of shoal at Sifford's "Falls" looking downstream from right bank.
126	II	20			147	#17—Ledge at Sifford's "Falls"—shoal from right bank.
126	II	20			193	#5—Sifford's Falls and shoals from right bank.
126	II	20			193	#6—Poling boat through Sifford's Falls.
126.2	II	20			203	#6—McCoy Ferry.
127-125	II	19			147	#19—Upper Sifford's Shoal No. 29.
127-125	II	19			147	#18—Submerged ledges at head of Sifford's "Falls"—shoal looking downstream from right bank.
128-131	III	45			273	*Looking south-southeast at mile 127.*

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION II. WYLIE SHOALS, VA., TO RADFORD, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
128.5			V	99	554	#55—View across from right bank at McCoy Railroad Station.
129			V	100	554	#54—View upstream taken from an elevation on the left bank at Parrott Mine.
129			V	101	554	#53—View across River from left bank taken at Parrott Mine.
130.3	II	19			146	#22—Whitethorne Ferry Shoal. View from left bank.
132.8	II	19			193	#7—Pool below Whitethorne Ferry.
132.8	II	18			193	#8—Pool below Whitethorne Ferry.
132.8	II	18			203	#6—Whitethorne Ferry.
134	II	18			146	#23—Shoal No. 31. View from left bank.
134-138	III	44			273	#44—*Looking east northeast along second big bend of river below Radford.*
135			V	103	554	#52—View across river from left bank about 10 miles below Radford.
135			V	104	554	#51—View from left bank about 10 miles below Radford.
135			V	105	554	#50—View across river from left bank about 10 miles below Radford.
136.6	II	18			147	#20—Shoal No. 32 from right bank.
137	II	17			193	#37—Pool below Barnette's Falls.
137	II	17			146	#24—Shoal No. 32, at mouth of Strouble's Creek.
138	II	17			147	#24—Rapid at Barnette's 'Falls' looking downstream from right bank.
138	II	17			147	#23—Rapid at Barnette's 'Falls' looking upstream from right bank.
138	II	16	V	102	193	#36—Barnette's Falls from downstream.
139.7	II	16			146	#27—Lower Pepper Falls. View from left bank downstream.
140.3	II	16			193	#35—Little Pepper Falls taken from downstream.
140.3	II	16			193	#34—Little Pepper Falls taken from upstream.
140-143	III	43			273	*Looking southeast at mile 138; bend in river just below Radford.*
141			V	107	554	#48—View from left bank about ½ Mi. below Walton "Y."
141.3			V	106	554	#49—View upstream from left bank at about ½ Mi. below Walton "Y."
142	II	15			147	#28—Crab Creek Shoals from left bank.
142	II	15			146	#28—Crab Creek Shoals. View from left bank looking across ledge.
142.8	II	15			146	#29—Shoal No. 37 above Crab Creek.
143.9	II	15			146	#25—Shoal No. 39 at Radford. View from left bank across river.
144	II	14			193	#33—In pool 1 mile below Radford.
144	II	14			146	#26—View from river bank across Shoal No. 40.

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

SECTION II. WYLIE SHOALS, VA., TO RADFORD, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
144	II	14			203	#10—Dudley Ferry, Mile 144.5.
144	II	14			193	#9—Looking upstream from boat in pool below Radford.
144	II	13			193	#11—Looking upstream from boat in pool below Radford.
144	II	13			193	#10—Looking upstream from boat in pool below Radford.
144.5			IV	12	554	#47—View downstream from Highway Bridge at Radford.
145			IV	12	554	#46—View across river from left bank taken at a point opposite the city of Radford.
145	II	13			147	#25—Radford Shoal No. 41 from right bank.
146-144	III	42			273	*East Radford, Va. Looking southwest.*

SECTION III. RADFORD, VA., TO ALLISONIA, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
146-147	III	41			273	*Radford, Virginia, looking southwest at mile 144.2.*
148.7	II	13			203	#11—Ingles Ferry.
148.7	II	12			193	#12—Navigating rapids at Ingles Ferry.
148.7			IV	12	554	#45—View from the left bank of Ingles Ferry just below Ingles Falls.
149.2			IV	11	554	#43—View across river of Ingles Falls from left bank about ½ Mi. above Ingles Ferry. #44—View of Ingles Falls from left bank, about ½ Mi. above Ingles Ferry.
150-148	III	40			273	*Looking south at mile 147.47. Ingles Ferry in foreground.*
150-152	III	39			273	*Looking southwest across mouth of Little River to dam site near upper end of quarry excavation.*
150-151	III	38			273	*Looking across New River at mile 149 and up Little River.*
150.5	II	12			193	#13—View of mouth of Little River and A. E. P. Co. dam site. #14—View from right bank of New River just below mouth Little River showing right abutment of A. E. P. Co. dam site.
151	II	11			193	#17—Cofferdam on right bank at A. E. P. Co. dam site. #19—Pool just above A. E. P. Co. dam site at Radford. #32—Pool just above A. E. P. Co. dam site.

Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

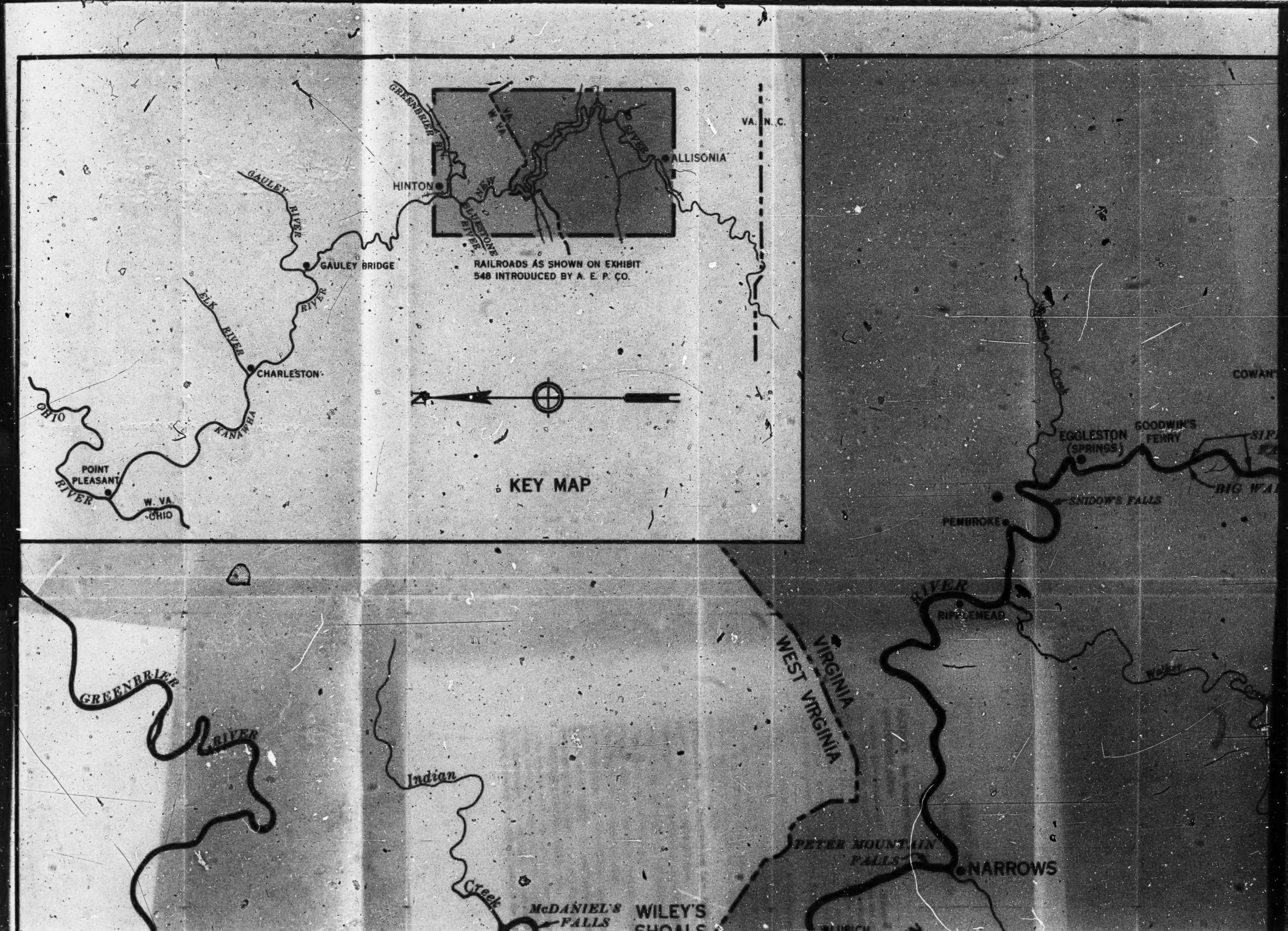
SECTION III. RADFORD, VA., TO ALLISONIA, VA.

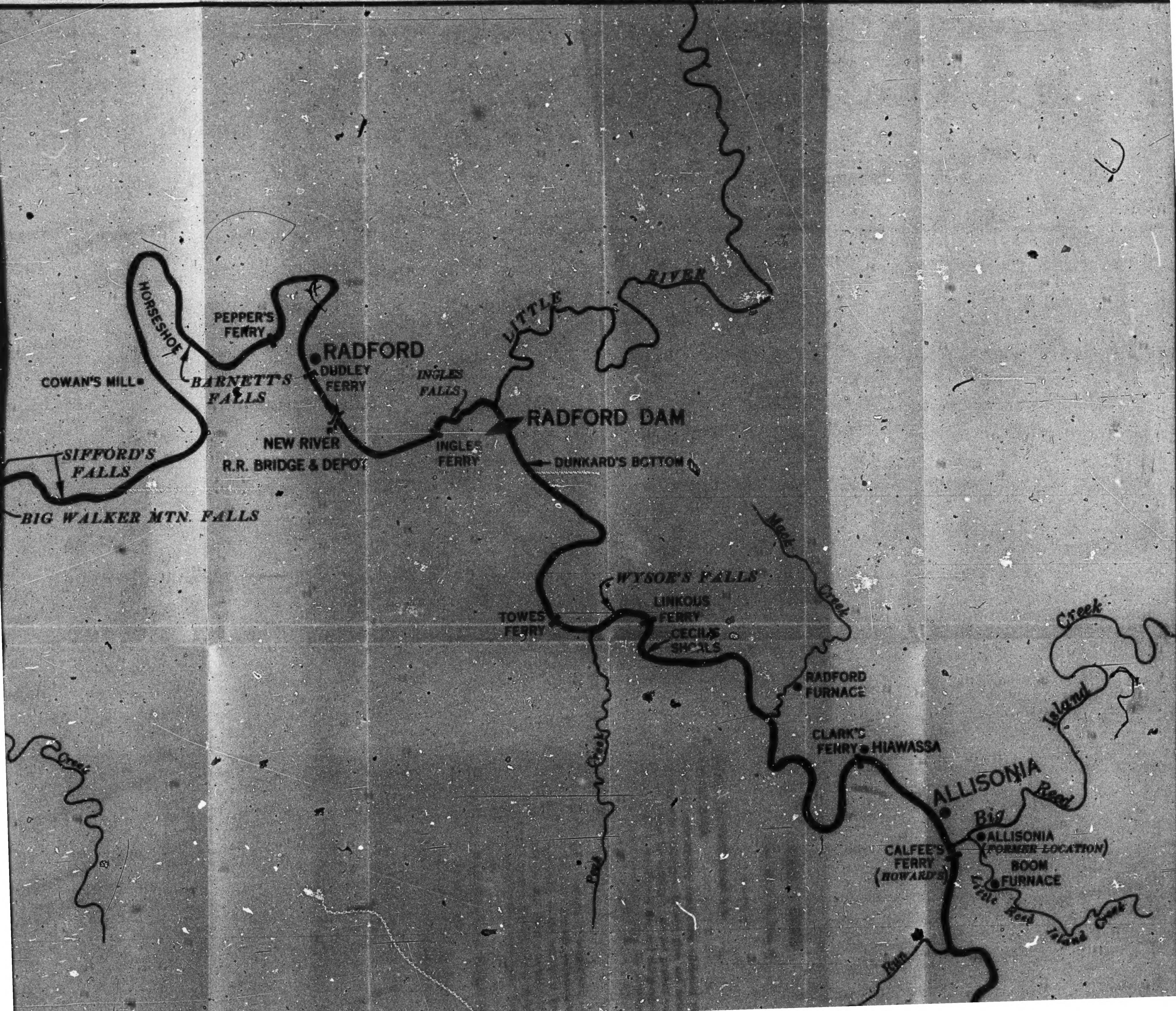
Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
151	II	12			193	#16—Right abutment of A. E. P. Co. dam site and portion of rock quarry.
152-154	III	37			273	*Looking southwest at mile 151 about a mile and a half above Radford dam site.*
153	III	36			273	*Looking north at mile 153; Cecil Ferry in middle background.*
154.3	II	11			203	#12—Cecils Ferry.
155			IV	11	554	#41—View across river from left bank at old No. 6 dam site 4 Mi. above present site. #42—View from left bank at old No. 6 dam site.
157			IV	10	554	#40—View looking upstream from a point on a high bluff about ¼ Mi. below mouth of Peak Creek.
157-159	III	35			273	*Looking downstream, foreground at mile 157.7, shows about same stretch of river as No. 34, but in opposite direction.*
157-159	III	34			273	*Looking south at mile 155.7 just below Peak Creek.*
157	II	10			193	#20—River looking upstream and pool 2 miles below Linkous Ferry.
157.3	II	10			203	#13—Towes Ferry.
158			IV	10	554	#39—View upstream from left bank about 1 Mi. below Linkous Ferry.
158.6			IV	10	554	#32—View across river from left bank about ¾ Mi. below Linkous Ferry.
159			IV	10	554	#37—View across river from left bank at a point immediately below Linkous Ferry.
159	II	10			203	#14—Linkous Ferry, Mi. 158.6, New R. Ferry shown on opposite side of river.
159			IV	9	554	#36—View looking across and upstream from left bank at a point just above Linkous Ferry.
159	II	10			193	#21—Shoals just above Linkous Ferry.
159	II	9			193	#31—Rapids just above Linkous Ferry.
159.5	II	9			193	#30—Pool ½ mile above Linkous Ferry.
159.9	II	9			203	#15—Whitt Ferry.
160-163	III	33			273	*Looking southwest at mile 159.1; Whitt's Ferry in left foreground.*
160.5			IV	9	554	#35—View upstream from river about ½ Mi. above Whitt's Ferry.
161			IV	9	554	#34—View across and upstream from left bank about 1 mile above Whitt's Ferry.
162			IV	9	554	#33—View from left bank about ¾ Mi. below Wheeler Branch Ferry.
162.1			IV	8	554	#31—View across river from left bank about ¾ Mi. below Wheeler Branch Ferry.

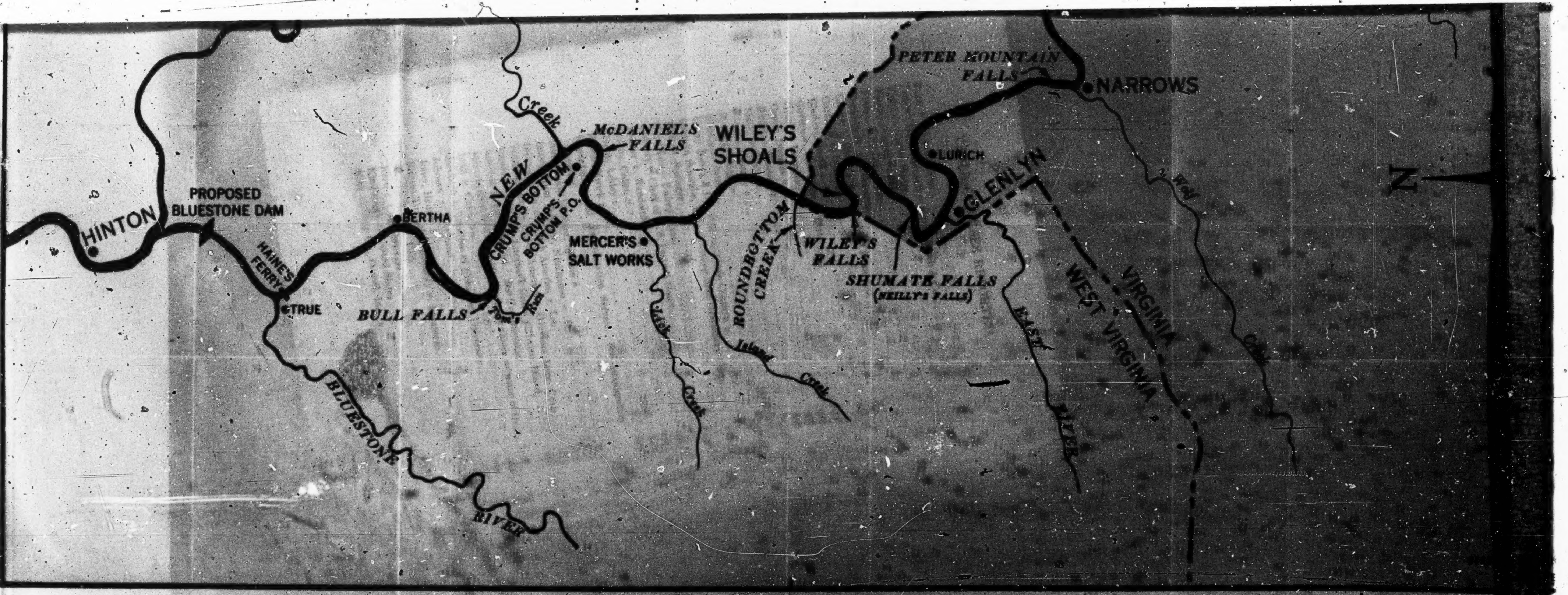
Index to photographs in volumes II, III, IV, and V, between Hinton, West Virginia, and Allisonia, Virginia

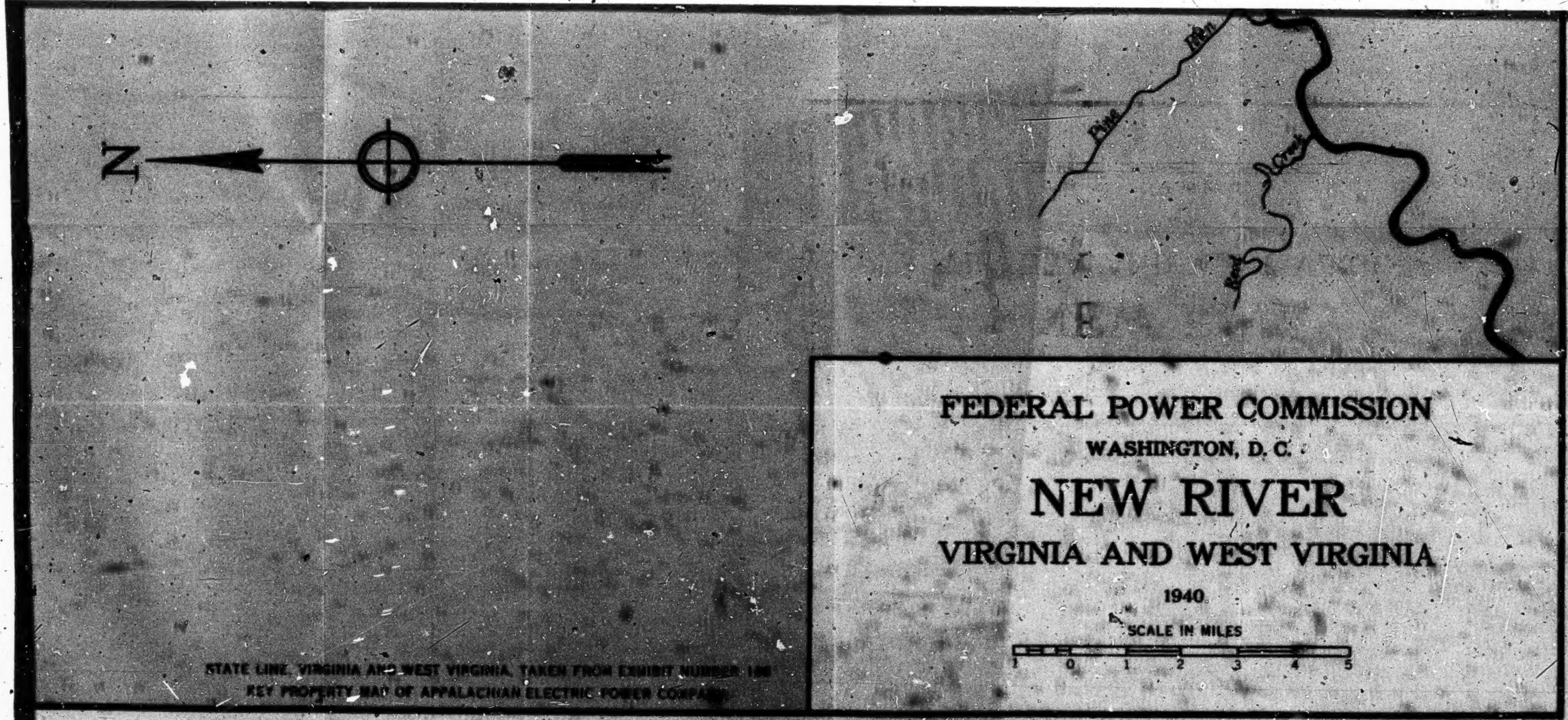
SECTION III. RADFORD, VA., TO ALLISONIA, VA.

Approx. Mileage	Petitioner's Photographs		Respondent's Photographs		Ex. No.	Description
	Vol.	Plate	Vol.	Plate		
162.1			IV	8	554	#32—View from left bank across river at a point about ¾ Mi. below Wheeler Branch Ferry.
162.2			IV	8	554	#30—View from left bank about ¼ Mi. below Wheeler Branch Ferry.
163.7	II	9			193	#22—Rapids 1 mile below Coxe's Ferry.
163.7	II	8			193	#29—View of rapids 1 mile below Coxe's Ferry.
163.7			IV	8	554	#29—View across stream from right bank about ¾ Mi. below Owen's Ferry.
163.7			IV	7	554	#26—View upstream from right bank about ¾ Mi. below Owen's Ferry.
163.7			IV	7	554	#27—View upstream from right bank about ¾ Mi. below Owen's Ferry.
						#28—View upstream from left bank about ¾ Mi. below Owen's Ferry.
164.2			IV	7	554	#25—View across river from right bank about ¼ Mi. below Owen's Ferry.
165-163	III	32			273	*Looking west southwest; foreground at mile 161.3 about a mile below Macks Creek.*
165	II	8			193	#24—Pool above rapids shown in No. 22.
						#23—Pool above rapids shown in E-6 (No. 22).
166.5			IV	6	554	#24—View from right bank about 3 Mi. below Clark's Ferry.
167			IV	6	554	#23—View upstream from right bank at Carnahan place about 2 miles below Clark's Ferry.
167.5			IV	6	554	#22—View from right bank downstream about 1 mile below Clark's Mill.
168.0			IV	6	554	#21—View from left bank just above Delton.
168.5			IV	5	554	#20—View upstream from right bank immediately above Delton.
169.0			IV	5	554	#19—View across river from right bank about ½ Mi. above Delton.
170.0	II	8			193	#25—Pool just below Hiwassee bridge.
170.7	II	7			203	#18—Clark's Ferry.
172-170	III	30			273	*Looking southwest at mile 168.4 about a mile below Allisonia.*
173.5			IV	5	554	#18—View across river from left bank just below gauging station at Allisonia.
173.5	II	7			193	#26—Pool at Allisonia.
						#27—Boat on right bank of New River at Allisonia.
						#28—Boat on right bank of New River at Allisonia.
173-175	III	29			273	*Looking west at Allisonia, mile 170.2 about 4 p. m., April 27.*


KEY MAP
RAILROADS AS SHOWN ON EXHIBIT 548 INTRODUCED BY A. E. P. CO.
VA.
W. VA.
VA.
N. C.
GREENBRIER RIV.
GAULEY RIVER
NEW RIVER
BLUESTONE RIVER
ELK RIVER
KANAWHA
OHIO
RIVER
HINTON
ALLISONIA
GAULEY BRIDGE
CHARLESTON
POINT PLEASANT
W. VA.
OHIO
N
GREENBRIER RIVER
Indian Creek
McDANIEL'S FALLS
WILEY'S SHOALS
VIRGINIA
WEST VIRGINIA
PETER MOUNTAIN FALLS
NARROWS
RIVER
RIPPLEMEAD
PEMBROKE
SNIDOW'S FALLS
EGGLESTON (SPRINGS)
GOODWIN'S FERRY
BIG WA
Creek
Walker Creek
COWAN'


HORSESHOE
PEPPER'S FERRY
RADFORD
DUDLEY FERRY
INGLES FALLS
LITTLE RIVER
RADFORD DAM
COWAN'S MILL
BARNETT'S FALLS
NEW RIVER R.R. BRIDGE & DEPOT
INGLES FERRY
DUNKARD'S BOTTOM
SIFFORD'S FALLS
BIG WALKER MTN. FALLS
Mack Creek
WYSOR'S FALLS
LINKOUS FERRY
TOWES FERRY
CECILS SHOALS
RADFORD FURNACE
Creek
CLARK'S FERRY
HIAWASSA
Creek
Peak
ALLISONIA
Big Reed Island Creek
ALLISONIA (FORMER LOCATION)
CALFEE'S FERRY (HOWARD'S)
BOOM FURNACE
Little Reed Island Creek
Run


HINTON
PROPOSED
BLUESTONE DAM
HAINE'S
FERRY
TRUE
BLUESTONE
RIVER
BERTHA
BULL FALLS
Tom's
Run
NEW
CRUMP'S BOTTOM
CRUMP'S
BOTTOM P.O.
Creek
McDANIEL'S
FALLS
MERCER'S
SALT WORKS
Lick
Creek
ROUNDBOTTOM
CREEK
Island
Creek
WILEY'S
SHOALS
WILEY'S
FALLS
SHUMATE FALLS
(NEILLY'S FALLS)
PETER MOUNTAIN
FALLS
NARROWS
LURICH
GLENLYN
EAST
RIVER
WEST
VIRGINIA
VIRGINIA
Wolf
Creek
N


N
Pine Run
Reed Creek
SCALE IN MILES
1
0
1
2
3
4
5

STATE LINE, VIRGINIA AND WEST VIRGINIA, TAKEN FROM EXHIBIT NUMBER 1[illegible]
KEY PROPERTY MAP OF APPALACHIAN ELECTRIC POWER COMPANY

FEDERAL POWER COMMISSION
WASHINGTON, D. C.

NEW RIVER

VIRGINIA AND WEST VIRGINIA

1940

INDEX

Page

I. New River at the site of respondent's project is navigable water of the United States 2
  - A. The controversy is one of law 2
  - B. Comparison with other rivers held navigable 5
    - 1. The DesPlaines River 6
    - 2. The Fox River 7
    - 3. The Colorado River 8
  - C. The facts of navigability 9
    - 1. The Allisonia-Radford and Wiley's Shoals-Hinton stretches 9
    - 2. The Radford-Wiley's Shoals stretch 11
    - 3. Physical characteristics: suitability for navigation 11
      - a. Velocity of current 12
      - b. Natural obstructions and channels 14
    - 4. Actual navigation over the Wiley's Shoals-Radford stretch 18
      - a. The findings below 18
      - b. Respondent's treatment of the record 20
  - D. The courts below applied erroneous legal criteria of navigability 26
    - 1. Difficulty of navigation does not defeat navigability 27
    - 2. Irregularity of the traffic does not defeat navigability 28
    - 3. It is immaterial that the traffic was an insubstantial part of commerce of the region 28
    - 4. Abandonment of commercial navigation does not defeat navigability 29
    - 5. Absence of commercial profit is immaterial 29

II. Respondent's project must be licensed because it will obstruct navigable capacity and affect the interests of interstate commerce 30
  - A. Impairment of navigable capacity 30
    - 1. The Hinton-Glen Lyn stretch 30
    - 2. The Kanawha and Ohio Rivers 31
  - B. The project will affect the flood-control plans for the Ohio valley 32

Page

III. The challenged provisions of the Federal Power Act are constitutional 33
  A. Congress may prohibit respondent's project 34
    1. If New River is navigable 34
    2. If the project adversely affects navigable capacity 34
    3. If the program adversely affects the flood-control program 35
    4. If the project affects the interests of interstate commerce 35
  B. Congress has full power to impose the conditions required in licenses under the Federal Power Act 36
    1. The scope of the constitutional issue 38
    2. The conditions further a legitimate federal interest in water resources 39
      (a) The Government could itself undertake the project and accomplish all of the conditions of the license 40
      (b) The Congress may either prohibit the project or license its construction on conditions appropriate to a Government project 42
    3. The charge of confiscation 44
      (a) Power rights 44
      (b) The recapture clause 46
Conclusion 49

CITATIONS

Cases:

Alabama Power Co. v. *Gulf Power Co.*, 283 Fed. 606 ..... 43, 46
Alabama Power Co. v. *Ickes*, 302 U. S. 464 38
Arizona v. *California*, 283 U. S. 423 ..... 29, 30, 40, 41, 42
Ashwander v. *Tennessee Valley Authority*, 297 U. S. 288 ..... 28, 29, 41
Berea College v. *Kentucky*, 211 U. S. 45 38
Bogardus v. *Commissioner*, 302 U. S. 34 3
Broad River Power Co. v. *Query*, 288 U. S. 178 43
Economy Light Co. v. *United States*, 256 U. S. 113 ..... 6, 28, 29
Fox River Co. v. *Railroad Commission*, 274 U. S. 651 47
Helvering v. *National Grocery Co.*, 304 U. S. 282 3
Helvering v. *Rankin*, 295 U. S. 123 2
Helvering v. *Tex-Penn Oil Co.*, 300 U. S. 481 3
Labor Board v. *Pennsylvania Greyhound Lines*, 303 U. S. 261 3
Leovy v. *United States*, 177 U. S. 621 3
Massachusetts v. *Mellon*, 262 U. S. 447 44
Montana Power Co. v. *Federal Power Commission*, 112 F. (2d) 371 48

Cases—Continued. Page
- *Montello, The*, 20 Wall. 430 3, 8, 27
- *New Jersey* v. *Sargent*, 269 U. S. 328 41, 48
- *Oakland Club* v. *South Carolina Public Service Authority*, 110 F. (2d) 84 43
- *Scott* v. *Lattig*, 227 U. S. 229 14
- *Steward Machine Co.* v. *Davis*, 301 U. S. 548 44
- *Susquehanna Co.* v. *Tax Commission*, 283 U. S. 291 43
- *United States* v. *Chandler-Dunbar Co.*, 229 U. S. 53 44
- *United States* v. *Esnault-Pelterie*, 303 U. S. 26 3
- *United States* v. *Rio Grande Irrigation Co.*, 174 U. S. 690 34
- *United States* v. *Utah*, 283 U. S. 64 8, 27, 28, 29, 30
- *United States* v. *West Virginia*, 295 U. S. 463 48
- *Water Power Co.* v. *Water Commissioners*, 168 U. S. 349 28, 29

Statutes:
- Federal Power Act:
  - Sec. 3 (8) 3, 27, 28, 29
  - Sec. 10 (a) 36, 41
  - Sec. 10 (b) 36
  - Sec. 10 (c) 37, 41
  - Sec. 10 (d) 37, 41
  - Sec. 14 37, 41, 44
  - Sec. 21 46
  - Sec. 23 36
- Rivers and Harbors Act of 1899:
  - Sec. 9 37
  - Sec. 10 37
- Virginia Acts of 1861–1862, Ch. 50 23

Miscellaneous:
- Annual Report, Chief of Engineers, 1876, Part II, p. 235 8
- 49 Cong. Rec. 3058 41
- H. Doc. 2, vol. 16, 57th Cong., 1st Sess., pp. 3535–3536, Annual Report to the Chief of Engineers, 1901 14
- H. Doc. 182, 72d Cong., 1st Sess., p. 20 6

In the Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA, PETITIONER
v.
APPALACHIAN ELECTRIC POWER COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

REPLY BRIEF FOR THE PETITIONER

The brief for the respondent raises a host of minor controversies over detail. These we shall not attempt to meet, lest a particularized rebuttal obscure the essential simplicity of the issues presented to this Court.[1] Instead, we shall attempt merely to provide a running outline of the major issues which are determinative of this case.

---

[1] It is perhaps desirable expressly to note that we do not concede that respondent is correct on the issues which are not developed in reply.

I

NEW RIVER AT THE SITE OF RESPONDENT'S PROJECT IS NAVIGABLE WATER OF THE UNITED STATES

A. THE CONTROVERSY IS ONE OF LAW

Respondent urges that the issues are those of fact, and that they are set at rest by the concurrent findings of the courts below (Br. 17–19, 30–31). On the contrary, we accept the concurrent findings of fact which were made by the courts below and present to this Court only the legal questions which arise on those findings.

The respondent's contention that we are foreclosed by concurrent findings is based upon a rather catholic use of the term "fact." If navigability itself were simply a "fact," like a horse or the height of a waterfall or the passage of a boat, the issue would ordinarily be considered closed by concurrent findings below. But it is, of course, not a fact in the sense of a physical object or an historical event. It is a conclusion which is derived by comparing (a) physical or historical facts, with (b) legal criteria. Cf. *Helvering* v. *Rankin,* 295 U. S. 123, 131. Where both courts below have agreed on the underlying physical or historical facts, those facts will not be reexamined here. But this by no means exempts from review the legal criteria applied to those facts by the courts below.[2]

---

[2] The decisions of this Court illustrate that no invariable and simple litmus can be applied to determine whether a given issue is one of fact or of law. It has held the validity

Certainly neither authority nor reason requires this Court to accept without reexamination a conclusion that a river is nonnavigable simply because it was reached by both lower courts. There has been a century of litigation in which the legal criteria of navigability have been announced by this Court, and Congress in Section 3 (8) of the Federal Power Act has supplied its own definition. We present to this Court simply the legal question whether these legal standards have correctly been applied to the facts of this river. For purposes of the review here, the concurrent finding rule may be taken to preclude reexamination of those basic findings which were reached by both courts. But it cannot preclude review of the legal consequences of those facts, or of the legal criteria which determine the conclusion as to navigability under the facts. *The Montello,* 20 Wall. 430, 442; *Leovy* v. *United States,* 177 U. S. 621, 628.

In the specific terms of this case, the problem is well illustrated by the two crucial conclusions of

---

and infringement of a patent (*United States* v. *Esnault-Pelterie*, 303 U. S. 26, 29–31), the existence of an obstacle to collective bargaining (*Labor Board* v. *Pennsylvania Greyhound Lines*, 303 U. S. 261, 271), and the purpose of an unreasonable accumulation of corporate surplus (*Helvering* v. *National Grocery Co.*, 304 U. S. 282, 294–295) each to be a question of fact. On the other hand, it has held the questions of whether the consideration included cash (*Helvering* v. *Tex-Penn Oil Co.*, 300 U. S. 481, 491), and whether a payment was a gift or compensation (*Bogardus* v. *Commissioner*, 302 U. S. 34, 39), to be questions of law, or questions of mixed law and fact.

the Circuit Court of Appeals as to (1) actual navigation and (2) susceptibility of the stream to navigation. It said (R. 2903, 2893):

> The plaintiff has not shown that there was interstate navigation on New River *of such a substantial and permanent nature and of such general and common usefulness that it would subject the river to Federal servitude to the benefit of navigation.*
>
> * * * * *
>
> A mere description of the physical and natural characteristics of the river [8] is very persuasive that it is not suspectible *of that character of navigation which is necessary, under the decisions above cited, to support the claim that it is navigable water of the United States.* [Italics supplied.]

The italicized portions of these passages are plainly a decision based upon the legal definition of navigable water adopted by the court below. The specific rulings of law made by the court below which we challenge here are those which put aside the evidence of actual navigation and suitability to navigation because the navigation (a) was difficult, largely because of the interruption from a few shoals and rapids, (b) was irregular, (c) did not form an important part of the commerce of the region, (d) did not continue for a very long period, and has been substantially nonexistent since construction of the paralleling railroads, and (e) was not commercially profitable (see *infra,* pp. 26–30).

---

[8] Here, as frequently was the case, the majority of the court below was speaking of New River generally, rather than the 111-mile stretch here in controversy. Thus, when it speaks of depths of one foot or a few inches (R. 2893) or a slope of 7.1 feet per mile (R. 2895), it has reference to the entire river, not to the stretch here involved, with low water depths of 2 feet or more for 98 percent of the distance, and not less than one foot at any place, and rarely less than 2 feet, and with an average slope of 4.4 feet per mile (Govt. Br. 70, 64).

These rulings are each erroneous. This we shall briefly indicate after sketching the picture of New River and its navigation. But the errors of the courts below, in contrast to the dissenting opinion of Judge Parker, seem most easily shown if the opinions be read against the decisions of this Court in which other rivers have been held navigable notwithstanding the difficulties confronting navigation.

B. COMPARISON WITH OTHER RIVERS HELD NAVIGABLE

In three cases this Court has held navigable rivers which bear a close resemblance to New River. A brief discussion of the facts of those cases also shows that navigation was at least as easy on the 111-mile stretch of New River here in issue as on those rivers.[4]

---

[4] Respondent offers charts by which to compare the slopes of these rivers with New River (Rsp. Br. 138, after Rsp. App. 237). The charts include all of New River, not merely those parts now in issue, and in some cases all of the compared rivers, not merely those parts in issue in the cited cases. Apparently because of the desire to include uncontroverted parts of the streams, the charts are cast upon an unnecessarily distorted scale. The length of the streams is

1. *The DesPlaines River.*—The portion of the DesPlaines River in controversy in *Economy Light & Power Co.* v. *United States,* 256 U. S. 113, was about 45 miles in length, 60 per cent of which was pool water and 40 per cent shoals and shallow water. The discharge was as much as 600 c. f. s. during an average of only 73 days per year. The 58-mile trip from Chicago to the mouth of the DesPlaines River could be accomplished without portage during only 48 days of the year; the portage would be less than 2 miles for only 73 days of the year, and less than 4 miles for only 116 days. During the rest of the year, an average of 249 days, a portage of the boat itself would be required for 1 or 2 miles, and portages of the cargo from 11 to 15 miles according to the water stage.[6] With the exception of an average period of 4 days per year, the controlling depths over the rapids and shallows were never more than 15 inches from Lake Michigan to the mouth of the DesPlaines, and such controlling depths were found along the better stretches of the river only during an average period of 116.2 days per year. At all other times, the controlling

---

represented to a scale of approximately 1 inch per 50 miles, while the slope is represented on the scale of 1 inch to 260 feet. In other words, the distortion is approximately in the ratio of 1 to 1,000.

[6] Indeed, at some stages a portage over the entire length of the river was required. H. Doc. 182, 72d Cong., 1st Sess., p. 20, quoting from Graham and Phillips Report of April 4, 1819.

depths were 12 inches or less. 256 Fed. 722, 793–796.

Moreover, no navigation on the DesPlaines had taken place for almost 100 years. This being true, it was necessary to rely entirely upon historical data for proof of such navigation as had formerly existed.[6] From the evidence, the Circuit Court of Appeals found only 14 specific instances of the use of the DesPlaines for commercial navigation, ranging over a period of more than 150 years, between the years 1673 and 1830, although the record showed less well authenticated evidence of many other trips. The navigation consisted chiefly of fur trade, carried on in canoes and flat boats roughly similar to those in use on New River (256 Fed. at 797–798). Upon these facts the Circuit Court of Appeals came to the conclusion that the DesPlaines was navigable and it was upon this evidence that this Court held that the actual navigation on the river was such as to make it navigable water of the United States.

2. *The Fox River.*—Eighteen miles of the stretch of the Fox River under consideration in

---

[6] The respondent seems to make much of the fact that, aside from the few exploratory trips, we have not shown navigation on New River in the distant past, and it claims that lack of historical navigation constitutes evidence of nonnavigability (Rsp. Br. 44–45; Rsp. App. 39–53). The argument is erroneous. Where there is evidence of actual navigation within the memory of man, there is obviously no need of searching into historical records.

The Montello, 20 Wall. 430, had in their natural condition an average fall of approximately 8 feet per mile. Within this reach the maximum fall was 29½ feet within a distance of only ¾ of a mile, while within another stretch of 2½ miles there was a fall of 38 feet. (See Annual Report, Chief of Engineers, 1876, Part II, p. 235.) Such slopes are not to be found in the Hinton-Allisonia stretch of New River. Continuous navigation on the Fox River, by boats of shallow draft, was not possible because of the obstructions in the form of shallows, rapids, and falls, which made portages necessary. Prior to its improvement by locks and dams, the commerce on the lower Fox was conducted by Durham boats, propelled by animal power; and the boats were comparable in size, draft, and capacity to the keelboats used on the New River (20 Wall. at 441; Govt. Br. 59). The trial court held the entire lower Fox nonnavigable, but the decision was reversed by this Court.

3. *The Colorado River.*—In *United States* v. *Utah,* 283 U. S. 64, this Court reviewed and sustained the findings of Mr. Charles Warren, Special Master in the case, in respect of the Colorado River between Mile 176, above Lees Ferry, and the Utah-Arizona Boundary (about 150 miles). His findings were as follows:

> I do not find that these rapids have proved any substantial impediment to a boat going downstream. Rowboats going upstream must ordinarily be dragged or poled up

> through, but to a motorboat going upstream these rapids form little obstacle, except in times of extreme high water; wide rafts have found difficulty in going down through some of these rapids at low water, without hitting upon rocks. Irrespective of the rapids, the ordinary velocities of the River present some difficulty to boats making the upstream trip. Such velocities in the 50-mile stretch between the mouth of the San Juan and the boundary line are 3½–4 miles per hour for about half of the year and over 4½ for the remainder of the year. * * * Most of the witnesses who made trips in rowboats testified to being obliged to pole or drag their boats upstream in many places; and the uptrips were, as a rule, long and difficult, more particularly below the mouth of the San Juan where the volume and velocity of the water were greater. (Report of the Special Master in No. 14, Original, October Term, 1930, pp. 146–7.)

It seems evident that the controverted stretch of New River, equally with those discussed above, would similarly have been held navigable if the proper legal standards had been applied by the courts below.

C. THE FACTS OF NAVIGABILITY

1. *The Allisonia-Radford and Wiley's Shoals-Hinton Stretches.*—Respondent seems unwilling to admit that these two stretches, of 28 and 27 miles respectively, are navigable; it does not, however,

affirmatively urge that they are nonnavigable (Rsp. Br. 41–43). Both courts below, by clear inference, held these stretches to be navigable (R. 114, 115, 2900–2902). The evidence, summarized in our main brief (Govt. Br. 35–38), shows that these stretches were extensively navigated and constitute navigable waters of the United States.

The only controversy raised by respondent is as to the distance above Hinton which should be included in the plainly navigable stretch.[7] Respondent prefers to place its end at Round Bottom Creek, where the Virginia-West Virginia state line crosses New River.[8] But its own chart (opp. Rsp. Br. 50) shows that the federal improvement extended beyond respondent's location of the state line, and the court below held (R. 2901) that the improved stretch reached for something less than a mile into Virginia.[9]

---

[7] This is important only with respect to our argument (Govt. Br. 79–81) as to impairment of the navigable capacity of the interstate stretch between Hinton and Glen Lyn.

[8] The location of the state line cannot seriously be challenged by respondent. Its own property map (Ex. No. 188, Vol. I, 9) and the latest U. S. Geological Survey map (Ex. 185, Vol. I, 8) alike show the state line at Round Bottom Creek, 24.5 miles above Hinton; it persists, however, in placing this line one mile upstream, at Wiley's Falls, although this is demonstrated by the record to be erroneous (R. 1140–1150).

[9] The District Court perhaps implied, but certainly did not hold, that the navigable stretch extended only 23 or 24 miles above Hinton (R. 114). But it is undisputed that a ~~slack-water pool~~ two foot channel reached from McDaniel's Falls, 18 miles above Hinton, to Wiley's Falls, 26 miles above Hinton (Ex.

2. *The Radford-Wiley's Shoals Stretch.*—This leaves for consideration only the 56-mile stretch of New River between Wiley's Shoals and Radford. We shall indicate the general nature of the facts shown by the record and found by the lower courts as to the physical characteristics of this stretch and as to the actual navigation over it. Then we shall show that the legal definition of navigable waters of the United States is fully applicable to that portion of New River.

3. *Physical Characteristics: Suitability for Navigation.*—The next section will sketch the substantial commercial navigation recognized by the lower courts to have moved over this 56-mile stretch of New River. This navigation, even if ignored as proof of actual navigation, should be conclusive that the river was *suitable* for navigation and therefore navigable (Govt. Br. 61–62). In this section, however, we shall examine the physical characteristics of the river and shall show, without the aid offered by the extensive evidence of actual navigation, that on the concurrent findings of the courts below this stretch of New River should have been held suitable for navigation and therefore navigable.

Since there is no question that the water-flow is sufficient for navigability (Govt. Br. 62–63), the question is simply whether (a) the velocity of the

---

196, Vol. I, p. 2) and that the federal improvement reached through Wiley's Falls to Wiley's Shoals, 27 miles above Hinton (Ex. 38, R. 2383; Ex. 39, R. 2395).

current is too great, or (b) the obstructing shoals and falls are too formidable to permit navigation. Neither is the case.

(a) *Velocity of Current.*—One of the factors which determine velocity of current is the slope of the river. Neither court below made a finding as to the slope of the river in the Allisonia-Hinton stretch (see R. 114, 2895, 2900–2901). We do not understand that respondent questions that the average slope in this entire stretch is 4.4 feet per mile, or that it is 3.8 feet in the Hinton-Wiley's Shoals stretch, 5.0 feet in the Radford-Allisonia stretch, and 4.4 feet in the intervening Wiley's Shoals-Radford stretch (Govt. Br. 64; Rsp. App. 8–18). Instead, it selects isolated portions of the middle stretch which have a much greater slope than the average and offers these portions as characteristic.[10] Since we do not deny the existence of a number of shoals and rapids which appear in this stretch, or that the slope is considerably greater than the average in occasional places, there is no controversy over the slope of the part of New River here in issue.

---

[10] Respondent relies upon Ex. No. 196, Vol. I, which in turn is based upon the Hutton survey of 1872 (Ex. 31, R. 2280–2289). That survey shows that in the plainly navigable Allisonia-Radford stretch one mile has a fall of 13 feet and another a fall of 10 feet (miles 27 and 32; R. 2283). In the Radford-Wiley's Shoals stretch, reaching twice as far, the two worst miles are those with a fall of 11 and 10 feet, respectively (miles 100 and 65; R. 2286, 2285).

Velocity of current, of course, is not fixed by slope alone, but is also influenced by channel depth and width. Therefore the best evidence of velocity is direct measurement. A Government witness, using a current meter (R. 930), measured the river velocities at each of the 41 rapids and shoals in the Wiley's Shoals-Radford stretch; his results show current velocities varying from 1 to 4.4 miles per hour (Govt. Br. 70). Respondent abuses the witness,[11] but has offered at no point in the extensive record any measurements to show that the velocities were in fact greater than those shown by the Government's measurements.

The District Court made no finding as to velocity, but the Circuit Court of Appeals found that there were "pools of comparatively still water", and that "the stream velocity varies at the shoals and rapids from 3 to 5 miles per hour"[12] (R. 2895).

The only finding made by the courts below, and the only evidence in the record, therefore, indicates that the maximum velocity, at the worst of the rapids and shoals in the Radford-Wiley's Shoals stretch, is 5 miles per hour or less. While we recognize that navigation would be difficult or uncomfortable at occasional shoals, the velocity of 5 miles per hour or less is, even at these places, well within the limits of navigability (R. 276, 927, 1102, 2296, 2367).[18]

---

[11] The abuse is unwarranted. One need only glance through the cross-examination from which respondent has culled isolated sentences (Rsp. App. 22–24; R. 930–934) to see that the witness was in no sense discredited by questions directed only to that end. Respondent's use of the District Court's criticism of the Government's testimony on power waves (R. 130–131) to discredit testimony on other parts of the case (Rsp. App. 29) is transparently unfair.

[12] Even this statement of the court below gives an exaggerated picture of the velocity, since it is a paraphrase of an engineer's survey of the upstream stretch between Lead Mines and Wilson Creek, which we do not now contend to be navigable (R. 2350).

(b) *Natural Obstructions and Channels.*—The District Court mentioned the shoals and rapids found in New River, but in no case did it confine its discussion of these obstructions to parts of the river within the 111-mile stretch now in issue (R. 108, 117). The Circuit Court of Appeals placed considerable emphasis upon these shoals and rapids (R. 2900–2901). Neither court estimated the total length of these shoals nor the average depth in the channels through them. Government witnesses estimated that the shoals extended over 15 per cent of the Wiley's Shoals-Radford stretch (R. 905, cf. Ex. 31, R. 2282–2287). Respondent urges that they cover more than a third of the distance (Rsp. App. 32–36). The controversy, which doubtless turns on the point where a shoal can be said to end is immaterial. The only question of importance is the extent to which there are navigable channels through the shoals.

---

[18] In the 73-mile reach of the navigable Snake River (*Scott* v. *Lattig*, 227 U. S. 229, 239, 242) between Riparia, Washington, and Lewiston, Idaho, the Army Engineers in 1901 reported 37 rapids or bars totalling 15 miles in length or 21% of the entire reach. The minimum velocity found over these rapids was 4 miles per hour and the maximum velocity 8.08 miles per hour. (Annual Report of the Chief of Engineers, 1901, pages 3535, 3536, 57th Cong., 1st Sess., H. Doc. 2, Vol. 16.)

Respondent apparently does not urge in terms that channels through the shoals are nonexistent, even in the natural state of the river, or that they were impassably narrow, but rather that the water depth was too shallow for navigation over the ledges and shoals (Rsp. App. 36–39). It relies for this solely upon various reports of the Army Engineers. All of these except one describe the entire New River[14] or the stretch reaching from Hinton all the way to the North Carolina line.[15] The one report relating to the 111-mile stretch now in controversy, heavily emphasized by respondent (Rsp. App. 37), is directed specifically at a shoal in the plainly navigable Allisonia-Radford stretch.[16]

Respondent's reliance upon the Engineer's reports, moreover, defeats its purpose, for their descriptions of the low water over the shoals and rapids are applicable equally to the plainly navigable Allisonia-Radford and Wiley's Shoals-Hinton stretches as well as to the Radford-Wiley's

---

[14] Conklin Report, 1934 (R. 2710).

[15] Reports of Chief of Engineers, 1881 (R. 2370, 2376); 1882 (R. 2382); 1883 (R. 2394); 1885 (R. 2405); 1886 (R. 2407); 1891 (R. 2413); 1897 (R. 2416). The reports, it is true, each repeat that the conditions obtain "throughout this distance," but are plainly not directed to the specific stretch in controversy.

[16] Cuyler Report, 1879 (R. 2339–2340).

Shoals stretch.[17] The only report which is directed specifically at the stretch now in issue is that of Major Altstaetter in 1912. He said (R. 2422):

> * * * From a study of the gauges at Radford and Hinton and other sources it appears that *at extreme low water* [18] the controlling depths over the bars may drop to less than 1 foot. This is due to the great rapidity of the current, the drop between these two places being about 348 feet. The headwaters of the river being in some of the highest mountains east of the Rockies a good discharge is ordinarily maintained, *and 2 feet found over the bars.*
>
> From Hinton to the vicinity of Glenlyn a boat drawing 2 feet will have sufficient depth of water for navigation *at practically all times. Mean stage conditions give 3 feet over nearly all bars.* The river, however, partakes of the characteristics of a mountain stream, with very rapid current and bad rapids, and therefore navigation is dangerous on it. [Italics added.]

The only actual measurements offered in evidence were those of a Government witness which showed, at ordinary summer low water flow (R. 906), that only at four places would the channel depths fall below 2 feet (Govt. Br. 70–71).

---

[17] The 1873 report stated that "the extent and kind of improvement required for the betterment of the river is about the same throughout" (R. 2296).

[18] The italicized qualification also serves to reconcile the otherwise divergent reports as to the shoal depths. The Conklin report of 1934, as does the Altstaetter report of 1912, expressly relates its estimate of minimum depths to low water. The controlling depths "at practically all times" are shown by the latter report to be considerably greater.

The District Court made no finding as to channel depths; the Circuit Court of Appeals described the entire river, not the stretch here in issue, in terms of shoals which frequently had only a few inches of water (R. 2893, 2895). When speaking of the stretch between Radford and the West Virginia line, it said the river had "serious obstacles to navigation * * * consisting of several difficult falls, and many long rapids and shoals" (R. 2900), but it did not find these to be impassable or the water depths to be inadequate.

It seems to us that a fair appraisal of the evidence and the statements of the court below would indicate that there were several falls or shoals which would be rather difficult to navigate during periods of high water, and which would doubtless require portage or pulling the boat in times of extreme low water. We do not see that the legal conclusion of navigability will vary whether these difficult stretches numbered two, six, or a dozen in the 56-mile stretch. But, if this number be material, it is to be noted that neither court below made a finding on this question and that the only definite evidence in the record shows that there are only three or four shoals or rapids which would introduce exceptional difficulty to navigation (Govt. Br. 70–

71), and these shoals constitute less than 3 percent of the 111-mile stretch (R. 905).[19]

4. *Actual Navigation Over the Wiley's Shoals-Radford Stretch.*—We think that there is no occasion for this Court to go behind the findings of the lower courts on the facts of actual navigation. If the record facts should be material, however, we must point out that they are seriously distorted by respondent.

(a) *The Findings Below.*—Neither court below denied the existence of actual navigation over this stretch of New River. The District Court, in contrast to the respondent (Rp. Br. 47–56, Rsp. App. 96–135) and the Court below (R. 2902), not only did not reflect on the credibility of the many witnesses who testified to this navigation, but in terms recognized this navigation. However, the court said (R. 114):

> there is a vagueness about the extent to which it occurred and indications that such trips were irregular, were attended with difficulty, and formed no appreciable part of any commercial transportation which took place on the river.

---

[19] We shall not prolong the controversy as to whether the Government's or the respondent's photographs more truly represent the shoals in New River (cf. Govt. Br. 72, Resp. Br. 40, Resp. App. 24–29). Either collection of photographs shows a river easily navigable except for several difficult but not necessarily impassable shoals, one or two of which might indeed be impassable at moderately low water.

The depth at Sifford's Falls, it may be noted, is erroneously printed as "1 to 8" feet instead of 1 foot in the tabulation in our main brief (Govt. Br. 70).

The Circuit Court of Appeals similarly recognized this navigation but approved the finding of the District Court and, in addition, declared (R. 2903):

> such trips could be made only at particular times when there was unusually high water; that even then navigation was not only difficult but dangerous; that while the boats at times may have carried some country produce there was nothing like an established trade and commerce * * *; and that the duration of such use of the keelboats was for a few years only and has been nonexistent for more than 50 years. * * * there was also testimony of nonexpert witnesses submitted by the defendant to the effect that the attempt to commercially use keelboats was unsuccessful and unprofitable * * *.

In terms of concurrent findings, both courts, then, have found (a) there was some navigation; (b) it was difficult; (c) it was irregular; and (d) the Wiley's Shoals-Radford stretch did not at any time form an important artery for the actual commercial transportation of the region. We do not attack these concurrent findings. We do submit that, as a matter of law, these findings show that New River was navigable in this 56-mile stretch.

The Circuit Court of Appeals evidently felt that something more was needed to show nonnavigability. It introduced the following statements of fact and law, which were neither found nor made the basis of legal conclusions by the District Court: (a) navigation was possible only at times of unusually high water; (b) the navigation was short lived and has been nonexistent for 50 years; and (c) it was not commercially profitable.

The propositions of law introduced by the Court of Appeals are shown in the next section to be wrong. The added statement of fact, that navigation was possible only at times of unusually high water, is *not* a concurrent finding of fact and is contradicted by the record [20] (Govt. Br. 53-54).

There is, then, no need to plunge into the extensive record of this case to determine the precise extent of the navigation over this stretch of the river. We are content to rest on the findings of actual navigation made by both courts below.

(b) *Respondent's Treatment of the Record.*—However, we are not willing to allow to go unchallenged respondent's intemperate attack upon Judge Parker's summary of the evidence (Rsp. Br.

---

[20] Respondent attempts to support this finding by reference to isolated statements that a "tide" was necessary for satisfactory navigation (Rsp. App. 120–122). But this condition of the river, the testimony of many of these witnesses and of other witnesses shows, meant simply a stage of the river which was above the extreme summer low water. Howard (R. 217); Collins (R. 220); Breeding (R. 259–260); Redpath (R. 275); Farmer (R. 292); Smith (R. 361); Medley (R. 380); Snodgrass (R. 304): Lane (R. 396); Smith (R. 398); Kenley (R. 401–402); Reed (R. 407). Respondent's own witness Knode stated that a trip down to Hinton was accomplished at "ordinary, not extra high" tide (R. 1572). So, too, the engineers' reports make plain that the low water which stopped navigation was simply the low water of summertime and not, as respondent would have it, anything less than a "flood tide." See 1880 Report (R. 2361); 1882 Report (R. 2385).

52–56) or its procrustean operations upon our tabulation of the evidence (Rsp. Br. 48–52).

A fair means of illustrating the liberties respondent has taken with the record, without too greatly expanding this brief in order to reply to an irrelevant charge, is to take the first item under each of the six categories of reasons which respondent offers (opp. Rsp. Br. 51) for eliminating evidence from our tabular summary of the record (found opp. Govt. Br. 48).

(1) "Incorrect Use of Testimony as Actually Recorded": The first of 55 items eliminated under this heading is line 2 B, representing navigation from Hinton to Glen Lyn, Virginia (Govt. Br. 178; R. 482–485). The witness Calloway testified that construction material for the Norfolk & Western Railroad was shipped to Hinton by railroad and boated up to a place between East River and Glen Lyn. The only possible inaccuracy in our use of this testimony is calling the destination Glen Lyn instead of a point ⅕ to ⅒ of a mile downstream from Glen Lyn.[21]

---

[21] Respondent also attacks the testimony of this witness because he stated that a man "came there with his auto" during the period 1881 to 1884 to supervise the loading and shipment of the material up the river (Rsp. Br. 50). This is a natural slip of the tongue, made after a generation of auto transportation. In any event, Calloway's testimony was supported by the testimony of the witness Reed, who actually operated the boats (R. 405–407); by Peters, who transported supplies to the Norfolk and Western Railroad (R. 319–320); by Dickinson, who saw the shipment of the material (R. 393); and by the reports of the Chief of Engineers: 1885, R. 2406; 1882. R. 2393.

(2) "Duplication": The first of 23 items eliminated under this heading is line 3 B, representing navigation from Mack's Creek to New River Bridge, near Radford (Govt. Br. 178; R. 218). Respondent says the trip is duplicated by line 3 A, representing navigation from Mack's Creek to Hinton (R. 218). This item, alone of those discussed here, permits an arguable justification for respondent's elimination. The witness Collins testified that "they used to run from eight to ten of these boats from Mack's Creek on New River down to New River and from New River to Hinton" (R. 218). This might be a technical duplication if the same boats invariably continued on to Hinton after stopping at New River Bridge, but it seems more probable that the boats frequently terminated their journey at the New River Bridge depot, as the testimony would equally imply.[22]

---

[22] The testimony of this witness of navigation by bateaux between Mack's Creek and Hinton, relied upon by Judge Parker (R. 2926–2927), which the witness personally observed as a passenger on the boats operated by his father, is attacked by respondent because Collins stated that the shoals and ledges in a portion of this reach of the river had "wing walls and channels and sluices through them" (Rsp. App. 133). The witness first stated that "there was a sluice through there" and that one shoal had a "wing dam" (R. 220–221). Then respondent's counsel placed the words "wing walls, channels, and sluices" in the mouth of the witness in his question, to which the witness answered in the affirmative (R. 221). Moreover, respondent's statement that there was no improvement in the 60-mile section between Radford and Wiley's Falls (Resp. App. 133) is incorrect. This section of the river was improved to some extent by

(3) "Hearsay": The first of 27 items eliminated under this heading is line 2 A, representing navigation upstream from Hinton (Govt. Br. 178; R. 482–485). The witness was assistant to the freight manager at the Hinton station of the Chesapeake & Ohio Railroad and testified that freight consigned to Hinton was boated upstream. Naturally, he did not leave the station to see if the freight actually went up the river (R. 484); equally naturally, his knowledge of the intended route of the freight is the full equivalent of actual observation. Judge Paul emphatically overruled hearsay objections of this nature.[23]

(4) "Non-Commercial Items": The first of 10 items eliminated under this heading is line 4 C, representing navigation from Mack's Creek to Hinton (Govt. Br. 178; R. 252). The goods transported were government property used in cutting the chan-

---

the State of Virginia during the war between the states, as is evidenced by the Report of the Chief of Engineers for 1879 (Ex. 35, R. 2342). (See also Virginia Acts of 1861–1862, Ch. 50.) The War Department reported that this improvement by the Confederate States had been "injudiciously located and poorly built" (R. 2342).

[23] He said (R. 262): "Mr. Abbott, as far as the hearsay feature of it is concerned, there are certain things that can only be proven by hearsay. Suppose someone would ask you about where your older brother had gone to college and he had gone to Princeton. You may not have gone to Princeton, and you may never have seen him when he was at Princeton. Certainly you would be able, if testifying, to say where he had gone. * * * Some things can only be proven that way, particularly things of this nature. * * *"

nel, boated down to Hinton for the purpose of sale. Only fine-spun constitutional theory would suggest that the items were "non-commercial" because the Government rather than a private person was the vendor.

(5) "Testimony Inconsistent With Other Evidence in the Case": The first of 8 items eliminated under this heading is line 6 C, representing navigation from Hinton to Shumate's Falls (Govt. Br. 178; R. 393 [24]). The witness Dickinson testified that the Norfolk & Western Railroad boated its construction supplies over this reach; Judge Parker accepted his testimony (R. 2927). Respondent cites as inconsistent evidence: testimony as to the construction of *another* railroad at a point about 50 miles upstream from the construction in question (R. 1650); testimony from the same witness that the *stone* for the Norfolk & Western abutments was shipped downstream from Pepper's Ferry, 46 miles upstream and just below Radford (R. 1652); testimony that this same witness did not know for a fact that the supplies were shipped up from Hinton, although he did *not* know that they were not so shipped (R. 1654); and a general reference to seven pages of argument in its brief (Rsp. App. 100–107) which need not be analyzed in detail.

---

[24] The record reference is erroneously given as R. 394–395 in both our brief (p. 178) and that of respondent (opp. p. 51).

It is to be noted again that Judge Paul did not in any way reflect upon the credibility of any of these witnesses (see R. 114).

(6) "Testimony Inconsistent With Well-Known Facts": The first of 10 items eliminated under this heading is line 1 A, representing navigation from Eggleston's Springs, to True, West Virginia (Govt. Br. 178; R. 458). Respondent seeks (Rsp. App. 133) to impeach the testimony of the witness Anderson, which was accepted by Judge Parker (R. 2926), for two reasons: (a) because the witness first stated that the trip which he was describing was made in 1870, when as a matter of fact it was made in 1879, and (b) because he stated that the trip was made at night. (a) But almost in the next breath after referring to the year 1870, the witness, without comment or suggestion or questioning by counsel or by the court, stated that the trip was made in 1879 (R. 459). (b) The witness' statement that this trip was made at night is completely corroborated by the testimony of *respondent's* witness Talbott, who testified that boatmen made the down-stream trips at night (R. 1542).

Respondent undertakes to deny that the reason for the cessation of navigation was the construction of paralleling railroads (cf. Govt. Br. 37–38, 52; Rsp. App. 137, 140). The Engineers' Reports (1891, R. 2756–2757; 1913, R. 2431) and a mass of testimony [25] must completely be disregarded if respondent's position is to be accepted. The District Court made no finding on this point; the court below indicated at least a probable agreement with our position (R. 2903).

D. THE COURTS BELOW APPLIED ERRONEOUS LEGAL CRITERIA OF NAVIGABILITY

We have, then, a relatively simple factual picture, established both by the concurrent findings of the courts below and by the indisputable evidence in the record: Of the 111 miles between Hinton and Allisonia, the 27 miles above Hinton and the 28 miles below Allisonia seem plainly to be navigable. The intervening 56-mile stretch does not differ appreciably in its physical characteristics from these stretches; its slope, natural obstructions, and water volume are substantially the same. A passable channel exists through all except a very few of the shoals and rapids. The actual commercial navigation on this stretch of the river has been considerable and amply demonstrates both navigation in fact and susceptibility to navigation. Yet the courts below have minimized or ignored the legal weight of this navigation because it (a) was difficult, (b) was irregular, (c) did not form an important part of the commerce of the region, (d) did not continue for a very long period, and has been substantially nonexistent since construction of the paralleling railroads and (e) was not commercially profitable.

---

[25] Harvey (R. 186); Linkous (R. 205); Howard (R. 210); Breeding (R. 255); Snyder (R. 263); Farmer (R. 295); Snidow (R. 302); Snodgrass (R. 304); Skeen (R. 340); Flanagan (R. 469).

We do not contest the fact that each of these limitations upon New River navigation existed. We do contest the legal proposition that they are sufficient to prevent this interstate stretch of the river from being held to be navigable waters of the United States. Judge Parker, recognizing these facts, concluded that the river was navigable. The only issue presented as to navigability, we believe, is the question of law as to the standards by which navigable waters of the United States are to be determined. Under both the Federal Power Act and the decisions of this Court that question was wrongly decided below.

1. *Difficulty of Navigation Does Not Defeat Navigability.*—The only factor which makes New River navigation difficult is the presence of shoals and rapids; in the 56-mile stretch there are a few places which during the low water months might require unloading a keelboat drawing 2 feet of water, and a number of places where navigation would not be easy. Section 3 (8) of the Federal Power Act in terms declares streams to be navigable "notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage." This Court has repeatedly applied the same judicial definition. *The Montello,* 20 Wall. 430, 443 (where

portages up to 2 miles were necessary); *Economy Light Co.* v. *United States,* 256 U. S. 113, 122 (where portages from 2 to 11 miles were generally necessary); *United States* v. *Utah,* 283 U. S. 64, 86; *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288, 329; *Water Power Co.* v. *Water Commissioners,* 168 U. S. 349, 359 (Govt. Br. 57, 66–67).

2. *Irregularity of the Traffic Does Not Defeat Navigability.*—Section 3 (8) of the Federal Power Act declares that navigable waters of the United States means streams which "are used or suitable for use for the transportation of persons or property in interstate or foreign commerce." An irregular use, obviously, is both a use and persuasive evidence of suitability for use. Nor do the decisions of this Court import any requirement that the river traffic must move on a regular schedule or be continued in approximately uniform volume from year to year. *United States* v. *Utah,* 283 U. S. 64, 82, is conclusive that sporadic navigation, interrupted by long periods of complete disuse, is sufficient (Govt. Br. 57–58).

3. *It is Immaterial That the Traffic Was An Insubstantial Part of Commerce of the Region.*—So long as there be a real commercial use of the river, which neither court below has denied, it is wholly immaterial what proportion of the commerce of the region is carried on the river. Section 3 (8) of the Federal Power Act defines navigability in terms of streams which are "used or suitable for use." A small commerce, equally with a large,

shows both use and suitability for use. And the decisions of this Court compel the same conclusion. *United States* v. *Utah,* 283 U. S. 64, 79, 82 (lumber rafts on the Grand River; only occasional commercial trips on the Green and Colorado Rivers); *Water Power Co.* v. *Water Commissioners,* 168 U. S. 349, 359 (logs and rafts). In *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288, 329, the Court found the Tennessee River navigable although it "in its present condition * * * is not adequately improved for commercial navigation, and traffic is small."

4. *Abandonment of Commercial Navigation Does Not Defeat Navigability.*—Section 3 (8) of the Act, in speaking of streams which "are used or *suitable for use*" excludes any thought that abandonment of actual use, which leaves suitability for use unaffected, can destroy navigability. And it has been conclusively settled that a river does not become nonnavigable because its commercial navigation has been abandoned. The Des Plaines River had been out of use for almost a century, "but a hundred years is a brief space in the life of a nation," and if federal control of navigable waters is to be abandoned "it is for Congress, not the courts, so to declare." *Economy Light Co.* v. *United States,* 256 U. S. 113, 124; see also *Arizona* v. *California,* 283 U. S. 423, 453–454.

5. *Absence of Commercial Profit is Immaterial.*—The suggestion of the court below, that the unprofitable nature of New River navigation

means the river is nonnavigable, has been accepted in no other case and does not seem to be explicitly urged by respondent in this Court. The notion that the United States has jurisdiction only over streams which carry a profitable navigation finds no support in the Act and is contradicted by the decisions of this Court. See *Arizona* v. *California,* 283 U. S. 423, 453–454; *United States* v. *Utah,* 283 U. S. 64, 79, 82.[26]

Every one of the legal grounds advanced by the courts below, therefore, is contradicted both by the Federal Power Act and the decisions of this Court. Had the lower courts applied the correct legal standards to the facts of New River as they understood them, their conclusion would of necessity have been that the 111-mile stretch now in issue was navigable water of the United States.

II

RESPONDENT'S PROJECT MUST BE LICENSED BECAUSE IT WILL OBSTRUCT NAVIGABLE CAPACITY AND AFFECT THE INTERESTS OF INTERSTATE COMMERCE

A. IMPAIRMENT OF NAVIGABLE CAPACITY

1. *The Hinton-Glen Lyn Stretch.*—We have stated that there is no dispute but that the respondent's project will impair whatever navigable

---

[26] In *United States* v. *Utah*, the Special Master, affirmed by this Court, specifically found that navigation on the Green River was unprofitable, and specifically ruled that this factor was immaterial. Report of Special Master, No. 14, original, Oct. term, 1930, pp. 110–111.

capacity exists in this stretch (Govt. Br. 79–80). Respondent, relying upon an ambiguous sentence in the majority opinion below (R. 2909) does actually deny this self-evident fact (Rsp. Br. 63–64) but offers no reason to explain why an intermittent rise and fall of 4 feet or more would not impair navigation over a 2 to 3 foot channel (Govt. Br. 79–80). And, as we have shown (Govt. Br. 80–81), this interstate stretch of New River is navigable as a matter of law (see *supra*, p. 10).[27]

2. *The Kanawha and Ohio Rivers.*—In our main brief we attempted to paint a picture of the effect of respondent's project upon the navigable capacity of the Kanawha and Ohio rivers; we had hoped to put this beyond controversy by relying upon respondent's witnesses and upon undisputed evidence (Govt. Br. 77–79, 81–85). In this we underestimated the possible extent of controversy; respondent vigorously attacks both our facts and our conclusions (Rsp. Br. 63–83; Rsp. App. 164–178). Whether or not respondent's intended method of operation will impair downstream navigable capacity seems to us to be a question of fact. Although

---

[27] Respondent emphasizes that the proposed Bluestone dam will completely eliminate navigation between Hinton and Glen Lyn (Rsp. Br. 64). It is not entirely clear whether this dam will be equipped with a barge-lift, since the plans include that as future installation (R. 1350, 1387). But, in any event, the dam will create a slack water pool, wholly navigable, extending upstream for 36 miles when the dam is full (R. 1350). This pool will reach well across the state line and beyond Glen Lyn.

the concurrent findings of the court below seem to us to be erroneous, we do not at this juncture of the case ask the Court to go behind those findings.[28]

This leaves only the two legal questions: (a) whether the courts below correctly looked to respondent's *intended* method of operation instead of its possible method of operation; and (b) whether the effect of downstream dams can properly be relied upon in the inquiry as to impairment of navigable capacity. These rulings we have shown to be erroneous (Govt. Br. 85–89). If the lower courts were held wrong on this ground, there would be no findings as to the fact of impairment of the navigable capacity of these rivers, since their findings were interwoven with their legal premises.

B. THE PROJECT WILL AFFECT THE FLOOD CONTROL PLANS FOR THE OHIO VALLEY

Respondent, we think, does not successfully eliminate the rather evident fact that its project will have an adverse or a beneficial effect upon flood control according to the manner in which it is operated (Govt. Br. 109–112; see Rsp. Br. 89–91). Indeed, any uncontrolled dam and reservoir of necessity is plainly a menace to a flood-control program.

The project *can*, it is true, aid in flood control if the reservoir waters are drawn down prior to the flood and the flood stages reduced by storage. But, on the other hand, if the reservoir is full when the flood crest reaches the project, it will be of no aid and may well be of considerable harm. Since the respondent insists (Rsp. Br. 90, 91, 110, 117) that it is operating a project for power and not for flood control, there will be occasions when it will hold the reservoir full to the last minute and then accentuate the flood damage by the release of stored water on the flood crest (R. 625–626, 987–990, 1289). Regulation by a federal agency will prevent this method of operation.

---

[28] It should specifically be noted that these findings do not cover the effect of respondent's project upon flood control and the impairment of navigable capacity thus resulting.

In the event of a concurrent flood over other tributaries of the Ohio, the problem is much more complicated. In that situation the desirability of lowering the Radford reservoir in advance of an approaching flood must be weighed in the light of the flood crest from other tributaries of the Ohio River. Releases from all of the reservoirs on these tributaries must be coordinated and timed so that the crest from the several streams will not reach the main stem of the Ohio at the same time. An integration of flood-control operations is absolutely essential. One central authority must therefore determine when and to what extent the reservoir is to be lowered. Because floods do not respect State lines, this authority must be vested in some agency of the Federal Government.

III

THE CHALLENGED PROVISIONS OF THE FEDERAL POWER ACT ARE CONSTITUTIONAL

Respondent urges two general grounds of invalidity, if the Federal Power Act be construed to apply to its project. First, that there can be no constitutional authority to require a license for a project on a nonnavigable stream, especially if the project does not impair navigable capacity (Rsp. Br. 107–120). Second, that if a license could be required, its conditions could not go beyond the protection of navigation (Rsp. Br. 121–138). Neither argument is valid.

A. CONGRESS MAY PROHIBIT RESPONDENT'S PROJECT

1. *If New River Is Navigable.*—Respondent vigorously asserts various limitations upon the power of the United States over navigable waters (Rsp. Br. 109–110), but it does not and cannot deny the full power of Congress to forbid structures erected in navigable waters of the United States.

2. *If the Project Adversely Affects Navigable Capacity.*—We should have thought that *United States* v. *Rio Grande Irrigation Co.,* 174 U. S. 690, settled the power of Congress to forbid or license structures in nonnavigable streams which threaten downstream navigable capacity.

Respondent contends (Rsp. Br. 113–116) however, that while Congress has power to prohibit the construction of projects in navigable waters, it cannot make the construction of a dam on nonnavigable waters "illegal *per se*", but may only forbid such operation of the dam as would impair navigable capacity downstream. It is somewhat difficult to understand the point of the argument since, wherever the project is located and whatever term is applied to it, the power to forbid is based on the power to protect navigation and navigable capacity. The contentions of both the respondent and petitioner as to the power of Congress to license the project on the conditions prescribed by the Federal Power Act are equally applicable whether the project is called illegal *per se* or whether it is forbidden because it threatens to impair navigable capacity.

3. *If the Project Adversely Affects the Flood Control Program.*—We have shown that the independent authority of the United States with respect to flood control alone, divorced from navigation, need not be considered in this case because floods on the New, Kanawha and Ohio rivers have an immediate impact upon navigable capacity and navigation facilities (Govt. Br. 104–106; *supra,* pp. 32–33). If the project will adversely affect the flood control program, then, it will also adversely affect navigable capacity and navigation facilities. The analysis of the preceding subsection is therefore fully applicable.

4. *If the Project Affects the Interests of Interstate Commerce.*—We have urged that the Federal Power Act requires that respondent's project be licensed even though its effect upon navigable capacity or flood control programs might under some plans of operation be beneficial rather than adverse (Govt. Br. 94–101). That argument need not be repeated here, nor need we answer respondent's attack (Resp. Br. 91–95) upon that construction

of Section 23; the issue is the familiar inquiry, largely unaided by the legislative history, whether or not Congress meant its language to be taken in a broad or a narrow sense. If the Court should agree with our construction of the Act, and if it should find the project would not have an adverse effect but rather might have a beneficial and possibly an adverse effect upon navigable capacity and flood control according to its method of operation, we submit that Congress still has power to prohibit or to license its construction. Since an uncertain or intermittent benefit is the practical equivalent of an adverse effect, the argument is the same as though navigable capacity or flood control were impaired. And, even if the effect of the project be viewed as purely beneficial, there is yet power to prohibit; our argument on this score has already been made at length (Govt. Br. 94–112).

B. CONGRESS HAS FULL POWER TO IMPOSE THE CONDITIONS REQUIRED IN LICENSES UNDER THE FEDERAL POWER ACT

Respondent makes a general attack upon all conditions of the licenses which are claimed to be unrelated to the protection of navigable waters or which, although related to navigability, restrict the use of its property without the payment of compensation (Rsp. Br. 122–123). In particular, respondent attacks (a) the requirement that the project be best adapted to a comprehensive plan for navigation, power, and "other beneficial uses" (Sec. 10 (a)) and (b) the recapture clause and related provisions permitting the Government, on expiration of the license period and after two years' notice, to take over the project on paying the licensee's net investment (Sec. 14) and providing for the maintenance of the project and reduction of net investment while the project remains under private management (Secs. 10 (c)—10 (d)).

Respondent's objections to the conditions required in licenses under the Federal Power Act seem to be a blend of commerce clause and due process objections (Rsp. Br. 121–128). As we understand its position, it may be epitomized as, first, an objection that the federal government can impose no condition which is unrelated to navigation and, second, an objection that the conditions amount to a taking of its property without just compensation. The brief of North Carolina,[29] *amicus curiae,* urges the first of these propositions (N. C. Br. 8–12, 15–24).

It may be observed at the outset that respondent is in no position to attack these conditions if its project is located in navigable waters of the United States or impairs the navigable capacity of those waters. In either case construction of its project is forbidden by Section 9 or 10 of the Rivers and Harbors Act of 1899. Whatever success might attend respondent's attack upon the Federal Power

---

[29] The page proof of the brief indicates that other parties are expected to be signatory in its final form.

Act, it would therefore still be subject to the injunction prayed by petitioner. Since respondent would gain no relief from a decision of invalidity, it would seem not to be in a position to raise its constitutional attack upon the Federal Power Act. Cf. *Berea College* v. *Kentucky,* 211 U. S. 45, 54; *Alabama Power Co.* v. *Ickes,* 302 U. S. 464, 479–480.

Each condition, however, is a reasonable and valid requirement for the United States to exact as a condition to its permission to build a dam which otherwise would be forbidden.

1. *The Scope of the Constitutional Issue.*—Since the United States has power to forbid construction or operation of respondent's project, it has corresponding power to permit the project to be constructed and operated if prescribed conditions are observed. The proposition is incontestable as a matter of logic and is amply supported by the authorities (Govt. Br. 130–131). Respondent does not seem to dispute that, if the Government can forbid the structure, it may permit it upon *some* conditions. Its attack is based instead on the ground that only those conditions can be required which relate directly to navigation (Rsp. Br. 121). Since we do not urge that all of the conditions prescribed by the Act relate to navigation alone, the constitutional issue reduces itself to the narrow inquiry whether the power to forbid the construction and operation of the project, because of its relation to navigation and navigable capacity, includes the power to permit its construction and

operation upon prescribed conditions, some of which do not relate to navigation alone.

We can still further delimit the scope of the issue. We do not urge that the United States can attach any conditions whatever to its license for construction and operation; it may be assumed that they must be designed to further or to protect a legitimate federal interest. Indeed, it may be assumed that the conditions must not only fulfill a legitimate federal purpose but that this purpose must also be one which bears some relation to the source of the licensing power.

In short, then, this case merely requires the Court to decide whether the power of the Government to license the project permits it to attach conditions reasonably designed to advance and to protect the interests of the United States in regard not only to navigation and flood control but also in respect of power development, conservation of water resources, and the other aspects of an integrated river development which can be made to serve the public welfare.

There is, therefore, no need to reply to the attacks of respondent (Rsp. Br. 117, 127) and *amicus curiae* (N. C. Br. 14, 21–24) so far as they are directed at the exaction of conditions having no relation to a proper federal interest in the development and integration of water resources.

2. *The Conditions Further a Legitimate Federal Interest in Water Resources.*—The respondent contends that Congress may regulate the rights of a

riparian owner *only* to the extent required for navigation. From this premise respondent argues that Congress may not say that the project is not an impairment to navigation by issuing a license and at the same time forbid the project save on conditions allegedly unrelated to navigation (Br. 134–136).

The simplest answer is that the constitutional authority of Congress is not limited to the power to prohibit an unlicensed impairment to navigation. The Congress may also authorize or itself construct a project for navigation and flood control which, if undertaken by a private party without congressional consent, could be forbidden as an obstruction. *Arizona* v. *California,* 283 U. S. 423, 452.

(a) *The Government Could Itself Undertake the Project and Accomplish All of the Conditions of the License.*—The *amicus curiae* brief seems to confine its attack on the interest of the Federal government in the license conditions to the limited issue whether the Government could itself construct the project (N. C. Br. 20). But, as we have shown, the United States could itself erect a dam and power plant above Radford if the stream were navigable, or if the dam aided downstream navigation, or if it were an integral factor in the flood-control program (Govt. Br. 119–120).

Apart from questions of compensation, treated below, respondent objects to this conclusion only because its project is simply a power project (Rsp. Br. 110, 117, 130, 131). But, because respondent views its own project only as a power project, it by no means follows that the same project would not be a navigation and a flood-control project if it were undertaken by the United States. The power purposes, which naturally enough provide the project's sole interest to respondent, would in the hands of the federal government be merely subordinate means to larger nonpecuniary ends. See *Arizona* v. *California,* 283 U. S. 423; *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288; *New Jersey* v. *Sargent,* 269 U. S. 328, 335–336; statement of Senator Root, 49 Cong. Rec. 3058.

If the United States had itself undertaken the construction and operation of the project for navigation and flood control, it plainly could have accomplished each of the conditions to the license to which respondent objects. It would be unthinkable that the Government could not ensure that its project be best adapted to a comprehensive plan for improving waterways, developing power resources, and other public uses (Sec. 10 (a)). *Arizona* v. *California,* 283 U. S. 423; *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288. And since Congress could construct the project, it may obviously reserve the right to take it over (Sec. 14) and prescribe related conditions as to the maintenance of the project and the conditions of recapture (Secs. 10 (c)–10 (d)).

It follows that each of the conditions prescribed by the Federal Power Act for licenses relates to a legitimate federal interest, arising out of the use of streams which are navigable or which affect navigability, and that the United States is not trespassing upon forbidden ground when it uses its power to forbid construction and operation of the project to accomplish these ends.

(b) *The Congress May Either Prohibit the Project or License Its Construction on Conditions Appropriate to a Government Project.*—It is obvious that a project located on a navigable river may constitute a physical obstruction to navigation even though it also creates a navigable channel (cf. *Arizona* v. *California, supra*), and it is equally clear that a dam on a nonnavigable stretch of the river may both impair navigable capacity in one stretch of the river and substantially improve navigation on other stretches. Likewise, a water-development project may impair channel depths but provide substantial flood-control storage. Water-storage reservoirs may aid or impair flood control according to their method of operation. Whether the advantages of a project offset the disadvantages is obviously a question for Congress rather than the private operator to determine. The Government may therefore construct a project for navigation and flood control which private individuals are forbidden to undertake without congressional consent. *Arizona* v. *California, supra,* at 452.

Since the Government may of course do through an agent or licensee what it may do directly, it may both forbid private development and license construction by its own agent for navigation and flood control. It was upon this settled proposition of constitutional law that the Federal Power Act was designed (Govt. Br. 114–119).[30]

The respondent's contention that Congress cannot compel it to obtain a license as a condition of exercising a property right which it already enjoys (Br. 117–118) is probably directed only to the question of compensation, but so far as it bears on the scope of federal powers it is plainly beside the mark. Respondent assumes that Congress cannot both prohibit the Radford project and permit its construction under license. Since, as we have shown, the Congress may either prohibit the project or authorize it on the conditions prescribed by the Federal Power Act, the respondent has no legal right to undertake a power development without a license. The sole inducement to accept the offer, therefore, is that respondent may thereby obtain power benefits to which it is not otherwise entitled.

---

[30] Several courts have recognized that the licensee of the Federal Power Commission is for many purposes simply the agent of the federal government. *Alabama Power Co.* v. *Gulf Power Co.*, 283 Fed. 606 (D. Ala.); *Oakland Club* v. *South Carolina Public Service Authority*, 110 F. (2d) 84 (C. C. A. 4th). For many purposes, of course, the licensee is not to be regarded as a technical agent of the United States. *Susquehanna Co.* v. *Tax Commission*, 283 U. S. 291, 293–294; *Broad River Power Co.* v. *Query*, 288 U. S. 178, 180–181. But, whatever the preferable nomenclature, the licensee advances appropriate federal purposes when it constructs the project and conforms to the prescribed conditions.

The offer of such economic benefits is not the exercise of compulsion, and any acceptance of the offer is wholly voluntary. *Cf. Steward Machine Co.* v. *Davis,* 301 U. S. 548, at 589–590; *Massachusetts* v. *Mellon,* 262 U. S. 447, 480.

3. *The Charge of Confiscation.*—Respondent objects, finally, that the conditions of the license are unconstitutional because they take its property without just compensation (Rsp. Br. 123–128). It complains, in this regard, that the Act takes its property (a) by restricting its use and (b) by the recapture provisions of Section 14.

(a) *Power Rights.*—The objection to the restrictions upon respondent's use of its property relates only to its property interest in its power rights. All uses of its lands are open to it without restriction, except only their use to construct a dam and power plant in the stream which will affect navigation or navigable capacity. This use of these riparian lands has a compensable value only with regard to whatever power rights attach to riparian lands along a stream with a utilizable fall.

If the United States had itself undertaken to construct the project, it would not have been required to compensate respondent for its power rights. *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53, settles that an upland owner can have no compensable property in the flow of a stream which can be utilized only in a manner which the Government can forbid. The case is directly applicable and conclusive if respondent's project is located in navigable waters of the United States. Its reasoning is equally applicable if the project will impair navigable capacity or flood control. The decision proceeded upon the ground that the riparian lands could not be devoted to power purposes without the construction of a project which the Government could forbid. 229 U. S. at 70–71. On like principle, no compensation for power value is required if the riparian lands on a nonnavigable stream cannot be devoted to power purposes without regulating the stream in a manner which the Government may forbid in order to protect downstream navigation and navigable capacity. In that case, as fully as though it were located in navigable waters, the project can be built or operated only with the permission of the Government. Against the Government, then, there can be no property rights in that water flow which can be utilized only with its permission.

Since there would be no duty to compensate respondent for its power rights if the lands or project were condemned by the United States, there can be no taking without just compensation if the Government chooses to license private capital to accomplish the same ends in its place. The property right, in either case, is nonexistent against the Government. It cannot be doubted that, if the Commission had licensed a power company other than respondent to construct a project at the Radford site, the licensee could condemn respondent's riparian lands under Section 21 of the Federal Power Act without making compensation for power value. *Alabama Power Co.* v. *Gulf Power Co.,* 283 Fed. 606 (D. Ala.). The respondent cannot complain if the Government offers to permit respondent itself to enjoy the power benefits under the license restrictions. Viewed in another light, the Federal Power Act is simply the offer of a bargain to the licensee: the United States defers its right to take the power rights for its own use without compensation, and the licensee in turn accepts the terms of the license as the price of retaining its right to develop the power resources for its own profit. The Constitution does not require that the Government go through the formality of instituting condemnation proceedings before it undertakes to offer a mutually advantageous bargain to private capital.

(b) *The Recapture Clause.*—Respondent objects that the power of the United States to take over the project, after the expiration of the 50-year license, at its net investment cost, or at its fair value if that be lower, is an unconstitutional confiscation of its property without just compensation (Resp. Br. 125–123, 133–138). We have shown, on the other hand, that Section 14 is a reasonable condition for the United States to attach to its permission to construct and operate the project (Govt. Br. 139–141), and that it would be a valid enactment even if there were no power to prohibit the project (Govt. Br. 141–144).

We see no reason to supplement the discussion in our main brief. We may, however, point out that respondent's attempt (Rsp. Br. 136) to distinguish *Fox River Co.* v. *Railroad Commission,* 274 U. S. 651, serves only to show that case to be conclusive of the issue here. The Wisconsin statute, as does the Federal Power Act, granted a license for the construction of a hydroelectric plant subject to the condition, *inter alia,* that the state could recapture the plant at the end of the license period upon the payment of an amount urged to be less than the "fair value" which would be required by the Constitution if the state were to condemn the project. Respondent seeks to distinguish the case on the grounds (1) that the states have power to engage in the electric power business, and (2) that the states, so long as they do not confiscate vested property rights, may establish such riparian property laws as they choose. Neither ground is tenable. (1) The United States, as we have shown above, has full authority to construct and operate a project such as respondent's. (2) The reservation that the states may not confiscate vested property rights ignores the very question in issue here, which is the charge that the Federal Power Act confiscates respondent's property through the operation of the recapture clause. And, it may be noted, whatever property rights the states may have in the power rights and the flowage of water do not reach to the power plant and equipment.

Respondent's attempt to distinguish the municipal franchise cases is equally unpersuasive (cf. Govt. Br. 140, Rsp. Br. 136). Just as the municipality may condition use of its streets, which it has power to forbid, on rates or recapture which otherwise would be confiscatory, so the United States may condition its consent to the use of streams by structures which would affect navigation and navigable capacity. None is compelled to accept the use of either the streets or the streams; and whether the source of the power to forbid is proprietary or regulatory is wholly immaterial.[31]

---

[31] In our main brief we advance as an alternative (Govt. Br. 140) argument that respondent cannot now challenge the recapture provisions, which would operate, if at all, only after a period of 50 years (Govt. Br. 137–139). In *Montana Power Co.* v. *Federal Power Commission*, 112 F. (2d) 371, 374 (C. C. A. 9th), decided since our main brief was printed, the court so ruled. It said: "The United States has not taken, has not threatened to take, and cannot for about fifty years, take the line in question. Under these circumstances, we think petitioner has no standing to raise the question. *New Jersey* v. *Sargent*, 269 U. S. 328, 339; *United States* v. *West Virginia*, 295 U. S. 463, 474. * * *"

CONCLUSION

For these reasons, in addition to those set out in our main brief, it is respectfully submitted that the decision of the court below should be reversed.

FRANCIS BIDDLE,
Solicitor General.
JOHN W. AIKEN,
WARNER W. GARDNER,
MELVIN H. SIEGEL,
Special Assistants to the Attorney General.
WILLIAM S. YOUNGMAN, JR.,
General Counsel,
DAVID W. ROBINSON,
GREGORY HANKIN,
Special Counsel,
WILLARD W. GATCHELL,
Principal Attorney,
Federal Power Commission.

OCTOBER 1940.

U. S. GOVERNMENT PRINTING OFFICE: 1940

FILE COPY

Office - Supreme Court, U. S.
FILED
FEB 18 1940
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1939.

No. [redacted] 12

UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

BRIEF OF RESPONDENT IN OPPOSITION TO PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT.

✓ RAYMOND T. JACKSON,
Union Commerce Building,
Cleveland, Ohio.

✓ A. HENRY MOSLE,
✓ HUGO KOHLMANN,
—no FRASER M. HORN,
63 Wall Street,
New York City.

✓ JOHN L. ABBOT,
Lynchburg,
Virginia.

Counsel for Respondent.

INDEX.

PAGE

Opinions Below 1

Statement of the Case 1

A. The Proceedings Leading Up to the Filing of the Instant Suit 1

B. Description and Location of Radford Project 4

C. The Issues Raised by the Instant Suit and Their Disposition by the Courts Below 5

The Issues as to Whether Certiorari Should be Granted 9

Argument 10

I. The First "Question Presented" (Navigability) tenders only an issue of fact upon which both lower courts have upon substantial evidence found adversely to petitioner; and consequently states no ground for certiorari 10

II. The second "Question Presented" (Effect of Project) tenders only an issue of fact, decided adversely to petitioner by both lower courts upon substantial evidence; and it plainly affords no ground for certiorari 18

III. The third and last "Question Presented" (Constitutionality of Power Act) tenders only abstract questions of law which were not decided by the court below. Consequently it states no ground for certiorari.. 22

Conclusion 24

TABLE OF CASES

A. PAGE

Alabama Power Co. v. *Ickes,* 302 U. S. 464 10
Appalachian Electric Power Co. v. *Smith,* 67 F. (2d) 451 4

B.

Borden's Farm Products Co. v. *Baldwin,* 293 U. S. 194 23
Brewer-Elliot Oil & Gas Co. v. *United States,* 260 U. S. 77 10

C.

California v. *San Pablo & T. R. Co.,* 149 U. S. 308.. 23
Crowell v. *Benson,* 285 U. S. 22 .... 10, 17

D.

Daniel Ball, The, 10 Wall. 557 .... 16, 17

E.

Edison Co. v. *Labor Board,* 305 U. S. 197 18

H.

Houston Oil Co. v. *Goodrich,* 245 U. S. 440 10
Hunt v. *Western Casualty Co.,* 293 U. S. 530 22

I.

Interstate Commerce Comm. v. *Oregon-Washington R. & N. Co.,* 288 U. S. 14 23

L.

Labor Board v. *Jones & Laughlin,* 301 U. S. 1 ..... 20, 28

N.

New Jersey v. *Sargent,* 269 U. S. 328 23

O. PAGE

Oklahoma v. *Texas*, 258 U. S. 574 .... 12, 15

S.

Southern Power Co. v. *Public Service Co.*, 263 U. S. 508 10

T.

The Daniel Ball, 10 Wall. 557 .... 16, 17
Tyrrell v. *District of Columbia*, 243 U. S. 1 23

U.

United States v. *Alaska S. S. Co.*, 253 U. S. 113 23
United States v. *Cress*, 243 U. S. 316 17
United States v. *Johnston*, 268 U. S. 220 10
United States v. *Oregon*, 295 U. S. 1 .... 15, 16
United States v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690 .... 18, 20, 21, 23
United States v. *Utah*, 283 U. S. 64 .... 10, 11

STATUTES

Federal Water Power Act of 1920, 41 Stat. 1063, and as amended by the Federal Power Act of 1935, 49 Stat. 803, 838 (U. S. C., Title 16, Secs. 791-817) 1, 2, 5, 6, 8, 9, 17, 22, 23, 24
Rivers and Harbors Act of 1899, c. 425, 30 Stat. 1121, 1151 (U. S. C., Title 33, Secs. 401, 403, 406) 5, 8, 9, 17, 22, 23, 24

MISCELLANEOUS

36 Op. A. G. 355 3

In the

Supreme Court of the United States

OCTOBER TERM, 1939

No. 674

United States of America,
Petitioner,
v.
Appalachian Electric Power Company,
Respondent.

BRIEF OF RESPONDENT IN OPPOSITION TO PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FOURTH CIRCUIT

The petitioner seeks a writ of certiorari to review the decree of the United States Circuit Court of Appeals for the Fourth Circuit (XI,* 64) affirming a decree of the United States District Court for the Western District of Virginia (I,* 170-1) dismissing the petitioner's Bill of Complaint after hearing on the merits.

Opinions Below

The opinion of the District Court (I, 78-163) is reported in 23 F. Supp. 83. The opinion of the Circuit Court of Appeals and the opinion of the dissenting judge (XI, 3, 64) are reported in 107 F. (2d) 769.

Statement of the Case

A. The Proceedings Leading Up to the Filing of the Instant Suit.

On June 26, 1925, a declaration of intention to construct, operate and maintain the project involved in this suit (hereinafter sometimes called the Radford project) was filed with the Federal Power Commission under Section 23 of the Federal Water Power Act by a predecessor of respondent for the purpose of obtaining a determination, in accordance with the plain facts, that the project was not subject to the jurisdiction of the Commission (Ex. 88, IX 531). Subsequently the declaration was assigned to, and adopted by, respondent. Pending action upon the declaration, respondent at the suggestion or request of the Commission, filed an application for a license for said project "upon the understanding that such application can be withdrawn if it should develop that a Federal license is not required." (I, 26; Exs. 568, IX 536; 102, IX 571.) Pending action upon the declaration, there was had by the Army engineers upon this application a field hearing which concededly constituted no part of any investigation under the declaration. (Ex. 101, IX 573; IX 775; 797, 806; I, 138.)

---

* Roman numerals refer to eleven volumes filed by petitioner with this Court. Vols. I-IX are appendices to briefs in C. C. A. Vol. X is respondent's like appendix of photographs, of which petitioner filed nine copies with reddish-brown covers, containing grievously blurred, detail-effacing reproductions; for any proper appreciation of the views portrayed, the Court is respectfully referred to the original exhibits or, more conveniently, to the *single, black-cover* copy filed with this Court of Vol. X as filed in C. C. A.

At the only public session of the Commission in connection with its investigation under the declaration (held March 2, 1926), the only evidence offered or received was the report of the Chief of Engineers that New River was not navigable and that it would *not be possible* so to operate the project as to impair the navigable capacity of navigable waters. (I, 138; Ex. 572, VIII 1.) Nevertheless on June 1, 1927, the Commission, while finding that New River "in the part thereof involved in said declaration of intention is not 'navigable waters' within the definition of said Act" (Federal Water Power Act) also purported to find "that the interests of interstate or foreign commerce would be affected by such proposed construction." (II, 1170-4.) On July 1, 1927, the Commission tendered a standard form or major license to respondent (Ex. 574-C, IX 583). Respondent declined the license but, while denying any jurisdiction in the Commission or petitioner, offered to accept all of the conditions of the tendered license regulatory of the flow through the power house or over the dam and having any relation to the alleged protection, no matter how unnecessary, of the navigable capacity of navigable waters. (Ex. 91, IX 600, 614.)

Subsequently, while still denying any jurisdiction in the Commission or petitioner, respondent on February 4, 1930, applied for a minor-part license, under section 10(i) of the Act, containing only such conditions as would have a real and substantial relation to the protection of navigation or navigable capacity. (Ex. 529, IX 615.) The Attorney General of the United States rendered on September 22, 1930, an opinion that the Commission had power to issue such a license and that any attempt to impose any broader license would raise grave constitutional questions (Ex. 532, IX 646[*]). On November 6, 1930, the Secretary of the Commission forwarded to respondent a draft of a proposed minor-part license. (Ex 537, IX 664.) Respondent offered to accept such minor-part license. (Ex. 542, IX 673.)

Suddenly the Commission advised respondent that on November 25, 1930, it had determined to take no action favorable or adverse on the application for a minor-part license because, in view of the questions of jurisdiction between the United States and Virginia, a court adjudication was desirable. (Ex. 91, IX 717.) The Commission, on April 3, 1931, denied the application for a minor-part license and ordered respondent not to proceed with construction unless and until it agreed to accept a license containing numerous burdensome conditions and restrictions having no relation to the putative protection of navigation or navigable capacity of the Kanawha River. (I, 140; II, 1175.)

On May 5, 1931, the Commission tendered the respondent such a license which recited that the "maps, plans and specifications of said project" submitted by respondent had been approved by petitioner through its agents, the Chief of Engineers and the Secretary of War, from the standpoint of navigation (as further appears from the endorsement on the plans themselves, Ex. 90-A) and by its agency, the Federal Power Commission, as being "best adapted to a comprehensive scheme of improvement and utilization of said waters, for the purposes of navigation and interests of navigation, and/or interstate or foreign commerce, of water power development, and other beneficial public uses." (Ex. 131; IX 722.) The Radford project has been constructed at the location and upon the precise plans so approved. (VIII 453; IX 1008.) This second tendered license (which [illegible] the license petitioner asked the court to require respondent to accept) contained *inter alia* precisely the same conditions (for the alleged protection of navigation) with reference to the regulation of flow through respondent's power house and over its dam as those contained in the draft of minor-part license which respondent had formally offered to accept. Because of the recapture clause and other conditions irrelevant to navigation, respondent declined this major license and sought a judicial determination of the controversy (*Appalachian Electric Power Co.* v. *Smith,* 67 F. (2d) 451), but the court found there was no jurisdiction.

---

[*] 36 Op. Atty. Gen. 355.

Having failed in its efforts to secure a judicial determination, respondent, under date of September 13, 1934, advised the Secretary of War that it had commenced construction without accepting a federal license, that for six years it had consistently expressed its willingness to accept a federal license with conditions limited to the protection of navigation or of navigable capacity, that the project would not cause any impairment of navigable capacity, but that the respondent would nevertheless abide by any orders of the Secretary of War regarding the construction and operation of the project and relating to the putative protection of navigation (Ex. 586, IX 740; Ex. 588, IX 746).

B. Description and Location of Radford Project.

The Radford project consists of a concrete dam with an overall height of 130 feet, a reservoir with a usable draw-down of 27 feet and utilizable storage capacity of 100,000 acre-feet and electric generating machinery with a maximum hydraulic capacity of approximately 9,000 c.f.s. The Radford project is located a few miles above Radford, Virginia, in the New River, a tributary of the Kanawha River. It is approximately 160 miles upstream from the head of navigation on the Kanawha River and approximately 170 miles upstream from the London Dam, the upstream Government dam on the Kanawha River. About four years ago Electro-Metallurgical Co. completed a hydroelectric development in the New River at Hawksnest, only about 13 or 14 miles above the head of navigation on the Kanawha River. The Buck and Byllesby hydroelectric plants of respondent were constructed in New River some miles above the Radford project about 1912 and have operated continuously since that time. All of the last three named dams were constructed and have been operated without a federal license; and none contains any lock or other navigation facilities.

Petitioner has instituted condemnation proceedings to acquire lands for the construction of its Bluestone Reservoir, in the New River, a few miles above Hinton, West Virginia, and about 85 miles downstream from the Radford project. According to the plans, the Government Bluestone project will consist of a concrete dam with a height of 150 feet, a utilizable power storage of 245,000 acre-feet, electric generating machinery with a maximum hydraulic capacity of 11,000 c.f.s. and flood storage of approximately 268,000 acre-feet (I, 127-8). Like all other dams on New River, the plans for this Government Bluestone dam do not provide for any lock or other means for navigation (XI, 21).

C. The Issues Raised by the Instant Suit and Their Disposition by the Courts Below.

On May 6, 1935, the petitioner instituted this suit for a mandatory injunction requiring respondent to remove its dam and hydroelectric plant then under construction in the New River just above Radford, Virginia, or to accept a major or standard form license under the Federal Water Power Act of 1920 (I, 1-24). The Bill asserted two alleged causes of action, to wit:

> *First:* That the construction and operation of respondent's project without a Federal license is unlawful
>
> (a) under Section 9 of the Rivers and Harbors Act of March 3, 1899 (30 Stat. 1151), because New River is navigable in fact in interstate commerce, or
>
> (b) if New River be not so navigable, then under Section 10 of that Act, because the construction and operation of said project would substantially impair the navigable capacity of the Kanawha River, a navigable water of the United States, to which New River is tributary (I, 1-15).
>
> *Second:* That the construction and operation of respondent's project without a standard-form or major

license under the Federal Water Power Act of 1920 is unlawful under that Act

(a) because New River is navigable in fact in interstate commerce, or

(b) if New River is not so navigable, then because the construction and operation of respondent's project will substantially impair the navigable capacity of the Kanawha River and thereby affect the interests of interstate commerce (I, 16-17, pars. 21-23).

It will thus be seen that, while two alleged causes of action were asserted upon the basis of different statutes, both alleged causes of action depend upon the same issues of fact. They were:

(a) Is New River navigable in fact in interstate commerce?

(b) If New River is not navigable in fact in interstate commerce, will the construction and operation of the Radford project substantially impair the navigable capacity of the Kanawha River?

While the answer raised other defenses, it is sufficient for present purposes to point out that both of these alleged ultimate facts were put in issue by the answer (I, 29-77). The hearing of evidence commenced on July 11, 1936 and extended continuously through September 5, 1936. More than 135 witnesses testified and more than 360 exhibits were introduced in evidence. The evidence, exclusive of voluminous exhibits, occupied over 7000 pages of transcript.*

After this exhaustive hearing, the District Court found each of these issues of fact against the petitioner. Upon the first issue of fact, the District Court found:

> "The volume of the evidence introduced before the court has permitted discussion of only the most pertinent features of it and then only in general

---

* On December 30, 1936, the petitioner filed a printed brief of 559 pages and respondent filed separate printed briefs on fact and law totaling 254 pages. Thereafter the District Court heard three days of oral argument. Subsequently supplemental briefs totaling 444 pages were filed with the District Court. Both parties filed requests for findings of fact and conclusions of law.

> terms. From a consideration of all of it, the conclusion is reached that New River is not, and never has been navigable, either in its natural condition or after the improvements made, except in certain short and isolated stretches to each of which the navigation was local and confined within the limits of a single state; and that it has never been used and has never been susceptible of use, as an avenue of interstate or foreign commerce. It is, therefore, found that defendant's project is not situated upon a navigable water of the United States." (I, 119.)
>
> "The New River is not a navigable water of the United States, either at the site of defendant's project or elsewhere throughout its course." (I, 167.)

These ultimate findings are supported by a comprehensive review of the evidence and by a large number of detailed findings upon underlying facts (I, 93-112). The evidence reviewed in the trial court's opinion abundantly supports its findings, but by no means exhausts the evidence supporting them.

Upon the second issue of fact, the District Court found:

> "I am unable to find anything in the evidence that indicates a probability that the operation of defendant's project will impair the navigable capacity of the Kanawha or any other navigable water. The only suggestion to which serious consideration could be given is the matter of the power waves heretofore discussed. If the Bluestone Dam is built as planned the possibility of harm from this source disappears. And it seems reasonably certain that a dam will be built at Bluestone—if not by the government, then by the defendant itself. But, even if no dam is ever built there, I think the evidence shows that navigation on the Kanawha will not be impaired or hampered in any way by power waves or any other causes due to the operation of defendant's plant at Radford." (I, 129-130).
>
> The construction of the defendant's project will not obstruct the navigable capacity of the Kanawha River or of any navigable water of the United States. And the operation of defendant's project in any normal, rational or probable method of operation will not obstruct, or impair the navigable capacity of the Kanawha or any navigable water of the United States

> and will not affect the interests of interstate commerce." (I, 167).

These ultimate findings are supported by numerous findings of underlying or evidentiary facts (I, 121-129).

While unnecessary, the District Court observed that the petitioner would not be barred if any material change in facts should occur in the future.

The Court of Appeals carefully reviewed, and independently weighed, the evidence and reached the same conclusions of fact as the District Court and thereupon affirmed the findings made by the District Court (XI, 13, 22, 26).

The States of Virginia and West Virginia appeared as *amici curiae* in both courts below and by their respective Attorneys General filed briefs in opposition to petitioner's contentions. Each State contended, among other things, that New River is not navigable and is not subject to the asserted jurisdiction of the Federal Power Commission.

Having found (a) that New River is not navigable in fact in interstate commerce and consequently not a navigable water of the United States and (b) that neither the construction nor the operation of respondent's project will substantially impair the navigable capacity of any navigable water of the United States and consequently will not affect an interest of interstate commerce, the courts below both held that neither the Rivers & Harbors Act of March 3, 1899 nor the Federal Water Power Act is applicable and *a fortiori* no cause of action had been established under either Act. Neither statute nor any part thereof was held unconstitutional, and upon the facts so found neither Act is applicable.

That the lower courts were correct in so holding upon these facts is, we think, conceded. In the Circuit Court of Appeals the petitioner expressly stated:

> "If New River is not a navigable water of the United States, and if the project in question will not diminish the navigable capacity of a navigable water of the United States, then the Act (Rivers & Harbors Act of March 3, 1899) is not applicable and, therefore, no constitutional question is involved." (Petitioner's Supplemental Brief in the Circuit Court of Appeals, p. 236.)

And further:

> "If, upon the facts, New River is not navigable water of the United States within the meaning of the Federal Power Act, and the project will not affect the interests of interstate or foreign commerce, then the Federal Power Act is not applicable and no constitutional questions need be considered." (Petitioner's Supp. Br. in Court of Appeals, pp. 236-7.)

The Issues as to Whether Certiorari Should be Granted.

The questions which the petitioner asserts (Pet. 2-3) are presented by its petition for certiorari are:

> "1. Whether respondent's project, a dam and hydro-electric plant constructed in New River, is in navigable waters of the United States, within the meaning of Section 9 of the Rivers and Harbors Act of 1899 and Section 3(8) of the Federal Power Act.
>
> 2. Whether respondent's project will obstruct the navigable capacity of waters of the United States within the meaning of Section 10 of the Rivers and Harbors Act of 1899, or affect the interests of interstate commerce within the meaning of Section 23 of the Federal Power Act.
>
> 3. Whether the licensing provisions of the Federal Power Act are constitutional, whether applied to a project located in navigable waters, or to a project which affects interstate commerce and is located in nonnavigable waters over which Congress has jurisdiction under the commerce clause."

As we hereinafter show, the first two questions present only issues of fact, while the third question tenders only abstract issues of law not raised by the facts and not decided by the court below.

Consequently, the respondent contends that the petition for certiorari should be denied because the petition seeks merely to invoke a review

> (a) of issues of fact upon which two lower courts have already decided adversely to petitioner upon evidence not only substantial but conclusive, and
>
> (b) of abstract legal questions which are moot upon the facts as so determined and which were not decided by the court below.

ARGUMENT

I

The first "Question Presented" (Navigability) tenders only an issue of fact upon which both lower courts have upon substantial evidence found adversely to petitioner; and consequently states no ground for certiorari.

Certiorari is not granted to review evidence and discuss specific facts. *United States* v. *Johnston,* 268 U. S. 220, 227; *Southern Power Co.* v. *Public Service Co.,* 263 U. S. 508, 509. Findings of fact concurred in by two lower courts will be accepted as unassailable in this court if supported by substantial evidence. *Alabama Power Co.* v. *Ickes,* 302 U. S. 464, 477; *Houston Oil Co.* v. *Goodrich,* 245 U. S. 440, 441; *Brewer-Elliot Oil and Gas Co.* v. *United States,* 260 U. S. 77.

Navigability, in the Federal sense, is a question of fact *Crowell* v. *Benson,* 285 U. S. 22, 55; and "each determination as to navigability must stand on its own facts". *United States* v. *Utah,* 283 U. S. 64, 87. In the Circuit Court of Appeals, petitioner said:

> "It cannot be said that the New River presents a 'clear case' of navigability or non-navigability * * *."
> (Petitioner's Supp. Br. in Court of Appeals, p. 268)

Manifestly, in the face of this admission, petitioner cannot be heard to say that this finding, concurred in by the Circuit Court of Appeals and the District Court, is not supported by substantial evidence—an issue as to which the burden of proof rested upon petitioner.

The evidence reviewed by both courts below conclusively shows that that concession was by no means improvident. Indeed the evidence reviewed establishes a clear case of non-navigability. (I, 88-90, 93, 95-119; XI, 11-26) But the evidence reviewed in the opinions by no means exhausts the evidence in support of the findings.

That New River was not navigable in fact in a state of nature was overwhelmingly established. In contrast with the average slope of 1.25 feet per mile on the navigable Kanawha, the average slope of New River between Wilson

Creek and its mouth is 7.1 feet per mile (I, 88). Petitioner refers to cases involving the Fox, Colorado, Grand and Green Rivers (Pet. 20). The average slope of the Fox River is less than 1.15 feet per mile (Report of Chief of Engineers 1936, pp. 1182-3). The average slopes of those parts of the Colorado, Green and Grand Rivers held navigable in *United States* v. *Utah, supra,* were only 2 feet per mile (*United States* v. *Utah, supra:* Govt. Exh. 5; Master's Report, 146).

The mile-by-mile surveys (Ex. 31, II, 614; Ex. 35, VIII, 178) of New River from Hinton to the North Carolina line, made by Army Engineers before any work had been done by the Government, graphically portray the fact that shoals, rapids, falls and boulders were so numerous, general and continuous that only an occasional pool could be found which the engineers could denominate as "good water". These surveys plainly establish that New River is not a stream where general navigability is "occasionally interrupted by falls, rapids or other obstructions to practical navigability," but instead one where ledges, boulders, rapids, falls and other unfavorable conditions are general and not merely occasional—are the rule and not the exception.

Thus, the figures in the Reports of the Chief of Engineers show that, in the three short and widely-separated intrastate reaches of New River in which Federal work (hereinafter discussed) was done in an effort to create local navigability to railheads, the engineers found that, even to provide a narrow channel (in one stretch as narrow as 10 feet) only 18 inches deep, it was necessary actually *to cut through rock ledges constituting from 34% to 44% of the entire distance* covered by these short attempted improvements (VIII, 211; VIII, 216; VIII, 206; VIII, 225). This well illustrates how numerous, general and continuous are the rocky ledges, quite apart from the innumerable shoals, boulders and other types of obstructions.

Although land travel presented tremendous difficulties and corresponding incentive to use New River, the uncontradicted evidence established a complete absence of any use of New River for trade, travel or transportation by early settlers, traders, travelers or even military expeditions VIII, 93-107). Indeed, the evidence affirmatively established that the routes used by early settlers, traders and travelers were land routes which, so far as they led westward or northwestward, had their terminus at Kelly's Boat Yard near Charleston, West Virginia, at the head of navigation on the Kanawha River (VIII, 95-117).

Lead smelters and charcoal iron furnaces were in operation on the New River above Radford from the earliest days. Although the great advantage which would have accrued, had it been possible to use New River for the transportation of these products to the eastern and western markets, was early recognized, the uncontradicted evidence establishes that the refined lead and the charcoal iron were transported by land to both eastern and western markets, except for a very limited, temporary, experimental and unsuccessful local movement of a small quantity of charcoal iron in open boats (beginning December 1881, and abandoned probably by June 1882, or at latest 1883) over a short stretch of the river above Radford, Virginia, after the attempted Federal improvement in that stretch (VIII, 114-117, 100-101; 122-132; 323; Ex. 38, II, 677, 682).

The natural non-navigable character of the New River was not changed by the inconsequential Federal work done on three widely separated intrastate stretches (VIII, 3-5; 51-53). A little less than $110,000. was spent on this abortive scheme during the period extending from 1877 to 1889. "Work was limited to the most easily improved places" (Ex. 572, VIII, 5) and no work was attempted in the 60-mile section extending downstream from Radford, Virginia, to the Virginia-West Virginia State Line. The nature of the undertaking, the actual conditions disclosed in the course of the work, and its abandonment were strong evidence of non-navigability (I, 96-109, 119; *Oklahoma* v. *Texas*, 258 U. S. 574, 590-1).

During the period extending from December 29, 1925, to October 24, 1930, New River, including particularly the stretch in the vicinity of Glen Lyn, was the subject of official investigation and report by no less than four officers of the Corps of Engineers of the United States Army, including two Chiefs of Engineers. In each instance *they reported that New River is not navigable in fact at any point in its course* (Ex. 539-B, VIII, 8; Ex. 579-B, VIII, 15; Ex. 579-C, VIII, 18; Ex. 572, VIII, 1).

However, the above mentioned Federal work had had two local effects which are of significance in interpreting and weighing evidence in this case. It resulted in some temporary local, intrastate use of New River by small open boats propelled by poles, for a short stretch above Hinton, West Virginia, and for a short stretch above Radford, Virginia. All reliable testimony of temporary use related to these short intrastate stretches and was referable to the artificial improvement in those local stretches.

The lower courts did not find that these short intrastate stretches (viz., one extending upstream from Radford, Virginia, and the other extending 23 to 24 miles between Hinton, West Virginia, and Round Bottom, West Virginia) were navigable in fact, but merely that such artificial navigability, if any, as was created in these short local stretches, or any part of them, was *not interstate*. Petitioner takes nothing by the repeated statement that "neither court below denied" that these intrastate stretches are navigable (Pet. 9, 22; see also 18)—an issue not involved in this case and upon which the lower courts made no finding. However, the Court of Appeals did observe that the Federal work in these intrastate stretches did not change "their original non-navigable condition" (XI, 26). The bald assertion (Pet. p. 23, footnote) that neither of the lower courts questioned the navigability of the stretch between Glen Lyn, Virginia, and Hinton, West Virginia, is in the teeth of the express finding of the District Court concurred in by the Court of Appeals (I, 167, 190; XI, 15, 22, 26, 30-31; see also pp. 6-7 supra).

But, even a finding (had any such been made) that these short intrastate stretches were navigable would have furnished no basis for a claim that the intervening 60 mile section, between Round Bottom, West Virginia, and Radford, Virginia, is navigable in fact. Plainly such use as was made of these local stretches was referable to their artificial improvement by the federal government, whereas the intervening section was practically devoid of Federal work.* The average slope of the river between Hinton, West Virginia, and Round Bottom, West Virginia, is (as stated by petitioner below, Petitioner's Supp. Br. in Court of Appeals, p. 52) 3.7 feet per mile (Ex. 196). The slope for the first 40 miles above Round Bottom is approximately 5.5 feet per mile or about 50 per cent greater (Ex. 196). No stretch between Hinton and Round Bottom has a slope approaching the average of 15 feet per mile which obtains over the 2.7 mile stretch between Big Walker Mountain Falls and the upper end of Sifford Falls in the 60 mile middle section (Ex. 196). Apart from the other obstacles, the effect upon velocities is obvious. Testimony also shows that the physical characteristics of the middle section of New River are unique, found in no other river of appreciable size and peculiarly unfavorable to navigation (VIII, 77-90). Some of the obstacles are shown in the photographs (X).**

Similarly, no attempt was made to improve the larger part of the stretch from Round Bottom, West Virginia, to Glen Lyn, Virginia. Again, the slope from Round Bottom to Glen Lyn is approximately 50 per cent greater than the slope between Hinton, West Virginia, and Round Bottom, West Virginia (Ex. 196). Above Round Bottom in quick succession are Kings Ripple with a gradient of 10 feet to the mile, Pennington's Ledge with a fall of 30 feet to the mile, Pennington's Shoals with a fall of 13½ feet per mile for 1900 feet; Kidwell's Ripple with a fall of about 17 feet per mile, Wiley's Falls with a fall of 4 feet in a distance of 10 feet (Ex. 31, II, 620), Wiley's Shoals with a fall of 17 feet per mile for 465 feet and Shumate's (Neilley's) Falls with a fall of 11 feet, 6 of it nearly vertical (Ex. 31, II, 620).

---

* The Federal work ceased after having proceeded only about 2 miles into this more precipitous intervening section (I, 99; XI, 23); none of it above the State line at Wiley's Falls was completed (VIII, 212).

** Meaning *black-cover* Vol. X of photographs as filed by respondent in C. C. A. and certified to this Court—not petitioner's grossly inadequate reproductions, with details blurred or completely lost, bound in reddish-brown.

The Corps of Engineers had specifically considered the Glen Lyn stretch and officially reported it to be non-navigable (Ex. 579-B, VIII, 15; Ex. 579-C, VIII, 18). Indeed, the *petitioner* is condemning lands for the construction of a dam 150 feet high a few miles above Hinton, West Virginia, which would be a complete barrier to navigation in this stretch were it navigable. And the conditions incorporated in the tendered license for the alleged protection of navigation relate only to the navigable Kanawha and have no application to nor even mention of the non-navigable New River (Ex. 131, IX, 732, Article 15).

The petitioner does not attempt to show that the finding of non-navigability is not supported by substantial evidence. Petitioner in effect merely asserts that there was some conflicting evidence (Pet. 18-19). Manifestly, this presents no question for review. Nevertheless, a word upon this alleged conflicting evidence may be appropriate. It is of the type which this Court has said is often vague and untrustworthy and must yield to evidence of a more definite character. (*United States* v. *Oregon*, 295 U. S. 1, 19; *Oklahoma* v. *Texas*, 258 U. S. 574, 586-7; XI, 24). This evidence, much of it hearsay, was not only at war with other types of evidence of a higher order, but was contradicted by other testimony of like character and by known facts (XI, 24-5).

The assertion (Pet. 19) that the lower courts did not dispute the accuracy of the facts summarized by the dissenting judge is manifestly untrue. In discussing this testimony the Court of Appeals said in part (XI, 24-5):

> "It is said that this conclusion did not correctly appraise the effect of the oral nonexpert testimony; and in plaintiff's reply brief there are listed the names of 23 such witnesses from whose testimony it is contended the contrary conclusion should have been reached. We have carefully considered this testimony, but are not convinced that it was given too little weight. This is the type of testimony that the trial judge who sees and hears the witnesses is particularly well qualified to appraise. These witnesses were for the most part elderly men who were testifying purely from unaided memory of events long past. Such testimony has inherent infirmities and is obvi-

> ously not entitled to the weight to be properly given to contemporary official written records (United States *v.* Oregon, 295 U. S. 19). It also had to be appraised in connection with similar testimony of almost an equal number of witnesses introduced by the defendant by which it was to a considerable extent contradicted or qualified; and proper consideration also had to be given to the other testimony in the case, verbal and documentary, of expert and scientific witnesses tending very strongly to show that the river was nonnavigable in fact."

Manifestly, that the finding of non-navigability, concurred in by both lower courts, is supported by substantial evidence is not open to question. Consequently, unless petitioner can demonstrate that the two lower courts applied an erroneous definition of navigable waters of the United States, the first question sought to be presented by the petition can furnish no basis for certiorari. To escape this difficulty, the petitioner advances two assertions. First, petitioner asserts that the courts below "have revised long-settled rules as to the test of navigable waters" (Pet. 16, 21). This contention is fully refuted by the opinions below (XI, 14-15; I, 110, 112-119). These opinions demonstrate that both courts adopted and applied the definition of navigable waters of the United States which was laid down by *The Daniel Ball,* 10 Wall. 557 and which has been consistently adhered to since that time (XI, 14-15; I, 112-115).* Petitioner cites no case which enunciates a test of navigability different from that applied by the courts below. Indeed, petitioner's argument on this point (Pet. 18-22), sought to be put forward under the color of a question of law, is in reality merely an argument that more weight should have been given certain selected items of evidence—a question of fact not open here—and this argument is advanced without any reference to the mass of other evidence which squarely supports the finding concurred in by both lower courts.

---

* The statement that the Court of Appeals "indicated that an actual present navigation was necessary" (Pet. 12) and the implication that that Court disregarded "susceptibility to commercial use" (Pet. 12) are clearly negatived by the opinion (IX, 14-15). Moreover, the first of these is sought to be conjured out of a comment, as to effect upon navigation, which has no relation to the definition of navigable waters laid down and applied by the Court.

The second assertion (Pet. 22) of the petitioner is that the courts below erred in not holding the intrastate stretch above Radford, Virginia, to be a navigable water of the United States because this alleged intrastate navigable water, upon which the negligible and unsuccessful experiment in boating charcoal-iron was made in the early 1880's (see p. 12, *supra*), connects with an interstate railroad at Radford, Virginia, over which some of such iron was subsequently shipped. This legal proposition is at war with every decision of this Court on the subject. Manifestly, *The Daniel Ball, supra,* furnishes no support for any contention that an intrastate navigable water becomes a navigable water of the United States if it is possible to transfer products to an interstate railroad. In addition, it should be observed, first, that the lower courts did not find that this stretch was an intrastate navigable water, and, second, that the uncontroverted evidence is that there is no commerce whatsoever on this stretch (or indeed any other stretch) of New River (VIII, 11).

If the reference to navigability "within the meaning of Section 9 of the Rivers and Harbors Act of 1899 and Section 3(8) of the Federal Power Act", is intended to imply that waters not navigable-in-fact in interstate commerce have been, or constitutionally could be, made navigable waters by legislative fiat, it is manifestly untenable. ***United States* v. *Cress,*** **243 U. S. 316, 322;** ***Crowell* v. *Benson,*** **285 U. S. 22, 55.**

From the foregoing, it is, we submit, clear that the first alleged "Question Presented" in the petition for certiorari tenders only an issue of fact, decided adversely to the petitioner by two lower courts on substantial evidence, and states no ground for certiorari.

II.

The second "Question Presented" (Effect of Project) tenders only an issue of fact, decided adversely to petitioner by both lower courts upon substantial evidence; and it plainly affords no ground for certiorari.

Whether or not the construction or operation of respondent's project would substantially impair the navigable capacity of any navigable water of the United States was plainly a question of fact as to which the burden of proof rested on petitioner. *United States* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690, 710; *Edison Co.* v. *Labor Board,* 305 U. S. 197, 223. This issue of fact has been found adversely to petitioner by both lower courts. (See pp. 7-8, *supra.*) That finding is plainly supported by substantial evidence, and it is unassailable here. (See p. 10, *supra.*)

In the Court of Appeals, the petitioner stated with respect to this issue:

> "It cannot be said that * * * there is a 'clear case' of absence of any effect on the interests of interstate or foreign commerce." (Petitioner's Supp. Br. in Court of Appeals, p. 268.)

While the evidence *does* establish a clear case of absence of any effect upon interstate or foreign commerce, this admission manifestly precludes any contention that this finding, concurred in by both lower courts, is not supported by substantial evidence.

Indeed, petitioner cites no evidence in support of any claim that the courts below should have found that respondent's project would impair the navigable capacity of the Kanawha River. 160 miles of tortuous river, broken by innumerable shoals, falls, ledges and rapids, separate respondent's project from the head of navigation on the Kanawha River, the nearest navigable water of the United States (XI, 28; I, 90). General Taylor, then Chief of Engineers, officially reported that it would not be possible, by any physical manipulation of the project works, wholly unrelated to practical or intended operation, to affect adversely navigation on the Kanawha River (VIII, 6-7).

The practical and intended operations of respondent's dam are of the same character and order of magnitude as the actual operations of the power plants at the Government navigation dams on the Kanawha River (Ex. 145, R. 3172-3; VIII, 508-9, 493-4; Ex. 263, II, 1090-3). However, the power plants at the Government navigation dams on the Kanawha River discharge *directly* into the navigable waters, yet manifestly do not impair navigable capacity. Any contention that similar operations at Radford, Virginia, 160 miles above the head of navigation, would impair the navigable capacity of the Kanawha River, is manifestly without substance.

Great wave tests, involving discharges far larger than the maximum hydraulic capacity of respondent's project, had been made by respondent in cooperation with the Corps of Engineers of the United States Army; and it was stipulated that Colonel Ardery (United States District Engineer, whom the petitioner would not give permission to appear and testify at the request of the trial court) would testify that these tests produced no interference with navigation or navigation works in the Kanawha River (VIII, 484, 39-41; I, 125). The finding is also supported by the testimony of numerous witnesses of the highest standing and ability and the widest experience. (I, 125-6; XI, 28; VIII, 401-12, 416-9, 430, 433-4; 438-42, 497-8).

Indeed, the description of these variations in flow as "waves" is misleading. By the time the waves in the great wave tests, above referred to, reached the head of navigation, their front had an average slope of 5 inches in about 20 miles, or one-fourth of an inch per mile, and their back had an average slope of 5 inches in about 80 miles, or one-sixteenth of an inch per mile (VIII, 520-1). It would be quite as reasonable to describe as a "hill" a section of a highway which rose 5 inches in a distance of 20 miles and then fell 5 inches in 80 miles. Such slopes would not even permit drainage.

Indeed, petitioner in substance concedes that the construction and operation of respondent's project will not impair the navigable capacity of the Kanawha River (Pet. 23). The inescapable consequences of this concession are not avoided by petitioner's three patently erroneous and untenable assertions (Pet. 23), which we now discuss.

First, without indicating any factual basis for, or application of, the contention in this case, petitioner asserts that effect upon interstate commerce, in relation to a project in non-navigable waters, embraces beneficial effect upon navigable waters elsewhere. This contention is plainly untenable as a matter of law (XI, 39; I, 143-4, 148; *Labor Board* v. *Jones & Laughlin*, 301 U. S. 1, 31-32). But in any event the question is not open to petitioner or involved in this case. The petitioner in its bill charged that respondent's project would impair the navigable capacity of the Kanawha River (I, 1-17). Petitioner requested the trial court so to find (R. 125).* The petitioner reiterated this request in the Court of Appeals (Petitioner's Supp. Br. in Court of Appeals, p. 26). Having pleaded and requested both lower courts to find that the project would impair navigable capacity, petitioner cannot now assert that the lower courts erred in not finding that the project would benefit navigable capacity, and consequently no factual basis for this contention is open to petitioner.

Second, petitioner asserts that in a suit of this character for injunctive relief, the trial court should not limit its inquiry to whether the *intended* acts of the defendant will substantially impair navigable capacity, but should also inquire whether any conceivable physically possible manipulation of the project works, no matter how unrelated to defendant's intended acts or common sense, would impair navigable capacity in navigable waters elsewhere. This is plainly erroneous as a matter of law. *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 710. However, the District Court also found that even the unintended and impractical manipulation of the project works assumed in petitioner's testimony would cause no interference with navigation on the Kanawha River (I, 125).

---

* This reference is to Vol. I (containing *inter alia* the pleadings) of the volumes (I-XX) of the typewritten transcript as certified to this Court. This explanation is necessary because another volume of the typewritten transcript contains one set of numbers which duplicates in part the page numbers of Vol. I.

Third, petitioner, while conceding that the lower courts correctly found as a fact that the " 'power waves' * * * will be substantially dissipated before they reach the Kanawha River" (Pet. 23), apparently asserts that the lower courts erroneously took into consideration the effect of dams intermediate between the Radford project and the Kanawha River. If the lower courts had done so, that would have been correct as a matter of law.* However, the District Court held that there would be no adverse effect on navigation on the Kanawha River, regardless of intermediate dams (I, 126-130). At present there is one such intermediate dam—the Hawksnest dam of Electro-Metallurgical Company, but, when the great wave tests, involving discharges far greater than the maximum hydraulic capacity of respondent's project, were made in 1930, no dam was in existence between the site of the Radford project and the Kanawha River; and yet no effect was produced upon navigation or navigation works in the Kanawha River. (See p. 19 *supra.*) Similarly, no intermediate dam existed when General Taylor made his official report in 1925. (See p. 18 *supra.*) It is true that both courts recognized the obvious fact that, with the construction of the Bluestone Dam, it will be absurd to claim that the Radford project could have any effect upon navigation; but the finding was not based upon that circumstance.

The further contention that the respondent's project will "affect the interests of interstate commerce" because it will have a beneficial effect upon flood control is plainly without substance. The record establishes that the Federal Government has no plan for the construction of a flood control project at the site of respondent's project (Ex. 145), but, even if petitioner had such a plan, it could only execute it by condemning respondent's property and paying fair value for the property taken. However, the question is not open to the petitioner. Neither in the pleadings nor in the trial court did petitioner make any contention that the respondent's project would be beneficial to flood control. It is a power project and not a flood control project.

---

* Impairment of navigable capacity is a question of fact. *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690. It is to be determined upon the basis of physical conditions as they actually exist and not upon the basis of hypothetical physical conditions which do not exist. It is to be a determination of actual impairment, not of hypothetical impairment under non-existent facts.

III.

The third and last "Question Presented" (Constitutionality of Power Act) tenders only abstract questions of law which were not decided by the court below. Consequently it states no ground for certiorari.

The third question sought to be presented (Pet. 2-3) asks this court to determine the abstract legal questions whether the license provisions of the Federal Water Power Act are constitutional (a) as applied to a project located in navigable waters and (b) as applied to a project located in non-navigable waters which affects interstate commerce. The lower court did not hold unconstitutional any part of either the Rivers and Harbors Act of March 3, 1899, or the Power Act (XI, 3-44).

The petitioner concedes that the facts as found by both lower courts present no constitutional question under either Act (Pet. 16-17). The Circuit Court categorically excluded the first question from the decision (XI, 42) and, as hereinbefore pointed out, did not hold unconstitutional any provision of either Act. In an effort to circumvent this difficulty, the petitioner, by references to the court's statements of contentions of the parties and discussion of abstract legal principles found in some of the reasoning of the court (Pet. 17), seeks to conjure out of the opinion an implication or inference that the court would have held some of the license conditions unconstitutional if that question had been presented by the facts. This effort involves a misconception or misconstruction of the opinion, but in any event is irrelevant. Certiorari does not lie to review alleged errors in the reasoning of the lower court. *Hunt* v. *Western*

Casualty Co., 293 U. S. 530; *Tyrrell* v. *District of Columbia*, 243 U. S. 1.

The correctness of the Circuit Court's holding that, upon the facts found by both lower courts, neither statute is applicable to respondent's project, is, we think, not fairly debatable, and was conceded by the petitioner in the court below. (See pp. 8-9 *supra.*) The factual premises upon which these concessions rest were squarely found as facts by both lower courts (see pp. 6-8 *supra*) and are supported by substantial evidence. (See pp. 10-16, 18-19, 21 *supra.*)

Quite apart from the petitioner's concession, the correctness of the holding, that the Rivers and Harbors Act is not applicable to respondent's project under the facts as found, is inescapable under its language and is squarely supported by *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690. Similarly, the correctness of the holding, that the Power Act is not applicable to respondent's project under the facts as found, is plain and squarely supported by fundamental principles long established by the decisions of this court. *Labor Board* v. *Jones & Laughlin*, 301 U. S. 1, 31-32.

Since, as petitioner states, the amendments to the Federal Water Power Act are immaterial to the questions sought to be presented (Pet. 2, footnote), the lack of substance in the uncertain suggestion that the lower court may have erroneously held that the amendments should not be given retroactive effect, is manifest.

It is a settled rule of this Court that it does not render advisory opinions, *California* v. *San Pablo & T. R. Co.*, 149 U. S. 308, 312, 314; *United States* v. *Alaska S. S. Co.*, 253 U. S. 113, 116; *New Jersey* v. *Sargent*, 269 U. S. 328, 333, and in particular that it will never decide a constitutional question where its decision is not absolutely necessary to the disposition of the case. *Interstate Commerce Comm.* v. *Oregon-Washington R. & N. Co.*, 288 U. S. 14; *Borden's Farm Products Co.* v. *Baldwin*, 293 U. S. 194. The lower court did not hold any Federal statute unconstitutional. Under the facts as found, it is plain and conceded that neither Act is applicable to respondent's project. (See pp. 8-9 *supra.*) It therefore follows that, if certiorari were granted, this Court could not, consistently with these long-established and salutary principles, decide any important question of constitutional law or of statutory construction with reference to either the Rivers and Harbors Act of March 3, 1899, or the Power Act. Consequently, the third and last "Question Presented" affords no ground for certiorari.

CONCLUSION.

For the reasons hereinbefore stated, the petition should be denied.

Respectfully submitted,

Raymond T. Jackson,
A. Henry Mosle,
Hugo Kohlmann,
Fraser M. Horn,
John L. Abbot,
Counsel for Respondent.

FILE COPY

Office - Supreme Court, U. S.
FILED
SEP 27 1940
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA,
Petitioner,
v.
APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

BRIEF FOR RESPONDENT.

RAYMOND T. JACKSON,
Cleveland, Ohio

M. F. MILLIKAN,
A. HENRY MOSLE,
CRESWELL M. MICOU,
FRASER M. HORN,
WENDELL W. FORBES,
M. W. BELCHER, JR.,
New York, N. Y.

JOHN L. ABBOT,
Lynchburg, Va,

Counsel for Respondent.

August 31, 1940

On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit.

INDEX

BRIEF FOR RESPONDENT

PAGE

Opinions Below 2

Jurisdiction 2

Statutes Involved 2

1. Rivers and Harbors Act of March 3, 1899.......... 2
2. The Federal Water Power Act of 1920.......... 2
3. The Federal Power Act of 1935.......... 4

Statement of the Case.......... 5

A. General description of the New and Kanawha Rivers 5

B. Location and description of Radford Project 7

C. Prior proceedings—background of the litigation 9

D. Issues raised by the instant suit and their disposition by the courts below.......... 13

The Nature and Scope of the Questions Presented in this Court.......... 17

Summary of Argument 20–29

Argument 30

Point I.—The courts below did not err in finding and concluding that New River is not navigable in fact in interstate commerce, and consequently is not a navigable water of the United States, either at respondent's damsite or at any other point in its course 30

PAGE

A. The courts below adopted the correct definition of navigable waters of the United States 31

B. The relation of the constitutional character of federal navigable waters to a proper determination of an issue as to federal navigability 35

C. The concurrent finding of both lower courts that New River is not navigable in fact in interstate commerce at any point in its course, is supported by evidence not only substantial but conclusive 37

  1. The physical characteristics of New River alone establish that New River in its natural and ordinary condition was not navigable in interstate commerce in the Allisonia-Hinton reach or elsewhere in its course.... 38

    Significance, interrelation and cumulative effect of various natural obstacles to navigability 38

    Physical characteristics as disclosed by the evidence 39

    The actual conditions disclosed by federal work 40

  2. The limited federal work did not change the natural non-navigable character of New River in interstate commerce............ 41

    Non-navigable character of Round Bottom-Radford section unchanged; important physical and other differences between that section and Hinton-Round Bottom stretch 42

  3. The absence of any use of New River by early traders, industries, or even military expeditions, is compelling evidence of its non-navigability 44

PAGE

4. Quite aside from the complete absence of early use, petitioner failed to establish practical use, or susceptibility for practical use, in interstate commerce............. 45

5. Comparison of New River, with the rivers involved in the cases upon which petitioner principally relies, establishes that New River is not navigable in the Allisonia-Hinton reach or elsewhere in its course....... 56

6. All considered action of Congress and the War Department sustains the conclusion that New River is non-navigable.......... 59

D. Petitioner's argument that the intrastate stretch between Allisonia and Radford is "a channel of interstate commerce", and consequently a navigable water of the United States, is without basis in fact or law 61

Point II.—The courts below did not err in finding that neither the construction nor operation of the Radford project will substantially interfere with navigation on, or impair the navigable capacity of, any navigable waters of the United States 63

A. Petitioner had the burden of proving that the Intended Acts of respondent would substantially impair the navigable capacity of navigable waters 65

B. The finding concurred in by both the courts below, that the operation of respondent's project will not impair the navigable capacity of any navigable water of the United States, is supported by evidence not only substantial but conclusive 67

1. As the lower courts found, the intended acts of respondent will not diminish the flow

PAGE

so as to impair the navigable capacity of the Kanawha or Ohio Rivers during allegedly "critical low-water periods".... 68

No inference of impairment may be drawn from the size or character of respondent's installation 68

Even a complete shut-off of all contribution from above the damsite during a low-water season, an assumption wholly unrelated to respondent's intended acts, would not impair navigable capacity of these streams 69

Respondent's project will increase low water flow every season and particularly during allegedly "critical low water periods" 71

Petitioner's allegedly undisputed evidence 71

2. As the lower courts found, the intended acts of respondent will not create so-called "waves" or tides which will impair the navigable capacity of the Kanawha River.. 74

The compensatory effect of downstream dams 79

Method of operation 82

Point III.—Neither the construction nor the operation of respondent's project violates the Rivers and Harbors Act of March 3, 1899.................. 83

Point IV.—The lower courts correctly held that the Power Act (both as originally enacted and as amended) does not purport to authorize or require a Federal license for respondent's project...... 84

PAGE

A. On the facts of this case, the inapplicability of the Power Act is not debatable and in fact conceded 85

B. Contrary to petitioner's contention, Section 23 does not authorize or require a license for respondent's project because, although located in a non-navigable stream and not impairing navigable capacity, its incidental effect upon navigation is beneficial........................... 85

Lack of factual basis for petitioner's contention—any beneficial effect indirect, incidental and insubstantial 87

Petitioner's contention, that Section 23 applies to projects on non-navigable streams the effect of which, if any, is beneficial, is erroneous as a matter of law 91

C. The Federal Power Act, properly construed, does not purport to authorize the Commission to require, or to issue, a license for a project on a non-navigable stream 95

D. Assuming *arguendo* that the Act could be construed to require SOME license for respondent's project, it should be construed as requiring only a minor-part license, or its equivalent, embracing only conditions regulatory of flow for the protection of navigation 103

E. Assuming *arguendo* that the Act could be construed to require a minor-part license for respondent's project, petitioner's conduct would bar it from relief 105

POINT V.—Petitioner has no constitutional authority to require a license for a project located in non-navigable waters and *a fortiori* for respondent's project which will not impair navigable capacity.. 107

PAGE

A. Petitioner has no constitutional authority to require a license for respondent's project under its implied authority in relation to navigable waters 108

  1. Even in navigable waters, the United States has no title or property right in the waters or the beds of the streams, and its powers are limited to control of such waters for purposes of navigation 109

  2. While the right of a riparian owner on a navigable stream to develop water power is subject to the servitude of navigation, the right of a riparian owner on a non-navigable stream is subject to no servitude in favor of navigation and may not be taken or restricted (as long as no nuisance is created) without compensation 111

  3. Any constitutional authority of the United States is no different or greater in relation to non-navigable waters than in relation to land; and consequently, it has no constitutional authority to make illegal *per se* the erection or maintenance of structures without a federal license merely because they are located in a non-navigable stream..... 113

  4. On the facts of this case, petitioner has no constitutional authority to require a license for respondent's project under its implied authority in relation to navigable waters.. 117

B. Petitioner has no constitutional authority to require a license for respondent's project under any other aspect of the commerce clause..... 119

PAGE

POINT VI.—Assuming *arguendo* that petitioner had authority to require some license for respondent's project, it could not constitutionally impose those conditions of the tendered license which are unrelated to the protection of navigation 121

A. Many of the license conditions would be unconstitutional as applied to projects located in navigable waters or in non-navigable waters and impairing navigable capacity; and, *a fortiori,* they are unconstitutional if applied to respondent's project located in non-navigable waters and not impairing navigable capacity.. 121

The "capture clause" (Section 14)........ 125

B. Petitioner's arguments in defense of the license conditions are severally untenable or inapposite 128

1. Petitioner's argument that it has authority to impose license regulations unrelated to its constitutional authority 128

2. Petitioner's argument that license conditions do not invade the rights of a State or its people 129

3. Petitioner's argument that respondent can not now raise the question of validity of the "capture clause" 131

4. Petitioner's argument that the "capture clause" is valid 133

(a) Argument that there is no taking of riparian rights 134

(b) Petitioner's argument that the "capture clause" is not confiscatory 136

PAGE

(c) Petitioner's argument based on claim that right to engage in interstate commerce is a privilege 136

(d) Petitioner's argument that the "capture clause" is valid as applied to a public utility 137

CONCLUSION 138

TABLE OF CASES

A.

Alabama Power Co., v. *Gulf Power Co.,* 283 Fed. 606 ....29, 110, 132
Alabama Power Co. v. *Ickes,* 302 U. S. 464......17, 20, 30
Anniston Mfg. Co. v. *Davis,* 301 U. S. 337.......... 133
Apfel v. *Mellon,* 33 F. (2d) 805.................... 101
Appalachian Electric Power Co. v. *Smith, et al.,* 4 F. Supp. 6; 67 F. 2d, 451, 291 U. S. 674.......... 12, 98
Arizona v. *California,* 283 U. S. 423...........30, 31, 35, 129
Ashwander v. *Tennessee Valley Authority,* 297 U. S. 288 110

B.

Baker v. *Schofield,* 243 U. S. 114................. 30
Blease v. *Safety Transit Co.,* 50 F. (2d) 852...... 66
Borax Consolidated Ltd. v. *Los Angeles,* 296 U. S. 10 109
Brewer-Elliott Co. v. *United States,* 260 U. S. 77 ....17, 20, 30, 31

C.

California Power Co. v. *Cement Co.,* 295 U. S. 142.. 110
Carpenter v. *Gold,* 88 Va. 551..................... 112
Carter v. *Carter Coal Co.,* 298 U. S. 238
37, 86, 94, 118, 120, 122, 128, 130

PAGE

Chicago, etc. Ry. Co. v. *Wisconsin,* 238 U. S. 491....134, 135

Columbus Ry. & Power Co. v. *Columbus,* 249 U. S. 399 ....29, 132

Connecticut v. *Massachusetts,* 282 U. S. 660........66, 110

Coyle v. *Oklahoma,* 221 U. S. 559.................. 129

Crowell v. *Benson,* 285 U. S. 22..........20, 30, 33, 35, 36

D.

Daniel Ball, The, 10 Wall. 557 ....20, 22, 32, 35, 62

Debs, In re, 158 U. S. 564.......................... 81, 94

Donnelly v. *United States,* 228 U. S. 243............ 36

Driscoll v. *Edison Co.,* 307 U. S. 104.............. 137–8

E.

Economy Light & Power Co. v. *United States,* 256 U. S. 113.. 57

Edison Co. v. *Labor Board,* 305 U. S. 197........ 23

Employers' Liability Cases, 207 U. S. 463 .....114, 128, 137

F.

Ford & Son v. *Little Falls Co.,* 280 U. S. 369........29, 132

Ford Hydro-Electric Co. v. *Neely,* 13 F. (2d) 361, cert. den. 273 U. S. 723.......................... 112

Fox River Paper Co. v. *Railroad Commission,* 274 U. S. 651 ....29, 129, 136

Frost Trucking Co. v. *Railroad Commission,* 271 U. S. 583..........................106, 114, 128-129

Fulton Power Co. v. *New York,* 200 N. Y. 400...... 112

G.

Georgia v. *Tennessee Copper Co.,* 206 U. S. 230...... 116

Gibbons v. *Ogden,* 9 Wheat. 1.....................113, 137

Gilman v. *Philadelphia,* 3 Wall. 713.................. 113

Greenleaf Lumber Co. v. *Garrison,* 237 U. S. 251.... 114

Gulf & I. Ry. Co. v. *Davis,* 26 F. (2d) 930, aff'd. 31 F. (2d) 109 36

H.

PAGE

Hanover Ins. Co. v. *Harding,* 272 U. S. 494...... 129

Harrison v. *Fite,* 148 Fed. 781.................... 36, 38

Head v. *Amoskeag Mfg. Co.,* 113 U. S. 9............ 110

Helvering v. *Davis,* 301 U. S. 619................. 86, 130

Holyoke Co. v. *Lyman,* 15 Wall. 500...............110, 124

Holy Trinity Church v. *United States,* 143 U. S. 457 103

Hoxie v. *Railroad,* 82 Conn. 352................... 137

Hudson County Water Co. v. *McCarter,* 209 U. S. 349 124

Hurley v. *Commission of Fisheries,* 257 U. S. 223..29, 132

I.

Interstate Commerce Commission v. *Oregon-Washington R. & N. Co.,* 288 U. S. 14......26-27, 95, 103, 105

In re Debs, 158 U. S. 564........................... 81, 94

K.

Kalama, etc. Co. v. *Kalama Driving Co.,* 48 Wash. 612, 94 Pac. 649.............................. 112

Kandle v. *United States,* 4 F. (2d) 183.............. 106

Kansas v. *Colorado,* 206 U. S. 46............109, 110, 130

Kaukauna Co. v. *Green Bay Co.,* 142 U. S. 254...... 110

Kidd v. *Pearson,* 128 U. S. 1...................... 120

Kimble v. *Kiser,* 59 F. (2d) 626 86

L.

Labor Board v. *Jones & Laughlin,* 301 U. S. 1..26, 37, 94, 118

Leovy v. *U. S.,* 177 U. S. 621...........31, 36, 37, 111, 113

Linder v. *United States,* 268 U. S. 5............114, 122, 128

Lynchburg v. *Mitchell,* 114 Va. 229............. 112

M.

Marks v. *United States,* 161 U. S. 297 101

McCulloch v. *Maryland,* 4 Wheat. 316 ....122, 128

Meyer v. *Somerville Water Co.,* 82 N. J. Eq. 572.... 66

Mintzer v. *Dredging Co.,* 242 Fed. 553 38

Missouri v. *Illinois,* 180 U. S. 208 66

PAGE

Missouri v. *Union E. L. & P. Co.*, 42 F. (2d) 692 110

Monongahela Navigation Co. v. *United States*, 148 U. S. 312 .... 106, 111, 114, 122, 135

Montello, The, 20 Wall. 430 .... 30, 36, 57

Montello, The, 11 Wall. 411 .... 22, 35, 57, 62

N.

National Labor Board v. *Jones & Laughlin*, 301 U. S. 1 .... 26, 37, 94, 118

New Jersey v. *New York*, 283 U. S. 336 82

New Jersey v. *Sargent*, 269 U. S. 328 100

O.

Oklahoma v. *Texas*, 258 U. S. 574 .... 20, 35, 36, 41, 47

Oklahoma v. *Woodring*, 60 S. Ct. 725 (1940) 86

Oregon & Cal. R.R. Co. v. *United States*, 238 U. S. 393 129

Otis Co. v. *Ludlow Co.*, 201 U. S. 140 110

P.

Packer v. *Bird*, 137 U. S. 661 111

Pan American P. & T. Co. v. *United States*, 273 U. S. 456 106

Pennsylvania Co. v. *Sun Company*, 290 Pa. 404, 138 Atl. 909 66

People ex rel. Niagara Falls Power Co. v. *Smith*, 70 App. Div. (N. Y.) 543 112

Pick Mfg. Co. v. *General Motors Co.*, 299 U. S. 3..... 30

Pike Rapids Power Co. v. *Railroad*, 99 F. (2d) 902, cert. den. 305 U. S. 660 .... 111, 135

Port of Seattle v. *Oregon & W. R.R. Co.*, 255 U. S. 56 .... 109, 134-135

Pumpelly v. *Green Bay Co.*, 13 Wall. 166 111

R.

Railroad Retirement Board v. *Alton R. Co.*, 295 U. S. 330 129

Railway Co. v. *McCarthy*, 96 U. S. 258 86

PAGE

Rankin v. *Harrisonburg,* 104 Va. 524 112
Ruddy v. *Rossi,* 248 U. S. 104 129

S.

St. Cloud P. S. Co. v. *St. Cloud,* 265 U. S. 352 132
Santa Cruz Fruit Packing Co. v. *Labor Board,* 303 U. S. 453 94
Schechter v. *United States,* 295 U. S. 495......37, 86, 94, 118, 120
Shively v. *Bowlby,* 152 U. S. 1............ 109
Smyth v. *Ames,* 169 U. S. 466............ 137
South Carolina Power Co. v. *Tax Commission,* 52 F. (2d) 515, aff'd 286 U. S. 525 119
South Carolina v. *United States,* 199 U. S. 437 137
Stafford v. *Wallace,* 258 U. S. 495 .... 26, 94
State of Iowa v. *Carr,* 191 Fed. 257 106
Stephenson v. *Binford,* 287 U. S. 251 129
Steward Machine Co. v. *Davis,* 301 U. S. 548 37

T.

Texas & N. O. R. Co. v. *Ry. Clerks,* 281 U. S. 548.... 30
The Daniel Ball, 10 Wall. U. S. 557 ....20, 22, 32, 35, 62
The Employers' Liability Cases, 207 U. S. 463...114, 128, 137
The Montello, 20 Wall. 430 ....30, 36, 57
The Montello, 11 Wall. 411 ....22, 35, 57, 62
The Thekla, 266 U. S. 328............106, 132
Trenton v. *New Jersey,* 262 U. S. 182............ 132

U.

Union Electric Co. v. *Snyder Co.,* 65 F. (2d) 297 112
United Fuel Gas Co. v. *R. R. Commission,* 278 U. S. 300 132
United Mine Workers v. *Coronado Co.,* 259 U. S. 344. 94
United States v. *Appalachian Electric Power Co.,* 23 F. Supp. 83, 107 F. (2d) 769 2
United States v. *Butler,* 297 U. S. 1 ....86, 114, 130
United States v. *Certain Lands,* 78 F. (2d) 684 86

PAGE

United States v. *Chandler-Dunbar Co.,* 229 U. S. 53 .... 110, 111, 114, 136
United States v. *Chemical Foundation,* 272 U. S. 1 .. 30
United States v. *Commercial Credit Co.,* 286 U. S. 63. 30
United States v. *Cress,* 243 U. S. 316 .... 20, 33, 36, 106, 109, 111, 112, 122
United States v. *Devereux,* 90 Fed. 182 106
United States v. *Doughton,* 62 F. (2d) 936 .... 36, 37, 114-115
United States v. *Holt State Bank,* 270 U. S. 49 36
United States v. *Lowden,* 308 U. S. 225 129
United States v. *Lynah,* 188 U. S. 445 111
United States v. *O'Donnell,* 303 U. S. 501 30
United States v. *Oregon,* 295 U. S. 1 .... 35, 36, 47, 109
United States v. *Midway Northern Oil Co.,* 232 Fed. 619 106
United States v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690 .... 23, 25, 26, 34, 36, 65, 66, 81, 83, 92, 101, 110, 111, 114, 116, 118
United States v. *River Rouge Co.,* 269 U. S. 411 .... 109, 111
United States v. *The Thekla,* 266 U. S. 328.......... 106
United States v. *Utah,* 283 U. S. 64 ...... 22, 30, 36, 56-57, 62
Utah Power & Light Co. v. *Pfost,* 286 U. S. 165...... 28, 29, 119, 120

V.

Virtue v. *Creamery Package Co.,* 227 U. S. 8 86

W.

Wisconsin v. *Illinois,* 278 U. S. 367 .... 109, 111

CONSTITUTION, STATUTES AND MISCELLANEOUS AUTHORITIES.

	PAGE
Annual Reports of the Federal Power Commission:	
1st Rep.	98
4th Rep.	98, 112
5th Rep.	104
7th Rep.	104
10th Rep.	98, 104
11th Rep.	104
12th Rep.	104
16th Rep.	104
18th Rep.	104
Anti-Trust Act	94
Bituminous Coal Act	94
59 Cong. Rec., p. 6523	97
Constitution, Federal:	
Fifth Amendment	15, 123, 125
Ninth and Tenth Amendments	29
37 Corpus Juris, pp. 166-7	116
Federal Wages and Hours Act	94
Federal Water Power Act and as amended by Federal Power Act of 1935	13, 16, 26, 27, 33, 34, 92, 95, 96, 108, 120, 122
Sec. 3	3, 4, 101
Sec. 3(8)	20, 32, 34, 64
Sec. 3(13)	126
Sec. 4(d)	2, 4, 96, 100, 103
Sec. 4(e)	5, 96, 100, 135
Sec. 6	132
Sec. 8	3, 4
Sec. 10	3, 4, 11, 27, 104, 123, 124, 125, 132, 135
Sec. 10(c)	2, 103, 124

PAGE

Sec. 10(i) 4
Sec. 13 103
Sec. 14 .... 3, 4, 29, 125, 126, 132, 135
Sec. 21 103
Sec. 23 .. 2, 4, 5, 9, 25, 26, 81, 84, 85, 91, 92, 93, 96, 97, 98, 99, 100, 102, 103
Sec. 23(b) 5
Sec. 313(b) 132

Flood Control Act of 1936 (Sec. 1) 94

Hearings on Public Utility Holding Act 100

House Documents:
No. 781, 60th Cong., 1st Sess. 58
No. 910, 66th Cong., 2nd Sess. 97

House Committee on Interstate Commerce (60th Cong.) Report of Subcommittee on Dams and Water Power (Taft Op.) 111

Judicial Code (Sec. 240(a)) 2

National Industrial Recovery Act 94

National Labor Relations Act 94

Rivers and Harbors Act of 1890-1892 116
Sec. 10 101

Rivers and Harbors Act of 1899 .... 16, 25, 26, 27, 83, 92, 93, 95, 107
Sec. 9 .... 2, 94, 102
Sec. 10 .... 2, 81, 94, 101, 102

Senate Reports (No. 621, 74th Cong., 1st Sess.) 102

Statutes at Large 102
Vol. 26, p. 426 101
Vol. 26, p. 454 116
Vol. 27, p. 88 101
Vol. 27, p. 110 116

PAGE

Vol. 30, p. 1121 101
Vol. 30, p. 1151 .... 2, 83
Vol. 34, p. 386 101
Vol. 36, p. 593 101
Vol. 41, p. 1063 .... 2, 101
Vol. 49, p. 838 4
Vol. 49, pp. 838-863 101

United States Code:
Title 15, Sec. 1, 701, 828 91
Title 16, Chap. 12 4
Title 16, Sec. 803(a) 123
Title 29, Sec. 202 94
Title 33 101

In the

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit

---

BRIEF FOR RESPONDENT

On March 4, 1940, this Court granted certiorari to review the decree of the United States Circuit Court of Appeals for the Fourth Circuit, affirming a final decree of the United States District Court for the Western District of Virginia dismissing the Amended Bill after an exhaustive hearing on the merits (R. 2943, 157-8). The Bill sought a mandatory injunction requiring respondent to take a major license under the Federal Water Power Act for the construction of its hydro-electric project in New River near Radford, Virginia,[1] or in the alternative, to remove "all or any part of such project works which lie within the limits of New River" (R. 4-20).

---

[1] Hereinafter sometimes referred to as "the Radford project."

Opinions Below

The opinion of the District Court (R. 101-154) is reported in 23 F. Supp. 82. The opinion of the Circuit Court of Appeals (R. 2880-2922) and the opinion of the dissenting judge (R. 2922-42) are reported in 107 F. (2d) 769.

Jurisdiction

The jurisdiction of this Court rests on Section 240(a) of the Judicial Code as amended by the Act of February 13, 1925.

Statutes Involved

The Bill of Complaint alleged, as separate grounds or causes of action, violations of sections 9 and 10 of the Rivers & Harbors Act of March 3, 1899 (30 Stat. 1151), and of Section 23 of the Federal Water Power Act of 1920 (41 Stat. 1063).

1. *Rivers & Harbors Act of March 3, 1899.* Section 9 of that Act prohibits the construction of a dam across a navigable water of the United States without the consent of Congress. Section 10 of that Act prohibits the creation of any obstruction, not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States.

2. *The Federal Water Power Act of 1920.* This Act did not prohibit anything but merely provided a more convenient means of granting and obtaining federal assent (in certain of the cases where required under the Rivers & Harbors Act of March 3, 1899,) than by special act of Congress. Section 4(d) of the Federal Water Power Act authorized the Federal Power Commission to issue a license for the construction of a project which is located *in navigable waters of the United States.* This was the only grant of licensing power in the Act. Section 10(c) provided

that the project shall not impair navigation. The Act also provided that a standard-form or major license issued thereunder should contain all of the conditions prescribed by the Act and such other conditions not inconsistent with the Act as the Commission might in its discretion impose (sec. 10).

Such licenses could be issued for not more than fifty years and were required to include, *inter alia*; the following conditions: the project shall be best adapted to a comprehensive scheme of improvement of navigation, water power and "other beneficial public uses"; the project shall be adequately maintained for purposes of navigation and the efficient "development and transmission of power"; the licensees shall maintain adequate depreciation reserves and "shall conform to such rules and regulations as the Commission may from time to time prescribe for the protection of life, health and property"; amortization reserves shall be maintained out of earnings in excess of a reasonable return upon the net investment as specified by the Commission and shall be applied, immediately or ultimately (in the discretion of the Commission), to the reduction of net investment; excessive profits as defined by the Commission shall be expropriated by the United States unless and until expropriated by the respective States; the project of the licensee may not be sold or leased without approval of the Commission (sec. 10, 3, 8; Ex. 131, R. 2673).

Section 14, the "capture clause",[1] authorizes the United States to "take over, maintain and operate" the power project at the end of the 50-year license period for "net investment" in dollars or the *then* fair value *whichever is the less;* and "net investment" is subject to diminution by deduction of amortization reserves, unappropriated surplus, current depreciation accounts and sinking funds and by the expropriation of excess profits as defined by the Commission (sec. 14, 3).

---

[1] This clause is sometimes called the "recapture" clause and petitioner so refers to it (Pet. Br. 136-143). "Recapture" is a weasel word. It implies the retaking or reclaiming of something owned by the recapturer and of which he had theretofore merely temporarily surrendered possession, or, as it were, a right of reverter. But in fact, "recapture" is a euphonism for taking property for public use without just compensation. The Act does not use this word, but describes the process as "taking over" the property of the citizen and in the same section carefully distinguishes the right of the United States, a state or municipality to acquire the property by condemnation (for a constitutional purpose) "upon payment of just compensation".

Section 10(i) authorizes a minor-part license under which the Commission may waive any or all conditions except the 50-year term in a license for a minor part of a complete project.

Section 23 (second paragraph), in the view of respondent, authorized anyone intending to construct a project on a stream of doubtful navigability to file in his discretion a declaration of such intention and obtain a preliminary determination whether the stream is navigable. If upon investigation the stream were found to be a navigable water of the United States, such declarant was prohibited from proceeding without a license issued under section 4 of the Act, but otherwise might, of course, construct his project upon compliance with state laws.

8. *The Federal Power Act of 1935.* Subsequent to the filing of the instant suit the Congress, by the Act of August 26, 1935 (49 Stat. 838-863), incorporated the Federal Water Power Act, with minor (and we believe immaterial) amendments, as Part I of an otherwise new statute which deals with additional subjects and is entitled the Federal Power Act. Part I of the Federal Power Act (the old Federal Water Power Act) was entitled "Regulation of the Development of Water Power Resources." Part II of the new statute deals with the "Regulation of Electric Utility Companies Engaged in Interstate Commerce" and Part III with procedural and administrative provisions applicable to licensees and public utilities, Title 16 U. S. C. (Conservation) Ch. 12.

By the Act of August 26, 1935, section 4 (d) of the Federal Water Power Act (the grant of licensing power) was renumbered section 4(e) and the phrase "navigable waters of the United States" was changed to read "streams over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States." In the view of respondent, this change in phraseology did not enlarge the grant of licensing authority and that authority, as before, is limited to projects in navigable waters.

The second paragraph of section 23 of the Federal Water Power Act became section 23(b). It was amended to add an initial sentence declaring unlawful projects built at government dams, on public lands or reservations and in "navigable waters of the United States" where constructed without a license from the Commission, if built since June 10, 1920, or where constructed without other federal authorization if built prior to June 10, 1920. It was also amended so as to make the filing of a declaration of intention mandatory. In the view of respondent, neither of these amendments, if applicable, affects, or was intended to affect, the meaning of the Federal Water Power Act in so far as it is claimed to be applicable in the case at bar.

The Bill of Complaint, asserting an alleged cause of action for violation of the Federal Water Power Act of 1920, was never amended to assert any violation of the Federal Power Act.

Statement of the Case.

A. General Description of the New and Kanawha Rivers.

New River, which is approximately 341 miles in length, rises in the mountains of northwestern North Carolina at an elevation of approximately 3800 feet. It enters Virginia in Grayson County where it is almost immediately joined by Wilson Creek. From this junction New River flows northeasterly for approximately 125 miles until it reaches a point shortly below Radford, Virginia, where it abruptly turns northwesterly and, breaking through the mountain ranges, flows in that general direction until near Gauley Bridge, West Virginia, it joins with the Gauley River at an elevation of 642 feet to form the Kanawha River. (R. 106-7.) The average fall of New River between Wilson Creek and its mouth is 7.1 feet per mile. (R. 107.) It crosses the Virginia-West Virginia State line at Wiley's Falls (mile 89 above the Kanawha). (R. 2909, 2938.) The Kanawha River, which has an average slope of only 1.25 feet per mile, flows in a northwesterly direction for approximately 96 miles to Point Pleasant, West Virginia, where it empties into the Ohio River. (R. 107.) While navigability of the Kanawha River in a state of nature above Kelly's Boatyard (just above the present site of Charleston, West Virginia) is doubtful (*Ex.*[1] *245*, p. 76), respondent conceded and the District Court found that the improved Kanawha River is now navigable from its mouth to a point 7 or 8 miles below its head at the junction of the New and Gauley Rivers. (R. 155.)

Between 1877 and 1889, the Federal Government attempted to create an artificial channel, relatively shallow and narrow, in three widely separated local stretches of New River, to wit: the lower one extending upstream from Hinton, West Virginia; the intermediate one extending upstream from New River Bridge near Radford, Virginia, and separated from the Hinton or lower stretch by some 60 miles of river where no federal improvement was even attempted; and the upper one extending for about eight miles between Lead Mines, Wythe County, Virginia, and Gulf in Carroll County, Virginia, separated from the intermediate stretch by about 14 miles. (R. 112-3.) While temporarily stimulating some local use immediately above the railroad stations at Hinton, W. Va., and Radford, Va., respectively, the attempted improvement proved to be of little or no value even locally. Otherwise the river is in its natural condition.

---

[1] Where citation is to an unprinted original exhibit or to an unprinted portion of an exhibit, the citation is italicized—thus, "*Ex.*"

No appropriations were made after 1886; and the dormant authorization for the project was formally repealed by Congress in 1902. The purpose of this meager federal work was, not to make a continuous navigable waterway out of the river, but only to provide local access to railroads. (Ex. 47, R. 2427, 2441; 514.)

B. Location and Description of Radford Project.

The Radford project is located in New River, a few miles above Radford, Virginia, approximately 160 miles above the head of navigation on the Kanawha River and approximately 170 miles above the London Dam, the upstream Government dam on the Kanawha River. (R. 156.) It does not involve the use of any land or other property of the United States. (R. 154, 156.)

The Radford project consists of a concrete dam with an overall height of 130 feet, a reservoir with a usable draw-down of 27 feet and utilizable storage capacity of 100,000 acre-feet and electric generating machinery with a maximum hydraulic capacity of approximately 9,000 c.f.s.[1] (R. 128, 2904.) The natural low water flow in an extremely dry year at the Radford site is about 600 c.f.s. By impounding flood waters for release during the low water season, the construction and operation of the Radford project will increase the average regulated low-water flow at the damsite to 1,230 c.f.s. in an extremely dry year. (R. 1321.) It will correspondingly increase the average low-water flow in average and good water years.

Many years ago (by a project adopted in 1875) 6-foot navigation had been created on the Kanawha River by the construction of 10 low navigation dams (8 of the wicket type and 2 of the crib type). (*Ex. 144,* R. 848.) By 1925 these old dams were obsolete and in a very serious state of dilapidation and disrepair so that their continued use was impossible without reconstruction or very extensive repairs (*Ex. 509*, R. 1833; R. 751-7.) Thereafter Congress adopted a new 9-foot navigation project on the Kanawha River and constructed new roller type navigation dams in the Kanawha River at London, Marmet and Winfield, W. Va., and a dam of similar type in the Ohio River at Gallipolis just below the mouth of the Kanawha River. Power plants have been constructed by a private licensee at the London, Marmet and Winfield dams on the Kanawha River. The hydraulic capacity of the power generating machinery installed at London, Marmet and Winfield under licenses issued by the Federal Power Commission is approximately 9,000 c.f.s., the same as at the Radford project. The low-water flow at these dams is approximately 1,000 to 1,100 c.f.s. (without deducting water used for navigation and hence not available for power) in comparison with the average regulated low-water flow of 1230 c.f.s. which will be produced by the Radford project at its site. (R. 1321; 1012-3.)

---

[1] In the interest of brevity the abbreviations "c.f.s." "s.f." "sec. ft." are used for the term "cubic feet per second".

The Buck and Byllesby hydro-electric plants of respondent were constructed in New River some miles above the Radford project about 1912 and have operated continuously since that time. About four years ago, the Electro-Metallurgical Company completed a hydroelectric development in the New River at Hawksnest, about 13 or 14 miles above the head of navigation on the Kanawha River. (R. 2906.) All of the last three named plants were constructed and have been operated throughout without a federal license; and none contains any lock or navigation facilities.

Petitioner has instituted condemnation proceedings to acquire lands for the construction of its Bluestone Reservoir in the New River, a few miles above Hinton, West Virginia, and about 85 miles downstream from the Radford project. According to the plans, the Government Bluestone project will consist of a concrete dam with a height of 150 feet, a utilizable power storage of 245,000 acre-feet, electric generating machinery with a maximum hydraulic capacity of 11,000 c.f.s. and a superimposed flood reservoir with a height of 35 feet and flood storage of approximately 268,000 acre-feet. (R. 131-2.) Like all other dams on New River, the plans for this Government Bluestone dam, contrary to petitioner's assertion (Pet. Br. 86), do not provide for any lock or other facilities for navigation. See p. 43, *infra*.

C. Prior Proceedings—Background of the Litigation.

On June 26, 1925, a Declaration of Intention to construct, operate and maintain the Radford project was filed with the Federal Power Commission under Section 23 of the Federal Water Power Act by a predecessor of respondent for the purpose of obtaining a determination, in accordance with the plain facts, that the project was not subject to the jurisdiction of the petitioner. (Ex. 88, R. 2469, 589.) Subsequently the Declaration was assigned to, and adopted by, respondent. (R. 136-7, 2883-4.) Pending action upon the declaration, respondent at the suggestion or request of the Commission, filed an application for a license for said project "upon the understanding that such application can be withdrawn if it should develop that a Federal license is not required." (R. 19-20; Ex. 568, R. 2849, 1827; Ex. 102, R. 2624, 602; R. 2884.) Also pending action upon the declaration, a field-hearing was had by the Army District Engineer upon this application which (notwithstanding petitioner's unsupported assertion in Pet. Br. 9) concededly constituted no part of any investigation under the Declaration. (R. 611-2, 733, 760; Ex. 101, R. 2604, 600.)

At the only public session (March 2, 1926,) of the Commission in connection with its investigation[1] under the

---

[1] It is desired to bring to the attention of the Court that certain exhibits were offered and received in evidence in this case for limited purposes only. Some of these exhibits have been referred to by petitioner without reference to any limitation (Pet. Br. 13). The greater number of such exhibits were received solely for the purpose of showing the nature of the alleged investigation made by the Federal Power Commission, or for the purpose of showing the course of conduct between respondent and appellant, or the

(Footnote continued on next page)

declaration, the only evidence offered or received was the report of the Chief of Engineers that New River was not navigable and that *it would not be possible* so to operate the project as *to impair* the navigable capacity of navigable waters.[1] (R. 138, 2884; *Ex. 572,* R. 1834; Ex. 97, R. 2527, 597.) Nevertheless, on June 1, 1927, the Commission, while finding "that New River in the part thereof involved in said declaration of intention is not 'navigable waters' within the definition of said Act (Federal Water Power Act)", also purported to find "that the interests of interstate or foreign commerce would be affected by such proposed construction." (Ex. 91, R. 2483, 2492-4, 591.) On July 1, 1927, the Commission tendered a major license to respondent. (Ex. 130, R. 2650, 768.) Respondent declined the license but, while denying any jurisdiction in the Commission or petitioner, offered to accept all of the conditions of the tendered license regulatory of the flow through the power house or over the dam having any relation to the alleged protection, no matter how unnecessary, of the navigable capacity of navigable waters. (Ex. 91, R. 2483, 2496-9, 2499-2506, 591.)

---

position of, intent of, and action taken by respondent with respect to its project. The following is a list of certain (not necessarily all) exhibits received for limited purposes: printed exhibits nos. 91 (R. 2483, 591); 94 (R. 2524, 594); 97 (R. 2528, 597); 99 (R. 2556, 599); 100 (R. 2584, 599); 101 (R. 2604, 600); 103 (R. 2625, 603); 104 (R. 2626, 604); 105 (R. 2628, 604); 106B (R. 2635, 605); 530 (R. 2762, 1830); 541 (R. 2796, 1832); 545 (R. 2806A, 1498); 548 (R. 2812A, 1673); 550 (R. 2813, 1725); 568 (R. 2849, 1827); 569 (R. 2850, 1827); 570 (R. 2850, 1827); 571 (R. 2851, 1827); 581 (R. 2865, 1832); 586 (R. 2868, 1833); 588 (R. 2871, 1833); and original but unprinted exhibits nos. 1 (R. 185); 95 (R. 596); 106, 106A, 106C (R. 605); 196 (R. 1242); 201 (R. 1354); 202 (R. 1354); 558A-G (R. 1776); 580 (R. 1832); 589 (R. 1833); 590 (R. 1833).

[1] In the interests of brevity and unless otherwise expressly stated, the term "navigable waters" is used herein to mean "navigable waters of the United States" and the terms "impairment of navigable waters" and "impairment" are used herein to mean "impairment of navigable waters of the United States".

Consistently denying any jurisdiction in the Commission or petitioner, respondent on February 4, 1930, applied for a minor-part license under section 10(i) of the Act, containing only such conditions as would have a real and substantial relation to the protection of navigation or navigable capacity. (Ex. 529, R. 2760, 1830; 2885, 139.) Thereafter the Federal Power Commission certified to the Attorney General of the United States that "New River is neither navigated nor navigable in fact" (Ex. 531, R. 2779, 1831; 2885) and on September 22, 1930, the Attorney General rendered an opinion that the Commission had authority under the Act to issue such minor-part license for the project and that any attempt to impose any broader license would raise grave constitutional questions (Ex. 532, R. 2781, 1831, 2885, 139). On November 6, 1930, the Executive Secretary of the Commission forwarded to respondent a preliminary draft of a minor-part license (Ex. 537, R. 2789, 1831). Respondent formally offered to accept such minor-part license (Ex. 542, R. 2806, 1831; 2886).

However, suddenly the Commission advised respondent that on November 25, 1930, it had determined to take no action, favorable or adverse, on the application for a minor-part license because, in view of the questions of jurisdiction between the United States and Virginia, a court adjudication was desirable. (Ex. 91, R. 2483, 2506-7, 591.) The Commission, on April 3, 1931, denied the application for a minor-part license and ordered respondent not to proceed with construction unless and until it agreed to accept a major license containing numerous burdensome conditions and restrictions having no relation to the putative protection of navigation on, or the navigable capacity of, the Kanawha River. (Ex. 91, R. 2483, 2509, 591; R. 139-40; 2886-7.)

On May 5, 1931, the Commission tendered the respondent such a major license which recited that the "maps, plans and specifications of said project" submitted by respondent had been approved by petitioner through its agents, the Chief of Engineers and the Secretary of War, from the standpoint of navigation (as further appears from the endorsement on the plans themselves, *Ex. 90-A*, R. 590) and by its agency, the Federal Power Commission, as being "best adapted to a comprehensive scheme of improvement and utilization of said waters, for the purposes of navigation and interests of navigation and/or interstate or foreign commerce, of water power development, and other beneficial public uses." (Ex. 131, R. 2663, 768.) The Radford project is constructed at the location and upon the precise plans so approved. (R. 2027, 1244-5.)

This second tendered license (which is the license petitioner asked the court to require respondent to accept) contained *inter alia* precisely the same conditions (for the alleged protection of navigation) with reference to the regulation of flow through respondent's power house and over its dam as those contained in the draft of minor-part license which respondent had formally offered to accept. However, because of the capture clause and other burdensome conditions irrelevant to navigation, respondent declined this major license and sought a judicial determination of the controversy (*Appalachian Electric Power Co.* v. *Smith*, 67 F. (2d) 451), but the Court of Appeals found there was no jurisdiction.[1]

Having failed in its efforts to secure a judicial determination, respondent, under date of September 13, 1934, advised the Secretary of War that it had commenced construction without accepting a federal license, that for six years it had consistently expressed its willingness to accept a federal license with conditions limited to the protection of navigation or of navigable capacity, that the project would not cause any impairment of navigable capacity but that the respondent would nevertheless abide by any orders of the Secretary of War regarding the construction and operation of the project and relating to the putative protection of navigation (Ex. 586, R. 2868, 1833; Ex. 588, R. 2871, 1833).

---

[1] It was after hearing but before final decision in the District Court, on the Commission's motion to dismiss the Bill in the above entitled suit, that the Commission at an executive session had on October 12, 1932, purported by resolution to reverse its previous finding of non-navigability of New River and to declare that New River is navigable from Wilson Creek to its mouth (Ex. 91, R. 2513-15, 591; Pet. Br. 13). As shown on the face of the resolution and as found by the lower courts (R. 140, 2912), the object of this *ex parte* action was to secure an advantage in the then pending litigation. No reliance was placed by petitioner on the foregoing resolution in the bill of complaint.

D. Issues Raised by the Instant Suit and Their Disposition by the Courts Below.

On May 6, 1935, the petitioner instituted this suit for a mandatory injunction requiring respondent to remove its dam and hydro-electric plant then under construction in the New River just above Radford, Virginia, or in the alternative to accept a major license under the Federal Water Power Act of 1920 (R. 4-38). The Bill asserted two alleged causes of action, to wit:

> *First:* That under the Rivers and Harbors Act of March 3, 1899 (30 Stat. 1151), the construction and operation of respondent's project without a federal license is unlawful
>
> (a) under section 9 thereof, because New River is navigable in fact in interstate commerce, or
>
> (b) if New River be not so navigable, then under section 10 of that Act, because the construction and operation of said project would substantially impair the navigable capacity of the Kanawha River, a navigable water of the United States, to which New River is tributary (R. 4-12).[1]
>
> *Second:* That the construction and operation of respondent's project in New River without a standard-form or major license under the Federal Water Power Act of 1920 is unlawful under the Act

---

[1] Contrary to the assertion in Petitioner's Brief p. 14, the Bill did not allege that the project would impair the navigable capacity of the Ohio River (R. 4-18). However, the evidence established and both lower courts expressly found that the respondent's project will not impair the navigable capacity of the Kanawha River or of "any navigable water of the United States" (See pp. 15-16, infra).

(a) because New River is navigable in fact in interstate commerce, or

(b) if New River is not so navigable, then because respondent's project will substantially impair the navigable capacity of the Kanawha River and thereby affect the interests of interstate commerce (R. 13-15).[1]

It will thus be seen that, while two alleged causes of action were asserted upon the basis of different statutes, both alleged causes of action depended upon the same issues of fact. They were:

(a) Is New River navigable in fact in interstate commerce?

(b) If New River is not navigable in fact in interstate commerce, will the construction and operation of the Radford project substantially impair the navigable capacity of the Kanawha River?

---

[1] (a) As a condition precedent to bringing any suit under this Act, the Bill alleged that the Commission had made a finding (which was merely in the words of the statute) "that the interests of interstate or foreign commerce would be affected by the proposed construction" (R. 14; 2853) and this alleged cause of action was sought to be supported in the courts below upon the theory that such alleged finding was conclusive. This theory was rejected by both lower courts (R. 149-52; 2910-12) and has been abandoned on certiorari (Pet. Br. 14, footnote 10, Pet. for Cert. 16). The Bill, relying upon the alleged navigability of New River, alleged that respondent's project "would affect the interests of interstate commerce on the New and Kanawha Rivers" (Bill, par. 23, R. 14). However, when the evidence established and the lower courts found that New River is not navigable, the issue of impairment was narrowed, under the allegations of the Bill, to the Kanawha River.

(b) In the Court of Appeals, petitioner for the first time advanced the theory "that effect upon interstate commerce" under the Power Act includes matters unrelated to navigation or navigable capacity. While this theory, rejected both by the lower court and the dissenting judge (R. 2909-14, 2924), is now abandoned (Pet. Br. 18-19; 103, footnote 30), it may be noted that no "effect upon interstate commerce" unrelated to navigation was alleged in the Bill (R. 11-17) and that petitioner's requested findings did not relate to any other type of alleged effect upon interstate commerce. (R. 94-8; See footnote, pp. 85-6, *infra.*)

The answer, *inter alia*, denied that New River is navigable in fact in interstate commerce; denied that the construction and intended operation, or any form of operation physically possible, will or could impair the navigable capacity of any navigable water; alleged that the respondent had full and complete proprietary right under the laws of Virginia to construct and operate the project; alleged that, if either statute be construed as conditioning or restricting the exercise of respondent's proprietary rights, each is to that extent unconstitutional; averred that, if any license could be required for the construction or operation of the project (which respondent denied), its conditions must be limited to those related solely to the protection of navigation or navigable capacity and that, if a license be necessary, the refusal of petitioner to grant respondent a federal license unless respondent would agree to be bound by unconstitutional conditions and restrictions, would constitute a taking of respondent's property without due process of law in violation of the Fifth Amendment and would bar petitioner from the relief sought; and averred that the Bill does not allege any acts, statement or threat of respondent to do anything which would impair navigable capacity of navigable waters (were that physically possible in the circumstances which respondent denied) but merely alleges a hypothetical or moot case. (R. 38-67.)

After an exhaustive hearing,[1] the District Court found (1) that New River is not a navigable water of the United States, "either at the site of defendant's project *or else-*

---

[1] The hearing of evidence commenced on July 11, 1936, and extended continuously through September 5, 1936. More than 135 witnesses testified and more than 360 exhibits were introduced in evidence. The evidence, exclusive of voluminous exhibits, occupied over 7,000 pages of transcript. On December 30, 1936, the petitioner filed a printed brief of 559 pages and respondent filed separate printed briefs on fact and law totaling 254 pages. Thereafter the District Court heard three days of oral argument. Subsequently supplemental briefs totaling 444 pages were filed with the District Court. Both parties filed requests for findings of fact and conclusions of law.

where throughout its course" (R. 126, 155-6);[1] (2) that neither the construction nor operation of respondent's project will obstruct or impair the navigable capacity "of the Kanawha River or *any navigable water of the United States and will not affect the interests of interstate commerce*" (R. 156, 133, 134, 153);[1] and (3) thereupon concluded that the petitioner had established no cause of action under either the Rivers & Harbors Act of March 3, 1899, or the Power Act and issued a decree dismissing the Bill. Although unnecessary, the District Court observed that the petitioner would not be barred if any material change in facts should occur in the future. (R. 153.)

The Court of Appeals carefully reviewed, and independently weighed, the evidence and reached the same conclusions of fact as the District Court and thereupon affirmed the findings made by the District Court. (R. 2893, 2900, 2903, 2904-8.)

The States of Virginia and West Virginia appeared as *amici curiae* in both courts below and by their respective Attorneys General filed briefs in opposition to petitioner's contentions. Each State contended, among other things, that New River is not navigable and is not subject to the asserted jurisdiction of the Federal Power Commission.

Having found (a) that New River is not navigable in fact in interstate commerce and consequently not a navigable water of the United States, and (b) that neither the construction nor the operation of respondent's project will impair the navigable capacity of any navigable water of the United States and consequently will not affect the interests of interstate commerce, the Court of Appeals also held that neither the Rivers & Harbors Act of March 3, 1899, nor the Federal Water Power Act is applicable and *a fortiori* no cause of action had been established under either Act. Neither statute nor any part thereof was adjudged unconstitutional, and upon the facts so found neither Act is applicable.

---

[1] Petitioner omits the italicized portion of these findings from its summary of the decision of the District Court. (Pet. Br. 16.)

That the lower courts were correct in so holding upon these facts is, we think, conceded. In the Court of Appeals the petitioner expressly stated:

> "If New River is not a navigable water of the United States, and if the project in question will not diminish the navigable capacity of a navigable water of the United States, then the Act (Rivers & Harbors Act of March 3, 1899) is not applicable and therefore, no constitutional question is involved." (Pet. Supp. Br. in C. C. A., p. 236.)

And further:

> "If, upon the facts, New River is not navigable water of the United States within the meaning of the Federal Power Act, and the project will not affect the interests of interstate or foreign commerce, then the Federal Power Act is not applicable and no constitutional questions need be considered." (Pet. Supp. Br. in C. C. A., pp. 236-7.)

The Nature and Scope of the Questions Presented in this Court.

The issues sought to be presented by petitioner in this Court are essentially issues of fact; that is, unless the findings concurred in by the two lower courts are set aside, no substantial question of law arises. Findings of fact concurred in by two lower courts will be accepted as unassailable in this Court if supported by substantial evidence. *Alabama Power Co.* v. *Ickes,* 302 U. S. 464, 477; *Brewer-Elliott Co.* v. *United States,* 260 U. S. 77, 86. Nevertheless, petitioner's statement of the questions presented (Pet. Br., 2) and its entire argument disregard the findings concurred in by the lower courts; in effect petitioner asks this Court to examine the evidence *de novo* and, sitting as a Court of first instance, to make a new and independent determination of the factual issues.

Petitioner does not attempt to show that these findings concurred in by both lower courts are not supported by substantial evidence but, in effect, merely argues that there was some conflicting evidence—and that argument is advanced without reference to the mass of testimony which squarely supports these findings. This manifestly presents no issue of law for this court. See p. 31, *infra.*

In our opinion, the only questions presented are:

> *First:* Is the finding, concurred in by both lower courts, that New River is not navigable in fact in interstate commerce either at respondent's damsite or at any other point in its course, supported by substantial evidence?
>
> *Second:* Is the finding concurred in by both lower courts, that neither the construction nor operation of respondent's project will substantially impair the navigable capacity of any navigable water of the United States or affect an interest of interstate commerce, supported by substantial evidence?
>
> *Third:* Does the Rivers & Harbors Act of March 3, 1899, or the Power Act purport to require a federal license for the construction of a project which is located on a non-navigable stream and does not impair navigable capacity?

The findings of the lower courts upon questions First and Second are supported by substantial evidence and are unassailable here. Upon the facts so found, both statutes are so plainly inapplicable to respondent's project that no question of their construction or interpretation arises. It follows that the decision of any further questions is neither necessary nor permissible in this case. Nevertheless, petitioner also seeks to present the following questions:

> 1. Is the (allegedly navigable) intrastate stretch of New River between Allisonia and Radford, Virginia, a navigable water of the United States if some part of a small quantity of charcoal-iron which was

boated over this stretch during a few months, approximately 60 years ago, was, after an intermediate transportation by wagon, shipped on an interstate railroad?

2. In the case of a project located on a non-navigable stream, does a beneficial effect upon navigation or navigable capacity, no matter how indirect, incidental or inconsequential, confer upon petitioner authority to require a license for respondent's project under the Power Act?

3. Does the United States have constitutional authority to require a federal license for a project which is located on a non-navigable stream and does not impair navigable capacity of navigable waters?

4. Does the United States have constitutional authority to impose license conditions unrelated to the protection of navigation or navigable capacity in the case of a project (a) in a non-navigable stream, or (b) in a navigable stream?

Question No. 1, were it otherwise presented, has no substantial basis in fact and is erroneous in law.

Question No. 2 was not raised by the pleadings or in the trial court and would not be open to petitioner in any event; but, even if it were, it is unsound as a matter of construction of the Power Act and, were that Act so construed, the Act would be in excess of petitioner's constitutional authority.

Questions 3 and 4 are plainly moot under the statutes invoked as applied to the facts of this case; but, were these questions presented, the answer to each of them would be in the negative.

SUMMARY OF ARGUMENT

I.

The courts below adopted and applied the definition of navigable waters which has been consistently adhered to by this Court since it was first enunciated in *The Daniel Ball,* 10 Wall. 557. If, as petitioner asserts, Section 3(8) of the Federal Power Act is simply "a codification of the criteria" of navigable waters enunciated by this Court, petitioner may not assert that the lower courts erred in adopting the definition of navigability promulgated and consistently adhered to by this Court. However, federal navigability is a constitutional fact; and if this statutory definition were construed to include waters not navigable in fact in interstate commerce, it would manifestly be unconstitutional and void. *United States* v. *Cress,* 243 U. S. 316, 322; *Crowell* v. *Benson,* 285 U. S. 22, 55. If, as we believe, this statutory definition is somewhat narrower than the judicial and constitutional definition of navigable waters, manifestly petitioner may not complain because the lower courts adopted and applied a broader definition of navigable waters than that prescribed by the statute upon which petitioner relies.

The finding, concurred in by the lower courts, that New River is not navigable in fact in interstate commerce either at respondent's damsite or elsewhere in its course is supported by substantial evidence and is unassailable here. *Alabama Power Co.* v. *Ickes,* 302 U. S. 464, 477; *Brewer-Elliott Co.* v. *United States,* 260 U. S. 77, 86.

The physical characteristics of the river, the actual conditions encountered in the limited federal work undertaken in the most easily improved short local stretches of the river, *Oklahoma* v. *Texas,* 258 U. S. 574, the absence of any use where land travel was so difficult as to have compelled the use of any feasible water transportation no matter how difficult, the testimony of expert and informed witnesses, comparisons with other streams such as the Kanawha, Colorado, Fox, Desplaines and Tennessee, the progress reports of the Engineers in charge of the federal work, the proven impracticability of boating charcoal-iron over the local stretch above Radford even after the limited federal improvement, the testimony of local non-expert witnesses who had actual knowledge with respect to alleged uses of the river—all plainly established that the river in its natural and ordinary condition is not navigable in interstate commerce at any point in its course. Officers of the Corps of Engineers, including two Chiefs of Engineers, have repeatedly reported, after careful examination, that New River is not navigable at any point in its course; and all the considered action of Congress and the War Department supports the finding that New River is non-navigable.

The limited federal work in three widely separated local stretches (which were "the most easily improved places") did not change the non-navigable character of New River in interstate commerce. (*Ex. 572,* text same as of Ex. 97, R. 2531.) All reliable testimony of temporary use related to intrastate use of the most favorable parts of these short stretches and was referable to the artificial improvement in those local stretches. It is highly doubtful (though not material in this case) whether intrastate navigability was created by these artificial improvements ***in any part*** of those stretches. However, it is sufficient that, as the lower courts found, these local improvements did not alter the natural non-navigable character of New River in interstate commerce. Whether intrastate navigability was artificially created in these stretches and, if so, at what point such navigability ended, was not in issue in the courts below and is not an issue here.

The evidence shows that the average slope of the river between Round Bottom, West Virginia, and Glen Lyn, Virginia, and indeed for 40 miles above Round Bottom, West

Virginia, is approximately 50 per cent greater than the average slope between Hinton, West Virginia, and Round Bottom, West Virginia, and that the other natural obstacles to any practical use in the first two mentioned stretches are also much more numerous and severe. Indeed, the testimony shows that the physical characteristics of the river in the 60-mile section between Radford, Virginia, and Round Bottom, West Virginia, are unique, found in no other stream of appreciable size and such as to negative navigability. The Army Engineers had several times specifically considered the Glen Lyn stretch and officially reported it to be non-navigable. Their reports show that neither before, nor during, nor after this limited federal work was New River, or any part thereof, used or susceptible of use in interstate commerce.

The fact that off and on from December 1881 to some time in 1882 or 1883, a small quantity of charcoal-iron was experimentally boated a short distance downstream to Radford and that some of this iron, after wagoning to the railroad, was shipped by rail, possibly in interstate commerce, does not make this intrastate stretch a navigable water of the United States. While the failure of this experiment negatived navigability of this intrastate stretch even after the attempted artificial federal improvement, the legal proposition advanced by petitioner is plainly unsound under the settled decisions of this Court. *The Daniel Ball, supra,* 563; *The Montello,* 11 Wall. 411, 415; *United States* v. *Utah,* 283 U. S. 64, 75. This is quite apart from the fact that such alleged commerce does not now exist, has not existed for over 50 years and, so far as can be foreseen, never will exist in the future.

Petitioner does not attempt to show that the finding of non-navigability is not supported by substantial evidence. Petitioner in effect merely asserts that there was some conflicting evidence. Manifestly, this presents no question for review.

II.

Whether or not respondent's intended acts would substantially impair the navigable capacity of any navigable water of the United States was plainly a question of fact as to which the burden of proof rested upon petitioner. *United States* v. *Rio Grande D. & I. Co.*, 174 U. S. 690, 710; *Edison Co.* v. *Labor Board*, 305 U. S. 197, 223. The finding, concurred in by the lower courts, that respondent's project will not impair the navigable capacity of any navigable waters of the United States, is supported by substantial evidence and not assailable here.

The evidence plainly establishes that respondent's project will not diminish the flow from above the damsite so as to impair the navigable capacity of the Kanawha or Ohio Rivers during allegedly "critical low water periods". Due to evidence introduced by petitioner upon assumptions wholly unrelated to any intended acts of respondent, other evidence was received which established that even a complete shut-off of all contribution from above the damsite during a low water season (an assumption wholly unrelated to any intended act of respondent) would not impair the navigable capacity of the Kanawha or Ohio Rivers. However, during the low water season of every year, respondent's project will increase the average low water flow below the damsite and in extremely dry years will increase such flow from a minimum of 600 s. f. to an average of 1230 s. f. (R. 1521-2). Assuming a week-end (Sunday) shutdown of 34 hours (the maximum contingently possible in respondent's operations) and a week of extreme low flow (when, if ever, the matter of contribution from above the damsite would be material), the contribution from above the damsite to the flow at the mouth of the Kanawha, with respondent's project in operation, can never fall below approximately 850 s. f. in comparison with a natural flow of 600 s. f. and generally will be substantially greater. Under similar conditions, the contribution from above the damsite to the flow at Kanawha Falls (above the head of navigation) would never fall below 770 s. f. in comparison with a natural contribution of 600 s. f.

Petitioner's assertion that there is difficulty in maintaining depths in the Kanawha and Ohio Rivers during allegedly "critical low water periods" and that the New River on one occasion in August 1918 contributed 38 per cent. of the flow of the Ohio below the mouth of the Kanawha, and on another occasion in September 1930 contributed 70 per cent. of the flow of the Kanawha at its mouth, are based upon the estimates of flow which are not only contradicted in, but shown to be, grossly erroneous by the record. However, for the reasons above stated and others too detailed to enumerate, the assertion would be immaterial were it true.

The assertion that respondent's project will produce tides or "so-called waves" in the Kanawha River of such size and character as to interfere with navigation is completely refuted by the record. Respondent's project is separated from the head of navigation on the Kanawha River, the nearest navigable water of the United States, by 160 miles of tortuous river, broken by numerous shoals, falls, ledges, pools and rapids. The practical and intended operations of respondent's project are of the same character and order of magnitude as the actual operations of the power plants at the Government navigation dams on the Kanawha River, which manifestly do not impair navigable capacity, although they discharge directly into navigable waters. The size and rate of any variations in flow which will exist in the Kanawha will be determined by the operations of the Government licensed projects on the Kanawha and not by respondent's project.

Tests involving discharges far larger than the maximum hydraulic capacity of respondent's project, had been made by respondent in cooperation with the Geological Survey and the Army Engineers; and the uncontradicted evidence showed that these tests produced no interference with navigation or navigation works in the Kanawha. The conclusion was confirmed by actual tests made at the power plants in the navigation dams on the Kanawha River.

The description of these variations in flow as "waves" is of course misleading. By the time the "waves" in the great tests, first above referred to, reached the head of navigation, their front had an average slope of 5 inches in about 20 miles, or ¼ of an inch per mile, and their back had an average slope of about 5 inches in 80 miles, or 1/16th of an inch per mile.

The finding, concurred in by the lower courts, is also supported by the testimony of numerous witnesses of the highest standing and ability and the widest experience.

III.

Since respondent's project is not located in navigable waters and will not impair the navigable capacity of any navigable waters, it is plain that petitioner has failed to establish any violation of the Rivers & Harbors Act of March 3, 1899. *United States* v. *Rio Grande D. & I. Co., supra.*

IV.

Upon the facts of this case as found by both lower courts on substantial evidence, the Power Act is so plainly inapplicable that no question of its construction or interpretation is presented; and petitioner so conceded in its petition for certiorari (16-17) and in the court below (Pet. Supp. Br. below 236-7).

Petitioner's argument that Section 23 authorizes and requires a license for respondent's project because its incidental effect upon navigation, if any, is beneficial, is untenable in fact and law. While it is true that the incidental effect of respondent's project, if any, upon navigable capacity, or flood control as related to navigation, is beneficial, the evidence plainly shows that any beneficial effect is indirect and incidental. While we deny that petitioner has constitutional authority to regulate intrastate matters because of a supposed or real beneficial effect upon interstate commerce, an essential factual basis for the exercise of such claimed authority, if it existed, would be that the beneficial effect should be direct and substantial. But the contention is also erroneous as a matter of law.

We think it clear that the Power Act does not apply to non-navigable streams, that it merely authorizes the Commission to license projects on navigable streams, and that a finding under Section 23 "that the interests of interstate * * * commerce would be affected" is merely a formula for finding whether the project is in navigable waters. However, if Section 23 may be construed as applying at all to a project on a non-navigable stream, then it is clear that 'effect upon commerce' must be construed as meaning only an adverse effect.

The Federal Water Power Act, which did not prohibit anything, was enacted to provide a means more convenient than a special act of Congress for giving assent in certain of the cases where required under the Rivers & Harbors Act of March 3, 1899; and such assent was required, if at all, for a project on a non-navigable stream only if it impaired navigable capacity. *United States* v. *Rio Grande D. & I. Co.*, *supra.* Since the Power Act is not only in *pari materia* but purely complementary to the Rivers & Harbors Act, it must be similarly construed. Moreover, both the Congress and this Court, in deference to constitutional limitations upon the Federal Government, have consistently used and construed the phrase "effect upon interstate commerce", when invoked as a basis for federal regulation of intrastate matters, as meaning an adverse effect. *Labor Board* v. *Jones & Laughlin,* 301 U. S. 1, 31-2, 36-7; *Stafford* v. *Wallace,* 258 U. S. 495, 528. If the phrase could be regarded as ambiguous, as it can not, the fact that petitioner's construction would obviously render the statute unconstitutional would preclude its adoption. *Interstate*

Commerce Commission v. *Oregon-Washington R. & N. Co.*, 288 U. S. 14. As petitioner concedes, none of the amendments of 1935 touch or affect the construction of this phrase.

While, in our opinion, the Court does not reach the question in this case, the Power Act, properly construed in the light of its language, legislative history and contemporaneous interpretation and in the light of the Rivers & Harbors Act to which it is complementary and which is still applicable, does not apply to any project on a non-navigable stream.

Assuming *arguendo* the Power Act could be construed as applying to a project on a non-navigable stream under some conditions, it can only be construed as authorizing or requiring a minor-part license for such a project under Section 10(i) of the Act, with license conditions limited to those having a real and substantial relation to the protection of navigation or navigable capacity. It is undisputed that respondent, while denying any authority of petitioner to require any license for its project, has repeatedly offered to accept such a minor-part license and that petitioner steadfastly refused to issue any license unless respondent would accept numerous burdensome conditions in excess of petitioner's constitutional authority. Consequently, petitioner would be barred from relief even if the Act could be so interpreted.

V.

If the Power Act were construed as applicable to respondent's project, it would be to that extent unconstitutional and void. Petitioner has no constitutional authority to require any license for respondent's project, which is located on non-navigable waters and will not impair navigable capacity. The precise constitutional authority invoked by Congress was its implied authority in relation to navigable waters. The United States has no title or property right in the waters, the beds or the water powers of either navigable or non-navigable streams. Its authority is limited to control of navigable waters solely for purposes of navigation.

The right of a riparian owner on a non-navigable stream, to develop water power or otherwise use his property, is subject to no servitude in favor of navigation and may not be taken or restricted without compensation. Of course no one has a right to create or maintain a nuisance. However, that limitation upon the use of property is not a servitude but merely results from the delimiting aspects of any definition of property rights. Any constitutional authority of the United States is no different or greater in relation to non-navigable waters than in relation to land and, consequently, it has no constitutional authority to make illegal *per se* the erection or maintenance of structures without a federal license merely because they are located in non-navigable waters. Since respondent's project is located in non-navigable waters and will not impair navigable capacity, petitioner plainly has no constitutional authority to require a license for its construction. Nor does petitioner have constitutional authority to require a license for respondent's project under any other aspect of the commerce clause. The construction of a hydroelectric plant and its operation for the generation of electricity is not interstate commerce. *Utah P. & L. Co.* v. *Pfost,* 286 U. S. 165, 179-82.

VI.

But, even if petitioner had authority to require some license for respondent's project, it could not constitutionally impose those conditions of the tendered license unrelated to the protection of navigation. An examination of the license conditions shows that they seek to impose numerous burdensome regulations upon respondent which have no real and substantial relation to the prevention of any substantial impairment of the navigable capacity of navigable waters, which seek to impose upon respondent regulations involving an exercise of local powers of government, such as the police power, in violation of the Ninth and Tenth Amendments, and which would require respondent, on the one hand, to devote its property to a public use without compensation and, on the other, to surrender its property to petitioner for an unconstitutional purpose. Nor are they sustainable under any other aspect of the commerce clause. Neither the construction of respondent's project nor the generation of electricity is interstate commerce. *Utah P. & L. Co.* v. *Pfost, supra.* But, even if they were, petitioner could not impose such license conditions, including the surrender of a citizen's manufacturing plant to petitioner for an unconstitutional purpose, and on confiscatory terms, as a regulation of interstate commerce.

Petitioner's argument that respondent can not now raise the question of the validity of the capture clause (Section 14) is plainly unsound. Upon acceptance, a license by the very terms of the statute becomes a contract which can thereafter be altered only by "mutual agreement." (Sec. 6; *Ford & Son* v. *Little Falls Co.,* 280 U. S. 369, 378-9; *Alabama P. Co.* v. *Gulf P. Co.,* 283 Fed. 606, 615.) It is well established that one may not obtain relief from his contract upon the ground that he has made a bad bargain and that consequently the contract is confiscatory. *Columbus R. & P. Co.* v. *Columbus,* 249 U. S. 399. This is quite apart from the fact that one who founds a right upon a statute (as would be the case if a license were accepted) may not challenge its constitutionality in other respects. *Hurley* v. *Commissioners,* 257 U. S. 223.

The case of *Fox River Paper Co.* v. *Railroad Commission,* 274 U. S. 651 (cited Pet. Br. 141), is plainly inapposite as pointed out by the court below (R. 2921). Quite aside from the striking differences between the capture clause of the Power Act and the terms of the Wisconsin statute (Pet. Br. 141), a State not only has the right to engage in the electric power business if it chooses, but so long as it does not confiscate acquired rights, it may establish such law of property, riparian and other, as it chooses.

ARGUMENT.

POINT I.

The Courts below did not err in finding and concluding that New River is not navigable in fact in interstate commerce, and consequently is not a navigable water of the United States, either at respondent's damsite or at any other point in its course.

Navigability, in the federal sense, is a question of fact (*Crowell* v. *Benson*, 285 U. S. 22, 55; *Arizona* v. *California*, 283 U. S. 423, 452), and "each determination as to navigability must stand on its own *facts*[1]". *United States* v. *Utah*, 283 U. S. 64, 87. Findings of fact which are concurred in by two lower courts, will be accepted as unassailable by this Court if supported by substantial evidence. *Alabama Power Co.* v. *Ickes*, 302 U. S. 464, 477.[2] That this rule applies to a finding that a stream is not navigable in fact in interstate commerce is not open to debate. In *Brewer-Elliott Oil & Gas Co.* v. *United States*, 260 U. S. 77, the finding of fact which this Court declined to review because concurred in by two lower courts was that the stream "was not, and never had been, navigable within the adjudged meaning of that term" (*loc. cit.* 86).[3]

---

[1] All italics are supplied unless otherwise specifically indicated.

[2] The distinction which petitioner urges (Pet. Br. 30) between findings of basic or evidentiary facts and findings of ultimate facts is non-existent. Findings of ultimate facts concurred in by two lower courts and supported by substantial evidence are not assailable in this Court. *United States* v. *O'Donnell*, 303 U. S. 501; *Texas and N. O. R. Co.* v. *Railway Clerks*, 281 U. S. 548; *Pick Mfg. Co.* v. *General Motors Co.*, 299 U. S. 3, 4; *United States* v. *Commercial Credit Co.*, 286 U. S. 63; *United States* v. *Chemical Foundation*, 272 U. S. 1; *Baker* v. *Schofield*, 243 U. S. 114.

[3] Nothing more clearly illuminates the fatal weakness of petitioner's attempt to escape the effect of this rule than its citation of authorities. (Pet. Br. 30.) *The Montello*, 20 Wall. 430, was

(*Footnote continued on next page*)

The petitioner cannot escape the consequences of this rule by the disingenuous argument that the petitioner merely "differs" with the lower courts on the "legal question" of the "weight and relevance" of the evidence (Pet. Br. 29). No question on the admission or rejection of evidence (as a matter of relevancy or otherwise) is presented to this Court by petitioner; and manifestly the litigant's disagreement with the "weight" accorded various selected items of evidence by the courts below presents no issue of law for this Court.

Consequently the only questions presented in this aspect of the case are:

First: Did the courts below adopt the correct definition of navigable waters of the United States?

Second: Is the concurrent finding of the two lower courts supported by substantial evidence?

The answer to both questions is plainly in the affirmative.

A. The courts below adopted the correct definition of navigable waters of the United States.

To support this proposition, it is only necessary to refer to the definition of navigable waters respectively adopted and applied in the opinion of the District Court (R. 122-125) and in the opinion of the Court of Appeals (R. 2892). A mere reading of the opinions establishes that both courts adopted

---

decided in 1874, approximately twenty years before the creation of intermediate courts of appeal (Act of March 3, 1891, 26 Stat. 826), and even on a direct review of the trial court, merely held that this court would review *not the weight of the evidence but the correctness of the legal definition of navigable waters adopted by the trial court.* In *Leovy* v. *United States*, 177 U. S. 621, 628, this court merely held that the correctness of instructions to a jury was open to review. *Arizona* v. *California*, 283 U. S. 423, was an *original* suit in this court! On the other hand, in the *Brewer-Elliott* case, this court held, in accordance with the settled principle, that this rule applied to a concurrent finding of non-navigability just as to any other finding of fact.

and applied the classic definition of navigable waters which was laid down by this Court in *The Daniel Ball,* 10 Wall. 557 (and consistently adhered to since that time), together with such clarifying interpretations of that definition as have been subsequently enunciated by this Court. Indeed, petitioner stated in the Court of Appeals that "there is little or no disagreement with the court below (District Court) as to the meaning of 'navigable waters of the United States'" (Pet. Sup. Br. in Court of Appeals 31), and the Court of Appeals applied the same definition.

The petitioner, in its discussion of the definition of navigable waters of the United States (Pet. Br. 30-35), does not attempt to point out any error in the definition of navigable waters adopted by either court below.[1] Instead it embarks on an argument that the definition of navigable waters in Section 3(8) of the Federal Power Act is "in truth simply a * * * codification of the criteria" of navigable waters which have been enunciated by this Court (Pet. Br. 34-5). From that standpoint, the discussion is an idle and space-consuming one. If petitioner's conclusion is sound, we must still look to the decisions of this Court to determine what those criteria mean. And, the petitioner, asserting that this statutory definition is a mere codification of the criteria enunciated by this Court, could hardly assert that the lower courts erred in adopting the definition of navigability promulgated by this Court.

On the other hand, if it be contended that the definition in the Power Act is broad enough to include waters not navigable in fact in interstate commerce, that statutory definition is to that extent manifestly void. Where a question of federal authority arises, navigability is a constitutional fact. Navigability in law depends upon navigability in fact; and such a contention would come down to a proposition that facts, even facts upon which depends the existence of jurisdiction or constitutional authority, may be created by legislative fiat. That such is not the case is too plain to require discussion. *United States* v. *Cress,* 243 U. S. 316, 322; *Crowell* v. *Benson,* 285 U. S. 22, 55.

---

[1] Petitioner's discussion entitled "The legal criteria of the courts below" (Pet. Br. 55-59), while involving many inaccuracies, merely relates to comments of the lower courts upon the character and weight of certain items of evidence and not to the definition of navigability adopted by them. This discussion of petitioner is therefore examined at pages 45 *et seq., infra.*

Therefore, contrary to petitioner's assertion, Congress may not "fix the precise boundaries of its commerce clause jurisdiction" or "define the character of streams which require federal control" (Pet. Br. 34) by declaring streams not navigable in fact in interstate commerce to be navigable waters of the United States. Constitutional power is not a matter of legislative definition. Unless the statutory definition of navigable waters is narrower than the judicial and constitutional definition, it follows that in so far as the authority sought to be exercised by petitioner depends upon establishing that New River is a navigable water of the United States, it is immaterial what definition may be included in the Federal Power Act.

However, we think that the petitioner has misconstrued the definition of navigable waters in the Power Act. With immaterial parts omitted, and the different parts and clauses designated by letter or number for convenience of discussion, that definition reads:

> " 'navigable waters' means
>
> (Part A) those *parts* of streams * * * (Clause 1) over which Congress has jurisdiction under its authority to regulate commerce * * * among the several States, *and* (Clause 2) which either in their natural or improved condition, notwithstanding interruptions between the navigable parts of such streams or waters by falls, shallows, or rapids compelling land carriage, *are* used or suitable for use for the transportation of persons or property in interstate or foreign commerce, including therein all such interrupting falls, shallows, or rapids,
>
> (Part B) together with such *other parts* of streams as shall have been authorized by Congress for improvement by the United States or shall have

> been recommended to Congress for such improvement after investigation under its authority;" (Sec. 3(8)).

Since Part B of the definition obviously has no application,[1] it is unnecessary to consider its proper interpretation; and we confine our discussion to Part A.

Long prior to the adoption of the Federal Water Power Act, the phrase in Clause 1 reading—"over which Congress has jurisdiction under its authority to regulate commerce * * * among the several States," had been authoritatively construed to mean those parts of streams which are navigable in fact in interstate commerce. *United States* v. *Rio Grande D. & I. Co.*, 174 U. S. 690. The definition so far, therefore, merely declares that navigable waters are those which are navigable in fact in interstate commerce. But, Clause 2 of the definition is in the conjunctive—not an *exception* but *an addition* to what has gone before—and sets up an additional requirement for navigable waters for the purposes of the Act. This plainly means that, to satisfy the statutory definition, a part of a stream must be used or suitable for use *at the present time and under present conditions* by the customary mode of trade and travel by water which prevails as of the date when the question of applicability of the Act arises. Thus a *past* use or suitability for use is not enough under the Act.

The reference to interrupting falls, shallows, or rapids merely takes cognizance of the rule that *occasional* interruptions in a stream *generally navigable* do not destroy its navigability. It will thus be seen that the statutory definition is narrower than the judicial and constitutional definition; consequently petitioner cannot complain because the lower courts adopted and applied a broader definition of navigable waters than that prescribed by the statute upon which petitioner relies.

---

[1] New River was not authorized or recommended for improvement at the date of the Act and has not been authorized or recommended for improvement at any time since.

Petitioner contributes nothing but confusion by injecting into its discussion of the *definition of navigable waters*, an argument that, in order to make effective its regulation and protection of interstate commerce, Congress may sometimes, under some circumstances and to some extent, impose regulations of a limited character upon matters which are not a part of interstate commerce or of instrumentalities of interstate commerce (Pet. Br. 34). This is quite beside the point as to what constitutes navigable waters of the United States. At an appropriate place in this brief, we shall discuss this quite unrelated question. (See pp. 61-3, *infra.*)

B. The relation of the constitutional character of federal navigable waters to a proper determination of an issue as to federal navigability.

Navigability in the federal sense is a question of constitutional fact. *Crowell* v. *Benson,* 285 U. S. 22, 55; *Arizona* v. *California,* 283 U. S. 423, 452. Neither Congressional appropriations for improvements nor other federal legislation or acts of federal officers or agencies can establish navigability of a river in interstate commerce, but the question is always one of fact to be determined by the courts. *Oklahoma* v. *Texas,* 258 U. S. 574, 585, 590-1. Indeed, the abandonment of such a federal attempt to create an interstate navigable waterway upon any stream tends to create a presumption against navigability. *Oklahoma* v. *Texas, supra,* 590.

Navigable waters of the United States are waters which are *navigable in fact* and which, by themselves or by uniting with other waters (navigable in fact) form a continuous highway over which commerce is or may be conducted among the States or with foreign countries in the customary modes in which commerce is conducted by water. *The Daniel Ball,* (1870) 10 Wall. 557; *The Montello,* 11 Wall. 411, 415; *United States* v. *Oregon,* 295 U. S. 1, 23. Navigability in fact must exist under "natural and ordinary conditions." *United States* v. *Oregon, supra,* 23; *United States* v. *Cress,* 243 U. S. 316, 321, 325-6; *United States* v. *Holt State Bank,* 270 U. S. 49, 56. Exceptional use, or susceptibility of use, in times of temporary high water or under other abnormal conditions, is insufficient. *Oklahoma* v. *Texas, supra,* 587; *United States* v. *Rio Grande D. & I. Co.,* 174 U. S. 690, 699. To be navigable in fact, a water must have a "capacity for *general and common usefulness* for purposes of trade and commerce." *United States* v. *Oregon, supra,* 23. *The Montello,* 20 Wall. 430, 442-3; *Donnelly* v. *United States,* 228 U. S. 243, 262.

It must be used or susceptible of use for "commerce of a *substantial and permanent character." Leovy* v. *United States,* 177 U. S. 621, 632;[1] *United States* v. *Doughton,* (C. C. A. 4th) 62 F. (2d) 936, 938. "A theoretical or potential navigability or one that is temporary, precarious and unprofitable, is not sufficient." *Harrison* v. *Fite,* (C. C. A. 8th) 148 Fed. 781, 784; *United States* v. *Doughton, supra,* 939. Where "*a stream has never been impressed* with the character of navigability *by past* use in commerce, * * * commerce actually *in esse* or at least * * * *in posse* is essential to navigability," *Gulf & I. Ry. Co.* v. *Davis,* 26 F. (2d) 930, 933, aff. 31 F. (2d) 109, cited with approval in *United States* v. *Doughton, supra.* Whether practical capacity for carrying useful, substantial and permanent commerce exists is a question of fact. *United States* v. *Utah,* 283 U. S. 64, 87; *Crowell* v. *Benson,* 285 U. S. 22, 55.

In short, the question is a practical one. Mere "physical possibility of passing by a boat" from one State to another is not sufficient to establish navigability. *Leovy* v. *United States,* supra, 635. The question is whether the stream in its natural and ordinary condition has a *real* and *substantial* capacity for *genuine, practical, common* and *general usefulness* for purposes of trade and commerce.

---

[1] The holding of this case on the amount of commerce necessary to establish navigability has been cited with approval in *Oklahoma* v. *Texas,* supra, 591, and *United States* v. *Oregon, supra,* 23.

There are fundamental and compelling reasons for the rule that a mere technical, theoretical, insubstantial or impractical capacity for interstate navigation is not sufficient and that, to establish navigability in fact, there must be shown a real, practical and genuinely useful capacity for carrying interstate commerce of a substantial and permanent character. In such cases the court is dealing with the question whether there exists a factual basis for the exercise of federal authority and hence, in the matter of finding the facts, the court is drawing the line between federal authority and the powers and rights reserved to the States and the people. The authority of the federal government is not to be extended and the reserved rights of the States and the people curtailed on the basis of negligible or inconsequential things. *Leovy* v. *United States, supra,* 623; *United States* v. *Doughton, supra,* 938. Cf. *Schechter* v. *United States,* 295 U. S. 495; dissenting opinion Cardozo J. in *Carter* v. *Carter Coal Co.,* 298 U. S. 238, 327-8; *Labor Board* v. *Jones & Laughlin Steel Corp.,* 301 U. S. 1; *Steward Machine Co.* v. *Davis,* 301 U. S. 548.

C. The concurrent finding of both lower courts that New River is not navigable in fact in interstate commerce at any point in its course, is supported by evidence not only substantial but conclusive.

Petitioner alleged in its Bill that New River is navigable from Wilson Creek to its mouth (Bill, Pars. 4, 9, R. 5, 7-8), requested the District Court so to find (Req. Fdg. 34, R. 93) and assigned error to the refusal of the District Court so to find (Ass. of Errors No. 3, R. 158). However, in this Court, as in the Court of Appeals, petitioner has abandoned the allegations of its Bill and its requested findings and has limited its claim of navigability to the reach between Allisonia, Virginia, and Hinton, West Virginia (Pet. Br. 35; R. 2900).

As the lower court held (R. 2900), the burden of proving navigability of New River rested upon the petitioner, the party asserting "the existence of the public servitude". *Harrison* v. *Fite,* (C. C. A. 8th) 148 Fed. 781, 785; *Mintzer* v. *Dredging Co.,* 242 Fed. 553, 559, affirmed 245 Fed. 297.

Both courts below found that New River is not navigable in fact in interstate commerce either *at the site of respondent's project or at any other point in its course.* See pp. 15-16, *supra.* The question here is whether this concurred in finding is supported by substantial evidence. This is, we think, conclusively established by the evidence reviewed in the opinions of both lower courts (R. 107-126; R. 2893-2904), although the evidence so reviewed by no means exhausts the evidence which supports the findings. Indeed, in the Court of Appeals, petitioner said:

> "It cannot be said that the New River presents a 'clear case' of navigability or non-navigability * * *." (Pet. Supp. Br. below, 268.)

While we think the evidence plainly shows a clear case of non-navigability, manifestly, in the face of this admission, petitioner cannot be heard to say that the concurred in finding is not supported by substantial evidence.

For the foregoing reasons, it would, we think, be unjustifiable to burden this Court with an extended analysis of the voluminous evidence upon this issue; and we shall, therefore, review the evidence only sufficiently to show that the concurred in finding of the lower courts is plainly supported by substantial evidence. However, if the Court should be interested in a more detailed analysis and discussion, it will be found in Part I of the separately bound Appendix A to this Brief.

1. *The physical characteristics of New River alone establish that New River in its natural and ordinary condition was not navigable in interstate commerce in the Allisonia-Hinton reach or elsewhere in its course.*

Significance, interrelation and cumulative effect of various natural obstacles to navigability. As petitioner conceded in the court below, low stream flow, limited depths and widths of channel, high and irregular velocities, shoals, falls, rapids, tortuous channels, rocky beds and banks, steep slopes, large scattered boulders and concealed rock ledges are all evidence of non-navigability (Pet. Br. in Court of Appeals 33-35, 41). All of these types of impediments to navigability are found in New River. (R. 2893-5, 2901)

Whether such natural obstacles and obstructions foreclose useful navigable capacity can be determined only by examining not merely the frequency and severity of each type of obstruction but also the cumulative effect of all types of obstacles in the stream. Petitioner however, in so far as it considers physical characteristics at all (Pet. Br. 62-5), urges upon this Court a determination of useful navigable capacity by considering only whether each particular type of impediment to navigation would, *by itself and in the absence of any other obstacles or impediments*, be tolerable for practical navigation.

Physical characteristics as disclosed by the evidence. Some of this evidence is summarized in the opinion of the Court of Appeals (R. 2893-5; 2901). In contrast with an average slope of 1.25 feet per mile on the navigable Kanawha, the average slope of New River between Wilson Creek and its mouth is 7.1 feet per mile (R. 107; for comparison of profiles, see Plate I at end of this brief). The Reports of the Army Engineers, from the mile-by-mile survey (Ex. 31, R. 2282; Ex. 35, R. 2351) of New River from Hinton to the North Carolina line (made by Army Engineers in 1872 before any Federal work[1]) to the Report of General Taylor, Chief of Engineers, in 1925 (*Ex. 572,* text same as Ex. 97, R. 2528), definitely establish that shoals, rapids, falls and huge boulders were so numerous, general and continuous as to preclude navigability in fact (R. 2897). In general, the river consists of short pools, separated by shoals, falls, rapids, rocky ledges and masses of huge boulders, the latter also being found in many of the pools. Where any channel exists through the shoals, rapids and falls, it is frequently tortuous, narrow, and difficult to find (R. 107-8; 1676 et seq.; 1783-6, 1706-8, 1660-1, 943-5).

---

[1] When the first survey was made, the discharge was 2,000 c. f. s. at Lead Mines (43 miles above Radford) and 3,000 at Lipford (Sifford's Falls, below Radford), so that the river was substantially at its average yearly flow and not even a low water condition. (Ex. 31; R. 2281-2.)

The photographs of *some* of the natural obstacles to navigability, which were introduced by respondent, plainly show a non-navigable stream (See (Photo) Appendix B to this brief). Respondent also suggests comparison between petitioner's aerial photographs (Pet. Br. 72, footnote) and respondent's photographs; but the comparison should be made between Petitioner's Appendix Vol. III (reasonably good photostats) and the corresponding photographs in Respondent's Appendix B (largely photoprints and reasonably good photostats)—not with respondent's photographs in Petitioner's Appendix Vol. V (very poor photostats). In fact, petitioner's aerial photographs are taken under such conditions as to minimize or obscure the natural obstacles and its ground photographs are often taken either from upstream or at such a distance as to minimize, and in some cases they wholly fail to show, important rapids or falls (See Appendix A, 24-29).

The testimony of the witness Matthews, a professor of geology who had specialized in stratigraphy and who had made a study of the stream for the Virginia Geological Survey, plainly shows that New River is *sui generis,* that the physical characteristics of the particular section of New River between Radford, Virginia, and Round Bottom, West Virginia, (the one which the petitioner now claims to be navigable) are unique, found in no other river of appreciable size and such as to preclude navigability in fact. (R. 2894, particularly footnote; R. 1675-87). See also the testimony of Major Putnam (R. 1785-6).

The actual conditions disclosed by federal work. The natural non-navigable character of New River was confirmed by the conditions encountered in the limited federal work undertaken in "the most easily improved places" on "three widely separated stretches with unnavigable reaches between them". (*Ex. 572;* text same as printed Ex. 97, R. 2531). In attempting to create a narrow channel, with low-water depth of only 18 inches (Ex. 37, R. 2373), it was found that ledges and shoals actually comprised from 34 to 44 per cent. of the entire distance covered by these short attempted improvements.[1] (Computed from Ex. 39; R. 2398; 2402-3 and *Ex. 563,* p. 2251. See also Appendix A 32-36). The reports of the Engineers disclose that even in these most favorable reaches the depth of water over the ledges and shoals (obviously at the deepest point and probably for an inconsequential width) was rarely over one foot (Ex. 37, R. 2370) and frequently only "a few inches" (Ex. 145, R. 2710) or again only "4-6 inches" (Ex. 35. R. 2340). Yet, when the channel was cut, the Engineers found that the previously excessive velocities were very greatly increased (Ex. 34, R. 2332). The conditions encountered were compelling evidence of non-navigability. *Oklahoma* v. *Texas, supra,* 590-1.

2. *The limited federal work did not change the natural non-navigable character of New River in interstate commerce.*

This "work was limited to the most easily improved places and effort made to so ameliorate conditions as to permit local navigation" over short stretches above Hinton and Radford, respectively, to the rail heads at those places (*Ex.*

---

[1] The so-called "measurements" of petitioner's witness Gerdes (Pet. Br. 69-71) were completely refuted by the official survey of the Corps of Engineers and their actual experience in trying to cut an insignificant channel in the parts of the river which were most easily susceptible of artificial improvement. His "measurements" were largely mere estimates, and he admitted that at various places he was afraid that he or his associates would be swept away in the current if actual measurements were attempted (R. 933-5, 930).

572, same text Ex. 97, R. 2531). We have already referred to the actual conditions encountered in these attempted improvements. The work did not change the natural non-navigable character of the stream in interstate commerce (R. 2897, 2903-4).

It is highly doubtful (though not material in this case) whether intrastate navigability was created even temporarily by these artificial improvements (undertaken between 1877 and 1886) in any part of those stretches (R. 2897, 2903-4). Thus an experimental attempt (initiated in December, 1881 and abandoned in 1882 or 1883) to boat charcoal-iron downstream to Radford from two of the sixteen furnaces tributary to the artificial improvement in that stretch, was unsuccessful (R. 2392, 2400, 1728-34, 1749-50, 1568-72, 1561, 294). However, whether intrastate navigability was artificially created in those stretches, and if so, at what point such navigability ended, was not in issue in the courts below and is not in issue here. Any temporary use which was brought about in the stretch above Hinton was at least below Round Bottom, West Virginia, and consequently, as the lower courts found, was not interstate (R. 115, 2902).

Non-navigable character of Round Bottom-Radford section unchanged; important physical and other differences between that section and Hinton-Round Bottom stretch. Petitioner's argument, based upon the erroneous assumption that navigability had been established throughout the stretches above Hinton and Radford and being to the effect that consequently the long intervening section must be navigable, is plainly untenable, quite aside from the erroneout hypothesis upon which it is based (Pet. Br. 35-6, 67-9).

Apart from the fact that any navigability above Hinton, outside of strictly local pools or during high water, was created by the artificial improvement, there are wide differences between the physical characteristics of that stretch and those of the stretch between Round Bottom and Glen Lyn, or those of the 60-mile middle section extending from Round Bottom to Radford. The average slope of the river between Hinton, West Virginia, and Round Bottom, West Virginia, is, as stated by petitioner below (Pet. Br. below 52), 3.7 feet per mile. The average slope of the stretches from Round Bottom to Glen Lyn and indeed for the first 40 miles above Round Bottom, is approximately 5.5 feet per mile or *about 50 percent greater* (*Ex. 196,* R. 1242). The falls, rapids, shoals and other obstacles are also much more numerous and severe. See Appendix A 8, 25. We have already invited attention to the testimony of Prof. Matthews showing that the physical characteristics of this intervening section of New River are unique and such as to preclude navigability (See p. 40, *supra*). Indeed, the Corps of Engineers had specifically examined the Glen Lyn stretch and officially reported it to be non-navigable (Ex. 579B, R. 2862; Ex. 579C, R. 2863-4).

This official view, and its correctness, are strongly emphasized by the proposal of the petitioner to construct a few miles above Hinton the Bluestone Dam, which, were the stretch navigable, would be a complete barrier to navigation (R. 2899),[1] and by the fact that in the license tendered respondent the conditions incorporated for the alleged protection of navigation relate only to the navigable Kanawha (Ex. 131, Art. 15, R. 2670).

---

[1] Petitioner, criticising the lower court for finding that the Bluestone Dam will have no locks or means for navigation (R. 2899), erroneously asserts that "a barge lift is to be provided" (Pet. Br. 86). While the cross-examination of petitioner's witness refutes this assertion (R. 1385-7), it is sufficient to point out that the verified bill of particulars filed by petitioner in the pending condemnation proceeding (Pet. Br. 110) states: "The proposed dam is to be a straight, concrete gravity structure with a spillway controlled by twenty-one gates, each 31 feet in height and 30 feet wide in the clear, *there being no facilities provided for water transportation.*"

3. *The absence of any use of New River by early traders, industries, or even military expeditions, is compelling evidcnce of its non-navigability.*

The evidence is uncontroverted that, until recent times, land travel down the New River valley presented tremendous difficulties and the greatest incentive to use New River or any practical water transportation no matter how difficult. The evidence established a complete absence of any use of New River from the settlement of the valley in 1774 (R. 1581-2) until in the 60's, when as a war measure involving physical possibility and not practicability, the Confederacy made an ineffective attempt to float some military supplies down New River to its commissary at Narrows, Virginia, and that the routes of trade and travel, and the routes used for marketing the products of lead smelters and charcoal-iron furnaces located on New River, were land routes which frequently paralleled and crossed New River and which, so far as they led westward or northwestward had their terminus at Kelly's Boat-Yard near Charleston, West Virginia, at the head of navigation on the Kanawha River (R. 1582-1604; 1725-36; 1752-3).

As evidence of "early navigation", petitioner states that "a number of expeditions navigated the river over the reach now in issue" (Pet. Br. 41). The "number" was in fact *two*—the John Marshall Expedition of 1812 (Ex. 189, R. 2716-35) and the Moore and Briggs Expedition of 1819 (Ex. 32, R. 2298-2324). The Marshall Commission "navigated" only, and the greater part of the "navigation" of the Moore and Briggs Expedition was over, the stretch from the mouth of the Greenbrier (a mile above Hinton) downstream to the mouth of the New River (R. 2725-6). Something of the character of this alleged "navigation" is shown by the facts that the Moore and Briggs "boat drew about nine inches (of) water" (R. 2307). These two exploratory expeditions are part of the history of the effort of the State of Virginia to locate a practical route *by land or canal* from the James River to the Kanawha and Ohio

Rivers (R. 2298-9; 2720-1, 2724) Obviously, neither expedition was in the usual course of trade, travel or commerce. Neither of these expeditions reported observing any use of New River but their reports do disclose the very grave and numerous natural obstacles to any practical use of New River other than by artificial improvement (R. 2723; see Appendix A pp. 39-53).

4. *Quite aside from the complete absence of early use, petitioner failed to establish practical use, or susceptibility for practical use, in interstate commerce.*

Petitioner in effect merely argues that certain general statements, considered apart from the definite statements touching the subject, in the Reports of the Army Engineers and certain selected items of testimony given by local non-expert witnesses, tend to support an inference of practical use or susceptibility for practical use, in interstate commerce in the Radford-Round Bottom section (Pet. Br. 42-55). In short, petitioner does not attempt to show that the concurred in findings of non-navigability are not supported by substantial evidence but, ignoring those findings and the great mass of evidence which squarely supports them, merely attempts to show that there was some conflicting evidence.

Petitioner completely misconstrues, or misuses, the engineering reports. The definite statements in those reports plainly establish that neither before nor during nor after the federal work was the river used, or susceptible of use, for interstate commerce (R. 2901). For illustration, the engineers reported: In 1873, that the improvement above Radford, "*if effected*" would open "to both eastern and western markets a large area of productive country, *now practically shut up*" (Ex. 31, R. 2288); in 1880, that a channel had been constructed 12½ miles above Hinton, West Virginia, "giving an outlet to the products of Mercer County, West Virginia" (Ex. 37, R. 2370); in 1881, that a channel had been completed 17¾ miles above Hinton to

McDaniel Falls, "giving an outlet to * * * Crumps Bottom and the Indian Creek country" and another, entirely separate and distinct, channel 12 miles above New River Bridge in Virginia "giving an outlet for timber and farm products, but not available for iron or ores until Radford furnace can be reached" (Ex. 37, R. 2370); in 1881, that the appriation for 1882 "will carry the improvement" past the "mouth of Lick Creek, 20 miles above Hinton, thus opening up the trade from" certain tributary territory (Ex. 37, R. 2370-1); in 1883, that charcoal-iron, zinc, copper and valuable timber above Radford "are kept from market by the non-completion of this work" (Ex. 39, R. 2400-1); in 1883, that the improvement, "when it reaches 35 miles above Hinton (which it never did), will give outlet to Peterstown, Monroe County, West Virginia" (Ex. 39, R. 2399); and in 1882 and 1883 (the last years that any work was done on the Hinton and Radford stretches and five and six years respectively after the improvements had been inaugurated) and in 1886 (four years after the last work on the Hinton and Radford stretches and nine years after the improvements had been inaugurated), that "the navigation of the river not being continuous as yet, it is practically a feeder to the several railroads which cross it and run along portions of it" (Ex. 38, R. 2384; Ex. 39, R. 2396; Ex. 41, R. 2407).

It is thus plain that *even these "most easily improved places"* (*Ex. 572* text same as Ex. 97, R. 2531) *were not navigable in their natural condition;* that any precarious navigability which they may have temporarily attained was dependent upon, and confined within the limits of, the small artificial channel created by the federal work; and that such use of New River, if any, as existed before the initiation of the federal work in 1877 was not only negligible in character but also purely local in a few favorable pools, or occurred during fortuitous high water (R. 2901).

These definite statements of the engineers cannot be overcome by reference to such occasional general statements as that there were so many keel boats *somewhere* "in this part of the river", or that, some years after the work had been in progress, the work was beneficial to, or was planned to benefit, keel boats "now in use" *somewhere* on the stretches of the river in certain parts of which an artificial channel had already been created. (Pet. Br. 43-4.) No claim that the concurred in finding of the lower courts is not supported by substantial evidence can justifiably be based upon any such use of these reports.

The local non-expert testimony upon which petitioner relies is of the type which this Court has said is often vague and untrustworthy and must yield to evidence of a more definite character. (*United States* v. *Oregon,* 295 U. S. 1, 19; *Oklahoma* v. *Texas,* 258 U. S. 574, 586-7; XI 25.) This evidence, much of it hearsay, was not only contradicted by other testimony of like character, but also by other types of evidence of a higher order and by known facts. In discussing this testimony the Court of Appeals said in part (R. 2902):

> "It is said that this conclusion did not correctly appraise the effect of the oral nonexpert testimony; and in plaintiff's reply brief there are listed the names of 23 such witnesses from whose testimony it is contended the contrary conclusion should have been reached. We have carefully considered this testimony, but are not convinced that it was given too little weight. *This is the type of testimony that the trial judge who sees and hears the witnesses is particularly well qualified to appraise.* These witnesses were for the most part elderly men who were testifying purely from unaided memory of events long past. Such testimony has inherent infirmities and is obviously not entitled to the weight to be properly given to contemporary official written records (United States *v.* Oregon, 295 U. S. 19). *It also had to be appraised in connection with similar testimony of almost an equal number of witnesses introduced by the defendant by which it was to a considerable extent contradicted or qualified;*

> *and proper consideration also had to be given to the other testimony in the case, verbal and documentary, of expert and scientific witnesses tending very strongly to show that the river was non-navigable in fact.*"

Petitioner seeks to avoid the effect of the weighing and sifting of this testimony by the courts below in connection with the mass of other evidence in the case by asserting that the lower courts introduced "novel qualifications to the definition of navigable waters" (Pet. Br. 55-8). The petitioner wholly misconceives the opinions below. The quotations by petitioner (Pet. Br. 56) from the opinions of both courts below clearly indicate, and the opinions as a whole conclusively show, that neither court was at that point enunciating standards of navigability but was only weighing and sifting particular evidence. Contrary to petitioner's unwarrantable assertion, the courts below did not say that "actual navigation" should be disregarded for any reason. What they did say was that certain evidence urged by the petitioner as proof of navigability in the Radford-Round Bottom section did not, when properly weighed and sifted, establish navigability even when considered by itself and that it had to be weighed in connection with other evidence both of a like character and of a higher order.[1] Thus the Court of Appeals reviewed the various lines of evidence pertaining to navigability (R. 2892-2904) and weighing all the evidence independently found that petitioner had failed to show that the river is a navigable water of the United States (R. 2900) under the definition of navigable waters enunciated by this Court. R. 2892; pp. 31-32, *supra*).

---

[1] Contrary to petitioner's assertions (Br. 53-56), there is abundant evidence to support the finding regarding the relation of trips to high water. (McWane, R. 1661, see also Append. A, p. 120; Coleman, R. 200; Weiss, R. 232; Medley, R. 380; Farmer, R. 430; Knode, R. 1567; Harvey, R. 1637-8; Breeding, R. 259; Duncan, R. 274; Haley, R. 280; Snidow, R. 297; Allison, R. 310; Smith, R. 400; Peterson, R. 448, 449; Moore, R. 451; Martin, R. 453; Roop, R. 513.) This was also patent from the definite evidence of physical characteristics of New River in its natural and ordinary condition.

Petitioner has sought to give this testimony an appearance of dignity, reliability, precision and substance, first, by setting up in tabular form, like a multiplication table (Pet. Br. 178), a liberal, not to say loose, construction of the most extreme statement of each witness, largely given in response to leading questions, in complete disregard of modifications appearing either in the direct or cross examination and of demonstrated error; and second, by then (upon the basis of a further loose construction of the already distorted interpretation in the table) reducing to the precision and definiteness of a geometrical figure (Pet. Br. op. p. 48), all the hearsay of childhood, demonstrably erroneous statements and the most extreme statements, waveringly and uncertainly hazarded by any witness out of a hazy memory. And, in doing so, petitioner completely disregards all conflicting evidence both of the same type and of a higher character.

In this complicated process of cumulative distortion petitioner in its diagram, showing allegedly "commercial navigation", has mislocated the West Virginia—Virginia state line[1] (Ex. 518; R. 2909, 2938); located Sulphur Springs Branch three miles further upstream from Hinton than it actually is; treated the testimony of different witnesses with relation to the same alleged trip as evidence of separate uses of the river (6D,[2] R. 393-4; 33D, R. 198-200; 47J,

---

[1] Were the question material in this case (as it is not), the State line between Virginia and West Virginia on the New River is located, not at the upper end of Round Bottom but, at Wiley's Falls (Ex. 518, R. 2754A; Ex. 46, R. 2426A; R. 2909, 2938).

[2] This reference and similar references hereafter appearing in this brief are to the lines, indicating movement by water, of petitioner's chart of 'commercial navigation', or to respondent's revised chart entitled "Alleged Commercial Navigation", etc., as the text may indicate, each of which lines of the former, petitioner has designated by numeral and letter, e. g., 6D, 33D, 47J. Respondent has used the same designations on its revision (of petitioner's chart) inserted opposite page 50 hereof.

R. 373-4; 56E, R. 348-9); treated as common and ordinary use by the customary modes of trade and travel by water the unusual and hazardous moving of the McWane boat from Radford to Hinton on a five or six foot "tide", even though this craft was being brought down in the *unfulfilled* hope that it could be used advantageously above Hinton, after the utter impracticability of its use above Radford had been demonstrated, and was consequently sold at Hinton and shipped away on a railway car (33D, R. 1660-5); diagrammed, as 'uncontradicted' evidence of use in the customary modes of trade and travel by water, hearsay statements of alleged boating for railroad construction (2B, R. 483, 481-6; 12B, R. 416-7), although it had been shown by conclusive evidence that such statements were erroneous (R. 1647-56); diagrammed, as evidence of use of the river from Hinton to Glen Lyn, the statement of a witness who said that a man "came there with his auto" *in 1883* (*sic*) to have some material shipped up the river by boat (R. 484-5); treated the testimony of witness Dickinson as evidence of tobacco shipments from Glen Lyn to Hinton (6A) even though the witness's own testimony (that part not printed by petitioner below) showed that this witness had wagoned the tobacco downstream to a point two or three miles below Round Bottom, West Virginia, (about 10 miles below Glen Lyn) for shipment by water to Hinton (R. 394-5).

The foregoing by no means exhausts the inaccuracies and misstatements contained in petitioner's tabulation and diagram, but is merely illustrative of their untrustworthiness.[1]

---

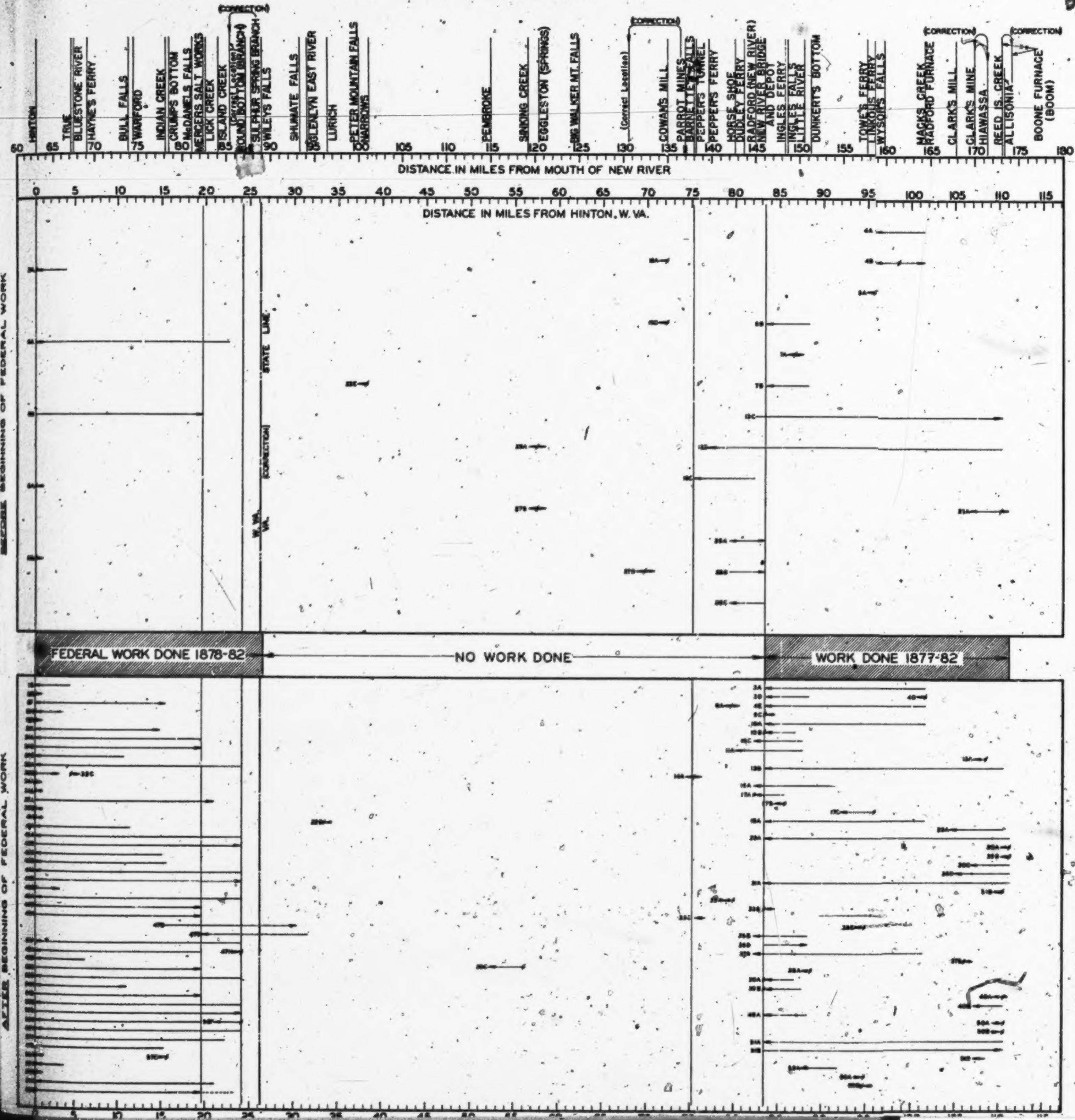
[1] As proof of susceptibility of practical navigation, petitioner cites the "stunts" of the witnesses Gerdes and Gragnon (Pet. Br. 54-55). On July 22, 1936, these witnesses launched a small boat with an outboard motor in the pool back of the London dam on the Kanawha River, navigated it up through the pool, pulled it for ¼ mile through a shoal, carried it around Kanawha Falls, boated up and down the pool behind the Kanawha Falls dam, loaded it on a

(*Footnote continued on next page*)

UNITED STATES
V
APPALACHIAN ELECTRIC POWER CO.
NO. 12. OCTOBER TERM, 1940,
U. S. SUPREME COURT

RESPONDENT'S REVISION* OF PETITIONER'S CHART RE ALLEGED COMMERCIAL NAVIGATION ON NEW RIVER BETWEEN HINTON, WEST VIRGINIA AND ALLISONIA, VIRGINIA

(PET. BR. 48)



LEGEND:

↚ = "Line" representing a boat or raft or logs alleged to have been seen at a given place, going in or coming from the indicated direction, but with distance of movement indefinite.

— = Alleged movement between given points.

← = Alleged direction of movement.

4A, 49B, etc. refer to tabulation in Petitioner's Appendix "B".

* **NOTE A**: As compared with Petitioner's chart, lines for which Petitioner's purported bases fall within one or more of the following categories have been appropriately eliminated, shortened or relocated†:

I Incorrect use of testimony as actually recorded
II Duplication
III Hearsay
IV Non-commercial items
V Items based on testimony, lacking probative value–
  (a) Testimony inconsistent with other evidence in the case.
  (b) Testimony inconsistent with well-known facts.

* **NOTE B**: Certain lines, because they refer to the period after the beginning of federal improvement, have been transferred from the upper to the lower portion of the chart†.

---

† For numerical identification of the lines in point and pertinent citations to the record, see reverse hereof.

THE LINES ON THIS CHART CAN NOT BE ACCEPTED AS ESTABLISHING THE OCCURRENCE OF ALL OF THESE ALLEGED MOVEMENTS OF BOATS, RAFTS OR LOGS, OR THEIR WEIGHT AND SIGNIFICANCE IF THEY DID OCCUR. THE LINES NECESSARILY FAIL TO REFLECT MANY FACTORS, SUCH AS CREDIBILITY, OCCURRENCES AT HIGH WATER, DIFFICULTIES ENCOUNTERED, ETC., WHICH WOULD JUSTIFY OR REQUIRE THE REJECTION OR DISREGARD OF SUCH TESTIMONY BY A TRIAL COURT. (SEE TEXT, ADJACENT PAGE).

Details of Respondent's Revisions re Alleged Commercial Navigation.

NOTE A: As compared with Petitioner's chart, lines for which Petitioner's purported bases fall within one or more of the following categories have been appropriately eliminated, shortened or relocated.†

* Some items (lines) fall under more than one category.

I. INCORRECT USE OF TESTIMONY AS ACTUALLY RECORDED.

Line	*Record*
2B*	482–5
4B*	252, 253
4D*	253
4E	254, 186, 455
5B	455
6A	394, 395
6B	394, 395
6E	395
7B	430
9A*	189, 195
9C*	194
11A	434, 436, 189
11B*	434–436
12B*	416, 417
14A*	205, 206
15A*	451
16A	270
16B*	269, 270
17B	268
18A	446
19A*	344
20A	510–512
25B*	296, 300
27B*	261, 262
27C*	261, 262
27D*	261, 262
28A*	224, 225
28D*	227, 228
30A*	307, 309
30B*	307–309
30C	307
31B	239
32C*	424–426
33B	199
33D*	200
33E	203
34A*	480
35A*	271
39A	186, 226, 228, 455, 291, 292
40A	335
41B*	310, 311
45A*	412
47B*	372, 1517, 1518, 1525, 1526
47C*	372
47E*	373
47G	375
47H	377, 378
49C*	487, 488, 490, 410
50A	449, 450
50B*	449
56C	348
60A*	203, 204
60B	204
61A	464–466
62C	234

II. DUPLICATION.

3B	(Duplicated by 3A)	218–224
3E	(Duplicated by 3A)	218–224
9B	(Duplicated by 11A)	189, 434, 436
11B*	(Duplicated by 11A)	434–436
11C	(Duplicated by 28B)	225, 435–436
16B*	(Duplicated by 17A)	267, 268, 269
22D	(Duplicated by 22B)	340
23B	(Duplicated by 23A)	437–439
23C	(Duplicated by 23A)	437–439
27C	(Duplicated by 27B)	261, 262
28D*	(Duplicated by 28A)	227, 228
37C	(Duplicated by 37B)	235, 236
41B*	(Duplicated by 41A)	310, 311
47C*	(Duplicated by 47B)	372
47E*	(Duplicated by 47A, 47D, 47B)	372, 373
47J	(Duplicated by 47B)	374, 383
49C*	(Duplicated by 49A)	487, 488, 490, 410
52B*	(Duplicated by 47B)	320, 323, 324, 372, 1517, 1518
54C	(Duplicated by 21A)	472, 473, 407, 408
56A	(Duplicated by 47A)	373, 348
56C	(Duplicated by 47D)	348, 373
56D	(Duplicated by 47B)	348, 361, 362, 372, 373, 1517, 1518, 1525, 1526
56E	(Duplicated by 47B)	348, 349, 361, 362, 372, 373, 1517, 1518, 1525, 1526

III. HEARSAY.

2A*	482–5
3A*	218–224
4B*	252, 253
4D*	253
9A*	189, 195
9C*	194
11D	435–436
12B*	416, 417
13A	215
14A*	205, 206
19A*	344
25B*	296
27B*	261, 262
27C*	261, 262
27D*	261, 262
28A*	224, 225
28D*	227, 228
30A*	307, 309
30B*	307–309
32C*	424–426
34A*	480
41B*	310, 311
50B*	449
52B*	320, 323, 324
60A*	203, 204
62A	228
62B	233, 234

IV. NON-COMMERCIAL ITEMS.

4C	252, 253
6D	393, 1656, *et seq.*
15A*	451, 453
22A	339, 340
22C	340
25A	296, 297
27A	261
33D*	200, 1660, 1661
45A*	412
51C	244–246

V. ITEMS BASED ON TESTIMONY LACKING PROBATIVE VALUE—

(a) Testimony inconsistent with other evidence in the case.

Line	*Record*
6C	394, 395, 1650, 1652; 1654; Resp. Append. A 100-107
35C	272, 1662
47B*	372, 1517, 1518, 1525, 1526
47I	272, 383, 372, 1517, 1518, 1525, 1526
52A	323, 319, 320
52D	320, 323, 328, 394, 395, 1651
54B	406, 408-411, 1650, Ex. 38, 2382, 2383 514
55A	398, 399, 400, 1651, 1672

(b) Testimony inconsistent with well-known facts.

1A	458, 459, 460
2B*	484, 485, Resp. Append. A 100-107
3A*	218-224
~~3C~~	~~218-224~~
3F	218-224
3G	218-224
25B*	1674
27B*	262, 266
34A*	480, 1650, 1652
35A*	271, 1562-1565

NOTE B: Certain lines, because they refer to the period after the beginning of federal improvement, have been transferred from the upper to the lower portion of the chart.

1B	459
2B	482-485, 1650, 1652-1654
3A	218, 222
3D	218
4D	Ex. 38, 2382, 2392, 514
4E	254
6F	391, 396
9A	189
9C	Ex. 38, 2382, 2392, 514
10A	Ex. 38, 2382, 2392, 514
10B	279; Ex. 38, 2382, 2392, 514
10C	279, 266, 269, 274, 276
11A	189, 433
12A	416, 417
12B	416-417, 1650-1652, 1654
13A	Ex. 38, 2382, 2387, 514
13B	Ex. 38, 2382, 2392, 514
14A	205
16A	269, 270
17A	269, 270, 267, 268
17B	267, 268, 271
17C	267, 268, 271
18A	Ex. 38, 2382, 2392, 514
20A	Ex. 38, 2382, 2392, 514
21A	Ex. 35, 2333, 2346, 514; 472, 473
22B	340
24A	410
24B	410
24C	410
25C	298

† *The item numbers hereinabove refer to the respective lines set forth on petitioner's chart (Pet. Br. 48) and the corresponding items in petitioner's tabulation (Pet. Appendix B, p. 178-184).*

* *Item (line) falls under more than one category.*

When petitioner's chart[1] (Pet. Br. p. 48) is corrected[2] to reflect *some, but not all,* of the factors enumerated by the Court of Appeals, it manifestly shows no appreciable use of the section between Round Bottom, West Virginia, and Radford, Virginia. Even if the testimony reflected by the lines on respondent's revised chart (opp. p. 50 hereof) could be accepted (as it can not) as establishing the occurrence of all of these alleged movements of boats or rafts or logs and could be considered apart from the other evidence in the case, they would afford no substantial basis for a finding of navigability. But it is plain that testimony may not be weighed and sifted by the egregious process of drawing lines upon a chart to represent the testimony of certain witnesses in such a manner as to attribute equal weight and credibility to the testimony of each such witness. Quite aside from the fact that such a process disregards the effect of the other clear and definite (but undiagrammed) evidence in the case, which clearly supports and indeed compels a finding of non-navigability, this curious method of weighing testimony wholly fails to reflect such things (many of

---

trailer and hauled it 6 or 8 miles to the pool above the Hawksnest dam, boated up and down the Hawksnest pool, loaded the boat on a trailer and hauled it to Hinton! (R. 1150-4). On July 19 and 20, 1936, Gerdes had attempted to run this small boat upstream from Hinton. While he did not disclose this effort on direct, it appeared on cross that he and his crew hauled the boat over Bull Falls, Harvey's Ledge, Wiley's Falls, Shumates Falls and Peters Mountain Falls (R. 941-3). How many other places does not appear, for he was not asked as to other points on cross or redirect. Finally, with all passengers in the boat attired in *life preservers,* on July 27th of a very hot summer, the witness testified that he got through Bull Falls in this small boat (R. 952-5)—at least nine days after he initiated the effort. It is significant that, apart from these "stunts" of the witnesses Gerdes and Gragnon, performed during the course of the trial in an effort to secure some evidence of navigability, not a single witness examined the river in a boat in preparation for his testimony, although that obviously would have been the most satisfactory method were it practicable. Even Gerdes did not make his alleged survey by boat but by automobile and on foot (R. 928-9).

---

[1] Essentially the same chart and accompanying tabulation (Pet. Br. 178) were also presented to the Court of Appeals.

[2] See also Resp. Append. A 130-5.

which can only be weighed by a Trial Court) as lack of veracity, obvious unreliability of memory, mental and physical condition, susceptibility to suggestion, innocent romancing, bias, the fact that an alleged trip was made, if at all, during unusual high water, the difficulties encountered, and the fact that trips such as the temporary and unsuccessful iron-boating, on the improved stretch above Radford, actually were proof of non-navigability.

Petitioner seeks to bolster its tabulation and diagram by quoting an alleged summary of such testimony from the dissenting opinion (Pet. Br. 49-52). It would seem sufficient to point out that both lower courts disagreed with this alleged summary of the dissenting judge. However, the quotation relied upon refers *only* to petitioner's Appendix II of evidence filed in the lower court (R. 2926-8), and is solely a summary of such portions of certain witnesses' testimony (often misconstrued or misstated) as are set forth in that appendix; it is not a summary of the record. Under the new rules of the Fourth Circuit, petitioner was permitted to attack the findings of the trial court by printing such selected excerpts from the evidence as, in the words of the rule, it desired the reviewing court to read, and petitioner took the fullest advantage of this rule by printing, in its appendix of evidence, only the most extreme statements of certain witnesses. By this process of sieving out all conflicting evidence of a like character, all other evidence of a higher order, and the qualifications, limitations and corrections in the testimony of the witnesses who had been thus selected, and by the further process of condensing the result as is done in the dissenting opinion, there is produced a recital which is grossly misleading even as a summary of only that part of the local non-expert testimony most favorable to petitioner's contention.

Manifestly, as the lower court said, this testimony had to be weighed by the trial court, and is to be weighed if at all by reviewing courts, not only in connection with other testimony of like character but also in connection with the other definite evidence in the case. Thus, the physical characteristics of the river (erroneously stated in the dissenting opinion), the actual conditions encountered in the federal work undertaken in the most easily improved stretches of the river, the absence of any early use under conditions which would have compelled use of any feasible water transportation no matter how difficult, the testimony of expert and informed witnesses, the considered action of Congress and of the Corps of Engineers, the comparison with other streams such as the Kanawha, Colorado and Fox, and the progress reports of the engineers upon the federal work, all negatived navigability or susceptibility to navigation in this unimproved middle section. Since the clear and definite evidence in the case negatived navigability or susceptibility to navigation in this unimproved section, the correctness of hearsay and other unsatisfactory evidence of alleged use in this unimproved section was more than ordinarily suspect. But that the testimony relied upon in the dissenting opinion, and weighed only in the light of testimony of that character, was unworthy of credit, mistaken, misconstrued or contradicted, plainly appears from the following illustrations:

1. According to the dissenting opinion, the uncontradicted testimony shows substantial use of the section between Radford, Virginia, and Round Bottom, West Virginia, and alleged supporting instances of transporting staves, lumber products, etc., are cited (Pet. Br. 49-52). This testimony was not only largely hearsay and lacking in probative value on its face, but it was plainly contradicted. Petitioner's witness Wauhop, who had been engaged in the most extensive stave operation on the entire river, testified that the highest upstream from Hinton that he had ever cut staves was at Island Creek, West Virginia (some miles below Round Bottom) and that he found it impractical to boat them downstream from that point to Hinton and too far to wagon them to Glen Lyn (R. 464, 466). Witness Buckland cut staves which he hoped to boat *downstream*

from a point near Pendleton's ferry (at Round Bottom), West Virginia, but, finding this impossible, had to wagon them to Lurich, Virginia (R. 1510-1). Witness Adair was engaged in *wagoning* staves from Round Bottom to Glen Lyn (R. 1526). And the weight of this testimony was greatly increased by the uncontradicted evidence that the difficulties and expense of wagoning over extremely bad roads were so great as to compel the use of any available water transportation no matter how difficult.

2. Other testimony is cited in the dissenting opinion to show boating of tobacco from Glen Lyn to Hinton for shipment by rail (Pet. Br. 49-52). Petitioner's witness Dickinson, who lived on a farm on New River between Glen Lyn and Wiley's Falls, testified that he and those living in Virginia always *wagoned* their tobacco to a point two or three miles below Round Bottom, West Virginia, i. e., to a point about ten miles below Glen Lyn, for transportation by water to Hinton (R. 394-5). Nothing could more squarely deny the existence of any practical use of the river for boating tobacco higher upstream than this point.

3. The dissenting opinion also cites testimony purporting to show the transportation of fertilizer from Glen Lyn downstream. Again petitioner's witness Dickinson, who used fertilizer frequently on his farm on New River below Glen Lyn, testified that it was *never brought to him except by wagon* (R. 391-5). Indeed, petitioner's witness Peters never testified that he took more than *one* load of fertilizer down from Glen Lyn—and that sole trip was made, *if at all*, during high water in the Spring (R. 328). But in the dissenting opinion this becomes testimony that the witness "worked on the river in boats for 16 or 18 years, that *in the Spring* he would go up the river to Glen Lyn to get fertilizer" (Pet. Br. 52).

4. The dissenting opinion states that "The witness Coleman operated a *steam boat* for six or seven months from Pepper's Ferry to Pepper's Tunnel" (Pet. Br. 51). This incident occurred when Pepper's tunnel, which was inac-

cessible by road, was being constructed by the Norfolk & Western Railroad. As a construction maneuver, to get materials and supplies to this job, an upright engine was mounted on a flat boat at Pepper's Ferry (the point of nearest access to a highway), and this was used to ferry material two miles down and across the river to the tunnel mouth. And in order to permit this ferrying operation it was necessary to dig the channel out for the two miles between Pepper's Ferry and Pepper's Tunnel before any hauling could be done (R. 202; 1652). Is it contended that, if it is physically possible to ferry a stream even by digging a channel for the ferry, such fact establishes navigability of the stream in its natural and ordinary condition and does so not only in the excavated portion but throughout its course?

5. Other testimony cited in the dissenting opinion is alleged to show that timbers and other supplies were boated from Hinton to Glen Lyn for railroad construction. Even though the matter of getting supplies to inaccessible places in railroad construction is a construction maneuver (analogous to moving a house a short distance on rollers) in which physical possibility and not practical use is the test, this testimony is completely refuted. Instead, the situation was that some railroad grading was done along the improved stretch of river below Round Bottom, West Virginia, presumably for the purpose of holding a franchise, although the railroad was never completed (R. 378; 1652). The evidence shows that, whereas any supplies which may have been transported by boat from Hinton were taken to this railroad grading operation in West Virginia; all materials and supplies (including bridge timbers) for railroad construction at Glen Lyn, Virginia, were transported by land (see Appendix A 101-7).

6. The dissenting judge, as evidence of commercial use, states that the witness Owen testified to carrying the Government boats down to Hinton for sale after the federal work was abandoned above Radford. While this also was

only a construction maneuver, not a commercial movement, it does show that there was no market for these small boats higher up the river than Hinton. The report of the resident Army Engineer, praising the man in charge of this maneuver "for the energy and ability displayed in this movement," discloses that "after much difficulty" he succeeded in *floating these boats downstream* in 29 days—reflecting progress of less than 2.7 miles per day! (Ex. 39, R. 2401). The movement was in the Spring (March and April) when "the water was high," and "There was a right smart tide" (Owen R. 249). Here, as in general where reliable testimony was available, the testimony relied upon by the dissenting judge and the petitioner was shown to be grossly erroneous and contradicted by known facts.

7. Although it is uncontradicted that no work was done between New River Bridge at Radford and about Wiley's Falls at the State line, some of these witnesses testified to seeing wing-dams and other artificial improvements at all the rapids and falls in this unimproved section and even to seeing work being done there! (R. 346-8; 303, 305; 220-1). There was some temporary intrastate boating in short stretches above Hinton and Radford after the federal work had been done there. Significantly, however, none of those engaged in such boating above Radford were known to those engaged in such boating above Hinton and *vice versa*. This, of course, would have been incredible if there had been any boating between Radford and Hinton.

The foregoing is, we think, sufficient to show the erroneous character of the alleged summary quoted by petitioner.

5. *Comparison of New River with the rivers involved in the cases upon which petitioner principally relies, establishes that New River is not navigable in the Allisonia-Hinton reach or elsewhere in its course.*

In support of its claims that the Allisonia-Hinton reach is navigable, petitioner repeatedly cites *United States* v.

Utah, 283 U. S. 64; *The Montello,* 11 Wall. 411, 20 Wall. 430; *Economy L. & P. Co.* v. *United States,* 256 U. S. 113 (Pet. Br. 58, 62, 63, 64, 66). A comparison between the physical characteristics and commercial use of the streams involved in those cases in their natural and ordinary condition with the physical characteristics and absence of commercial use of New River in its natural and ordinary condition confirms the fact, shown by the evidence and found by both lower courts, that New River is not navigable in the Hinton-Allisonia reach or elsewhere in its course.

On Plate I, at the end of this brief, are shown the profiles of the New and Kanawha Rivers and of those parts of the Colorado, Grand, Green and San Juan Rivers, the navigability of which was the subject of judicial determination in *United States* v. *Utah, supra.* Not only does Plate I show that the slope of New River is *throughout* very much steeper than the slope of those parts of the Colorado and Green Rivers which were held navigable in the *Utah* case (indicated by hatching under the profiles), but also that its slope is quite comparable to that of the San Juan River which was held non-navigable. Furthermore, the Master found that the Colorado River had been the subject of commercial use in the mining industry, whereas no use was ever made of New River by such industries even though lead and iron mines and furnaces were located on its very banks.

The *Montello* and *Economy* cases involved links in the two finest and most extensive inland waterway systems on the continent, to wit, the Great Lakes-Fox-Wisconsin Waterway to the Mississippi River system and the Great Lakes-Desplaines-Illinois River Waterway to the Mississippi River system. Both these great waterways had been practically utilized in commercial navigation from the settlement of the continent for a period of more than 150 years (indeed, continuously to the time of the Montello and since, in the case of the Fox route). We have hereinbefore pointed out the complete absence of any such use of the New River.

On Plates II and III, at the end of this brief, there are shown the profiles of the New and Kanawha Rivers and of the Great Lakes-Fox-Wisconsin and Great Lakes-Desplaines-Illinois River routes to the Mississippi River system. Mere inspection of these Plates shows that, while the slopes of the relatively short difficult stretches of the Fox and Desplaines were comparable to the slope of the *entire New River,* these short difficult stretches were in each instance merely a single concentrated difficult stretch, involving a relatively minor obstruction to, and interruption of, navigability in a continuous waterway extending over 3000 miles with almost limitless reaches of excellent water and navigation on either side. It was, of course, this circumstance which made tolerable and practicable the portaging over a short distance on the lower Fox and on the Desplaines. On the other hand, where obstruction to, and interruption of, navigability are continuous, navigation is obviously impracticable if not impossible.

If, as petitioner says and the reports show, these short difficult reaches in the Fox and Desplaines could not be passed except by portaging, a mere inspection of the profiles on Plates II and III shows that portaging would be required—not occasionally but continuously—throughout the entire length of New River. Manifestly such conditions preclude practical navigation and foreclose any finding of navigability in fact.

Both petitioner and the dissenting Judge refer to the Tennessee River (Pet. Br. 67; R. 2935) as apparently supporting some inference that New River is navigable. The wide difference between the physical characteristics of the New and Tennessee Rivers is strikingly revealed by their profiles on Plate IV at the end of this brief. The slope of 5.93 feet per mile in the 14 miles of Big Muscle Shoals (which the Board of Army Engineers states *"was entirely un-navigable"*, H. D. 781, 60th Cong., 1st Sess., p. 5, par. 4) is of the same order as the slope of 5.5 feet per mile in the 40-mile section of New River above Round Bottom, Vest Virginia. However, the slope of the remaining 24 niles of Muscle Shoals is only about 2 feet per mile; the verage slope of the entire Tennessee from Knoxville to Paducah (652 miles) is *only 0.79 feet per mile; 0.45 feet per* nile from its mouth to the foot of Muscle Shoals (255 niles); *0.76 feet* per mile from the head of Muscle Shoals Knoxville (359 miles).

All of the foregoing comparisons plainly establish that lew River is not navigable either in the Allisonia-Hinton ection or elsewhere throughout its course.

All considered action of Congress and the War Department sustains the conclusion that New River is nonnavigable.

None of the Army Engineer Reports relating to the ederal work on New River, to which petitioner refers (Pet. r. 42-4), deal with the question of navigability, but merely ith the possibility of creating; or the progress being made the attempt to create, artificial navigability in certain cal intrastate reaches.

The alleged report (Pet. Br. 44) of the Chief of Enneers that the river was navigable, was in fact only a ply to a personal inquiry of a Congressman, and merely ates that "it would appear that the action heretofore ken by Congress [referring to the appropriations of 77-1886] has indicated its opinion that New River is a avigable water of the United States" (Ex. 47, R. 2429). part from these reports, petitioner refers to three letters om the Secretary of War to two members of the Congress d a private individual. Their casual character is apparent and they only say federal permission would be necesry for a dam in New River either because of the old ongressional appropriation (see above) or because it is "interstate stream" (R. 2431-2, 2457-8, 2453).

In contrast, a greatly abbreviated summary of the *conlered* action of Congress and the War Department in reect of New River is as follows:

The appropriations by Congress for the creation of artificial navigability in New River were abandoned after 1886 (Ex. 528, R. 2759). In 1902 it repealed the Act creating the project and ordered the unexpended funds returned to the Treasury (32 Stat. 331, 374). In 1912, after making another survey, the Chief of Engineers, concurring with the Board of Engineers, the Division Engineer and the District Engineer, recommended against any attempted improvement of New River (Ex. 46, R. 2419, 2420, 2425-6). In a report made by the Chief of Engineers in 1916, it was stated that "there has been no useful navigation on New River at any time, and none is possible under existing natural conditions" (Ex. 566, R. 2844). In 1925 the Chief of Engineers officially reported that New River is not navigable (*Ex. 572,* same text Ex. 97, R. 2528-32).

In 1927 the Federal Power Commission so found (Ex. 91, R. 2492-4). In 1930 the Corps of Engineers made three official reports (one to the Federal Power Commission) that New River is not navigable *at any point in its course* (Ex. 539-B, R. 2795-6; 579-B, R. 2858; 579-C, R. 2863). In 1930 the Federal Power Commission certified to the Attorney General of the United States that "New River is neither navigated nor navigable in fact" (Exs. 531, R. 2779).

No dam upon New River has ever had any navigation facilities. The Corps of Engineers in 1930 reported that no permit was required for bridges (one at Glen Lyn), a most significant recommendation in view of the customary attitude of playing safe and assuming jurisdiction, at least temporarily, whenever there is any possible doubt (Exs. 579-B, 579-C). Eloquent evidence that Congress did not consider New River to be navigable is the fact that petitioner is now condemning lands for the construction of its Bluestone dam 150 feet high at a point 3 miles above Hinton, which dam will have no locks or navigation facilities and would therefore be a complete barrier even to local navigation to the railroad at Hinton, if that stretch was even locally navigable (Ex. 145, R. 2677; R. 2899, 2909; see also footnote, p. 43, *supra*). Indeed, the very conditions for the alleged protection of navigation, incorporated in the license tendered to respondent, which petitioner in this case would require respondent to accept, *relate only to the navigable Kanawha* and have no application to, and make no mention of, the non-navigable New River (Ex. 131, Article 15, R. 2670).

The sole conflicting instance is the self-serving declaration of the Federal Power Commission on October 12, 1932, when, in the midst of litigation over the Radford project and in complete disregard of the official reports of the Chiefs of Engineers, Generals Taylor in 1925 (*Ex. 572*, Ex. 97, R. 2528) and Brown in 1930 (*Ex. 539, B*, R. 2795-6), it undertook to reverse its previous finding of non-navigability for the purpose of trying to gain an advantage in the litigation (R. 2513-15; 140; 2912).

D. Petitioner's argument that the intrastate stretch between Allisonia and Radford is "a channel of interstate commerce", and consequently a navigable water of the United States, is without basis in fact or law.

Petitioner contends that, even though New River below Radford is non-navigable, the Allisonia-Radford stretch above is "navigable waters of the United States" because "a substantial commercial traffic was formerly shipped downstream to Radford and out of the state by railroad" (Pet. Br. 73, 74).

The sole factual basis for this argument is the unsuccessful experiment (conducted off and on from December 1881 to some time in 1882 or 1883) in boating charcoal-iron down to New River Bridge from two of the 16 furnaces tributary to the artificial improvement in that stretch. (See pp. 41-2, *supra.*) This iron was subsequently wagoned to the railroad station called New River Depot (R. 244) and shipped by rail, some part of it in interstate commerce. The result of this experiment, we think, plainly established that this stretch was not locally navigable even after the artificial federal improvement.

However, assuming *arguendo* that the stretch was then navigable intrastate, petitioner's argument that consequently it is a navigable water of the United States is plainly unsound and squarely refuted by the case which petitioner cites, namely, the *Daniel Ball* (Pet. Br. 74). That case makes it clear that navigable waters of the United States, in contradistinction to navigable waters of the States, are those waters which are navigable in fact and

> "form in their ordinary condition *by themselves*, or by *uniting with other waters*, [not by uniting with railroad nor by uniting with wagon roads which in turn unite with railroads] a *continued* highway * * * over which commerce * * * with other states * * * is conducted by *water*." (10 Wall. 557, 563)

Similarly in *The Montello*, 11 Wall. 411, this Court, in passing upon this precise contention, said:

> "It (the Fox River) can only be deemed a navigable water of the United States when it *forms, by itself* or by its *connection* with other *waters*, such a highway. * * * If, however, the river is *not of itself a highway* for commerce with other States or foreign countries, or does not form such highway by its connection with other waters, and is *only navigable between different places within the State*, then it is not a navigable water of the United States, but only a navigable water of the State * * * "

and further:

> "The fact that the steamer * * * was engaged in commerce between the States, does not affect the question under consideration [i. e., whether Fox River is a navigable water of the United States] * * * " (p. 415).

To the same effect, see *United States* v. *Utah*, 283 U. S. 64, 75.

Here again petitioner merely confuses the issue by injecting an argument (Pet. Br. 74-75) as to whether, and if so to what extent, Congress may regulate *interstate commerce* upon an intrastate navigable water—a question quite beside the point on the issue whether a stream is a navigable water of the United States. Moreover, since 1883 there has not been, and it is conceded that there is not now, any such "alleged commerce" upon this stretch (R. 2919; Ex. 579B, R. 2860, Par. 8; 2898). Whatever may be the power of Congress to regulate *interstate commerce upon* an intrastate navigable water (and that is a question not germane to any issue in this case), it would be difficult to predicate such regulation upon a commerce which does not now exist, has not existed for over 50 years and, so far as can be foreseen, never will exist in the future.

POINT II

The courts below did not err in finding that neither the construction nor operation of the Radford project will substantially interfere with navigation on, or impair the navigable capacity of, any navigable waters of the United States.

Petitioner, disregarding the finding concurred in by both lower courts as well as most of the evidence upon the issue, asserts that the operation of respondent's project will impair the navigable capacity, *first,* of an allegedly navigable stretch of New River between Hinton, West Virginia and Glen Lyn, Virginia, and, *second,* of the Kanawha and Ohio Rivers (Pet. Br. 79-88).

The first assertion is disposed of by the fact that, as both lower courts found, New River is not a navigable water of the United States at any point in its course (See Point I). However, despite petitioner's assertion, respondent does not concede that the operation of respondent's project would impair the navigable capacity of the Hinton-Glen Lyn stretch even were it navigable; and the Court of Appeals specifically found that "there is no satisfactory proof that the operation of the defendant's dam will in fact impair even possibly existing present capacity for navigation" in the Hinton-Glen Lyn stretch (R. 2909). Indeed, the fact that this claim is wholly without substance clearly appears. Petitioner is seeking to condemn lands for the construction of its Bluestone project, which, were this stretch navigable, would be a complete barrier to navigation (See p. 60, *supra*). The conditions incorporated in the tendered license for the alleged protection of navigation relate specifically to the navigable Kanawha and have no application to the non-navigable New River. (Ex. 131, Art. 15, R. 2670.)[1]

The navigability of the Ohio River and of the Kanawha River to a point about five miles below Kanawha Falls is undisputed (Ex. 600, R. 2874-E). The adverse effect, if any, of the operation of respondent's project would be greater in the case of the Kanawha River than in the case of the more distant Ohio River,[2] as petitioner conceded below, and this issue may therefore properly be regarded as narrowed to the navigable portion of the Kanawha River.

---

[1] It may be noted that, while the finding that New River is not navigable at any point in its course is based upon the judicial and constitutional definition of navigable waters, the definition of navigable waters in Section 3(8) of the *Power Act excludes waters which are not presently used or susceptible of use* under present conditions and modes of transportation by water. See pages 33-4, *supra*. As the dissenting judge said: "The impairment of a theoretical navigable capacity would not constitute a basis for requiring a license if the interests of commerce were not affected; * * * (R. 2924). It is conceded that there is not now, and for many years has not been, navigation of any character on any part of this stretch and, of course in fact there never was navigable capacity in that part of this stretch which extends from Glen Lyn, Virginia, well down into West Virginia, whatever may have been the situation for a few miles above Hinton, West Virginia. (See pp. 42-3, 45-6, *supra.*)

[2] The lack of substance in this belated claim of impairment of navigable capacity of the Ohio River is emphasized by the fact that the Bill did not even allege, and was never amended to allege, that operation of respondent's project would impair the navigable capacity of that river (R. 4-12).

The burden of proving that the operation of respondent's project would substantially impair navigable capacity rested upon petitioner. *U. S. v. Rio Grande D. & I. Co.*, 174 U. S. 690. Both courts below found that neither the construction nor operation of respondent's project will impair the navigable capacity *of the Kanawha River or of any navigable water of the United States.* (R. 133, 153, 156, 2904, 2908, 2909.) We submit that the evidence, reviewed by the lower courts in their opinions, establishes that the finding is supported by substantial evidence and precludes any serious consideration of this question (R. 128-133, 2904-2909). Therefore, any extended review of the voluminous evidence on this issue seems unnecessary and unwarranted. However, some of the evidence on this issue, due to its scientific and technical character and other reasons, is not susceptible of summary review; and, if the court should be interested in a more detailed analysis, it will be found in the separately bound Appendix A to this brief at the points indicated by cross-references hereinbelow.

A. Petitioner had the burden of proving that the INTENDED ACTS of respondent would substantially impair the navigable capacity of navigable waters.

Petitioner sought anticipatory relief against the *intended acts* of respondent. These intended acts consisted of (1) the construction of a dam with appurtenances for the generation of electricity on the non-navigable New River at a point about 160 miles above the head of navigation on the Kanawha River and (2) the operation of these structures for the generation of electricity. The petitioner had the burden of proving either (1) that the mere erection of these structures, regardless of how they are used, would substantially impair the navigable capacity of distant navigable waters (and no such claim has been or could be made), or (2) that the *intended or contemplated use* by respondent (i. e., its *intended acts*) would produce that result.

It was not enough for petitioner to say, or even to prove, that it could conceive of a way in which the structures could be manipulated so as to impair navigable capacity. Petitioner had to establish that such impairment would follow from the use which the respondent intended to make, i. e., *the things which respondent intended to do.* This follows from the settled rule that, where a structure is not a nuisance *per se* and the alleged nuisance depends upon the manner in which the structure is used, relief may not be granted unless it clearly appears that the alleged nuisance will be the necessary or practically certain result of the use which the defendant intends to make. *Connecticut* v. *Massachusetts,* 282 U. S. 660, 673-4; *Missouri* v. *Illinois,* 180 U. S. 208, 248; *Blease* v. *Safety Transit Co.,* (C. C. A. 4th) 50 F. (2d) 852, 856; *Meyer* v. *Somerville Water Co.,* 82 N. J. Eq. 572, 576-7; *Pennsylvania Co.* v. *Sun Co.,* 290 Pa. 404, 138 Atl. 909, 912.

These principles apply with full force to a suit by the United States for anticipatory relief against an alleged threat of impairment of navigable capacity of navigable waters of the United States. *United States* v. *Rio Grande D. & I. Co. supra.* In that case the United States sought to enjoin construction of a dam and irrigation works, on the upper Rio Grande River, which necessarily contemplated the *permanent diversion* and *loss* of a substantial part of the flow of the stream. This Court, in reversing the decree, directed the lower court:

> "* * * to order an inquiry into the question whether the *intended acts of the defendants* in the construction of a dam and *in appropriating the waters* of the Rio Grande will *substantially diminish* the navigability of that stream *within the limits of present navigability,* and if so, to enter a decree restraining those acts *to the extent they will so diminish.*" (*loc. cit.* 710.)

Neither the lower courts nor the respondent stated, as petitioner pretends to believe (Pet. Br. 85, 88), that the test under this rule is whether the defendant intends to create a nuisance, but, as the Court of Appeals stated, whether the necessary or practically certain result of the intended acts of the defendant will be to create a nuisance, whether a nuisance be intended or not. (R. 2908).

B. The finding concurred in by both the courts below, that the operation of respondent's project will not impair the navigable capacity of any navigable water of the United States, is supported by evidence not only substantial but conclusive.

It is, we think, conceded that the construction of a dam on a non-navigable stream cannot *per se* affect the navigable capacity of any navigable water. (R. 128-9); and that the only conceivable way in which respondent's project could impair navigable capacity elsewhere would be by the manner in which the flow of the river is passed through the powerhouse or over the dam.

The United States has no property or other right under the commerce clause in the natural flow of a stream, navigable or non-navigable. Subject to the authority of the Federal Government to preserve navigable capacity, the right to control or regulate the natural flow of streams resides in the States. Proof that an alteration in natural flow will substantially impair navigable capacity of some federal navigable water is a *sine qua non* of the existence, and delimits the extent, of any right or authority of the United States to restrain or restrict an alteration in natural flow under State authority. (See pp. 109, 110, 113-17, *infra.*)

Consequently, the issue is, not whether the natural flow of the stream will be altered by the intended acts, but solely whether such alteration in natural flow, if any, as will result from the intended acts of respondent will cause a substantial impairment of navigable capacity in the Kanawha River. (See pp. 109-10, 116, *infra.*) Petitioner asserts (Pet. Br. 81-83) that the operation of respondent's project would impair the navigable capacity of the Kanawha and Ohio Rivers during allegedly "critical low-water periods" (1) by diminishing the flow of those streams, as the result of a maximum weekly (Sunday) shutdown of 34 hours (only contingently possible), to such an extent as substantially to impair their navigable capacity, and (2) by varying the flow through the power house or past the dam so as to produce tides or so-called "waves" in the Kanawha River, approximately 160 miles below, of such size and character as to interfere with navigation. Petitioner below based both of these contentions upon assumptions which, as both courts found, have no foundation in respondent's intended acts. (R. 129-130; 2904-2906). Although petitioner's contentions were thus entirely theoretical and moot, the Trial Court found that "even this (theoretical) possibility is denied by the evidence." (R. 134.)

1. *As the lower courts found, the intended acts of respondent will not diminish the flow so as to impair the navigable capacity of the Kanawha or Ohio Rivers during allegedly "critical low water periods".*

Petitioner's contention is that the operation of respondent's project might impair navigable capacity of these streams during allegedly "critical low water periods". (Pet. Br. 81-3.)

The evidence established, *first,* that, although wholly unrelated to respondent's intended acts, a complete shutoff of all contribution or flow from above the damsite even if continued indefinitely during an extreme low water period, would not impair navigable capacity of these streams, and, *second,* that the intended acts of respondent will increase the low-water flow of these streams every season and particularly during allegedly "critical low water periods."

No inference of impairment may be drawn from the size or character of respondent's installation. Contrary to petitioner's attempted implication (Pet. Br. 77-8), there is nothing about the size or character of respondent's project which supports an inference that respondent's acts will impair navigable capacity. The ratio between installed hydraulic capacity and the assured low water flow is smaller in the case of respondent's project than in the case of the power projects at the Government navigation dams on the Kanawha River, without any allowance for the water used for navigation at the Kanawha dams, and hence not available for power. (See pp. 7-8, *supra.*) Respondent's project has been constructed at the site and upon the plans which were approved by the Secretary of War and Chief of Engineers from the standpoint of navigation and by the Federal Power Commission as best adapted for utilization of the waters for navigation, commerce, water power and other beneficial uses (Ex. 131, R. 2664-5; Ex. 90-A, R. 1245, 2027). The economic and engineering feasibility of respondent's intended acts, which the evidence established and the lower courts found would not impair navigable capacity, is therefore established and was conceded in the District Court (Pl. (Pet.) Br. on Motion to Strike Answer, p. 149).

Even a complete shut-off of all contribution from above the damsite during a low-water season, an assumption wholly unrelated to respondent's intended acts,[1] would not

---

[1] In an effort to make some showing of an alleged threat of impairment through diminution of water supply during low-water seasons, petitioner in the Trial Court relied upon the anomalous contention that, by arranging to fill the reservoir during the extreme low-water period of an extremely dry year instead of during the season of high flow, it would be physically possible to impound such extreme low flow, for a period of five or six weeks, with the result of depriving the streams below of any contribution from above the damsite. The evidence established that such a physically (but not rationally or practically) possible manipulation would destroy the value and defeat the very purpose of a power reservoir, which is to increase the firm or dependable capacity of the power plant during low-water seasons (which determines its dependable capacity throughout the year), and that such manipulation would be without relation to any intended acts of respondent, to any practical operation or to common sense. (R. 130, 131, 1955-7, 2040-5, 1320-5). This chimerical claim was abandoned by the petitioner in the Court of Appeals; however, due to this irrelevant

(Footnote continued on next page)

impair navigable capacity of these streams. The uncontradicted evidence established that the maximum amount of water needed or useful for navigation on the Kanawha River under present conditions does not exceed 150 s. f. and would not exceed 200 c. f. for double the present commerce (R. 2064-6); that, even if commerce increased so as to utilize the maximum theoretical capacity (practical capacity and its water requirements would be much less) of the Kanawha River (an assumption wholly unjustified), not more than 500 s. f. would be needed or useful for navigation (R. 1794-7); that, in the recently granted licenses for power developments at the Kanawha navigation dams, the Army Engineers reserved only 250 s. f. for all other purposes including navigation uses (R. 2219-21, 2105); and that, with no contribution from above the damsite, there would still be more water than would be needed or could be used for navigation on the Kanawha River even during extreme low water (R. 1968-9; 2066; *Ex. 572,* text same as Ex. 97, R. 2532).

The uncontradicted evidence also established that, with the use of the Ohio River to its maximum theoretical capacity, which would involve a manifold but highly improbable increase in present commerce, the minimum flow of the Ohio River just above the mouth of the Kanawha (at old Dam 25) alone would supply more than twice the amount of water needed or useful for navigation (R. 1794-7; *Ex. 601,* p. 146, par. 263; *Ex. 602,* 1st col. of flows).

While, as hereinafter appears, respondent's project will in fact increase the low water flow of these streams, it was thus shown, as General Taylor, Chief of Engineers, officially reported in 1925, even when the old dilapidated, leaky dams

---

contention of the petitioner in the Trial Court, evidence was received which, as that court found, established that even such an irrelevant or irrational assumption would not result in any impairment of navigable capacity (R. 130, 131, 133, 134). In the lower court and here petitioner has been compelled to rely upon a modified, though still unwarranted, claim that on the occasions (only contingently possible) of week-end (Sunday) shutdowns navigation would be deprived of all contribution from above the damsite.

(now replaced) were in the Kanawha River, that "*it would not be possible* to operate the proposed project so as *to adversely affect navigation on the Kanawha River* under the existing project" (*Ex. 572,* same text Ex. 97, R. 2532).

Respondent's project will increase low water flow every season and particularly during allegedly "critical low water periods." During the low water season of every year, the Radford project will substantially increase the average low-water flow below the damsite and in extremely dry years will increase such flow from a minimum of 600 s. f. to an average of 1230 s. f. (R. 1321-2). While stressing this circumstance in its argument on the applicability of the Power Act, the petitioner, in its argument on impairment of navigable capacity, studiously omits all reference to this undisputed and important fact.

Petitioner's allegedly undisputed evidence. Under the heading "The undisputed evidence", petitioner argues (1) that during allegedly "critical low-water periods" New River at the damsite had on one occasion (September, 1930) contributed as much as 70 per cent. of the flow of the Kanawha and on another occasion (August, 1918) 38 per cent. of the flow of the Ohio below the mouth of the Kanawha; (2) that week-end (Sunday) shutdowns of respondent's project (only contingently possible) would cut off these respective percentages of the flows of these streams for 34 hours during allegedly critical low-water periods; (3) that there is great difficulty in maintaining project depths on these streams during low water and (4) that consequently navigable capacity of these streams will be impaired (Pet. Br., 81-83). It should be sufficient to point out that the record establishes that even a permanent shut-off of all flow at the damsite would not impair navigable capacity of these streams. (See pp. 69-70, *supra*). However, each of the foregoing premises is untrue and naturally the conclusion is erroneous.

Contrary to the implication of petitioner's heading, the record shows that the flow figures for the Ohio (mere estimates and not measurements, R. 1436-41) used in petitioner's computations are not only contradicted but grossly erroneous. (Cf. R. 1421 with *Ex. 602,* 1st col. of flows and *Ex. 601,* p. 146, par. 263) Similarly the flow figures used by petitioner for the damsite and the mouth of the Kanawha were mere estimates in the making of which different records and dates erroneously chosen were used with the result of obtaining an abnormal and disproportionately higher flow at the damsite and smaller flow at the mouth of the Kanawha (R. 567-78).

In addition to taking erroneous and discredited flow figures, petitioner has selected a short period during a low-water season (in August, 1918) when there was a freshet on the New and Kanawha Rivers but none on the upper Ohio, so as to obtain a temporarily distorted but immaterial relationship between the flows of the Kanawha and Ohio. Thus, the flows used for the damsite and the Kanawha are respectively 2260 s. f. and 4737 s. f. (R. 559, 1317) in comparison with natural low-water flows of 600 s. f. and from 1000 to 1100 s. f. respectively, (R. 1012). On the other hand, the erroneous flow figure used for the Ohio is approximately 50 per cent. of the lowest recorded flow of that river (*Ex. 602,* 1st col. of flows).

An even more serious defect in petitioner's argument is the wholly unsupported and unsupportable assumption that, even if petitioner's flow figures were correct, the operation of respondent's project would, under the conditions assumed by petitioner or otherwise, deprive the Kanawha and Ohio Rivers of contribution from above the damsite. The evidence on this subject is too detailed for brief review; but the fundamental and vital error in petitioner's assumption is easily shown by considering the following case of extreme low-flow—when, if ever, the matter of contribution from above the damsite would be material.

Accepting *arguendo* the excessive estimate of petitioner's witness that the effectiveness of a 57 hour shut-off would reach a brief peak of 75 per cent. (R. 803) at the mouth of the Kanawha, the effectiveness of a 34 hour shut-off (the maximum contingently possible in respondent's operations) would reach a brief peak of 45 per cent.,* leaving at least a residual of 55 per cent. of the previous flow. It is undisputed that the extreme low flow at the damsite is 600 s. f. and that respondent's project will increase this low-water flow by an average of 630 s. f. If such an extreme low flow continued for a week, the average flow below the damsite, with respondent's project in continuous operation, would be 1230 s. f. If a maximum shut-down of 34 hours did occur in such a week of extreme low flow, the utilization of the available water during the remaining 134 hours of the week (as is, of course, the purpose of a power reservoir) would result in an average flow of 1540 s. f.; and the contribution from above the damsite to the flow at the mouth of the Kanawha would never fall below approximately 850 s. f. even at the brief height of maximum effectiveness of such a shut-off, except for which the contribution from above the damsite, with respondent's project in operation, would be still larger. This contribution would compare with the natural contribution of 600 s. f. And, accepting *arguendo* the corresponding excessive estimate of petitioner's witness (R. 803), the minimum contribution from above the damsite at Kanawha Falls (somewhat above the head of navigation) during such an assumed week of extreme low water would not fall below approximately 770 s. f., in comparison with the natural flow of 600 s. f.

Since any effect of respondent's project upon water supply during allegedly critical "low-water periods" would be beneficial, petitioner's assertion that there is great difficulty in maintaining project depths on the Kanawha and Ohio Rivers during low water would be immaterial, were it true. Consequently, while the assertion is refuted by the overwhelming weight of the evidence, it seems unnecessary to burden the Court with a review of the testimony on that subject. It is based on the disputed, contradicted and largely discredited testimony of its own witnesses. The testimony of Dr. Mead, Colonel Scheidenhelm, and Major Putnam and the Report of General Taylor, Chief of Engineers, fully refute the contention. (See pp. 69-70, *supra*). In addition, the failure of petitioner to call, and its refusal to permit to appear, Colonel Conklin, the U. S. District Engineer in charge of these waters, completely discredits the claim (R. 75-82, 515, 557). However, in case the Court is interested, this and other evidence relating to factual errors underlying petitioner's argument, under the grossly misleading heading "The undisputed evidence", is reviewed in Appendix A, Part II-A.

---

* Effectiveness for 34-hour shut off assumed directly proportional to that estimated by petitioner's witness for 57-hour shut off, although it would not unlikely be somewhat less.

2. *As the lower courts found, the intended acts of respondent will not create so-called "waves" or tides which will impair the navigable capacity of the Kanawha River.*

The issue of impairment in this aspect has no relation to any alleged diminution of navigation project depths which, on a canalized river like the Kanawha, cannot be reduced below the project level unless the water supply is reduced below the requirements for navigation. We have previously shown that such a result is impossible (See pp. 69-73, *supra*). Indeed, in the Trial Court petitioner, obviously recognizing these facts, relied chiefly upon a curious claim that so-called "power waves" from Radford would cause seiches (i. e. oscillations—R. 129), in the navigation pools on the Kanawha, which would cause the pools to "dip" below project levels. The evidence showed this claim to be so baseless that it was abandoned in the Court of Appeals. The sole issue is whether the operation of respondent's project will produce tides or so-called "waves" in the Kanawha River, approximately 160 miles below, of such size and character as to interfere with navigation. Both courts below specifically examined this question and found against the petitioner (R. 133; 2904). That finding is plainly supported by evidence not only substantial but conclusive.

About 160 miles of tortuous river, involving a succession of innumerable shoals, falls, ledges, pools and rapids, separate respondent's project from the head of navigation on the Kanawha River, the nearest navigable water of the United States (R. 2906; 128). General Taylor, then Chief of Engineers, officially reported that it would not be possible, by any physical manipulation of the project works, wholly without basis in any practical operation or in the intended acts of respondent, to affect adversely navigation on the Kanawha River (*Ex. 572*, text same as Ex. 97, R. 2532). Indeed, petitioner's witness, Colonel Watkins, had officially reported that "power tides or waves" discharged directly into navigation pools do not adversely affect navigation on a fully canalized stream (R. 1036, 1037-8) like the Kanawha.

Some variation in the flow through a power plant is normal and customary due to the variations in power load, and such variation is often called "peaking". Thus the power station at the Government Bluestone project is intended to have peaking operation and the plants at the Kanawha dams *are now operated upon a peaking basis* (R. 130-1; Ex. 145, R. 2707-13, 2679-80; R. 2073-6, 2063-4; Ex. 263, R. 2750-2). The hydraulic capacity of the installations at the Kanawha navigation dams is the same as at respondent's project, but the ratio between the hydraulic installation and the assured low flow is larger at the Kanawha dams than at Radford, and the power plants at the Kanawha dams *discharge directly into the navigable waters.*

The practical and intended operations at respondent's project are of the same character and order of magnitude as the actual operations of the power plants at the Government navigation dams on the Kanawha River (Ex. 145, R. 2679-80; 2075-76, 2063-4; Ex. 263, 2750-52). Obviously the Army Engineers and the Federal Power Commission are not permitting, let alone deliberately causing, impairment of navigable capacity on the Kanawha River in order to develop power at these dams. Any contention that similar operations at Radford, Virginia, about 160 miles above the head of navigation, would impair navigable capacity of the Kanawha River, is plainly without substance.[1] Indeed, the evidence established that the size and rate of any variations in flow which will exist in the Kanawha will be determined by the operations of the Government licensed projects on the Kanawha and not by the respondent's project (R. 2062-3).

The evidence discloses that neither the volume nor rapidity of the variations which could be produced in the Kanawha by any manipulation of the Radford project, much less by the intended acts of respondent, would even remotely approach the magnitude or rate of the variations which, the evidence disclosed, would have no effect upon navigable capacity (R. 1864-9, 1872-3, 2055, 2058-63, 1787-94) or which are established by the Government for the operation of the power projects at the Kanawha navigation dams which discharge directly into navigable waters (R. 2192). For a more detailed review of this evidence, see Appendix A, Part II-B.

These conclusions were fully supported by the comprehensive series of "wave tests" made in 1930 on the New and Kanawha Rivers by respondent in cooperation with Colonel Ardery, United States District Engineer, and the United States Geological Survey. In these tests the power stations and spillway gates at the Buck and Byllesby plants were simultaneously thrown wide open to produce the largest possible tide or wave and involved discharges as great as 15,000 s. f., or approximately 167% of the maximum hydraulic capacity of the Radford project, and produced approximately the "block" form of wave, which is the most persistent but which cannot occur in practical operation (R. 2047-52, 836-7, 1860-1, 1872). Contrary to petitioner's implication (Pet. Br. 84), some of these waves as they passed the damsite were of substantially the same order of magnitude as any wave which could be produced by the upper limit of any operations intended by respondent (R. 2057, 2121). Of course the effect of a "wave" does not depend upon the size of the reservoir from which it is emitted (as petitioner erroneously implies, Pet. Br. 84) but upon the size and form of the wave itself. Colonel Scheidenhelm testified, and it was stipulated that Colonel Ardery would testify, that these operations produced no interference with navigation or navigation works on the Kanawha (R. 2055, 1828-9) and they could not be detected in a rowboat or by the eye (Ex. 544; R. 775, 1859, 2056-7).

---

[1] Neither the lower courts nor the respondent reasoned (as petitioner pretends, Pet. Br. 87, footnote 12) that, because the Government permits power development under regulation at its navigation dams on the Kanawha River, *a fortiori* power development at respondent's project 160 miles upstream on New River will not impair navigable capacity. The point is that the regulations for the operation of the power projects at the Kanawha dams provide for, and the actual operations of such power projects discharging directly into the navigable waters produce, variations in flow many times exceeding in extent and rate of change any variations which it would be physically possible to produce in the Kanawha River by *any* manipulation of respondent's project 160 miles upstream, although without basis in respondent's intended acts.

Indeed, the description of these tides or variations in flow as "waves" is misleading, and petitioner's reference to its reproduction of Ex. 227, if intended to be considered as a picture of these so-called waves, is even more misleading and unjustifiable (Pet. Br. 83). The vertical scale (representing the variations in gauge heights) on that reproduction of Ex. 227 is *2 feet to the inch,* while the longitudinal scale (representing the distance up and down stream) *averages about 96 miles, or roughly 500,000 feet, to the inch.* By the time the typical waves in the 1930 wave test reached the head of navigation their front had an average slope of 5 inches in about 20 miles, or *one-fourth of an inch per mile,* and their back had an average slope of 5 inches in about 80 miles, or *one-sixteenth of an inch per mile* (R. 2121-2). A ripple caused by a vagrant breeze would be more noticeable. It would be quite as reasonable to describe as a "hill" a section of a highway which rose 5 inches in a distance of 20 miles and then fell 5 inches in 80 miles. Such slopes would not even permit drainage.

The finding was also supported by actual tests which were made by the witness Professor Thomas, head of the Hydraulics Department of Carnegie Institute and consultant for the Army Engineers on such problems, at the power plants at the Government navigation dams on the Kanawha River and by his integrating model tests, which are the most advanced and precise method of pre-determining the behavior of irregular flow of water (R. 1850-53; 1862-9). It is a significant fact that the respondent offered the only witnesses who had ever made any tests upon these rivers, although petitioner had at its command the former U. S. District Engineer, Colonel Ardery, who participated in one of the tests, but refused to call him or permit him to appear (R. 77-82).

Since the finding is plainly supported by substantial evidence, it seems unnecessary to analyze the testimony of the two subordinate employees of Col. Conklin (cited by petitioner, Pet. Br. 85, 87) as to alleged difficulties of navigation and groundings on the Kanawha River. However, the testimony is plainly irrelevant. Manifestly, none of the alleged difficulties or groundings could have been caused by any operations of the uncompleted Radford plant. Moreover, an analysis of the evidence shows that none of these difficulties was caused even by the operation of the power plants on the Kanawha and that, to the extent that they really occurred, they were due to over-loading in certain portions of the old 6-foot project on the Kanawha during the period when that project was being replaced by the existing 9-foot project and other like causes (R. 2125-6; 2132-3; 2128; 2167-8). The absence of any claim of groundings on the Ohio River not only confirms the fact that the groundings in the Kanawha were the result of overloading in the old 6-foot project on the Kanawha, but also shows that the power operations in the Kanawha had not produced any groundings in the Ohio, despite the fact that the changes in flow produced by power operations in the Kanawha were many times greater than it would be physically possible to produce in the Kanawha by any conceivable manipulation of the Radford project. For a fuller discussion of this evidence, see Appendix A, Part II-C.

The compensatory effect of downstream dams. Petitioner expressly conceded in its brief on certiorari (p. 23), as it still impliedly concedes, that the courts below were correct in finding as a fact that power waves will be substantially dissipated before they reach the Kanawha River, but now asserts that this finding was based, erroneously, upon the compensatory effect of downstream dams (Pet. Br. 85-7). Of course, the finding of the lower courts is not based upon the existence or operation of any intervening dams. The Kanawha Falls dam of the Electro-Metallurgical Company is a run-of-the-river plant which does not affect stream flow. There were no other intermediate dams in 1930 when there were made the "wave" tests which produced no effect upon navigation or navigation works in the Kanawha River, or when General Taylor made his official report in 1925 (see pp. 7-9, 76, *supra*). This and other evidence established, and the lower courts found, that there would be no adverse effect upon navigable capacity regardless of intermediate dams (R. 133; 2904, 2059). It is true that both courts adverted to the obvious fact that the construction of the Bluestone dam will make it physically impossible for respondent's project to have any effect on the Kanawha; but the finding was not based on that circumstance (R. 133, 2904, 2059).

In any case, however, inasmuch as the operation of respondent's project will not impair the navigable capacity of any navigable water, it is immaterial whether that fact arises out of its distant location and the nature of respondent's intended acts or is prevented by the presence of other downstream dams whether constructed by respondent or others. Petitioner's authority is limited to preventing an actual impairment of navigable capacity. So long as that constitutional fact does not exist, petitioner is without authority in the premises, regardless of the reasons for the non-existence of that essential fact.

Petitioner inquires rhetorically, what would be the situation in the case of a succession of dams, above the head of navigation, where the cumulative effects might be to impair navigation (Pet. Br. 87). The answers are simple and plain. *First,* the effect of such a succession of dams with reservoirs (and if they are run-of-river projects they do not affect the flow of the stream) is controlled by the dam furthest downstream, independently of the operation of the upper dams. In other words, petitioner's assumption that the effects are cumulative is an egregious error. *Second,* if the downstream dam did in fact cause an impairment of navigable capacity, its operation could be restrained or restricted; but that would not vest any authority in the petitioner to regulate upstream dams which do not impair navigable capacity. *Third,* even if, contrary to the fact, it were assumed that the effect of such dams would be cumulative, it would still follow that the authority of the petitioner to restrain or restrict any of them would not arise unless and until such a succession of dams were constructed and so operated that their cumulative effect would actually impair navigable capacity.

The petitioner then argues that the fact that respondent's project will not impair navigable capacity is due to the existence and operation of the navigation dams and power plants in the Kanawha River and that consequently it should be held as a matter of law—a sort of legal fiction—that navigable capacity of the Kanawha River is impaired even though the record conclusively establishes that such is not the fact and that such effect, if any, as accrues on the Kanawha River, as petitioner argues later in its brief for another purpose, is *beneficial* to navigation.[1] Petitioner

---

[1] The court below did not "suppose" that the Kanawha navigation dams "can be so operated as largely to compensate for any fluctuation in the water flow which respondent's project is apt to

(Footnote continued on next page)

can no more than any private person sustain an action for injunctive relief without proof of actual or imminently threatened injury. *In re Debs,* 158 U. S. 564, 592-3, 584-5. There is no proof that the operation of respondent's project would impair the navigable capacity (such as it might be) of the Kanawha River if that river were unimproved. But that is a speculative and moot case not before this Court. When and if ever the navigation dams in the Kanawha River are removed, it will be time enough to consider whether any impairment of navigable capacity would result under those conditions.

However, impairment of navigable capacity is a question of fact under existing conditions. *U. S.* v. *Rio Grande D. & I. Co.,* 174 U. S. 690. It is to be determined upon the basis of physical conditions as they actually exist, and not upon the basis of hypothetical non-existing conditions. Actual impairment is a *sine qua non* of the existence of any constitutional authority (See pp. 111-6, *infra*), and it is also an express requirement of the statutes which petitioner invokes. Section 23 of the Federal Power Act applies only where "the interests of interstate or foreign commerce *would be* affected" and clearly refers to actual or present conditions. Section 10 of the Rivers and Harbors Act likewise applies to a present or existing condition, which this Court recognized in the *Rio Grande* case by stating the

---

cause" (Pet. Br. 86). The only evidence considered by the court dealt with actual operations of the Government dams and power projects before respondent's project was completed or in operation. Moreover, the evidence shows that conditions in the Kanawha River do not, and will not, depend upon the operation of respondent's project but solely upon the operation of the projects at the Government dam, entirely independently of whether respondent's project were ever built or how it should be operated. (See p. 76, *supra.*)

The United States does not, merely because it has improved a navigable stream, lose the right to prevent impairment of navigable capacity thereof. On the other hand, it does not by virtue of such improvement either acquire control of projects on non-navigable streams which do not impair navigable capacity or otherwise extend its constitutional authority.

question to be whether the permanent diversion there involved would interfere with "navigable capacity within the limits *where navigation is a recognized fact*" (*loc. cit.* 709) and by remanding the case for a determination of whether such diversion would "substantially diminish the navigability of that stream within the limits of present navigability." (Cf. *New Jersey* v. *New York*, 283 U. S. 336, 344.)

In truth, petitioner's argument rests upon the fallacy (apparently indulged by the dissenting judge, R. 2938) that under the commerce clause the United States has some right in the natural flow of a non-navigable stream which permits it to insist upon that natural flow, in derogation of the right of the States and their citizens, even though there be no impairment of navigable capacity. Plainly, however, the rights of the Federal Government are limited to the prevention of such a change in natural flow as will substantially impair navigable capacity of federal navigable waters. (See pp. 111-116, *infra*).

Method of operation. Petitioner also asserts that the concurred in finding is erroneous because, as petitioner unjustifiably implies, it is based upon an "intention not to impair navigable capacity" (Pet. Br. 88). There is a wide distinction between a mere "intention not to impair navigable capacity" and the fact that, as both lower courts found, the result of respondent's intended acts (not its purpose with respect to navigation) will not impair navigable capacity. It is the latter which is the controlling fact, as was specifically pointed out and applied by the Court of Appeals (R. 2908). Manifestly, if the result of the "intended acts" of respondent would be substantially to impair navigable capacity, it would be immaterial that respondent does not intend to impair navigable capacity. But, just as clearly, petitioner could not sustain its burden by proving that, although the intended acts of respondent would not cause any impairment of navigable capacity, the result of conceivable other acts which respondent does not intend or threaten to do, would be to impair navigable capacity. And petitioner failed even to prove that such moot and hypothetical acts would impair navigable capacity (R. 130, 134).

POINT III.

Neither the construction nor the operation of respondent's project violates the Rivers and Harbors Act of March 3, 1899.

Since, as both lower courts found, New River is not a navigable water of the United States and respondent's project will not impair the navigable capacity of any federal navigable water, plainly neither the construction nor operation of respondent's project violates the Rivers and Harbors Act of March 3, 1899, c. 425; 30 Stat. 1151. As the lower courts held, that statute is simply inapplicable. *United States* v. *Rio Grande D. & I. Co.,* 174 U. S. 690.

POINT IV.

The lower courts correctly held that the Power Act (both as originally enacted and as amended) does not purport to authorize or require a Federal license for respondent's project.

Under Point V we show that, if the Act were construed as applicable to respondent's project, it would be to that extent unconstitutional and void; but we here examine the question whether the Act, construed in the light of recognized canons of statutory construction, purports to authorize or require a Federal license for such a project. It is the position of respondent:

First: That, upon the facts of this case the Power Act is so plainly inapplicable that no question of construction or interpretation is presented.

Second: That petitioner's argument, that Section 23 applies to respondent's project because of its incidental beneficial effect upon navigation, is without substantial factual support in the record and erroneous as a matter of law.

Third: That the Power Act, properly construed, is not applicable to any project on a non-navigable stream.

Fourth: That, assuming *arguendo* that the Act could be construed to require some license for respondent's project, it should be construed as requiring only a minor-part license with conditions limited to the regulation of flow for the protection of navigation.

Fifth: That, upon such latter interpretation, petitioner would, upon the undisputed facts of this case, be barred from any relief.

A. On the facts of this case, the inapplicability of the Power Act is not debatable and in fact conceded.

Both the lower courts found that respondent's project is not located in navigable waters and will not impair navigable capacity or affect an interest of interstate commerce. (R. 133, 156, 2904.) These findings, as we have shown, are supported by substantial evidence; and consequently they determine the only factual bases upon which any interpretation of the Power Act is involved, or permissible, in this case.

A mere reading of the Act, and particularly Section 23, plainly shows that there is no conceivable interpretation under which the Act would be applicable to respondent's project upon the facts found by both lower courts; and the petitioner so conceded in its petition for certiorari (16-17) and in the court below. (Pet. Supp. Br. below, 236-7.)

B. Contrary to petitioner's contention, Section 23 does not authorize or require a license for respondent's project because, although located in a non-navigable stream and not impairing navigable capacity, its incidental effect upon navigation is beneficial.

Petitioner, shifting its position on this point for the third time in the litigation over this project and for the second time in the instant suit,[1] contends in this court for

---

[1] In the first suit, petitioner construed Section 23, as respondent did and still does, as creating a procedure for resolving doubt as to the navigability of a stream and relied on the alleged navigability of New River as a basis for its jurisdiction. (See note 2, p. 98, *infra.*) In the instant case, the only effect on interstate commerce asserted by petitioner in its Bill or in the District Court as being within the purview of the Act, was the alleged impairment of navigable capacity, and not a single finding requested by petitioner upon the issue of "effect" was directed to anything other than an alleged impairment of navigable capacity and consequently to effect upon "the interests of interstate commerce as related to navigable waters of the United States". (R. 94-8, particularly Req. Fdg. 53.)

In the Court of Appeals petitioner *for the first time* asserted that "effect on interstate commerce" includes matters unrelated to navigation or navigable capacity. (R. 2916; Pet. Sup. Br. below,

(*Footnote continued on next page*)

the first time that Section 23 authorizes and requires a license for respondent's project merely because its incidental effect, if any, upon navigable capacity, or upon flood control as related to navigation, is beneficial. (Pet. Br. 93, 94, 103, 109.) We think the petitioner may not thus shift its position and advance a new theory of its case in this Court (*Virtue* v. *Creamery Package Co.,* 227 U. S. 8, 38-9; *Railway Co.* v. *McCarthy,* 96 U. S. 258, 267-8; *Kimble* v. *Kiser,* (C. C. A. 4th) 59 F. (2d) 626, 628); but in any event the contention is both without adequate factual basis and erroneous in law.

We agree with petitioner that the scope of petitioner's constitutional authority in relation to flood control is not involved in this case (Pet. Br. 102, footnote 28), and we, therefore, do not discuss that question.[1] Whatever may

---

Spec. of Errors V, pp. 10, 11.) None of the matters urged in the Court of Appeals related to beneficial effects—the theory now advanced. (Pet. Br. below 55-7; Pet. Sup. Br. 138-43.) These contentions, advanced in the Court of Appeals without support of the Bill, in the record or in law, were rejected both by that court and by the dissenting judge (R. 2909-14; 2924) and were abandoned in the Petition for Certiorari; and petitioner disclaims any attempt again to raise those contentions here, as it obviously could not on its petition. (Pet. Br. 103, footnote 30.)

Shifting its ground again, petitioner now contends in this court for the first time that Section 23 applies to a beneficial effect. (Pet. Br. 93, 94; Cf. Pet. Br. below 55-7; Pet. Sup. Br. below, 138-142.)

[1] However, we flatly deny that petitioner (as asserted in its brief in *Oklahoma* v. *Woodring,* 60 S. Ct. 725 (1940)), has any constitutional authority under the General Welfare Clause directly to construct a flood-control project or to engage in any other activity as a *federal enterprise* for which independent authority may not be found in the substantive enumerated powers granted to the Federal Government. (*United States* v. *Butler,* 297 U. S. 1, 64; *Carter* v. *Carter Coal Co.,* 298 U. S. 238, 292; *Helvering* v. *Davis,* 301 U. S. 619, 640; *United States* v. *Certain Lands,* 78 F. (2d) 684, appeal dismissed 297 U. S. 726.) This does not in any wise limit the financial aid which the Federal Government may contribute to the solution of flood problems, but it does defer to the constitutional requirement that action by the Federal Government "must be made in a manner consistent with the authority granted by the Constitution" (*Schechter Corp.* v. *United States,* 295 U. S. 495, 550) and avoids what would otherwise be a grave breach in our dual constitutional system.

be the constitutional authority of petitioner with respect to flood control it could not acquire respondent's lands for a flood control project except upon condemnation and payment of just compensation. It could neither take respondent's lands without compensation for that purpose nor require respondent to construct, or devote its property to a flood-control project without compensation.

Lack of factual basis for petitioner's contention—any beneficial effect indirect, incidental and insubstantial. It is well-settled that petitioner may not regulate intrastate matters because of indirect or incidental adverse effects upon interstate commerce (see pp. 93-4, *infra*); and manifestly, if petitioner had authority to regulate intrastate matters because of beneficial effects (as it has not, see p. 91-5, *infra*), an indispensable factual basis would be that the effect should be direct and substantial. All of petitioner's evidence and requested findings were directed to a contention that the effect of respondent's project would be adverse (R. 94-98). These alleged adverse effects included impairment of navigable capacity, interference with plans of petitioner "now formulated and *to be formulated*" for flood control and prevention of soil erosion and an alleged threat of injury to federal improvements in the Kanawha River (R. 16-17, Pars. 27-8). The Trial Court found against petitioner on these issues (R. 156). There was, and can be, no contention that petitioner has any plan to construct, and much less has authorized construction, of a project of any character at respondent's site (Bill R. 16-18). No evidence was offered to support the allegation that respondent's project would interfere with any plan of petitioner "formulated" or "*to be* formulated", or that respondent's project would damage property of petitioner; and any such claims were abandoned in the Court of Appeals. (Pet. Supp. Br. below 9-14.)

The District Court, dealing only with this alleged but unproved plan "formulated and to be formulated", found that the effect, if any, of respondent's project upon flood control "will be helpful". (R. 133.) The Court of Appeals, in noticing and rejecting the now abandoned and unfounded contention (R. 132-3) that respondent's project might in some way interfere with the operation of the proposed Bluestone Reservoir, merely observed that respondent's project would seem to be "a help rather than a hindrance in this respect". (R. 2909.) Petitioner has in this respect specified error only as to the failure of the court below to hold that for this reason respondent's project affects interstate commerce and must be licensed (Pet. Br. 19, Spec. 5),[1]—a contention not made in the court below. (Pet. Sup. Br. below, 5-14.)

It is true that such effect, if any, as respondent's project has on either navigability or flood control will be beneficial. But it is also true that any such effect is indirect, incidental and insubstantial.

An incidental effect of respondent's project will be to increase the extreme low-water flow by 630 s. f. At extreme low water—the time when the effect would be greatest and the only time when it could be material—this would increase the depths below the London Dam (the upper dam on the Kanawha River) by the insubstantial amount of less 1/5 of an inch (R. 1304; Ex. 116, R. 2639). This apart from the fact that enrichment of the water supply, even in low-water seasons, is not needed or useful for navigation (See p. 69, *et seq., supra*) and consequently affords no substantial benefit to navigation.

---

[1] While petitioner is thus foreclosed, not only by the concurrent finding of the lower courts but also, by its failure to specify any error in their finding that respondent's project will not adversely affect flood control, it may be noted that the alleged evidence which petitioner cites in support of a hypothetical possibility of adverse effect on floods (Pet. Br. 109, footnote 42) is merely testimony of two of its own witnesses (that of one, contradictory and unreliable on its face, and that of the other, the bare assertion of an unqualified witness) who, the Trial Court found, had "displayed a bias and evasiveness, and an unwillingness to admit even obvious facts hostile to their contentions, to such an extent as to deprive their testimony of much value". (R. 131.) Cf. Testimony of Dr. Mead, R. 1991-2.

It is thus apparent that, even if petitioner's contention were legally sound, as it is not, it would lack substantial basis in fact. As we shall show, even a substantial benefit to navigable capacity or interstate commerce created incidentally by an intrastate activity (or by an interstate activity, for that matter) of a citizen does not subject the citizen to the burden of maintaining such benefit in perpetuity or to being prohibited from using his property unless he will submit to burdensome regulations by petitioner. Nevertheless, it may be noted in passing that the argument of petitioner, based upon a hypothetical set of facts, finds no support in the facts of this case and in addition is legally irrelevant (Pet. Br. 99).

Petitioner, departing from its Bill, the record and its contentions in the courts below, engages in an academic discussion of Ohio River flood control and in a wholly unsupported and largely erroneous exposition of the operation of flood-control systems and power projects (Pet. Br. 106-11). While these academic discussions outside the record are quite immaterial to any issue before this Court, it seems appropriate to point out *some* of the express and implied errors included in the discussion.

Petitioner's reference to the cost of navigation improvements in the Ohio and Kanawha Rivers is not only unsupported by the record but patently irrelevant: Those in the Ohio are outside the scope of the Bill. The allegation of threatened damage to petitioner's works in the Kanawha was never supported by any evidence, found against petitioner by the Trial Court (R. 133, 156), abandoned in the Court of Appeals and omitted from petitioner's specification of errors in this Court (Pet. Br. 18-19). We are not here concerned with the question whether a system of tributary flood control reservoirs is the best means of controlling floods in the Ohio Valley or whether the construction of such a system is within any constitutional authority of petitioner. Assuming both premises, they furnish no support for the contention that petitioner may therefore prohibit respondent from using its lands unless respondent will construct a flood-control reservoir, rather than a power plant, without compensation.

Petitioner cites certain recommendations by the Army Engineers for the construction of a series of flood-control dams on tributaries of the Ohio River and also the authorization of certain flood-control projects by the Flood Control Acts of 1936, 1937 and 1938 (Pet. Br. 106-8). Neither a recommendation nor an authorization for a flood-control project at respondent's site would support a contention that respondent's lands may be taken without compensation to implement such plans or authorizations or that respondent may be prohibited from using its lands unless it will construct a flood-control project without compensation. But, *none of the plans or Flood Control Acts cited by petitioner recommended or authorized any project* (flood-control or other) *at respondent's site.* Moreover, the report of the Army Engineers (charged with the administration of Flood-Control Acts) on the Kanawha Basin, including New River, shows that they never contemplated such a project and that they never contemplated flood control in connection with respondent's project (*Ex. 145*).

However, that the incidental beneficial effect, if any, upon navigation, by way of flood control or otherwise, must be negligible does clearly appear from the report cited by petitioner. In that report, H. D. 306, 74th Congress, 1st Session, the Corps of Engineers examined a plan for a system of *80 reservoirs* (including the Bluestone Reservoir) on the principal tributaries of the Ohio and estimated to cost $574,900,000. The Corps of Engineers reported that the total annual benefits which would accrue to navigation upon the entire Ohio River from the construction of this vast, costly system of reservoirs, would be only about $5,000 per year (*Ex. 601,* pp. 93-4, Par. 135). The report also discloses that *no* benefit to navigation in the great Kanawha basin would accrue from the construction of the proposed Bluestone Reservoir on the New River near Hinton, West Virginia (*Ex. 601,* p. 94, Table 27; p. 183, table 53). Most of the projects included in this plan were, of course, genuine flood-control reservoirs and even the Bluestone Reservoir, though largely a power project, included a substantial flood-control reservoir superimposed on the power project (See pp. 8-9, *supra*). It is thus manifest that, while the incidental effect of respondent's project upon flood control, if any, will be helpful, that beneficial effect will be not only indirect and incidental, but also insubstantial.

The question then is whether Section 23, properly construed, purports to prohibit a riparian owner from developing water-power resources on a non-navigable stream without a federal license, imposing the burdensome restrictions and obligations of the Power Act, solely because an indirect and incidental result of the use of his property will be to create such insubstantial and negligible benefits to navigation, by way of flood control or otherwise. Of course, the repeated statement of petitioner (Pet. Br. 109, 111, 112) that, if it were permitted to regulate respondent's project, it might enforce some manipulation of the project not intended by respondent and which would increase the incidental benefit to flood-control, is nothing more than a bald assertion of a right to take respondent's property without compensation. It would be as reasonable to assert a right to regulate the use of any land in the United States because it *could* be used for a post-office, fort, arsenal, or other federal purpose.

Petitioner's contention, that Section 23 applies to projects on non-navigable streams the effect of which, if any, is beneficial, is erroneous as a matter of law. We think it clear that the Power Act, properly construed, does not apply to non-navigable streams, that it merely authorizes the Commission to issue licenses for projects on navigable streams and that the finding under Section 23 "that the interests of interstate or foreign commerce would be affected by such proposed construction" is merely a statutory formula for determining whether or not the project is in navigable waters.[1] However, if Section 23 may be construed as applying to a project on a non-navigable stream in any circumstances, then it is perfectly clear that "effect upon interstate commerce", as used in the Act, must be construed as meaning only an adverse effect.[2]

The very purpose of the Power Act, *which did not prohibit anything,* was to provide a means more convenient than a special act of Congress for giving federal assent in certain of the cases where required under the Rivers and Harbors Act of March 3, 1899; and such assent was required, if at all, for a project on a non-navigable stream only if it impaired navigable capacity. *United States* v. *Rio Grande D. & I. Co., supra.* The Power Act is therefore not merely in *pari materia* with the Rivers and Harbors Act but purely complementary to that Act. Since the Rivers and Harbors Act obviously dealt only with impairment of navigable capacity, that is, with an adverse effect, under the plainest principles of statutory construction, the Power Act, were it applicable at all to projects on non-navigable streams must be similarly construed.

Moreover, petitioner's contention would lead to absurd consequences and attribute a ridiculous intent to Congress. Between 1920 and 1935 the filing of a declaration under Section 23 was purely discretionary. If no declaration was filed, a project was obviously subject only to the prohibitions of the Rivers and Harbors Act; and plainly under that Act a project on a non-navigable stream is lawful unless it substantially impairs navigable capacity. *United States* v. *Rio Grande D. & I. Co., supra.* Petitioner thus attributes to Congress an attempt to impose burdensome regulations and ultimate loss of his property upon a citizen who undertook to ascertain whether his project, unless Federally authorized, would violate the Rivers and Harbors Act, whereas the project would be perfectly lawful and free from such burdens if he did not so undertake to ascertain. Plainly no such absurd and discriminatory intent can fairly be attributed to Congress.

---

[1] See Point IV-C, *infra.*

[2] The Power Act does not even mention flood control; and, despite petitioner's labored argument (Pet. Br. 102-4), both its legislative history and language make clear that it has nothing to do with flood control. However, the question is here moot; for it is plain that, if, contrary to our contention, the Power Act could be construed as applicable to projects on non-navigable streams, then "effect upon interstate commerce", as used in that Act, must be construed as meaning only an adverse effect.

There is not a scintilla of evidence in legislative history to support any such contention. The Committee Reports, as petitioner in effect concedes (Pet. Br. 96, footnote 23), furnish no support for the contention. Nor do the Reports or Debates upon the 1935 Amendments.

Petitioner argues that the alleged contrast between the language of the Rivers and Harbors Act and that of Section 23 establishes a Congressional intent to require a license for a project on a non-navigable stream even though its incidental effect upon navigation is solely beneficial. (Pet. Br. 95.) What has already been said, with reference to the construction of the Power Act in *pari materia* with the Rivers and Harbors Act, fully refutes this contention. But the contention rests also upon a complete misconception of the meaning of the phrase "effect upon interstate commerce" as it has been consistently used and understood by Congress and construed by this Court.

Obviously, neither the construction nor operation of a power project on a non-navigable stream (or on a navigable stream for that matter) is interstate commerce. (See p. 119, *infra.*) Any constitutional authority of petitioner under the commerce clause to regulate matters which are not interstate commerce, or instrumentalities of interstate commerce, is dependent upon establishing *as a fact* that such intrastate matters or activities have a direct and substantial *adverse* effect upon interstate commerce and that the proposed federal regulations are necessary for, and have a real and substantial relation to, the protection of interstate commerce from substantial injury flowing from such intra-

state acts. (*Schechter Corp.* v. *United States,* 295 U. S. 495, 546; *Labor Board* v. *Jones & Laughlin Co.,* 301 U. S. 1, 31-2, 36-7; *Santa Cruz Fruit Packing Co.* v. *Labor Board,* 303 U. S. 453, 463-9; dissenting opinion Cardozo, J. in *Carter* v. *Carter Coal Co.,* 298 U. S. 238, 327-8.) (*United Mine Workers* v. *Coronado Co.,* 259 U. S. 344, 408, 410-11; *Stafford* v. *Wallace,* 258 U. S. 495, 523-4, 528.)

This interpretation of the phrase rests not only upon the obvious limitations of the commerce clause but upon the fact that any other construction would plainly destroy our dual system of government.

In *Stafford* v. *Wallace, supra,* this Court said:

> "As already noted, the word 'commerce' when used in the act is defined to be interstate and foreign commerce. Its provisions are carefully drawn to apply only to those practices and obstructions which in the judgment of Congress are likely to affect interstate commerce *prejudicially. Thus construed* and applied, we think the act clearly within congressional power and valid." (*loc. cit.* 528.)

To the same effect see *Labor Board* v. *Jones & Laughlin Co., supra,* 31. The petitioner can no more sustain an action for injunctive relief than any private person upon mere proof of a threatened benefit. It must prove a threatened injury. (*In re Debs,* 158 U. S. 564, 583, 584-5.)

That "effect upon interstate commerce" as a basis for federal regulation of intrastate matters means *an adverse effect* has been consistently recognized by Congress throughout the course of legislative history. For illustration, cf. Sections 9 and 10 of the *Rivers and Harbors Act* of 1899 and see Section 1 of the *Flood Control Act* of 1936 (quoted Pet. Br. 105); *National Labor Relations Act,* 29 U. S. C. 151, 152, 160; *National Industrial Recovery Act,* 15 U. S. C. 701; *Federal Wages and Hours Act,* 29 U. S. C. 202; *Bituminous Coal Act* of 1937, 15 U. S. C. 828; the *Anti-Trust Act,* 15 U. S. C. 1. It is thus apparent that the phrase, "effect upon interstate commerce", has been consistently understood and used by Congress and construed by this Court to mean an *adverse effect.* Consequently, there is no basis for the construction urged by petitioner. There is nothing in legislative history to indicate that the phrase in Section 23 was used in other than its usual legislative and judicial meaning. And, if the phrase could be regarded as ambiguous, as it can not, the fact that petitioner's construction would obviously render the statute unconstitutional would preclude its adoption. *Interstate Commerce Comm.* v. *Oregon-Washington R. & N. Co.,* 288 U. S. 14.

Petitioner asserts that the constitutional authority of the Federal Government to require a certificate of convenience and necessity for an interstate railroad, notwithstanding the fact that the effect of its construction upon interstate commerce will presumably be beneficial, offers a close analogy. (Pet. Br. 100.) On the contrary, it only illuminates the fundamental error in petitioner's contention. Obviously petitioner may regulate an interstate railroad under the commerce clause, whether the effect of the operation of the railroad be beneficial or otherwise, because the railroad is an instrumentality of interstate commerce and its regulation falls squarely within the granted authority. But constitutional authority to regulate interstate commerce and its instrumentalities affords no support for petitioner's contention that petitioner may regulate *intrastate matters* which are neither interstate commerce nor an instrumentality of interstate commerce.

C. The Federal Power Act, properly construed, does not purport to authorize the Commission to require, or to issue, a license for a project on a non-navigable stream.

When the Federal Water Power Act was enacted in 1920, protection of navigable capacity of navigable waters was, as it still is, provided by the Rivers and Harbors Act of March 3, 1899. Under that Act, no power project could be constructed in a navigable stream without a special Act of Congress. The Federal Water Power Act was passed, not to protect navigable capacity, but to provide a more convenient means of obtaining federal assent and thereby encourage riparian owners to develop water power resources on navigable waters. *The Water Power Act did not prohibit anything.* This is inescapably established by its legislative history hereinafter discussed, as well as upon analysis of the language of the Act. *The prohibition against impairment of navigable capacity had been and remained in the Rivers and Harbors Act.*

The language of the Federal Water Power Act, its legislative history and its contemporaneous interpretation by the Commission itself are convincing proof that the Act did not attempt to confer, even if Congress could validly confer, upon the Federal Power Commission authority to require a federal license for projects on non-navigable streams[1] (R. 141-7). The licensing authority of the Commission (laying aside public lands and reservations not here involved) was and is limited to projects actually located in navigable streams or utilizing surplus water or water power from government dams. (Section 4(d) of Act of 1920, 4(e) of Act as amended in 1935, Pet. for Cert. 27). This section is the full grant of licensing authority to the Commission and defines the scope of its jurisdiction. Petitioner does not contend that any authority to issue or require a license for a project in a non-navigable stream can be found in Section 4(d) (or 4(e) of the Act of 1935).

Section 23 (second paragraph, either as enacted or amended), upon which petitioner has been and is compelled to rely, did not grant any additional licensing authority[1] and consequently did not enlarge the scope of projects for which the Commission could require or issue a license. Manifestly Congress did not intend to authorize its agency to require a license for a project on a non-navigable stream *which its agency was not authorized to issue.* That this was the intent of Congress (i. e. that the statute applied only to project on navigable waters) is manifest from its legislative history (See Appendix A, Part III). Section 23 had quite a different purpose.

---

[1] The Water Power Act was a merger of separate bills proposed for the leasing of water power developments on public lands and the licensing of power developments on navigable waters, which, of course, rested upon widely different constitutional bases. This undoubtedly accounts for the inclusion of many conditions inappropriate for, and in excess of constitutional authority over, navigable streams. (See Point VI, 121, *infra.*) Since this case does not involve public lands, reservations or property of the United States, that phase of the Act is excluded from this discussion.

Congress knew that the navigability *vel non* of many streams and the point where navigability ceased in many other streams were undetermined and doubtful. The status of relatively few of our streams had been determined by judicial decision. Where such was not the case the consequent doubts impeded the development of many water powers with which in fact petitioner had no legal concern. In this situation, the second paragraph of Section 23 was introduced into the Federal Water Power Act to provide a procedure whereby a citizen intending and willing to construct a project in a non-navigable stream, but in doubt whether it might later be determined to be navigable and his structure therefore unlawful under the Act of 1899 could in his discretion obtain an administrative determination whether the stream is navigable and within the terms of the Act and within petitioner's jurisdiction thereunder. That is the interpretation placed upon it both in the Report of the Managers for the House Conference Committee[2] and in the Senatorial Debates (quoted in opinion of District Court, R. 145-60). The Federal Power Commission itself initially and for many years so interpreted the Act.[1] Indeed, this was the interpretation placed upon Section 23 by petitioner in the earlier case involving this project.[2]

---

[1] Where applicable, the Section merely required and requires the declarant to apply for and receive "a license under the provisions of this Act." Licenses, as above pointed out, are authorized under the provisions of the Act only for projects in navigable waters.

[2] "This amendment seeks to prescribe how *a stream of doubtful navigability may be determined* as within the provisions of the law * * * ." (H. D. 910, 66 Cong., 2nd Sess., 59 Cong. Rec. 6523.)

The language of the Power Act as a whole does not support the interpretation which petitioner seeks to place on Section 23, and Congress, if it had intended to grant to the Commission authority which Congress itself had never exercised or assumed to possess, would have done so in unequivocal terms. Section 23 was inserted as an amendment and, if it were then, or now, intended to apply to non-navigable streams, Section 4(d) would have been amended, either at the time Section 23 was inserted or subsequently, to authorize the issuance of such licenses on non-navigable streams. And the filing of a declaration of intention would not have been left discretionary between 1920 and 1935. The amendment in 1935 making it mandatory is merely *clausula in terrorem* (R. 148).

It is thus plain that Section 23 of the Power Act was not intended to restrict or regulate power development on non-navigable streams but to provide for an administrative determination of navigability to remove or alleviate the doubts and fears of timid developers which had been retarding development. Many persons and corporations, public and private, were considering constructing hydro-electric developments on streams which they believed to be, but were not patently and had not actually been declared, non-navigable. Until this was determined they were unwilling to construct the project and assume the risk that the stream might later be held navigable. Thus, being doubtful as to the status of the stream, one person might intend, under the Act, to construct a project in such a stream regardless of whether the stream be found to be navigable or non-navigable. Another might intend to construct only if the stream be found to be non-navigable and if therefore no license is required. In either case the statute authorized him to invoke an administrative determination of the character of the stream.

---

[1] "The Federal Water Power Act did not propose to bring any new streams within the authority of the Federal Government. *It proposed rather to provide a method whereby the status of doubtful streams* could be determined * * *." (First Annual Report (1920), p. 54.) See also Fourth Annual Report, quoted by District Court, R. 147. Indeed, it was not until 1930, after this controversy arose, that a later Commission, conceding that "The law contains no express authority for the issuance of licenses for such projects on non-navigable streams", somewhat diffidently asserted that "the authority to do so seemed a *suitable inference* from the provisions of Section 23." (Tenth Annual Report, p. 7.)

[2] In its brief in *Appalachian E. P. Co.* v. *Smith, supra* (brought to the attention of the District Court in the instant case), petitioner said: "Congress desiring to assist those who are *in doubt as to navigability of a stream* provided the method under Section 23 of the Power Act for determining their liability. * * * Section 23 put the burden upon the applicant to negative the idea of *navigable waters* in his application." (pp. 44-5.)

To give Section 23 a meaning entirely consistent with the legislative history, it is sufficient merely to place proper emphasis upon the word "*intending*" and to bear in mind that at the time declaration is filed the status of the stream is uncertain. The relevant parts of Section 23 with important words italicized is as follows:

> "Any person * * * *intending* to construct a dam * * * in any stream or part thereof, [other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States] may in their discretion file declaration of such intention with the Commission, whereupon the Commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such *proposed construction*, such person * * * shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this Act." (Italics and brackets added.)

By reference to the italicized word "intending", and to the bracketed phrase "other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States," it will be seen that the language not inaptly provides, as Congress intended, that a person intending to construct a development in a non-navigable stream might obtain an administrative determination confirming, if such be the case, that the waters do not fall within the category of navigable streams and that the water power development when made will not be an unlawful structure.

In any case it is obvious that the section was not intended to deal with streams known or declared to be navigable or non-navigable, but rather with streams of *doubtful navigability*. The expression "other than those defined herein as navigable waters" might, of course, be read, consistently with the legislative intent, as "other than those *declared* (or known) to be navigable waters as herein defined". It was apparently so considered by this Court in describing the provisions of the Act in *New Jersey* v. *Sargent,* 269 U. S. 328, 336. (See also Appendix A, Part III.)

Nor was this meaning of section 23 changed by the amendments of 1935. While all of these amendments were requested by the Commission and adopted by Congress on the repeated assurances of the Commission that they did not extend the authority of the Commission and were only clarifying, we are here concerned only with the amendments to the licensing section (Sec. 4(d), renumbered 4(e)) and to Section 23. Plainly none of the amendments to Section 23 is effective to extend its application to non-navigable streams. And it is equally plain, as the Commission expressly and repeatedly assured Congress, that the amendment of the grant of licensing authority (Sec. 4(d)) did not enlarge the authority of the Commission. (Hearings on Public Utility Holding Act, Part I, 450, 470, 471.)

The change in terminology employed in the grant of licensing authority from "navigable waters of the United States", as used in the Rivers & Harbors Act of 1899, to "water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States", as used in Sec. 3 of the Federal Power Act, is merely a change to equivalent terminology and has in the past been used interchangeably in such legislation throughout the course of legislative history.[1] In fact Section 10 of the Rivers & Harbors Acts of 1890 and 1892 had used the terminology "waters in respect of which the United States has jurisdiction," and Section 10 of the Rivers & Harbors Act of 1899 shortened the terminology to "waters of the United States." Both of these expressions have always been held to include only navigable waters of the United States. *United States* v. *Rio Grande D. & I. Co., supra.* The same phrase had been used and was retained to define navigable waters in the Water Power Act. (Sec. 3(8).) Had Congress intended to give to the expression, with a meaning already well defined, some revolutionary meaning, evidence of that intent would be found in the legislative history of the Federal Power Act or in the selection of words carrying a plainly different meaning. *Marks* v. *United States,* 161 U. S. 297, 302-3; *Apfel* v. *Mellon,* 33 F. (2d) 805, 807, cert. denied, 280 U. S. 585. In any case, had Congress had the intent alleged by petitioner, it could easily, and doubtless would, have expressed its intent in plain, unmistakable language using, e. g., the term "non-navigable waters". But no such term appears in the Act.

Moreover, Section 3 of the Federal Water Power Act, before amendment and now, expressly defines navigable waters as "those *parts* of streams * * * over which Congress has jurisdiction under its authority to regulate commerce * * * ", after which there are included cumulative requirements which are obviously intended as limitations upon the broad definition. It is conceded that Section 23 can not constitutionally, and does not by its language purport to, enlarge the Act beyond streams over which Congress has jurisdiction, and, by the very definition of terms contained in the Act, this phrase is synonymous with navigable waters of the United States. Consistently, therefore, with this definition in the Act, as well as with its legislative history and contemporaneous interpretation, Section 23, like all the rest of the Act, can fairly be construed as applicable only to navigable waters and its obvious purpose is to afford, by way of encouragement of timid developers of water power, a preliminary determination whether the pertinent waters are navigable and consequently whether the United States will attempt to assert any jurisdiction over them.

---

[1] 26 Stat. 426, Secs. 4, 7, 10; 27 Stat. 88, Sec. 3; 30 Stat. 1121, Secs. 9, 10; 34 Stat. 386, Secs. 1, 6; 36 Stat. 593, Secs. 1, 4; 41 Stat. 1063, Secs. 3, 4(d), 11, 12, 23; 49 Stat. 838, Secs. 201(8), 202(e), 210; See also Title 33 U. S. C.

It will be observed that with complete consistency the first sentence added to Section 23 by the Amendments of 1935, purported (except in relation to public lands or reservations and Government dams not here involved) to make illegal only projects constructed in *"navigable waters of the United States"* where constructed without a license from the Power Commission, if built since June 10, 1920, or where built without other federal authorization, if constructed prior to June 10, 1920.[1] This plainly negatives petitioner's contention that the Act applies to other than navigable streams. This was a Congressional reaffirmation (no doubt dictated by a recognition of the limits of federal constitutional authority in the same way that a similar distinction was drawn in Sections 9 and 10 of the Rivers & Harbors Act of March 3, 1899) of the legislative intent, so abundantly evidenced by legislative history, that the Federal Power Act applies only to navigable waters of the United States.

---

[1] As Senator Wheeler pointed out in submitting the Report of the Committee on Interstate Commerce, this did not add anything to the prohibition in the Rivers and Harbors Act of 1899 (Senate Report No. 621, 74th Cong., 1st Sess., with reference to Section 210).

Likewise, it is significant that the sentence added in 1935 to Section 23 prohibited construction, *operation or maintenance,* whereas the only thing to be investigated upon the filing of a Declaration of Intention was and is the effect of the "proposed *construction.*" This clearly negatives any claim that Section 23 applies to non-navigable waters. It is plain that construction alone could affect navigation or even "an interest of interstate commerce" only if it were in a navigable stream. Otherwise any conceivable effect of the proposed project on interstate commerce could arise only in the method of operation. And the Act throughout provides this controlling distinction between the operation of a project and the mere construction of a project. (See 4(d), 10(c), 13, 21.)

The fact that any other interpretation would plainly make the Act unconstitutional (See Points V and VI) and would mark a revolutionary change in congressional attitude, supports, and indeed requires, this interpretation, because it is fundamental that a statute should be construed not merely so as to avoid unconstitutionality but so as to avoid raising grave or serious questions as to its constitutionality. *Interstate Commerce Commission* v. *Oregon-Washington R. & N. Co.,* 288 U. S. 14; *Holy Trinity Church* v. *United States,* 143 U. S. 457.

For a fuller review of legislative history and proper interpretation of the Act, see Appendix A, Part III.

D. Assuming *arguendo* that the Act could be construed to require SOME license for respondent's project, it should be construed as requiring only a minor-part license, or its equivalent, embracing only conditions regulatory of flow for the protection of navigation.

If the absence of any licensing authority on non-navigable streams, and if the other considerations establishing that the Act does not extend to non-navigable streams, be disregarded, then Section 23 would merely authorize the issuance of a license "under the provisions of the Act." While a standard form or major license under the Act must contain all the conditions embodied in subsections (a) to (h) of Section 10 of the Act, Section 10(i) authorizes the Commission to waive all conditions except the 50 year term "in issuing a license for a minor part of a project." The legislative history shows that, laying aside projects on Indian Reservations not here involved, a minor-part license may be issued whenever the interest of the United States, of whatever character, is only minor in relation to the project as a whole (R. 2771-3; 2785-6).

Although the evidence shows and the lower courts found that neither the intended operation nor any conceivable operation would impair navigable capacity, it is obvious that the only conceivable interest of the United States is in the manner in which the water is passed through the power house and over the dam from the standpoint of navigation and that, to accomplish such a purpose, only the control of the gates of the power house and dam would be required or useful. Manifestly, this is only a minor part of the project, whether viewed as a physical structure or otherwise.

On September 22, 1930, the Attorney General of the United States, in an opinion dealing with respondent's project, said:

> "the only interest which the United States has to protect, and for which it *may* be justified in issuing a license, is a *very minor part of the complete project, viz., the manner in which the flow of the stream below the dam is affected by* the operation of the water power" (Ex. 532, R. 2786).

And the Attorney General, in the same opinion, after advising the Federal Power Commission that it was authorized to issue a minor part license for respondent's project with conditions so limited, stated further that such an interpretation of the Act was *"necessary in order to avoid serious questions regarding the constitutionality of the Act."*

Both before and after the hearing on the declaration of intention on respondent's project, the Federal Power Commission granted such minor-part licenses where the interest of the United States was minor in comparison with the complete project, *even though the project was located in navigable waters or on public lands.*[1] Obviously, such an interpretation of the statute would satisfy every possible federal interest and, although we think the petitioner is without constitutional authority to require any license, such a construction would at least minimize the extent of the unconstitutional invasion of the rights of the respondent and of the State. To that extent, it would give some effect to the rule that a statute should be construed "so as to avoid not only the conclusion that it is unconstitutional but also grave doubts upon that score." *I. C. C.* v. *Oregon-Washington R. & N. Co., supra.* On the other hand, petitioner's attempt to impose upon this project on a non-navigable stream the conditions of a major license (many of which would be unconstitutional even as applied to a project on a navigable river) involves the grossest invasion of the rights of the State and confiscation of the property of respondent.

E. Assuming *arguendo* that the Act could be construed to require a minor-part license for respondent's project, petitioner's conduct would bar it from relief.

For the reasons hereinbefore reviewed, it is apparent that, under any conceivable interpretation of the statute and under any conceivable view of petitioner's constitutional authority, petitioner could at most require for respondent's project a license with conditions limited to the regulation of the flow through the power house and over the dam for the alleged protection of navigation. Respondent, while denying any jurisdiction of petitioner in the premises, steadfastly, over a period extending from 1928 to the time when the instant suit was instituted in 1935, offered to accept a minor-part license containing such conditions. Specifically it offered to accept the identical conditions regulatory of flow for the alleged protection of navigation which are incorporated in the license which petitioner asks the courts to require respondent to accept. See pp. 11-13, *supra*. Petitioner, on the other hand, steadfastly refused to issue a license unless respondent would agree to accept a major license with its numerous unconstitutional conditions and restrictions, discussed in Point VI, *infra.*

---

[1] For minor part licenses for projects involving navigable waters see 5th Annual Report 111-12; 10th Annual Report 82, 83, and for a project utilizing a portion of a federal navigation improvement, 16th Annual Report 53; for other illustrations of minor part licenses granted by Commission, even involving the use of public lands, see 7th Annual Report 231, 232; 11th Annual Report 193, 195; 12th Annual Report 238, 240; 18th Annual Report 57.

Petitioner now asks a court of equity to prevent the respondent from making any use of its property and to render its property substantially valueless unless respondent will agree to the surrender of its constitutional rights. It is plain that the relief sought by petitioner would constitute a taking of respondent's property without due process of law in contravention of the Fifth Amendment. *Monongahela Navigation Co.* v. *United States, supra; United States* v. *Cress, supra.* To grant relief under such circumstances would require a court of equity to aid in the accomplishment of an unlawful and unconstitutional act. When the United States comes into a court of equity, all the rules established for the administration of justice between individuals are applicable to its claims and rights.[1] The constitutional rights of the individual may not be thus destroyed. *Frost Trucking Co.* v. *Railroad Commission,*

---

[1] *Pan American P. & T. Co.* v. *United States,* 273 U. S. 456, 505; *United States* v. *The Thekla,* 266 U. S. 328; *Kandle* v. *United States,* 4 F. (2d) 183 (C. C. A. 3rd); *United States* v. *Midway Northern Oil Co.,* 232 Fed. 619; *United States* v. *Devereux,* 90 Fed. 182 (C. C. A. 4th); *State of Iowa* v. *Carr,* 191 Fed. 257 (C. C. A. 8th).

271 U. S. 583, 593. And surely a court of equity will not lend its aid to such a scheme.

On the other hand, as the Trial Court pointed out, if, contrary to the situation as it now exists, any new situation should ever arise in which the operation of respondent's project created or threatened to create an impairment of navigable capacity, the authority of the United States to compel removal of the structure or modification of the method of operation would be full and complete under the Rivers and Harbors Act of March 3, 1899. But, as the court below found, such a situation does not now exist.

POINT V.

Petitioner has no constitutional authority to require a license for a project located in non-navigable waters and *a fortiori* for respondent's project which will not impair navigable capacity.

Since, as we have shown, respondent's project is not located in navigable waters and its operation will not impair the navigable capacity of any navigable waters or affect the interests of interstate commerce within the meaning of the Power Act, that Act is plainly inapplicable; and no constitutional question is presented for decision. See Point IV *supra*.

However, if, as petitioner urges, that Act were applied to respondent's project, it would be to that extent plainly unconstitutional for the following reasons:

> *First:* Petitioner has no constitutional authority to require a license for a project on a non-navigable stream and *a fortiori* for respondent's project which will not impair navigable capacity.
>
> *Second:* Even for projects in navigable waters or in non-navigable waters and impairing navigable

capacity, and *a fortiori* for respondent's project located on a non-navigable stream and not impairing navigable capacity, many of the license conditions are:

(a) in excess of any constitutional authority of petitioner,

(b) a clear invasion of the rights reserved to the states and their peoples under the ninth and tenth amendments, and

(c) a taking of property without due process of law—both as a taking without constitutional authority and as a taking without just compensation.

The first proposition is discussed in this section; and the second proposition is discussed in Point VI *infra*.

The precise constitutional authority which Congress invoked in the Federal Water Power Act was its implied authority over navigable waters; and, as hereinafter appears, it is that aspect of the commerce clause upon which petitioner almost wholly relies. However, since petitioner also invokes some other aspects of the commerce clause, it will contribute to clarity, and avoid what in our view is confusion in petitioner's brief, to consider separately (1) whether constitutional authority to require any license for respondent's project exists under such implied authority in relation to navigable waters, and (2) if not, whether it exists under any other aspect of the commerce clause. For these reasons, we shall examine these questions separately in the order stated.

A. Petitioner has no constitutional authority to require a license for respondent's project under its implied authority in relation to navigable waters.

This proposition is, we think, demonstrated by a brief examination of the nature of the respective rights of the

United States, the States and riparian owners in navigable and non-navigable waters.

1. ***Even in navigable waters, the United States has no title or property right in the waters or the beds of the streams, and its powers are limited to control of such waters for purposes of navigation.***

Contrary to petitioner's assertion (Pet. Br. 114-5), the water power resources of streams, either navigable or non-navigable, are not the "heritage" of the Federal Government but instead are the property of the several states except in so far as the States may have granted them to their citizens. The United States has no title or property right in navigable streams, their waters, their water power or the lands over which they flow; and the property rights of riparian owners, on both navigable and non-navigable streams, are created by and flow exclusively from State sovereignty. *Port of Seattle* v. *Oregon & W. R. R.*, 255 U. S. 56, 63; *United States* v. *Cress*, 243 U. S. 316; *Borax Consolidated, Ltd.* v. *Los Angeles*, 296 U. S. 10; *Shively* v. *Bowlby*, 152 U. S. 1. The right or authority of the United States in relation to navigable waters is limited to the control thereof for the purposes of navigation. *Port of Seattle* v. *Oregon & W. R. R. Co., supra*, 63; *United States* v. *Oregon*, 295 U. S. 1, 14; *Kansas* v. *Colorado*, 206 U. S. 46. Any legislation ostensibly for the control of navigable waters which has no real or substantial relation to their control for purposes of navigation is unconstitutional and void. *United States* v. *River Rouge Co.*, 269 U. S. 411, 419; *Wisconsin* v. *Illinois*, 278 U. S. 367, 415.

Contrary to petitioner's apparent claim (Pet. Br. 124, 130), the authority of the United States to control navigable waters, solely for purposes of navigation, does not include the old common law right to have waters run *currere solebat*. That was a property right of riparian owners which was and is subject to regulation and change by the States, the source of all property rights, in order to turn their resources to a more perfect use. So long as the States do not substantially impair navigable capacity of federal navigable waters, the States may authorize or command such alteration in natural flow of their streams as they deem in their best interests. *Kansas* v. *Colorado,* 206 U. S. 46, 94; *United States* v. *Rio Grande Irrigation Co.,* 174 U. S. 690, 703; *Head* v. *Amoskeag Co.,* 113 U. S. 9; *Holyoke Co.* v. *Lyman,* 15 Wall. 500; *Otis Co.* v. *Ludlow Co.,* 201 U. S. 140, 152; *Connecticut* v. *Massachusetts,* 282 U. S. 660, 670. It is solely a matter of State choice. *California Power Co.* v. *Cement Co.,* 295 U. S. 142, 163-4.

Contrary to petitioner's assertions (Pet. Br. 118, 119, 130), the United States has no authority under the commerce clause or otherwise to construct or acquire a power project or to develop the waterpower resources of either navigable or non-navigable streams; and it may not constitutionally create water power other than that which is incidentally and necessarily produced by works constructed for some constitutional purpose and those works must be reasonably appropriate for, and have a real and substantial relation to, the performance of the constitutional function which in the premises is limited to the creation or improvement of navigability. *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288, 340; *Kaukauna Co.* v. *Green Bay Co.,* 142 U. S. 254, 273; *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53, 73; *Alabama Power Co.* v. *Gulf Power Co.,* 283 Fed. 606, 613; *Missouri* v. *Union E. L. & P. Co.,* 42 F. (2d) 692, 695. This limitation upon petitioner's constitutional authority is unaffected by considerations of "economic feasibility" and can not be escaped by designating a statutory scheme as a "multiple purpose project" (Pet. Br. 119). Petitioner may not develop water power merely for profit, or as a primary purpose, or as a separate and independent objective, merely because it concurrently authorizes some constitutional structure which does not necessarily or incidentally create the water power.

2. *While the right of a riparian owner on a navigable stream to develop water power is subject to the servitude of navigation, the right of a riparian owner on a non-navigable stream is subject to no servitude in favor of navigation and may not be taken or restricted (as long as no nuisance is created) without compensation.*

The right to use the flow of a stream for the development of water power is a recognized property right and a normal incident of riparian ownership. Even on a navigable stream, the underlying right to develop water power is in the state or riparian owner. *Pike Rapids Power Co.* v. *Railroad,* 99 F. (2d) 902, 908, cert. denied 305 U. S. 660; and its exercise is restricted only by such limitations as may arise out of the necessity to refrain from interfering with the use or improvement of the stream *in its natural location* for navigation purposes. *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53; *United States* v. *Cress,* 243 U. S. 316; Opinion of Chief Justice Taft as Secretary of War, Report of Sub-Committee on Dams and Water Power, House Committee on Interstate Commerce, 60th Congress, February 25, 1909.

The servitude in favor of navigation, to which riparian lands on navigable streams are subject, is a *natural servitude* implicit in the location of the property and *limited to the stream in its natural state. United States* v. *Cress,* 243 U. S. 316, 321, 325; *Pumpelly* v. *Green Bay Co.,* 13 Wall. 166; *United States* v. *Lynah,* 188 U. S. 445; *Packer* v. *Bird,* 137 U. S. 661, 667; *United States* v. *Rio Grande Irrigation Co.,* 174 U. S. 690, 698; *Leovy* v. *United States,* 177 U. S. 621, 631. Whenever that servitude is exceeded by any action of the federal government in the improvement of a navigable water or the creation of an artificial federal waterway, it takes property for which it must make compensation. *United States* v. *Cress, supra,* 326; *United States* v. *Lynah, supra; Monongahela Navigation Co.* v. *United States,* 148 U. S. 312, 336; *United States* v. *River Rouge Co.,* 269 U. S. 411, 419; *Wisconsin* v. *Illinois,* 278 U. S. 367, 415, 418.

On the other hand, the property rights of riparian owners on non-navigable streams are subject to no servitude in favor of navigation. When and if such rights are restricted by the federal government for the improvement of navigation or the creation of navigability, there is a taking of property for which compensation must be made. *United States* v. *Cress, supra,* 319-321; Fourth Annual Rep. Fed. Power Commission: 1924, p. 181, 185, Opinion of Chief Counsel. Of course, no one has a right to create or maintain a nuisance. However, that limitation upon the use of property is not a servitude but merely results from the inherent limitation upon all property rights. A right inseparably connected with the ownership of the land through which a non-navigable stream flows is the right to create water power by damming the stream and using the power; and this property right can not be taken from the riparian owner except for public purposes and then only upon compensation. *United States* v. *Cress, supra,* 321-2, 329-330; *Ford Hydro-Electric Co.* v. *Neely,* 13 F. (2d) 361, 362, cert. den. 273 U. S. 723; *Union Electric Co.* v. *Snyder Co.,* 65 F. (2d) 297, 304; *Carpenter* v. *Gold,* 88 Va. 551; *Rankin* v. *Harrisonburg,* 104 Va. 524; *Lynchburg* v. *Mitchell,* 114 Va. 229; *Fulton Power Co.* v. *New York,* 200 N. Y. 400; *Kalama etc. Co.* v. *Kalama Driving Co.,* 48 Wash. 612, 94 Pac. 649; *People ex rel. Niagara Falls Power Co.* v. *Smith,* 70 App. Div. (N. Y.) 543, 546. The extent to which riparian owners may vary the natural flow for the development of water power resources depends upon the law of the particular state. (See pp. 109-110, *supra*). It is unquestioned that the sum of the proprietary rights granted respondent by the State of Virginia constitutes a full and complete property right to construct and operate respondent's project under the laws of that State (R. 154).

This is not to say that the United States has no constitutional authority to utilize a non-navigable stream in the creation of an artificial interstate waterway, but in so doing it must make compensation for property taken. In such cases it is not exercising its power of mere "regulation" of navigable waters but is appropriating for a public purpose private property for which it must make compensation under the Fifth Amendment. (See also pp. 111-12, *supra.*) There is a marked distinction between the power of the Federal Government *to regulate without compensation* and the power *to make public improvements upon compensation made for property taken.* We here deal with the limits of the power of the United States *to regulate without compensation.*

3. *Any constitutional authority of the United States is no different or greater in relation to non-navigable waters than in relation to land; and consequently, it has no constitutional authority to make illegal* **per se** *the erection or maintenance of structures without a federal license merely because they are located in a non-navigable stream.*

The constitutional authority of the United States in the premises rests solely upon its jurisdiction over navigable waters. This results in a marked distinction between its constitutional authority over structures in a navigable stream and its *incidental* authority to prevent any substantial impairment of their navigable capacity by any act, wherever performed, beyond the limits of navigable waters.

The constitutional authority of the Federal Government over navigable streams is merely implied from the authority to regulate interstate commerce. *Gilman* v. *Philadelphia,* 3 Wall. 713; *Gibbons* v. *Ogden,* 9 Wheat. 1. It is merely "an incidental power". *Leovy* v. *United States, supra,* 632. This implied authority over interstate navigable streams arises solely from the fact that they are *natural* highways of interstate commerce. It does not derive from the fact that *they are water* but from the fact that they are natural instrumentalities of interstate commerce. The result is that the Federal Government may regulate, and therefore require a license for, the placing of structures in such highways so long as such regulation has a real and substantial relation to the protection of navigation or navigable capacity and so long as it does not attempt to make the exercise of the licensing power the vehicle of extending federal authority into a field closed to the Federal Government by the Constitution. *United States* v. *Butler*, 297 U. S. 1; *Linder* v. *United States*, 268 U. S. 5, 17; *The Employers' Liability Cases*, 207 U. S. 463, 502; *Frost Trucking Co.* v. *R. R. Commission*, 271 U. S. 583. Within those limitations, it may make the erection or maintenance of a structure in a navigable stream without a federal license *ipso facto* unlawful.[1] *Greenleaf Lumber Co.* v. *Garrison*, 237 U. S. 251.

On the other hand, a non-navigable stream is not a highway of interstate commerce, and riparian lands on such streams are subject to no servitude in favor of navigation. Plainly the Congress has no peculiar constitutional authority over acts merely because they occur in non-navigable streams. It has no greater constitutional authority in relation to structures in these streams than in relation to structures on dry land. Therefore it may not make the erection or maintenance of structures in those streams without a federal license *ipso facto* unlawful and consequently does not have authority to require a permit or license for such structures merely because they are located in non-navigable streams. *United States* v. *Rio Grande Irrigation Co.*, 174 U. S. 690; *United States* v.

---

[1] It may, however, be noted that there is a wide distinction between the authority of the Federal Government to abate a structure in navigable waters as an obstruction to navigation and the authority of the Federal Government to appropriate such a structure to a public constitutional use. It may abate such an obstruction without compensation, for that is merely an enforcement of the servitude of riparian property in favor of navigation. However, it may not appropriate the structure to the public use without making compensation. *Monongahela Navigation Co.* v. *United States*, 148 U. S. 312; *United States* v. *Chandler-Dunbar Co.*, 229 U. S. 53. In the *Chandler-Dunbar* case the Federal Government *paid for the property taken* and that which it required to be abated as an obstruction to navigation and, for which it made no compensation, it did not seek to appropriate to the public use.

Doughton, 62 F. (2d) 936 (C. C. A. 4th). Of course, the United States has authority to protect navigable capacity from impairment by any act wherever performed, but whenever the act is performed outside of navigable waters (whether in non-navigable streams or on dry land), any right to prevent it depends upon proof that it does or will substantially impair the navigable capacity of navigable waters, and the constitutional limit of federal authority in such cases is to restrain the erection or method of operation of the structure to the extent, and only to the extent, necessary to remove or prevent an actual or threatened substantial impairment of the navigable capacity of the navigable stream.

The existence of any federal constitutional authority rests not upon what is done outside the navigable stream; instead it rests upon and is circumscribed by the existence and extent of the actual or threatened adverse effect in the navigable stream. The existence of such an adverse effect in the navigable stream is the sole and indispensable factual basis of any possible federal authority and the extent of any such authority is measured by what is necessary to remove or prevent a substantial impairment of navigable capacity, for beyond that no factual basis for the exercise of constitutional authority exists. In short, the indispensable factual bases of federal authority in the premises are: (1) a navigable water of the United States; (2) actual or threatened substantial impairment of its navigable capacity; and (3) proof that such actual and threatened impairment is caused by the construction or operation of a structure in a non-navigable stream or elsewhere outside the navigable waters. Manifestly, the United States is without constitutional authority to make structures in non-navigable streams illegal *per se* without a federal license and consequently may not impose a general federal licensing system upon such structures.[1]

---

[1] Obviously, if petitioner, without establishing these facts, has no authority to restrain any act of respondent, *a fortiori* it has no

(Footnote continued on next page)

Thus, in *United States v. Rio Grande Irrigation Co., supra,* the United States sought to enjoin the intended acts of the defendant (the construction of large irrigation works on a non-navigable reach of the Rio Grande River, with permanent diversion of a substantial part of its flow) upon the ground that the project was "not affirmatively authorized by law" as allegedly required by the Rivers and Harbors Acts of 1890 (26 Stat. 454) and 1892 (27 Stat. 110). There was no claim that the project had been "affirmatively authorized by law". This Court held that the project was not for that reason *ipso facto* unlawful and that the United States could enjoin the intended acts of the defendant only upon proof that they would substantially impair the navigable capacity of navigable waters "where navigability is a recognized fact" (loc. cit. 709) and *then only to the extent that such intended acts would thus substantially diminish navigable capacity elsewhere.*[1] (*loc. cit.* 710).

---

authority to impose the requirement of a federal license for the doing of an act which it has no power to prohibit. As stated in 37 Corpus Juris 166-7:

> "The term 'license' is not involved in uncertainty or doubt; in its general and popular sense, as used with reference to occupations and privileges, it means a right or permission granted by some competent authority to carry on a business or do an act which, without such license, would be illegal. It is a formal or official permit or permission to carry on some business or do some act which, without the license, would be unlawful, the words 'license' and 'permit' often being used synonymously."

[1] The situation of the United States in relation to structures outside navigable waters is in principle similar to that of the State of Georgia in *Georgia v. Tennessee Copper Co.,* 206 U. S. 230. There Georgia had no jurisdiction over what was done in the State of Tennessee. Its rights rested solely upon the effect produced in the State of Georgia and were limited to restraining the acts in Tennessee to the extent necessary to prevent substantial adverse effect in the State of Georgia.

4. ***On the facts of this case, petitioner has no constitutional authority to require a license for respondent's project under its implied authority in relation to navigable waters.***

Since respondent's project is not located in a navigable stream and its operation will not impair navigable capacity, it necessarily follows that petitioner has no constitutional authority to require a license for, or to restrain operation of, the project under petitioner's implied authority in relation to navigable waters. All of petitioner's arguments in support of a contrary conclusion are untenable either in fact or in law, or both.

(1) Petitioner's argument that it has constitutional authority to construct respondent's project, and that, therefore, it may license a private corporation to construct the project *upon whatever terms petitioner may prescribe* (Pet. Br., 120-1), is both inapposite and unsound.

First: Petitioner may not construct a project, either directly or through an agent, for which it has no constitutional authority—such as respondent's project, which is simply a power plant on a non-navigable stream (see p. 110, *supra*).

Second: The wide difference between the authority to employ a *voluntary* agent to construct a *constitutional* structure and the asserted authority to *impress or coerce* a citizen as an unwilling agent to construct a federal work *"upon such terms and conditions" as petitioner may prescribe,* hardly requires elaboration. In short, petitioner asserts authority to prohibit a citizen from using his property for the only purpose for which it is useful or valuable to him unless the citizen will consent to become a federal agent upon such terms and conditions as petitioner prescribes. But on analysis, petitioner's argument is even broader and more shocking. It comes down to a proposition that because petitioner has authority to condemn any citizen's land for a constitutional purpose, petitioner may, without condemnation (and indeed without any Congressional authorization to acquire the citizen's land for any purpose), prohibit a citizen from using his land for any purpose without a federal license—so conditioned that the citizen must submit to burdensome regulation by petitioner and eventually turn over his land to petitioner upon such terms as petitioner may prescribe.

There is not an acre of land or a city lot in the United States which could not conceivably be acquired for a post road, post office, arsenal, fort or other federal work. By parity of reasoning, petitioner may prohibit every landowner in the United States from building anything upon his property without a federal license because forsooth a federal structure could conceivably be built upon the land.

(2) Petitioner asserts that it has constitutional authority to prohibit the construction of respondent's project because *its incidental* effect, *if any*, upon navigation or flood control will be beneficial. (Pet. Br. 123-4.) Laying to one side the fact that any benefit to navigation or flood control is purely incidental, fortuitous and unsubstantial (see pp. 87-9, *supra*), the contention is plainly unsound. Neither the construction nor operation of respondent's project is interstate commerce. (See p. 119, *infra.*) Petitioner has no constitutional authority under the commerce clause to regulate intrastate matters except when, and then only to the extent that, such regulations have a real and substantial relation to, and are necessary for, the protection of interstate commerce from *substantial injury* produced by such intrastate acts. *Schechter Corp.* v. *United States*, 295 U. S. 495, 544; *Labor Board* v. *Jones & Laughlin*, 301 U. S. 1, 31-2, 36-7; *Carter* v. *Carter Coal Co.*, dissenting opinion Cardozo, J., 298 U. S. 238, 327-8; *United States* v. *Rio Grande D & I Co.*, *supra*. Almost every act of every citizen probably has some insubstantial and remote effect upon interstate commerce. We are now told that, if that is so, whether that incidental

effect be detrimental or beneficial, every such act of a citizen falls within the regulatory authority of petitioner under the commerce clause. Not only is this contention in the teeth of the decisions of this Court but it would plainly destroy our dual system of government.

Nor does petitioner's implied contention that by a license it could compel respondent to operate its project, at the expense of itself and its property rights, so as to increase the incidental benefits to navigation and flood control in relation to navigation stand in any better stead. Petitioner has no constitutional authority to require respondent to make such federal improvements without compensation. If petitioner had such authority, it could as well require respondent to utilize its property *solely* for flood control or for the construction of an artificial navigable waterway, all without compensation. The difference would be one of degree and not of constitutional authority.

B. Petitioner has no constitutional authority to require a license for respondent's project under any other aspect of the commerce clause.

Neither the construction nor operation of respondent's project is interstate commerce. *Utah Power Co.* v. *Pfost,* 286 U. S. 165, 179-82; *South Carolina Power Co.* v. *Tax Commission,* 52 F. (2d) 515, 524, *affirmed* 286 U. S. 525. Petitioner has no constitutional authority to prohibit the operation of manufacturing plants or of farms merely because some part of the goods produced may ultimately move in interstate commerce. Petitioner advances only two arguments in support of its contention that it has authority to require a license under the commerce clause for reasons unrelated to its implied authority over navigable waters. Both are plainly without substance.

(1) Petitioner asserts, without citation of authority, that it may forbid the construction of respondent's project without a federal license merely because some part of the

electricity which it generates will move in interstate commerce. (Pet. Br. 125.) The distinction between the regulation of goods *after they commence to move in interstate commerce* and the asserted authority *to prohibit construction of manufacturing plants* without a federal license is obvious and fatal to petitioner's contention. *Utah Power Co.* v. *Pfost, supra; Kidd* v. *Pearson*, 128 U. S. 1; *Carter* v. *Carter Coal Co., supra; Schechter Corp.* v. *United States, supra.* And, in the very Part II of the Power Act to which petitioner refers, Congress has expressly disclaimed any intention to assert such authority under the Power Act (Tit. 16 U. S. C. 824(b)). There is, of course, no analogy to the federal authority to regulate an *instrumentality* of interstate commerce; and indeed even that authority extends only to the facilities upon which the movement of goods in interstate commerce depends.

2. Finally, petitioner asserts, without citation of authority, that it may prohibit construction of respondent's project because the natural flow of all waters from the spring houses to the sea is interstate commerce. (Pet. Br. 126-7.) Manifestly, the natural flow of water is not commerce at all. The recognition of such a theory would destroy the constitutional distinction between navigable and non-navigable waters and between federal and state waters, and would transfer to the Federal Government control over, and virtual ownership of, practically all of the waters of the States.

POINT VI.

Assuming *arguendo* that petitioner had authority to require some license for respondent's project, it could not constitutionally impose those conditions of the tendered license which are unrelated to the protection of navigation.

We have already shown that any authority to require a license, if it exists, must rest upon petitioner's implied authority in relation to navigable waters (see pp. 107-20, *supra*).[1] Consequently, we now examine the question whether, assuming *arguendo* petitioner's authority to require *some* license, the license conditions could be sustained under petitioner's implied authority in relation to navigable waters.

A. Many of the license conditions would be unconstitutional as applied to projects located in navigable waters or in non-navigable waters and impairing navigable capacity; and, *a fortiori*, they are unconstitutional if applied to respondent's project located in non-navigable waters and not impairing navigable capacity.

We have already seen that even on a navigable stream the Federal Government may not impose regulations which do not have a real and substantial relation to the protection of navigation or navigable capacity. *A fortiori* it can not impose such conditions or regulations upon non-navigable streams, where the sole source of its constitutional authority, if any, must depend upon the actual or threatened impairment of navigable capacity in navigable waters by reason of acts done on non-navigable streams.

---

[1] In so far as petitioner seeks to defend the license conditions upon any other aspect of the commerce power, they are discussed at pages 128-38 *infra*.

The constitutional authority of the petitioner in so far as it exists over navigable streams or any other subject-matter, is limited by the principles: (1) that the exercise of an admitted power may not be made the vehicle of exercising authority not delegated to the Federal Government or forbidden to it; (2) that, conversely, the attainment of a prohibited end may not be accomplished under the pretext of exerting powers which have been granted to the United States. *McCulloch* v. *Maryland,* 4 Wheat. 416, 421, 423; *Linder* v. *United States,* 268 U. S. 5, 17;[1] (3) that, regardless of amount of compensation, petitioner may not take lands of a citizen for an unconstitutional purpose; and (4) that the Federal Government, even in the process of making a public improvement within its constitutional authority, may not take property without compensation in violation of the Fifth Amendment. *United States* v. *Cress,* 243 U. S. 316, 319; *Monongahela Navigation Co.* v. *United States,* 148 U. S. 312, 336.

Briefly stated, the tests which must be applied to determine whether the statute (Power Act), as construed by petitioner, or the terms of the tendered license (which petitioner asks the court to require respondent to accept) are within the constitutional authority of the petitioner are:

(1) Does the license impose regulations upon respondent which do not have a real and substantial relation to the prevention of any substantial impairment of the navigable capacity of navigable waters of the United States?

(2) Does the license impose regulations upon respondent which involve an exercise of local powers of government, such as the police power or any other power not delegated to the Federal Government but reserved to the States and the people and expressly

---

[1] As this Court has said, "to a constitutional end many ways are open; but to an end not within the terms of the Constitution, all ways are closed". *Carter* v. *Carter Coal Co.,* 298 U. S. 238, 291.

forbidden to the Federal Government by the Ninth and Tenth Amendments?

(3) Does the license impose regulations upon respondent which, for the purpose of creating navigability or of improving navigability elsewhere, restrict the use of respondent's property, with the result of appropriating respondent's property for a public improvement without compensation, or which require respondent to surrender its property to petitioner for an unconstitutional use—all in violation of the Fifth Amendment?

The license, in conformity with the mandatory terms of the Act, stipulates that respondent shall be subject not only to all the terms and conditions of the Act, but also to such rules and regulations as the Commission may prescribe (Ex. 131, R. 2663, 2665, 768). Many of the terms in the tendered license would be unconstitutional for a project on a navigable stream, but here we are concerned only with a project on a non-navigable stream. In the interests of brevity we do not consider these conditions in detail but confine our discussion to illustrative conditions which, in our opinion, plainly establish that the license is beyond the constitutional authority of petitioner to impose.

Section 10(a) (16 U. S. C. 803(a)) requires that a licensed project shall "be best adapted to a comprehensive plan (1) for *improving or developing a water or waterways* for the use * * * of interstate or foreign commerce, (2) for the improvement and utilization of water power development, and (3) for other beneficial public uses, including recreational purposes". Condition 1 requires a licensee to devote or agree to devote his property to a public use without compensation. Condition 2 attempts to usurp authority reserved to the States over the development of water power on non-navigable streams. Condition 3 attempts to assert federal authority in displacement of the ordinary police powers of the state over its non-navigable waters. The regulation of the waters of a stream, *even a navigable stream*, for uses other than navigation, falls exclusively within state sovereignty. *Hudson County Water Co.* v. *McCarter*, 209 U. S. 349; *Holyoke Co.* v. *Lyman*, 15 Wall. 500, see also cases p. 110, *supra*. So long as there is no impairment of navigable capacity of federal navigable waters, it is no concern of the Federal Government whether the policy of Virginia for the development of its non-navigable streams—or its navigable streams, for that matter—meets the approval of any federal bureau.

Section 10(c) contains numerous conditions relating to the maintenance, renewal, replacement and operation of the power plant, the establishment and maintenance of depreciation reserves for such purposes and also for purposes of navigation and requires a licensee to

> "conform to such rules and regulations as the Commission may from time to time prescribe for the protection of life, health and property".

Manifestly, none of the conditions has any relation to the protection of navigable capacity. Some of them require a licensee to devote its property to public use without compensation and they further attempt to transfer to petitioner the full police power of the State.

Section 10(d) requires the establishment of "amortization reserves" out of earnings "in excess of a specified reasonable rate" to be applied from time to time in reduction of the net investment of the licensee. Manifestly these conditions have no relation to the prevention of impairment of navigable capacity of navigable waters, and are a plain invasion of the reserved rights of the State.

Section 10(e) requires the licensee to pay annual charges fixed by the Commission "for the expropriation to the Government of excessive profits" and provides for the establishment of a federal policy of stimulating public ownership of power developments on navigable streams. Manifestly the expropriation "of excessive profits" according to the ideas of the petitioner has no relation to the protection of navigable waters. Likewise the petitioner has no right or authority to impose directly or indirectly upon a State a system of either public or private development of water power, or to exclude the citizens of a State from the development of its water power resources under State law.

Section 10(g) purports to empower the Commission to regulate projects in any manner whatsoever so long as not inconsistent with the Act. It thus purports to appropriate all the powers of government reserved to the States. Typical of the conditions which might be imposed under this broad authority, if it could be upheld, are Articles 21 and 22 of the tendered license (Ex. 131, R. 2663, 768) which prohibit the lease or sale of the project or any part thereof without the approval of the Commission.

The "capture clause" (Section 14). Section 14, which purports to give petitioner the right to "take over" or capture[1] a project at the end of the license period, is printed in petitioner's brief 154-6. This clause is plainly in excess of any constitutional authority of petitioner, an invasion of the reserved right of the States and their people and a clear taking of private property without due process of law—both as a taking without constitutional authority and as a taking without just compensation as required by the Fifth Amendment.

First: It requires respondent to agree that petitioner shall have the right *"to take over and thereafter maintain and operate"* respondent's project. Respondent's project is simply a power project which petitioner would have no constitutional authority to take over and operate whether on a navigable or a non-navigable stream. The taking of a citizen's property for a purpose for which the "taking" government has no constitutional authority to condemn, is a gross invasion of the rights of the citizen, no matter what compensation is paid. It is also a gross invasion of the rights of the states and their peoples. Plainly, if petitioner may prohibit the use of private property unless the owner will surrender that property, immediately or ultimately, to petitioner for purposes for which petitioner has no authority to condemn or acquire the property, petitioner may destroy the authority of the States to regulate the development of their own resources and the right of their peoples to utilize such resources under State law in conformity with State policy.

---

[1] As to gross error of describing this alleged right as "recapture", see footnote p. 3, *supra*.

Second: The "capture" clause is plainly confiscatory. It requires a licensee to agree that petitioner may "take over" the project upon payment to the licensee of its "net investment" in the project, or its fair value at the time of taking, *whichever is the less.* The Act itself, with a realistic bow to the language of the street, carefully distinguishes between such "taking over" the property of a licensee and its acquisition by condemnation "upon payment of just compensation" (Sec. 14). Upon such taking over or capture "net investment" is subject to diminution by deduction of amortization reserves, unappropriated surplus, current depreciation accounts and sinking funds and by the expropriation of excess profits, as defined by the Federal Power Commission and excludes any allowance for going value (Sec. 14; Sec. 3(13)). Both the "net investment" and the "fair value" prescribed by the Act not only exclude "going value", but also any value for water rights or lands in *excess* of "the *actual* reasonable cost thereof at the time of acquisition" (no matter when acquired, which may have been years before the issuance of the license) so that petitioner will "take" any increase in the value of lands or water rights and the licensee will bear the loss of any decrease in their value.

The confiscatory character of such a contractual obligation would be sufficiently apparent under stable monetary and economic conditions. But under present conditions with the potentiality of severe inflation constituting a definite threat, it is obvious that under such a contract there is a real possibility that the petitioner might "take over" respondent's property upon paying merely the number of dollars (greatly reduced in purchasing power) which had not been eliminated from the original investment by the statutory definitions of "net investment" and "fair value" and thereby might acquire such property for an insignificant fraction of its reproduction value, of its real worth or of the original investment.

If the Federal Government had the authority to acquire and operate a hydro-electric plant on a non-navigable stream, it could condemn such a plant *at any time upon payment of just compensation.* There can be no reason for attempting to extort a contract to sell such a property to the petitioner unless it is that petitioner (as is the fact) is without constitutional authority to condemn the property or that petitioner (as is also the fact) seeks to acquire the property for less than just compensation.

Assuming the right of "capture" (which respondent denies), petitioner asserts that, if it has the power to capture, it can prescribe all of the terms of the capture. The Federal Government has the right to condemn property for a public, constitutional use but it can not prescribe the terms of condemnation. Under the Constitution it must pay just compensation, to be determined by the courts.

Plainly, as petitioner now concedes (Pet. Br. 128) none of the foregoing illustrative conditions, nor various similar conditions prescribed by the Act and included in the tendered license, has any real or substantial relation to the protection of navigable waters and consequently may not be sustained under petitioner's implied authority in relation to such waters. Since, as we have previously shown, any authority of petitioner to require any license must rest upon this implied authority, it follows that such conditions may not be sustained under any other aspect of the commerce clause and this further appears from our subsequent examination of the arguments advanced by petitioner in defense of these license conditions.

It is thus plain that, even if petitioner had the authority, as it has not, to require some license for respondent's project, both the statute, as construed by petitioner, and the tendered license would be unconstitutional and void.

B. Petitioner's arguments in defense of the license conditions are severally untenable or inapposite.

We now examine seriatim petitioner's arguments in defense of these license conditions.

1. *Petitioner's argument that it has authority to impose license regulations unrelated to its constitutional authority.* (Pet. Br. 128-131) Petitioner does not attempt to show that these license conditions are related to, or sustainable under, its implied authority in relation to navigable waters or under any other aspect of the commerce clause. Instead, it argues that, because, as petitioner erroneously asserts, petitioner has authority to forbid construction, or itself to construct, respondent's project, it can impose such regulations by way of license as it chooses to prescribe, even though they be wholly unrelated to the constitutional authority under which it issues the license, and that such a course would not be "the accomplishment of a forbidden end" (Pet. Br. 130). Quite apart from the fact that petitioner would not have the constitutional authority to construct respondent's project (p. 110 *supra*), the argument is plainly unsound.

Petitioner is not here exercising a proprietary right but only a governmental function; and, when acting solely in that capacity it can impose no regulations by license which it could not have imposed by general statute. It is well settled that the Federal Government cannot, in the guise of conditioning discretionary action even in the field of its admitted authority, exercise authority not delegated, or forbidden, to it by the Constitution. *McCulloch* v. *Maryland,* 4 Wheat. 416, 423; *Linder* v. *United States,* 268 U. S. 5, 17; *The Employers' Liability Cases,* 207 U. S. 463, 502; *Carter* v. *Carter Coal Co.,* 298 U. S. 238, 291. Cf. *Frost Trucking*

Co. v. *Railroad Commission,* 271 U. S. 583, 593; *Coyle* v. *Oklahoma,* 221 U. S. 559; *Hanover Ins. Co.* v. *Harding,* 272 U. S. 494, 517. Manifestly any other rule would be the end of constitutional rights and of our constitutional system. Consequently, even if petitioner had authority both to forbid and to construct the project, it could not validly impose regulations unrelated to the constitutional authority upon which must depend its right to act at all in the premises.

The fundamental fallacy in petitioner's argument is made manifest by the alleged analogies upon which petitioner finds itself compelled to rely (Pet. Br. 130-1). We here deal with the constitutional authority of petitioner under the commerce clause. Cases dealing (a) with the authority of the Federal Government, in the exercise of its proprietary rights, to condition the use of public lands; (b) with the authority of a State, exercising both proprietary rights and full police powers, to regulate the use of its highways; (c) with the authority of a State (exercising proprietary rights, authority to define property rights within the State, and full authority to engage in the power business) to regulate the construction of a hydro-electric project in its streams; and (d) with the authority of petitioner to regulate an instrumentality of interstate commerce, are so palpably inapposite that they only reveal more clearly the error in petitioner's contention.[1]

2: *Petitioner's argument that license conditions do not invade the rights of a State or its people.* (Pet. Br. 133-4) Petitioner argues that the license conditions do not invade state rights (a) because the development of water resources is a "national problem" and (b) because, as petitioner asserts, petitioner could build the project or acquire it by eminent domain.[1]

---

[1] The cases cited by petitioner to which the numbered clauses of the above sentence refer are respectively:

(a) *Arizona* v. *California,* 283 U. S. 423; *Ruddy* v. *Rossi,* 248 U. S. 104; *Oregon & Cal. R.R.* v. *United States,* 238 U. S. 393; (b) *Stephenson* v. *Binford,* 287 U. S. 251; (c) *Fox River Co.* v. *R.R. Commission,* 274 U. S. 651; (d) *United States* v. *Lowden,* 308 U. S. 225; *Railroad Retirement Board* v. *Alton R. Co.,* 295 U. S. 330.

First: The development of water resources is no more a "national problem" than the development of all other economic resources of the States. Petitioner cites, and we are aware of, no constitutional grant of authority to regulate "national problems"; and the decisions of this Court conclusively establish that there is none. *Kansas* v. *Colorado,* 206 U. S. 46; *Carter* v. *Carter Coal Co., supra,* 291-2; *United States* v. *Butler,* 297 U. S. 1. The case of *Helvering* v. *Davis,* 301 U. S. 619, dealing with the power to spend (but not to regulate) for the general welfare, is plainly inapposite.

The argument is bottomed upon two fundamental fallacies; the one that the water resources of the several States are owned by petitioner and not by the States, and, the other, that there is some vague or nebulous power in the Federal Government to do anything which it thinks that it could do better than the States.

Second: Virginia, like all other States, has full sovereign authority to establish such policy for the development of her water resources as she may from time to time deem best for the health, prosperity and general welfare of her people. See p. 110 *supra.* Whenever the petitioner undertakes to burden, obstruct or prevent the execution of this state policy, it is a palpable invasion of the rights of the State and also of her people, for her people have the constitutional right to develop her water resources without unauthorized interference, regulation or control by petitioner.

---

[1] Petitioner's assertion, that both the lower court and respondent conceded that petitioner could build respondent's project or acquire it by eminent domain, is such a clear misstatement that it may hardly be excused on the ground of careless interpretation. (See R. 2891-2, 2921; Resp. Br. below 61-2, 72-3.)

Third: Many of the license conditions seek to usurp the ordinary police powers of the State. Manifestly this is an invasion of the rights of the State and of her people, who have a right to be subject only to her regulation in those matters. In all intrastate matters her citizens have a right not to be displaced by the Federal Government and to be free from federal interference, regulation or control.

Fourth: The argument that there is no invasion of the rights of the State or of respondent because petitioner might condemn respondent's lands is palpably unsound. While petitioner could condemn respondent's *land* for the construction of *some constitutional federal project*, it could neither condemn the land *for the construction of a power project like respondent's nor condemn respondent's project for carrying on the power business.* The fact that any tract of land in the State might be acquired for some constitutional federal purpose and thereby be removed from the state tax roll does not sustain the conclusion that consequently the petitioner might compel any or all land owners in the State to turn over their property for federal use in commercial ventures not within petitioner's constitutional authority, and that this would not be an invasion of the rights of the State or of her people.

3. *Petitioner's argument that respondent can not now raise the question of validity of the "capture clause".* Petitioner argues that, as to the question whether the "capture clause" is valid, respondent has no right to raise it in this suit (a) because "the prevailing social viewpoint" may be different at the end of the license period, (b) because petitioner's option may never be exercised, and (c) because respondent will have adequate remedies when and if the option is exercised (Pet. Br. 137-9). Each ground of this argument is untenable.

First: It is true that by the end of the license term, by amendment to the Constitution, property rights may have been destroyed, but we are considering this case upon the basis of our constitutional system as it now exists. Moreover, even petitioner in effect concedes that the "capture" clause affects adversely *present day* values of property (Pet. Br. 137) and to that extent involves a taking at and from the very beginning of the license period.

Second: Both the tendered license and the mandatory provisions of the Act expressly require a licensee to agree to, and to accept, all of the terms and conditions prescribed by the Act and such further conditions as the Commission may have prescribed in the license (sec. 10(a)). Thereafter the terms of the license may be altered *only* by "mutual agreement" (sec. 6; R. 2675). The license becomes a contract (*Ford & Son* v. *Little Falls Co.*, 280 U. S. 369, 378-9; *Alabama Power Co.* v. *Gulf Power Co.*, 283 Fed. 606, 615), as petitioner itself asserts (Pet. Br. 140, 135). It is established law that one may not obtain relief from his contract upon the ground that he has made a bad bargain and that consequently the contract is confiscatory. *Columbus Ry. & Power Co.* v. *Columbus*, 249 U. S. 399; *St. Cloud P. S. Co.* v. *St. Cloud*, 265 U. S. 352; *Trenton* v. *New Jersey*, 262 U. S. 182. It is palpably unsound to suggest that a statute which imposes a present irrevocable contract obligation upon a citizen to turn over his property at a specified future date at the election of petitioner *for an unconstitutional purpose and for a confiscatory price is not being presently applied to him.* One might as well argue that a citizen sentenced to death by a trial court could not appeal because perhaps the governor might commute his sentence. Moreover, one who founds a right upon a statute (as would be the case if a license were accepted) may not challenge its constitutionality in other respects. *Hurley* v. *Commission of Fisheries*, 257 U. S. 223; *United Fuel Gas Co.* v. *R.R. Commission*, 278 U. S. 300.

Third: Petitioner's assertion that respondent would have adequate remedies is plainly untenable (Pet. Br. 138-9). The alleged remedy provided by Sections 14 and 313(b) (which were first created by the amendments of 1935) is much narrower than that provided by the statute under consideration in *Anniston Mfg. Co.* v. *Davis*, 301 U. S. 337, and would not, we think, afford an adequate remedy even if this statutory remedy were open to respondent and did not in any event deal only with a segment of the capture clause.[1] Even if that remedy otherwise extended to every question of law and fact, the objections that petitioner has no constitutional authority to "take over" respondent's project and that the provisions of the capture clause are confiscatory (see pp. 125-7 *supra*) would not be open to ~~petitioner~~ Respondent for the reasons stated in the preceding paragraph. Consequently this alleged remedy would consist merely of a right to exact strict performance of one of several unconstitutional phases of the statute of which respondent complains. It is unnecessary to argue the inadequacy of such an alleged remedy.

The argument that a licensee could recover on "implied contract" in a situation where the compensation is fixed by an express contract, as we have shown and as petitioner concedes (Pet. Br. 140) is plainly erroneous; and the cases cited by petitioner (Pet. Br. 139) are plainly inapposite.

It is thus obvious that respondent would have no remedy at all, let alone any adequate remedy, against the unconstitutional exactions of the capture clause if it accepted a license. Of course, petitioner makes no claim that respondent would have any remedy, other than in this proceeding against the other unconstitutional license conditions.

4. *Petitioner's argument that the "capture clause" is valid.* Petitioner does not attempt to meet the insuperable

---

[1] This alleged remedy relates only to the determination of "net investment" as defined by the statute which is only one of the three unconstitutional features of the option sought to be imposed by petitioner. The other two are the option to take for statutory "fair value" which excludes various elements of constitutional fair value and the adverse taking of a citizen's property for an unconstitutional purpose. (See pp. 125-7, *supra.*)

objection that the "capture clause" would require a citizen to turn his property over to petitioner for a purpose for which petitioner has no constitutional authority to condemn, or otherwise acquire, property. Instead it advances specious arguments which sum up to the effect that, if petitioner had constitutional authority to acquire respondent's project, the "capture clause" would be valid.

(a) *Argument that there is no taking of riparian rights.* (Pet. Br. 136) Petitioner's argument on this point assumes that the project is in a navigable stream or that it would impair navigable capacity and that petitioner has sanctioned an impairment of navigable capacity. Consequently its arguments are inapposite.

However, in addition they are unsound. Petitioner's contention that respondent's property rights are limited to the natural flow of the stream, is plainly erroneous (see p. 112, *supra*); but, even on petitioner's erroneous hypothesis, there would be a taking of respondent's riparian rights to use the natural flow. It is similarly incorrect that power rights may not be developed on a non-navigable stream without federal assent. See pp. 112-16, *supra.*

Even on a navigable stream, the right to develop water power is in the riparian owner and petitioner mis-states when it says (Pet. Br. 136) that respondent does not contend that many of these license conditions are unconstitutional as applied to a project on a navigable stream where no federal property is involved. Respondent has consistently made this contention. Assuming *arguendo* that petitioner had the absolute right to prohibit its development, it is well settled that there is no right to appropriate property without compensation even though the owner could not derive a profit from its use. *Chicago etc. R. Co.* v. *Wisconsin,* 238 U. S. 491, 499. Petitioner may regulate the right of a riparian owner, to develop water power on a navigable stream, *only* in so far as necessary to protect navigation or navigable capacity. *Port of Seattle*

v. *Oregon & W. R. R. Co.*, 255 U. S. 56; *Pike Rapids Power Co.* v. *Railroad,* 99 F. (2nd) 902, 908, cert. den. 305 U. S. 660. Consequently petitioner may not say that a power development would not impair navigable capacity (as it in effect must say under sec. 4(e), 10(a) and 10(c) of the Power Act) but nevertheless forbid it unless the riparian owner will submit to regulations unrelated to the protection of navigable capacity and in excess of its constitutional authority. (See pp. 121-7, *supra.*)

Where the power to prohibit is subject to constitutional limitations, it follows that any conditions which may be attached are subject to like limitations. *Chicago, etc. R. Co.* v. *Wisconsin, supra,* 502. Concededly, petitioner may abate a power project in a navigable stream without compensation as a public nuisance if it in fact obstructs navigable capacity. However, petitioner may not on one hand say that a power project is not an obstruction to navigation and at the same time, because of some assumed arbitrary authority to prohibit such a development, take the development for its own use without compensation. This is precisely what the Power Act attempts to do. (Secs. 4(e) 10(a), 10(c); 14.) Nor may petitioner say that, although a power project creates some impairment of navigable capacity, petitioner will not abate the project as a public nuisance for that reason but will "take" the project without compensation for continued maintenance, operation and use by petitioner. This also the Act, as construed by petitioner, attempts to do.

There is manifest distinction between, on the one hand, the authority of petitioner to abate a project in a navigable stream as a public nuisance and, on the other hand, its lack of any authority to insist that the project shall not be abated as an obstruction to navigation but instead that it shall be converted by petitioner to its own use without compensation on the theory that it could have elected to abate the project. *Monongahela Navigation Co.* v. *United States,* 148 U. S. 312; *United States* v. *Chandler-Dunbar Co.*, 229 U. S. 53 (see footnote p. 114, *supra*). It follows that petitioner may not convert a power project to its own use without compensation either on a navigable or non-navigable stream.

(b) *Petitioner's argument that the "capture clause" is not confiscatory.* (Pet. Br. 140-1). The argument that a *contract price* can not be confiscatory hardly supports the claim that it would not be confiscatory to compel a citizen to accept a contract providing compensation which would be confiscatory unless specified by contract. There is plainly no analogy to voluntarily negotiated municipal franchises. No one is compelled to accept the municipal franchise to use its streets on penalty of being barred from use of his own property. Moreover, municipalities in such cases exercise full proprietary rights in their streets, police power and the authority to engage in business. *Fox River Co.* v. *Commission*, 274 U. S. 651 (cited Pet. Br. 28, 130, 141) involves the authority of a State, not the Federal Government, and is plainly inapposite as pointed out by the court below (R. 2921). Apart from the striking differences between the "capture clause" of the Power Act and the terms of the Wisconsin law (Pet. Br. 141), a State, unlike the federal government, not only has the authority to engage in the electric power business if it chooses, but so long as it does not confiscate vested rights, it may establish such law of property, riparian and other, as it chooses. (See p. 110, *supra.*)

(c) *Petitioner's argument based on claim that right to engage in interstate commerce is a privilege.* (Pet. Br. 141-2) Petitioner asserts that the right to engage in interstate commerce is "a privilege" which petitioner, at its whim, may grant, deny or barter upon such terms as it may choose—including the "taking over" of the property of a citizen as a condition of granting him permission to engage in interstate commerce. Truly this would be totalitarianism run riot.

The right to engage in interstate commerce is not "a privilege." *The Employers' Liability Cases,* 207 U. S. 463, 502-3. That right was not created by, and does not spring from, the Federal Government or the Federal Constitution. As Chief Justice Marshall said in *Gibbons* v. *Ogden,* 9 Wheat. 1, 211:

> "In pursuing this inquiry at the bar, it has been said, that the constitution does not confer the right of intercourse between State and State. That right derives its source from those laws whose authority is acknowledged by civilized man throughout the world. *This is true. The constitution found it an existing right,* and gave to Congress the power to regulate it."

See also Chief Justice Baldwin in *Hoxie* v. *Railroad,* 82 Conn. 352, 364. Cf. *South Carolina* v. *United States,* 199 U. S. 437, 457-9.

It is a far cry from these fundamental principles to petitioner's present assertion that the Federal Government, standing at the crossroads of commerce like the robber barons of old, may not merely levy tribute upon such commerce but prohibit the manufacturer or farmer from transporting any of his goods in interstate commerce unless he will surrender his factory or farm to the petitioner upon such terms as it may choose to prescribe.

(d) *Petitioner's argument that the "capture clause" is valid as applied to a public utility* (Pet. Br. 142-4).[1] We have previously shown that "net investment" under the *Power Act* would be confiscatory even if "prudent investment" were regarded as a constitutional basis for rate making or condemnation of property. (See pp. 125-8, *supra.*) But, notwithstanding the importance petitioner attaches to the fact that it has recently urged such a basis for rate making, that basis has been consistently rejected by this Court as unconstitutional. *Smyth* v. *Ames,* 169 U. S. 466; *Driscoll*

---

[1] Petitioner's assertion (Pet. Br. 141, 142) that the project would be valueless at the end of the term even though petitioner has no authority to prohibit its construction or operation (previously shown to be unsound in any event) seems so self-destructive that no discussion is warranted.

v. *Edison Co.,* 307 U. S. 104. And even petitioner has not, so far as we are aware, "urged" that the base for rate-making should be either "prudent investment" or *"fair value", whichever should be less at the time,* and in addition that, under such a rule, various elements of constitutional fair value should be excluded from the rate base. Moreover, even on petitioner's erroneous hypothesis, it would hardly follow that a utility's property could be taken for less than fair value; and all of the decisions of this court deny such a possibility. Here, as consistently throughout its brief, petitioner disregards the wide distinction between the obligation which a citizen may voluntarily assume and those which can be validly imposed upon him without compensation by his government (Pet. Br. 143-4). Petitioner also overlooks the fact that dedication of property to *one* public use does not require a citizen to devote his property to *some other* public use to which he has never dedicated it. Here as elsewhere in its arguments on this subject, petitioner disregards the fact that it has no constitutional authority to condemn, or otherwise acquire, respondent's power project and that consequently it may not take respondent's property against its will for any compensation, no matter how large.

CONCLUSION

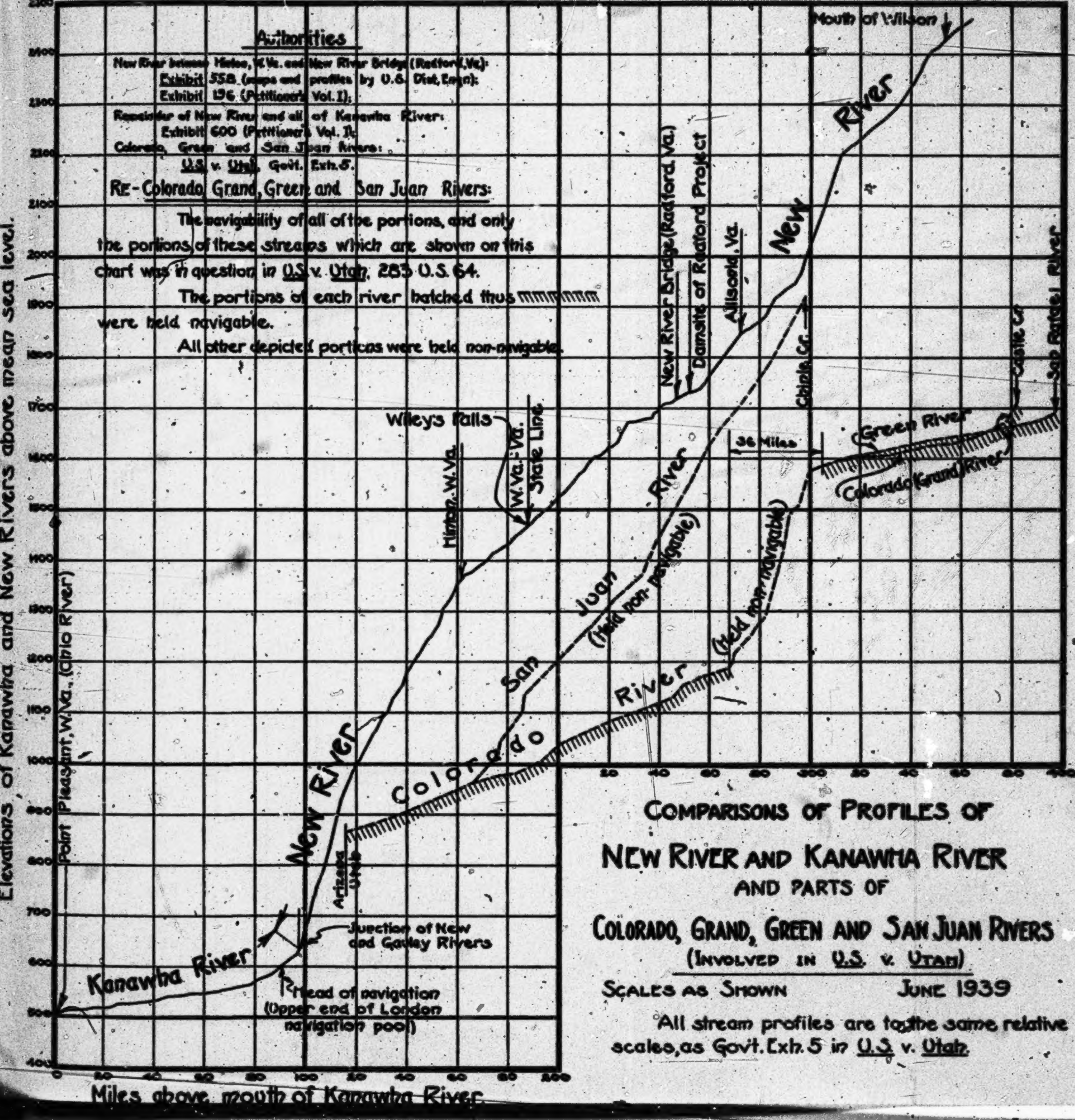
For the reasons hereinbefore stated, the decision of the court below, affirming the decision of the District Court, should be affirmed.

Respectfully submitted,

Raymond T. Jackson,
M. F. Millikan,
A. Henry Mosle,
Creswell M. Micou,
Fraser M. Horn,
Wendell W. Forbes,
M. W. Belcher, Jr.,
John L. Abbot.
Counsel for Respondent

August 31, 1940.

Plate I



Authorities

New River between Hinton, W. Va. and New River Bridge (Radford, Va.):
Exhibit 558 (maps and profiles by U.S. Dist. Engr.);
Exhibit 196 (Petitioner's Vol. I);
Remainder of New River and all of Kanawha River:
Exhibit 600 (Petitioner's Vol. I);
Colorado, Green and San Juan Rivers:
U.S. v. Utah, Govt. Exh. 5.

RE - Colorado, Grand, Green and San Juan Rivers:

The navigability of all of the portions, and only the portions of these streams which are shown on this chart was in question in U.S. v. Utah, 283 U.S. 64.

The portions of each river hatched thus ▨ were held navigable.

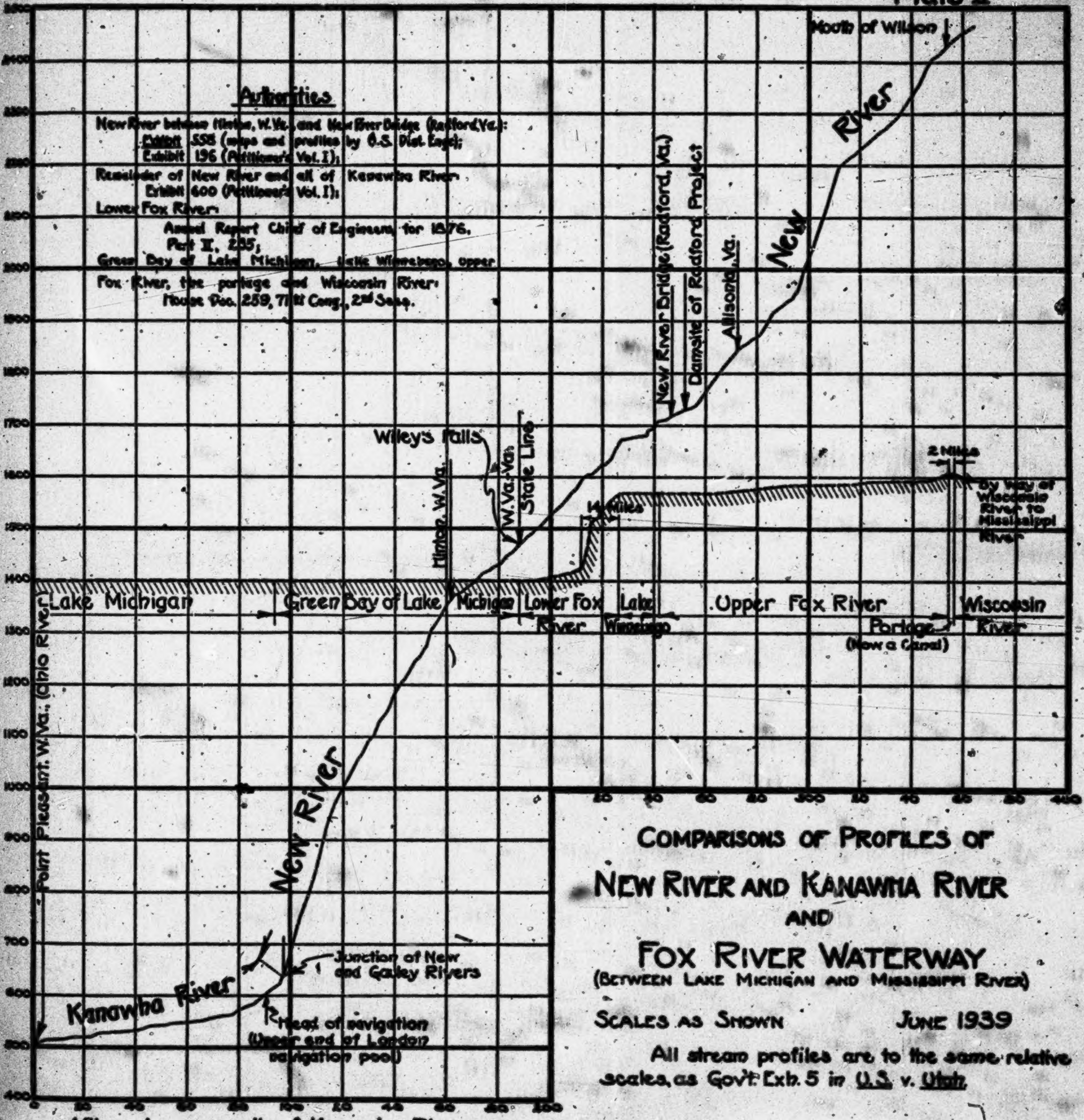
All other depicted portions were held non-navigable.

COMPARISONS OF PROFILES OF
NEW RIVER AND KANAWHA RIVER
AND PARTS OF
COLORADO, GRAND, GREEN AND SAN JUAN RIVERS
(INVOLVED IN U.S. v. UTAH)

SCALES AS SHOWN JUNE 1939

All stream profiles are to the same relative scales, as Govt. Exh. 5 in U.S. v. Utah.

Plate II



Authorities

New River between Hinton, W. Va. and New River Bridge (Radford, Va.):
Exhibit 558 (maps and profiles by U.S. Dist. Engr.);
Exhibit 196 (Petitioner's Vol. I);
Remainder of New River and all of Kanawha River:
Exhibit 600 (Petitioner's Vol. I);
Lower Fox River:
Annual Report Chief of Engineers for 1876, Part II, 235;
Green Bay of Lake Michigan, Lake Winnebago, upper Fox River, the portage and Wisconsin River:
House Doc. 259, 71st Cong., 2nd Sess.

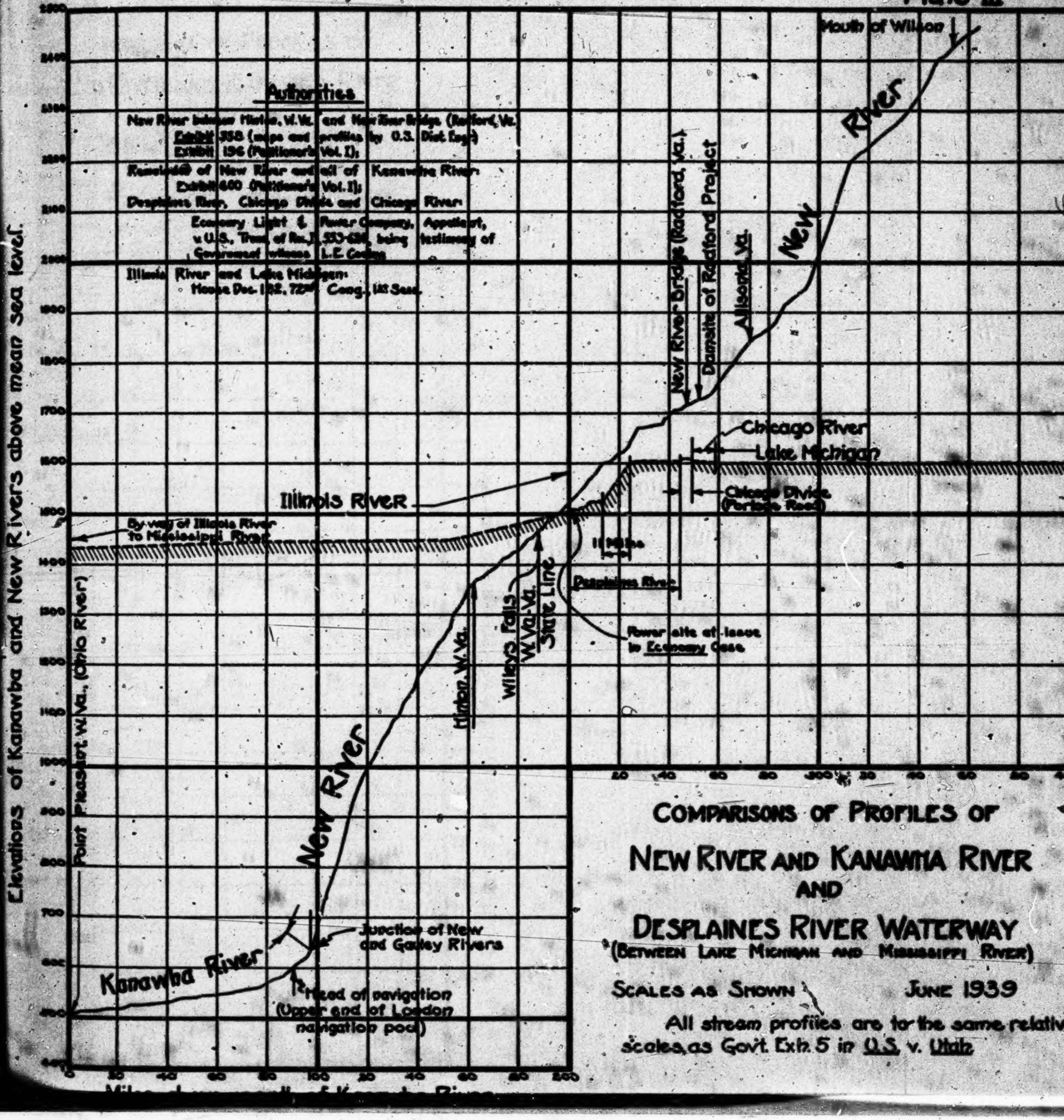
COMPARISONS OF PROFILES OF NEW RIVER AND KANAWHA RIVER AND FOX RIVER WATERWAY

(BETWEEN LAKE MICHIGAN AND MISSISSIPPI RIVER)

SCALES AS SHOWN JUNE 1939

All stream profiles are to the same relative scales, as Gov't. Exh. 5 in U.S. v. Utah.

Plate III



COMPARISONS OF PROFILES OF
NEW RIVER AND KANAWHA RIVER
AND
DESPLAINES RIVER WATERWAY
(BETWEEN LAKE MICHIGAN AND MISSISSIPPI RIVER)

SCALES AS SHOWN JUNE 1939

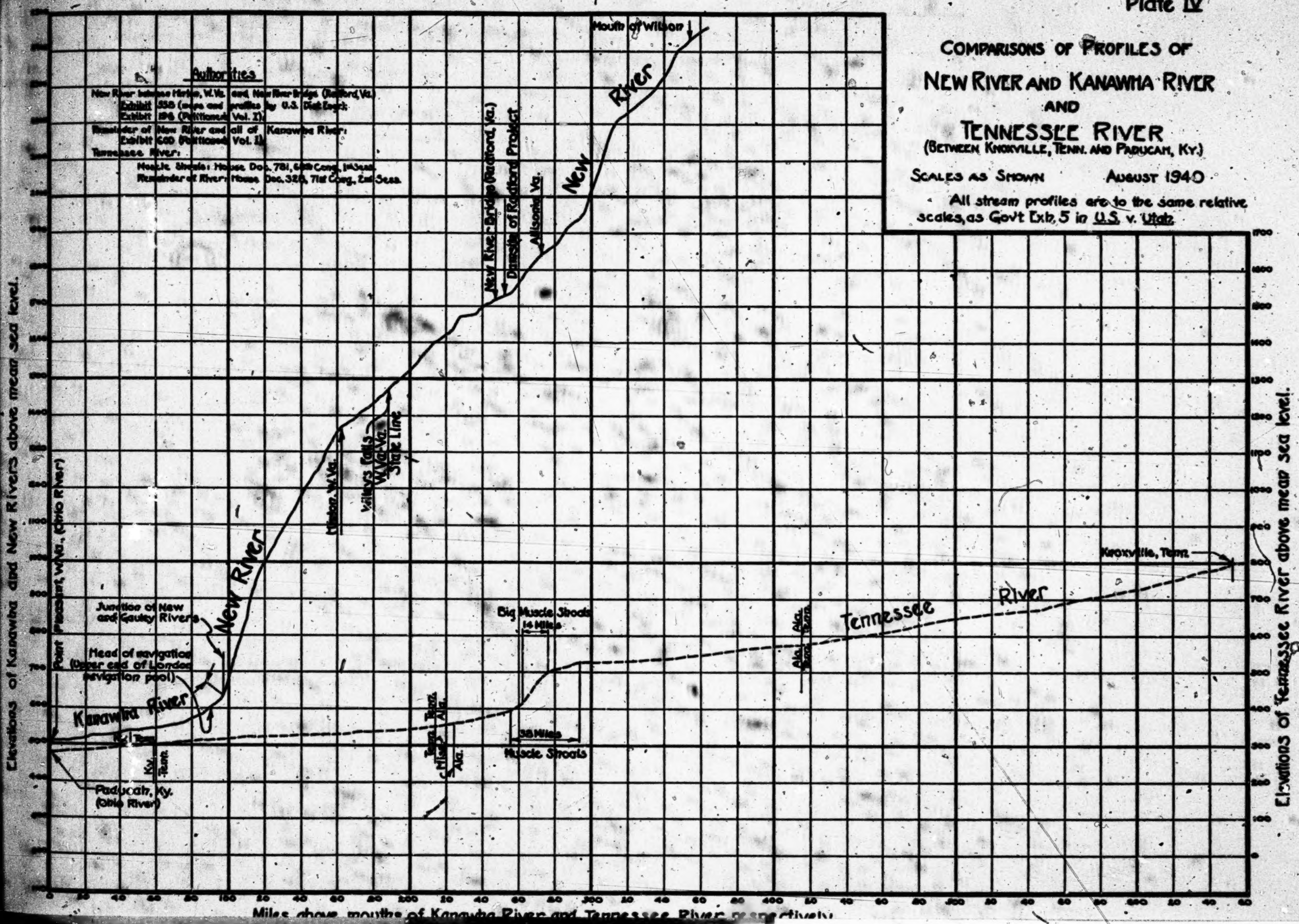
All stream profiles are to the same relativ
scales, as Govt. Exh. 5 in U.S. v. Utah

Plate IV

COMPARISONS OF PROFILES OF
NEW RIVER AND KANAWHA RIVER
AND
TENNESSEE RIVER
(BETWEEN KNOXVILLE, TENN. AND PADUCAH, KY.)

SCALES AS SHOWN   AUGUST 1940

All stream profiles are to the same relative scales, as Gov't Exh. 5 in U.S. v. Utah.



Authorities

New River between Hinton, W.Va. and New River Bridge (Radford, Va.)
Exhibit 558 (maps and profiles by U.S. Dist Engrs.
Exhibit 196 (Petitioners Vol. I);
Remainder of New River and all of Kanawha River:
Exhibit 600 (Petitioners Vol. I).
Tennessee River:
Muscle Shoals: House Doc. 781, 65th Cong., 1st Sess.
Remainder of River: House Doc. 328, 71st Cong., 2nd Sess.

COPY. CUT OFF AT BOTTOM

6

FILE COPY

Office - Supreme Court, U. S.
FILED
SEP 27 1940
CHARLES ELMORE CROPLEY
CLERK

Appendix A
To Respondent's Brief.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

August 31, 1940

On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit.

INDEX

APPENDIX A
TO RESPONDENT'S BRIEF

Part I—Analysis of the Evidence in the Record Upon the Issue of Navigability *Vel Non* of New River 1

A. The evidence not only supported the Trial Court's finding, concurred in by the Circuit Court of Appeals, that New River is non-navigable but precluded any other finding 2

1. The physical characteristics of New River alone establish that it is non-navigable ... 2

(a) General description 2

(b) Sufficiency of flow 4

(c) Mountainous character of stream.... 5

(d) Fall and slope 8

(e) Velocities 18

(f) Photographs of ledges and shoals.... 24

(g) Ledges and shoals—their character and extent 29

(h) Natural depths 36

2. The absence of any use of New River for trade, travel or transportation by early traders, industries or even military expeditions, or indeed any use before the experimental local use under the stimulus and novelty of artificial local federal improvements, is compelling evidence of its non-navigability 39

PAGE

(a) History does not record any use of New River as a means of trade, travel or transportation by early settlers, traders or explorers 39

(b) Although the lead and iron industries were established on upper New River in very early days, history not only fails to disclose any use of New River for the transportation of either product but affirmatively establishes that neither product was ever transported, even locally, on New River, except a limited experimental and temporary local movement in 1881-1882 48

(c) There is no other evidence of any substantial use of New River, even local in character, before the federal work.. 53

3. The nature and extent of the federal work on New River and its subsequent abandonment not only failed to support an inference of navigability but constituted strong evidence of lack of practical utility for navigation 63

(a) The use during and after the federal work was essentially limited in amount, local, and of relatively short duration 65

(1) Miscellaneous use of river by bateaux or "keel-boats" 65

(2) Transportation of pig iron 68

(3) Furnaces along New River continued to operate after the experiment in pig-iron boating ceased.. 73

PAGE

(4) "Steamboats" 75

(5) "Stunting" 77

(b) The nature and scope of the federal work were insignificant as to aim and ineffective as to accomplishment 79

4. The petitioner failed to show practical use, or susceptibility for practical use, in interstate commerce of substantial and permanent character 96

(a) Testimony dealing with alleged uses of New River 96

(1) Alleged uses during Civil War era 97

(2) Alleged uses during period of unsuccessful federal work 98

(3) Even the localized uses elsewhere did not extend into the 60-mile gap below New River Bridge 99

(4) Dearth of personal experiences of commercial use by those of petitioner's witnesses who testified concerning vicinity of the Horseshoe 114

(5) Testimony of local witnesses of petitioner largely lacked probative value 115

(6) High water in relation to local uses 120

(7) Any appreciable use of New River in West Virginia was not only limited to a short reach above Hinton but was not permanent in character 122

PAGE

(8) Inaccurate nature of petitioner's tabulation and diagram of alleged uses 130

(b) The reports of the Army Engineers show that the work on the river was discontinued, not on account of the opening of the railroad nor on account of the exhaustion of natural resources but, because the cost was greatly exceeding the estimates made by the Army Engineers 135

(c) The Army Engineers' reports, fairly analyzed, show that petitioner has exaggerated the extent of water borne commerce during the period of the federal work 140

5. Although neither Congressional nor official action can make a river navigable, all considered action of Congress and the War Department sustains the conclusion that New River is non-navigable 145

(a) All considered action by the War Department has reflected the view and the fact that New River is non-navigable 145

(b) Significance of attitude of federal government regarding New River....... 150

6. Although comparison with other rivers (held navigable or non-navigable) is irrelevant in fact and law, petitioner's comparisons serve only to confirm the non-navigability of New River.................. 157

(a) Comparison with Colorado, Green and Grand Rivers 158

PAGE

(b) Comparison with Fox River 160

(c) Comparison with Desplaines River... 162

(d) Comparison with Tennessee River.... 163

PART II—ANALYSIS OF EVIDENCE RELEVANT TO ISSUE OF IMPAIRMENT OF NAVIGABLE CAPACITY 164

A. Petitioner's allegedly undisputed evidence ... 164

B. Supplementary review of certain evidence relating to the alleged effect of so-called power "waves" or tides upon navigable capacity... 172

C. The testimony cited by petitioner with reference to alleged difficulties of navigation on the Kanawha River is not only largely erroneous but plainly irrelevant 174

PART III—LEGISLATIVE HISTORY OF THE FEDERAL WATER POWER ACT AND ANALYSIS OF SECTION 23 .. 179

A. Legislative history affords no basis for the contention, but in fact denies, that Congress attempted to authorize the Commission to require a license for a project located in a non-navigable stream and not involving any federal property 179

1. Prior legislation recognized clearly the distinction between the authority to regulate structures actually located in navigable waters and the authority merely to prevent acts in non-navigable waters which might affect navigable capacity below.......... 180

2. The extent of the power of Congress to require a license was already well defined in the Rio Grande decision and recognized by Congress 183

PAGE

  - (a) The Rio Grande decision confirmed that Congress did not and cannot require its authorization for structures in non-navigable streams 184
  - (b) The limitations upon Congress' authority and the distinctions between navigable and non-navigable waters were clearly borne in mind by Congress in enacting the Federal Water Power Act 191
- 3. The Federal Water Power Act was merely a consent statute creating a governmental agency to authorize projects (in navigable waters) otherwise unlawful under the Act of 1899 198
- 4. Section 23 was designed merely to afford intending developers a means of obtaining an administrative determination of the character of the stream in Cases of Doubtful Navigability 201
- 5. Petitioner's claim of authority to require a license for projects on non-navigable streams results from a strained and belated administrative interpretation, not from any intent of Congress 206

B. The language of the Act, as well as Congress' clear intent, negatives the right of petitioner to require a license for a project on a non-navigable stream 212

- 1. The statute is unvarying in its reference to navigable waters only................. 214
- 2. The section of the Power Act empowering the issuance of licenses authorizes them only as to projects on navigable waters.... 215

PAGE

3. A "proposed construction" itself cannot affect the interests of interstate commerce unless actually located in navigable waters 217

4. Petitioner's interpretation requires a tortuous construction of the language of Section 23 220

C. The 1935 amendments do not support petitioner's claimed interpretation 225

D. Petitioner's interpretation fails to meet the tests prescribed by this Court............. 230

E. The reasonable interpretation of Section 23, required by its legislative history, its language and recognized principles of statutory construction, leaves every federal interest adequately protected 234

TABLE OF CASES

B.

Barrett v. *Van Pelt,* 268 U. S. 85.................224, 225

C.

Church of Holy Trinity v. *United States,* 143 U. S. 457 224

Crowell v. *Benson,* 285 U. S. 22.................... 206

E.

Economy Light & Power Co. v. *United States,* 256 U. S. 113 162

F. PAGE

Fleishman Co. v. *United States,* 270 U. S. 349...... 224

G.

Georgia v. *Tennessee Copper Co.,* 206 U. S. 230....190, 191
Gibbons v. *Ogden,* 9 Wheat. 1 179
Gilman v. *Philadelphia,* 3 Wall. 713.............. 179
Greenleaf Lumber Co. v. *Garrison,* 237 U. S. 251.... 236

H.

Hawaii v. *Mankichi,* 190 U. S. 197................ 224

I.

Interstate Commerce Commission v. *Oregon-Washington R. & N. Co.,* 288 U. S. 14......215, 220, 230, 231
232, 233

L.

Lau Ow Bew v. *United States,* 144 U. S. 47........ 224
Louisville Bridge Co. v. *United States,* 242 U. S. 409 ....236, 237

M.

Monongahela Bridge Company v. *United States,* 216 U. S. 177 236
Montello, The, 11 Wall. 411 160
Montello, The, 20 Wall. 430........................ 160

N.

National Labor Relations Board v. *Jones & Laughlin Steel Corporation,* 301 U. S. 1.............. 233
New Jersey v. *Sargent,* 269 U. S. 328..212, 213, 214, 215, 225
North Bloomfield Gravel Mining Co. v. *United States,* 88 Fed. 664 190

O. PAGE

Oates v. *National Bank,* 100 U. S. 239.............. 224
Oklahoma v. *Texas,* 258 U. S. 574............116, 151, 154

S.

Sanitary District of Chicago v. *United States,* 266 U. S. 405 ....183, 236
Stewart v. *Kahn,* 11 Wall. 493...................... 224

U.

Union Bridge Co. v. *United States,* 204 U. S. 364....236, 237
United States v. *Appalachian Electric Power Co.,* 23 F. Supp. 83, 107 F. (2d) 769 ....2, 13, 38, 39
United States v. *Bellingham Bay Boom Co.,* 176 U. S. 211 182
United States v. *Oregon,* 295 U. S. 1................ 115
United States v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690....182, 184, 185, 186, 187, 188 189, 190, 217, 227, 230
United States v. *Utah,* 283 U. S. 64........157, 158, 159, 160

W.

West Chicago Railway v. *Chicago,* 201 U. S. 506.... 236
Woodruff v. *North Bloomfield Gravel Mining Co.,* 18 Fed. 753 190

CONSTITUTION, STATUTES AND MISCELLANEOUS AUTHORITIES.

PAGE

Annual Reports of the Federal Power Commission
  1st Rep. 198, 206, 207
  2d Rep. 208
  3d Rep. 208
  4th Rep. 200, 207, 208
  5th Rep. 208
  6th Rep. 208
  7th Rep. 96, 208
  8th Rep. 208, 218
  10th Rep. 155, 209
  11th Rep. 155, 210

Committee on Interstate and Foreign Commerce
  Hearings on H.R. 5423, 74th Cong., 1st Sess. 226

Congressional Record
 Vol. 53
  pp. 2197-8 196
  p. 2580 194
  p. 2641 194
  p. 2651 194
  p. 3244 194

 Vol. 54
  pp. 779-84 194
  pp. 1006-7 .... 194, 196
  pp. 1264-8 194
  p. 2786 194

 Vol. 58, p. 2226 194

 Vol. 59
  p. 1041 194
  p. 1103 203
  p. 1430 191
  pp. 6529-31 194

PAGE
p. 7723 194
p. 8349 ....199, 200, 205

Constitution, Federal Art. IV, sec. 3................. 179
Constitution, Federal Art. I, sec. 8 179

Federal Water Power Act and as amended by Federal Power Act of 1935 ....179, 183, 184, 185, 188, 189, 191, 198, 206, 211, 212, 217, 225, 226, 230, 233, 235, 237
  Sec. 3 201
  Sec. 4 215
  Sec. 4(d) 201, 203, 215, 216, 218, 222, 223, 227
  Sec. 4(e) 226, 227
  Sec. 6 201
  Sec. 10 201
  Sec. 10(b) 214
  Sec. 10(c) 214, 218
  Sec. 11 214
  Sec. 12 214
  Sec. 13 218
  Sec. 14 201
  Sec. 21 218
  Sec. 23 ... 179, 201, 202, 203, 204, 205, 206, 207, 208, 209, 212, 213, 215, 216, 218, 219, 220, 221, 222, 223, 227, 228, 229, 234, 235
  Sec. 23(b) 226, 228

Federal Power Commission
  Rules and Regulations 223
  Supplement to Decisions (under Sec. 23) 208

House Documents
  No. 1318, 74th Cong., 1st Sess. 211, 226

House Reports
  No. 61, 66th Cong., 1st Sess. 197
  No. 910, 66th Cong., 2nd Sess. 202

Interstate Commerce Act of 1887 231

Jefferson, Notes on Virginia 49

PAGE
Public Utility Holding Company Act of 1935 . . 211, 225, 226
    Hearings on 211, 217, 228

Rivers and Harbors Act of 1890-1892 . . . . 182, 184
    Sec. 10 182

Rivers and Harbors Act of 1899 . . 180, 181, 182, 183, 184, 188, 189, 198, 200, 207, 208, 220, 227, 228, 229, 230, 235, 236, 237

    Sec. 9 . . . . 180, 182
    Sec. 10 . . . . 181, 182, 183
    Sec. 12 183

Senate Documents
    No. 301, 61st Cong., 2nd Sess. 194
    No. 621, 74th Cong., 1st Sess. 211, 226

Statutes at Large
    Vol. 26, p. 454 . . . . 182, 184
    Vol. 27, p. 110 . . . . 182, 184
    Vol. 30, p. 1151 181
    Vol. 32, p. 331 154

Transportation Act of 1920 231

United States Code
    Title 33, Sec. 401 180
        Sec. 403 181

IN THE

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA
Petitioner,
v.
APPALACHIAN ELECTRIC POWER COMPANY
Respondent.

On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit.

APPENDIX A
TO RESPONDENT'S BRIEF

PART I

Analysis of the evidence in the record upon the issue of navigability *vel non* of New River.

In our view the evidence reviewed in the opinions of the lower courts and cited in our Brief so plainly establishes that the concurrent finding of non-navigability made by the lower courts is supported by substantial evidence that no detailed analysis of the very voluminous evidence offered and received upon this issue should be necessary. For that reason we have sought to avoid burdening the Court with detailed analysis in our Brief. However, if the Court should take a different view of the issue, we have deemed it our duty to supply in this separately bound Appendix a comprehensive review of the evidence upon this issue for such assistance as it may afford the Court.

A. The evidence not only supported the trial Court's finding, concurred in by the Circuit Court of Appeals, that New River is non-navigable but precluded any other finding.

It is well established that navigability is a question of fact and that in each instance the question of whether a river is navigable depends upon the facts peculiar to it. This principle applies with especial force to New River, for the evidence establishes that "it properly is said to be *sui generis*" (R. 2893; 107F. (2d) 769, 780).

On the question of navigability, none of the facts peculiar to the river under examination are more important than are its peculiar physical characteristics. We therefore first examine the evidence from that point. That evidence alone, we think, establishes that New River is patently non-navigable.

1. *The physical characteristics of New River alone establish that it is non-navigable.*

(a) General Description.

New River is approximately 341 miles in length. It has its source in North Carolina and enters Virginia in Grayson County and flows generally in a northeasterly direction

> "through and between spurs of the Blue Ridge Mountains, parallel to the main divides of this Ridge and the Alleghenies" (Ex. 145, R. 2702-3).

until it reaches the horseshoe near Radford, Virginia, where it turns sharply in a northwesterly direction

> "and keeps that same general trend of flow into West Virginia and to its mouth where it joins the Gauley River to form the Kanawha River. Through almost its entire length the river flows through a

> rugged mountainous country. Its valley is narrow, the flood plain being very little wider than the low-water channel which varies in width from about 200 to 1000 feet. In many places the banks are sheer bluffs rising from the river's edge. Ledges of limestone, sandstone, and shale crossing the river at frequent intervals create rapids and waterfalls. The waterfalls vary in height up to about 18 feet. Between the ledges there are usually short pools of varying depths. The low-water depth in the channel varies from a few inches to more than 6 feet" (Ex. 145; R. 2710).

The pools are rarely over a mile in length (Ex. 31; R. 2282). For long distances downstream from Radford the river flows substantially at right angles across numerous resistant rock strata. These steeply upthrust rock strata, which cross the river perpendicularly to the thread of the stream, have a unique characteristic in that the prevailing slope of such strata is downward in an upstream direction rather than downward in a downstream direction.[1] This peculiar characteristic accentuates the roughness and turbulence of the stream. Where the softer strata have been worn away immediately downstream from the resistant strata, huge boulders, many of which have broken off from the resistant strata above, are commonly found. Some of these boulders project above the water surface and others are treacherously submerged, as such channel as exists through the shoals, rapids and falls is frequently tortuous and difficult to find (Matthews, R. 1677-1681; Buck,

---

[1] The unique physical characteristics of New River are well shown by the testimony of Professor Matthews who fortunately and entirely independently of this case had made a detailed study of a portion of New River for the Virginia Geological Survey. Matthews is a geologist specializing in stratigraphy. His testimony clearly establishes the unique character and slope of the strata across which New River flows, the unique effects which this geological condition produces upon the detailed profile of the stream and the fact that New River by reason of its geological setting is *sui generis* (Matthews, R. 1676-1681).

R. 1706; Putnam, R. 1784-1786; McWane, R. 1660-1661; Ex. 145, R. 2703; Ex. 31, R. 2282-3; Ex. 35, R. 2350-2355).

The mile-by-mile surveys of New River from Hinton to the North Carolina line which were made before any work had been done by the Government, graphically portray the great number of shoals, rapids and falls throughout the length of New River. These mile-by-mile surveys are remarkable for the infrequency with which the engineers found even an occasional pool which they could denominate as "good water". They disclose that within many individual miles there are numerous shoals, projecting ledges and falls, and that in many instances shoals, ledges and rapids cover a very large part of the entire mile under examination. They disclose the great extent of artificial improvement which was necessary even to provide an inconsequential shallow draft keel-boat passage. One has only to read the reports of these mile-by-mile surveys to realize that New River is, and in its natural condition was, patently non-navigable (Ex. 31, R. 2282-2287; Ex. 35, R. 2351).

(b) Sufficiency of Flow.

Petitioner argues (Pet. Br. 62) that there is a sufficiency of water flow in the case of New River and that that is one of the bases for determining navigability. Of course, navigable capacity is not established by the presence or absence of stream flow, inasmuch as it seems obvious that, if there is an absence of sufficient stream flow to support navigation, the Court will not look further for impediments to navigation. Actually, rivers with comparatively small drainage areas and flows may support navigation due to other physical characteristics which are of greater importance, such as, for example, the location of a river in a series of ancient lake beds or pools or its location in a drowned valley, as is true of the York and other rivers on the Atlantic Coast.[1]

---

[1] In fact, what navigation requires is a channel filled with water to at least a minimum depth and a minimum width in which water need *not flow* at all.

On the other hand, a stream may be a "mountain torrent", as Captain Craighill described New River (Ex. 565, R. 2837), with an abundant supply of water and at the same time, owing to its unfavorable physical characteristics, be utterly unsuitable for a highway of commerce.

(c) Mountainous Character of Stream.

The excerpts from the Army Engineer reports quoted under the sub-heading (a) *supra,* entitled "General Description", as well as many other reports of the engineers, again and again emphasize the fact that New River is characteristically a mountain stream throughout its entire course.

For example, the report of N. H. Hutton, dated December 17, 1872, to Colonel Craighill, states:

> "The river in its present condition presents the usual features of mountain-streams: reaches of comparatively still and deep water separated by rapids and shoals" (Ex. 31; R. 2282).

And again in a report to the Chief of Engineers, 1876, Hutton states:

> "The masses of rock cumbering the water-way appear at times almost to have absorbed the river * * * " (Ex. 245, 56; R. 2745).

And William Proctor Smith, writing of the river in 1879 states:

> "From the latter point the river runs between the different ranges of the Blue Ridge and the Alleghany Mountains in an easterly direction for 22 miles, and thence northeasterly to the terminus of the survey. The headwaters are 2500 feet above tide water; the country mountainous, the roads rough and sometimes impassable."
>
> * * * * * * * *
>
> "As is usual with mountain streams, this river presents pools of comparatively deep and still water

> separated by rapids, shoals and falls" (Ex. 35; R. 2350).

Captain Craighill, who examined the river, stated in letter dated February 4, 1903:

> "Both rivers (New and Greenbrier) are mountain torrents, with very steep, rocky beds" (Ex. 565; R. 2837).

And Major Alstaetter, reporting with respect to the river, in 1912, states:

> "The river, however, partakes of the characteristics of a mountain stream, with very rapid current and bad rapids, and therefore navigation is dangerous on it" (Ex. 46; R. 2422).

Likewise Major Conklin, in a report concerning the river, dated November 19, 1934, states:

> "Through almost its entire length the river flows through a rugged mountainous country" (Ex. 145; R. 2710).

And Colonel Spalding, in a report concerning the tributaries of the Kanawha River, of which the largest is the New River, states:

> "because of their unfavorable natural characteristics (steep slope and tortuous alignment) none of the tributaries of Kanawha River offer potentialities for development in the interest of modern navigation" (Ex. 145; R. 2690).

and Colonel Herman, under date of October 15, 1932, states in his report:

> "The channel of the New River is, in general, narrow and tortuous with numerous rapids and falls, since its course lies almost entirely in a rugged mountainous region. The stream follows deep, narrow valleys formed by the long parallel folds typical of the Alleghany mountain system" (Ex. 145; R. 2703).

Additional descriptive matter appears in the Report of Lieutenant Hazzard to Captain McNeill, dated March 20, 1828:

> "From Bowyer's Ferry to within 2 miles of the Great Falls the valley of Kanawha presents a novel and frightful appearance, and the obstacles that are met with are decidedly more formidable than any that have even yet been encountered and overcome. The river here breaks through Sewell Mountain, and is confined throughout within narrow limits, bounded by rugged banks and precipitous cliffs, rising many hundred feet above the surface of the water.
>
> "Immense masses of rocks, which have been ejected from the cliffs near the brow of the mountain, cover the lower slope on both sides of the valley, giving to the whole a most appalling appearance. In many instances these huge fragments have been precipitated entirely across the bed of the stream. In such places the river when agitated and swollen by heavy rains—the current being obstructed in its course—frequently rises from 35 to 50 feet above its usual height.
>
> "Numerous rapids and falls occur, over which the water rushes with deafening impetuosity" (*Ex. 245,*[1] pp. 117-118).

Or, again, the Report of Captain William G. McNeill to Major General Macomb (printed in Report on the James River and Kanawha Canal Route), which was transmitted by letter dated March 24, 1828, from the Secretary of War to the Speaker of the House of Representatives, wherein it is said:

> "Two Falls, Buffalo Falls, Richmond Falls, and the Great Falls, with an almost continuous rapid, when perpendicular falls do not occur—in all constituting a spectacle the sublimity of which can scarcely be surpassed—characterize New River below its confluence with the Greenbrier as an impetuous and al-

---

[1] Where citation is to an unprinted original exhibit or to an unprinted portion of an exhibit, the citation is italicized—thus "*Ex.*"

> most resistless torrent. And the general aspect of both sides of the river, with the wild features of its valley, can offer few temptations to the intrusion of civilized man" (*Ex. 245*, p. 102).

(d) Fall and Slope.

Petitioner states (Pet. Br., 64) that "the lower courts were not wholly fair in their discussion of the slope of the river. The District Court, in stating that the slope of the river above Radford and Hinton was about 4 feet per mile drew an implied contrast between these stretches and the intervening reach (R. 114). The Court below confined its discussion to the fact that the slope was 'very much greater than the average in many places' (R. 2900-01), and that the entire river had a slope of 7.1 feet per mile (R. 2895)".

With respect to petitioner's assertion, several things should be noted:

First: It should be borne in mind that petitioner has now changed two of the reaches of the river which were discussed by the District Court; that whereas, the District Court, in discussing the river, referred to a gradient of about 4 feet per mile as applicable to the stretch of 23 or 24 miles upstream from Hinton,[1] petitioner, while implying that it is dealing with the same lower stretch[2] that the District Court discussed, actually is directing its remarks to the 27 mile reach from Hinton to Wiley's Shoals. Similarly, it has shortened the 60-mile middle section immediately above to 56 miles and compares not the two sections discussed by the Court but a 27-mile stretch with a 56-mile section. By such shortening, it transfers the stretch between Round Bottom (the upstream end of the 23 or 24 mile stretch) and Wiley's Shoals from the middle section to the lower section, thereby likewise transferring all of the shoals and ledges, including Wiley's Falls, into the lower stretch. Hence, petitioner, contrary to what it implies to this Court, does not in fact compare the same reaches of the stream that the courts below had under consideration.

---

[1] The pertinent quotation is as follows:

> "For example, from Hinton upward for 23 or 24 miles the river has the least gradient in its course, about 4 feet per mile, with considerable pool water and few precipitous shoals. The same conditions obtain to a more or less extent on the section of the river for 25 or 30 miles above Radford" (R. 114).

[2] However, in its brief in the Court below, petitioner expressly recognized that the lower stretch referred to by the Trial Court was "The *24-mile* stretch from *Hinton to Round Bottom*" (Appellant's (Pet.) Reply Br. 8.)

The slope on that 23 or 24 mile stretch from Hinton to Round Bottom, while it is stated by the lower court to be about 4 feet per mile, was actually conceded by petitioner—in its tabulation appearing in petitioner's supplemental brief in the Circuit Court of Appeals (App. Supp. Br. 52)—to be 3.7 feet per mile. Moreover, petitioner in that very tabulation shows the slope in the 7.7 miles from the upper end of that 24 mile stretch to Glen Lyn, Va. (which 7.7 miles is a part of the 60-mile section) to be 5.2 feet per mile, thus exceeding the gradient of the 24 mile stretch by nearly one-half.

It is also significant to note the slope of that 24 mile stretch from Hinton to Round Bottom is about the same for the upper half as for the lower half, and throughout that 24 mile distance there are no outstanding falls, rapids or shoals (Bull Falls being the greatest obstacle has a fall of three feet). This uniform profile appears from petitioner's *Ex. 196*, although it is of a very small scale.

On the other hand, the character of the 60-mile section (Round Bottom to Radford) upstream from Round Bottom is quite different, the lower two-thirds of this section, i. e. from Round Bottom to the head of Sifford's Falls, a distance of approximately 40 miles, having a slope of 5½ feet per mile[1] while in the upper one-third of this section the slope is only 2.3 feet per mile. Thus the major obstacles to navigation lie in the downstream 40 miles of this 60 mile middle section, although in the upper 20 miles thereof Barnett's Falls and Pepper Falls (about 2 miles apart) stand out on petitioner's *Ex. 196,* and in fact far exceed anything in the Hinton-Round Bottom stretch.

---

[1] This slope of course is 50% greater than that of 3.7 feet per mile in the Hinton-Round Bottom 24 mile stretch.

Again, in that 24-mile stretch above Hinton, there is no portion which even remotely approaches the steepness of slope of the 2.7 mile stretch between Big Walker Mountain Falls and the upper end of Sifford's Falls, which stretch is also in the Virginia portion of the 60-mile section and where, for a distance of 2.7 miles, the slope averages 13 feet per mile.

A careful scaling of the profile, *Ex. 196* (petitioner's appendix Vol. I) brings the slope conditions clearly to light. Thus, the heaviest concentrations of fall are as follows:

In the lower ⅔rds of the 60-mile middle section—that is the 40-mile reach upstream from Round Bottom—(mile 87.3)

					Fall per mile
Mile	91.4,	for	1.5 miles	upstream	12
"	100.0;	"	1.0 mile	"	12
"	112.0,	"	1.2 miles	"	12
"	117.3,	"	0.5 "	"	20
"	124.6,	"	2.7 "	"	13
	Total		6.9		69

In the 24-mile stretch upstream from Hinton—(mile 62.6)

					Fall per mile
Mile	64.0,	for	1.4 miles	upstream	6
"	68.0,	"	1.0 mile	"	7
"	72.5,	"	2.0 miles	"	6
"	78.0,	"	1.0 mile	"	8
"	82.5,	"	1.5 miles	"	6
	Total		6.9		33

It appears superficially from the above comparison that at the worst places the obstacles to navigation in the 40 miles of the 60 mile middle section are twice as severe as in the Hinton-Round Bottom section. However, the ratio of severity is even greater. Thus along any river there are certain normal slopes, mile by mile, required to keep the volume of water flowing. It is the *excess* over the normal slope which forms the proper index as to obstacles to navigation. Clearly, as to relative severity of impediments, those of the 40-mile section upstream from Round Bottom are not at all of the same order as those in the 24 miles downstream therefrom, but are outstandingly more severe. Steeper slopes in the surface of rivers, of course, cause greater velocities and if steep enough cause rapids.

Even according to petitioner's own listing of what it calls the "principal obstructions on New River between Hinton, West Virginia, and Allisonia, Virginia" (Pet. Br., 48, footnote), only two falls are in the lower (Hinton-Round Bottom) stretch, and two in the upper (Radford-Allisonia) stretch, whereas in the middle or intermediate (Round Bottom-Radford) section petitioner lists five (viz., Wiley's Falls, Shumate's Falls, Peter Mountain Falls, Big Walker Mountain Falls and Barnette's Falls). To be sure, the middle section is longer than the adjacent stretches; however, petitioner, in reciting the "principal obstructions" in that middle section, has omitted reference to Snidow's Falls where Hutton proposed a total of seven dams *(Ex. 190)*; to Sifford's Falls (the worst impediment of all involving a 2¼ mile stretch with a total fall of about 23 feet), and to the Pepper series of falls (where Hutton proposed six dams). An addition of these would make a total of eight[1] "principal obstructions" within the middle section or four times as many as in either the upper or lower stretches.

Still another reason for greater impediments in the middle section lies in the geographical and geological conditions. The river at Sifford's Falls and Shoals is from 1100 to 1700 feet in width (*Ex. 190,* sheet 6), the greatest anywhere on New River. With the water so spread out and the steep slope that obtains, it is obvious that there is scant depth, where any, over the innumerable ledges that cross the stream (*Ex. 273,* Photo 46). Certainly the District Court properly implied that there were steeper shoals in the 60 mile middle section than in the section below Round Bottom.

---

[1] In this connection, it should be borne in mind that the "principal falls" recited in the Moore & Briggs survey of 1819 (quoted at Pet. Br. 41) includes only those as far upstream as Sinking Creek. Thus, as concerns the middle section, the Moore & Briggs recital stops short of Big Walker Mountain Falls, Sifford's Falls, Barnette's Falls and the Pepper series of falls.

Turning to the observations of the Court of Appeals, which, in its general discussion of the physical characteristics of the river, stated:

> "The gradient, slope or fall of the bed of New River is *not uniform*[1] throughout its course *but varies* from 3 to 4 feet per mile to at places 31 feet per mile" (R. 2895).

it can be seen that the Court's statement is amply borne out by petitioner's own Exhibit No. 145 wherein the United States District Engineer says:

> "From its source at about elevation 3,800 to its mouth at elevation 652, the New River has a total fall of 3,148 feet in its length of about 341 miles, or an average slope of 9.2 feet per mile. The average natural slopes of the New River are as follows:

	feet per mile
From the source of the South Fork to the junction of the forks (86.4 miles)	15.1
From the source of the North Fork to the junction of the forks (41.5 miles)	31.5
From the junction of the forks to Washington Mills (48.2 miles)	6.5
From Washington Mills to the Wythe-Carroll County line (13.8 miles)	15.2
From the Wythe-Carroll County line to the mouth of the Greenbrier River (128.9 miles)	4.8
From the mouth of the Greenbrier River to the mouth of the New River (64.1 miles)	11.1"

(R.2703)

---

[1] All italics are supplied unless otherwise specifically indicated.

Similarly the Circuit Court's opinion, with reference to the 111-mile reach of river which petitioner now claims is navigable, and which states:

> "It is said (by petitioner) there was an ample volume of water, and the gradient or slope of the river was on the average not much steeper than in the sections which were improved, and that the pools were much greater in extent than the rapids. But the obstacles to navigation consisted chiefly in the falls and rapids which were numerous and long; and the *slope was not uniform,* but very much greater than the average in many places."[23]

---

[23] "The mile-by-mile survey reached Radford coming down stream at about the fortieth mile. Thereafter for illustration some of the more difficult obstacles to navigation shown in the survey in various places reads as follows:

'49th mile. Rapids and shoals (mostly over bowlders) 2000 feet long; fall, 4 feet.

'51st mile. Rapid, over bowlders and gravel, 1500 feet long, fall, 8 feet.

'53rd mile. At lower end Barnitz Falls, over five ledges of limestone 450 feet, over all fall, 6 feet.

'54th mile. Shoal and rapid over bowlders and gravel 800 feet long, fall 4 feet.

'67th mile. Shoals continue for 1,600 feet; then a short pool and Walker's Mount Falls, where the river falls 5 feet in 500 feet, over two ledges of shale and metamorphic limestone.

'68th mile. Continuous ledges of 4,000 feet; fall 8 feet.

'74th mile. Snidow's Falls, 2000 feet in length; over bowlders and gravel, fall, 5 feet.

'79th mile. Rapid over two ledges, 500 feet long; fall 7 feet; swift water whole mile.

'92nd mile. Peter's Mountain Falls, where river falls 4½ feet in 1,300 feet, over a succession of limestone ledges, terminating in an abrupt fall of 5 feet.

'100th mile. Neilley's Falls and rapids; whole fall 11 feet, 6 of it nearly vertical. A sluice 500 feet long, along left bank, will pass them, with 50 feet of rock excavation and 450 feet of bowlders and gravel.

'104th mile. Commences with shallow riffle, 600 feet long, over bowlders and gravel, and following this occurs Wiley's Falls where the river falls 4 feet in 10 feet, over a limestone ledge about 50 feet wide.'" (Opinion of C. C. A., R. 2900-01; 107 F. 2d, 769, 785-6.)

is clearly substantiated by the evidence.

Certainly, in light of the foregoing, respondent is at an utter loss to understand how petitioner has the temerity to state that the Circuit Court of Appeals was unfair when it stated that the slope of the river was "very much greater than the average in many places" (Pet. Br., 64, footnote 36; 107 F. 2d, 769, 785) and that the average gradient was 7.1 feet[1] per mile (R. 2895).

Indeed, the courts below were not unfair to petitioner, but rather petitioner, by its assertions, has been unfair to the courts. To illustrate, petitioner quotes (Pet. Br. 67-8) three extracts from the mile-by-mile survey (Ex. 31; R. 2282) which are as follows:

> "67th mile. Shoals continue for 1,600 feet; then a short pool and Walker's Mount Falls, where the river falls 5 feet in 500 feet, over two ledges of shale and metamorphic limestone".
>
> "68th mile. Continuous ledges of 4,000 feet; fall 8 feet."
>
> * * * * *
>
> "92nd mile. Peter's Mountain Falls, where river falls 4½ feet in 1,300 feet, over a succession of limestone ledges, terminating in an abrupt fall of 5 feet."

These, as well as eight other illustrations, were likewise quoted by the lower Court (R. 2901; 107 F. 2d, 769, 785-6; see page 13 hereof), to show that the "slope was not uniform, but very much greater than the average in many places" (R. 2900-1). Petitioner erroneously states that these three are "the most extreme of the eleven examples quoted by the court below" (Pet. Br. 67). However, an examination of the court's opinion shows that it referred to others just as extreme; for example, the fall in the 51st mile, the description of which was quoted by the court from the Hutton survey (Ex. 31, R. 2277) is just as extreme as that in the 68th mile which petitioner has selected:

---

[1] However, this is not the slope for the "entire river" (Pet. Br. 64). The words "entire river" are petitioner's words, not those of the court. An examination of the Court's opinion discloses that in giving the gradient of 7.1 feet per mile the Circuit Court was speaking of the 252-mile reach from the mouth of a tributary, the Wilson, to the mouth of the New River, which gradient is conceded to be correct by petitioner's statement that: "The average slope from Wilson Creek (at mile 252) to the mouth of the river is 7.1 feet per mile."

> "51st mile. Rapid, over bowlders and gravel 1500 feet long, fall, 8 feet" (R. 2901).

and the fall in the 100th mile[1] of *11 feet* clearly belies petitioner's statement that it has selected, for the purpose of its comparison, the three most extreme examples quoted by the Court of Appeals.

However, petitioner egregiously misrepresents the opinion of the court below, when it (a) trims the 60-mile middle section, discussed by the courts below, down to 56 miles so as thereby to eliminate Wiley's Falls from that section, (b) expands unwarrantedly the 23- or 24-mile Hinton stretch to 27 miles so as to include Wiley's Falls in the Hinton stretch and (c) then predicates a third misrepresentation on the already double error by implying to this Court that the lower stretch which petitioner has thus expanded is the same lower stretch that the courts below (according to petitioner) inferentially held navigable and that such lower stretch contains obstacles equally as formidable as the obstacles noted by the court below in the middle section, citing the 104th mile which contains Wiley's Falls to demonstrate the point (Pet. Br. 68-69); whereas actually the 104th mile was one of the very obstacles listed by the court below in support of its conclusion that the slope in the 60-mile middle section was very much greater than the average in many places (R. 2901, last footnote on that page). Petitioner's multiplicity of misstatements and misrepresentations in connection with its comparison of the middle section with the lower completely disqualifies it as being entitled to criticize anyone, let alone a court, on the score of fairness.

---

[1] "100th mile. Neilley's Falls and rapids; whole fall 11 feet, 6 of it nearly vertical. A sluice 500 feet long, along left bank, will pass them, with 50 feet of rock excavation and 450 feet of bowlders and gravel" (R. 2901).

However, on the main point of gradients, the report of the United States Assistant Engineer, N. H. Hutton, of December 17, 1872 (R. 2280-9), together with the subsequent report of Major William P. Craighill of January 9, 1873 (R. 2295-8) are noteworthy. They contain estimates of work and cost for two assumed depths of "navigation", viz., (a) a depth of 2 ft. and (b) a depth of 3 ft. For the former it was assumed that there would be required only the excavation of sluices through the falls, shoals and rapids.[1] For the latter it was reported that various structures would be required and comparison of the estimated structures as between the several sections bears strikingly upon the demonstration that, as compared with the adjacent sections, the middle section was far less susceptible to use for water transportation and far less susceptible to improvement so as to permit such use.

The structures for the 3 feet navigation contemplated low dams and also at the more critical places some locks. In general, the dams were intended to concentrate the water at and through the sluices at the falls, shoals and rapids but in connection with the locks or certain by-pass canals, the dams would have had the normal function of dams in a canalized stream, viz., of creating depth over ledges and shoals. The dams which were proposed to be in connection with sluices extended in the main entirely across the river (except, of course, at the sluices themselves). However, at certain other places the dams were to extend only part way across the river, thus in effect being wing dams. For purposes of comparison, we take into account only those wing dams which, together with any connected islands, were to extend at least half-way across the river. On such basis, this comparison is as follows:

---

[1] The fact that Captain Cuyler subsequently found after two seasons of federal work on the river that it would be necessary to abandon the idea of excavating sluices (R. 2340) and "to adopt a more general and radical method" of improvement (Report C. of E. 1879; R. 2340) consisting of dams and "locks and dams" at "the main falls" (R. 2340-1) in order to attain even the two foot depth, does not vitiate the comparison.

	Approx. Length in Miles	*No. of Complete Dams*	*Wing Dams at least halfway*	*Locks*
Lower Section: Hinton (Mouth of Greenbrier River) to Round Bottom, West Va.	24	12	2	None
Middle Section: Round Bottom, West Va. to Radford, Va. (New River Bridge)	60	41	6	8
Upper Section: Radford to Allisonia, Va.	27	15	1	2

The locations of the proposed dams and locks, as well as of any canal (as at Sifford's Falls in the middle section), are shown in red upon [redacted] the maps accompanying the Craighill-Hutton report (*Ex. 190*). The dams at the locks were to have an average height of 6 feet (R. 2297) and the locks were to have varying lifts. Thus the lock at Barnett's Falls, not far below Radford, was to have a lift of 6 feet, and the two locks between Glen Lyn, Va. and the State line, i. e. at Shumate's and Wiley's Falls (at the State line), were to have lifts of 5 feet each. Locks are expensive both to build and also to maintain and operate. Obviously, the locks were proposed only for the places which these United States engineers considered to be the *major impediments* to navigability. Thus the absence of any estimated requirement of a lock and dam in the lower section; i. e., anywhere downstream from Round Bottom, West Virginia, speaks strongly of the less obstructive physical characteristics in the lower section (Hinton-Round Bottom) as compared with the middle section (Round Bottom-Radford).

To be sure, the attempt actually to attain a depth of feet throughout the lower section of the river was not successful (see pages 80-83 hereof) and therefore ther is no justification for assuming that the dams estimated b Hutton to be necessary for 3 feet depths would have accomplished the intended purpose had an attempt actually bee made to create navigability in the middle section by suc means. Nevertheless, this consideration does not vitiat the comparison between the physical obstacles to navigability existing in the respective sections as estimated b Hutton following his survey in 1872.

Furthermore, the reports of other Army Engineers als make clear that the obstacle of gradient is such as not onl to make impractical useful navigation but also to make i economically unjustified to create artificial navigability o the river. On this subject the Board of Engineers for River and Harbors reported (Jan. 11, 1935):

> "None of the tributaries (of the Kanawha), because of their unfavorable natural characteristics are suitable for development for navigation, althoug prior to 1902 the United States expended funds intermittently on some of the tributaries to facilitate rafting and shallow-draft navigation.
>
> * * * * * *
>
> "Because of the *steep slopes* of the tributarie their improvement for navigation either as a separat undertaking or in combination with power development or flood control, is not *economically practicable'* (Ex. 145; R. 2684, 2687).

(e) Velocities.

Owing to the steep gradient of the river, which throughout its course averages 9.2 feet per mile (Ex. 145; R. 2703) it is obvious that velocities—"at about the rate of 3 mile per hour" over the rapids at the ledges and shoals and "a about the rate of 5 miles per hour" over the falls (Ex. 35 R. 2350)—would of themselves preclude continuous navigability-in-fact. Only with a high degree of canalization b means of a series of locks and dams could the effect of the swift current have been overcome.[1]

This discouraging aspect of the work of attempted improvement was a cause of concern to the army engineers almost from the beginning.

Captain Cuyler, for example, considered the matter of velocities in making his report of July, 1878. He there stated he had made a series of gagings

> "at and below Ingle's Falls, this point being chosen not so much with an eye to the regularity of river section, but because it was the most serious obstacle to navigation, on the line of the season, and was a *characteristic type* of that class of obstructions— * * *" (Ex. 34, p. 497; R. 2330).

He found the "mean velocity of the river at this point to be about 5¼ miles" per hour when the discharge was 900 c.f.s. (R. 2331). Apparently he was dubious as to the prospect of overcoming the obstacles presented by the swift current of the river by the type of work then being carried on, for, after a description of the regimen of the river, he states

> "With such a regimen any improvement made as to deepening and widening the channel introduces the *new obstacle of largely-increased velocity* and volume; so that though the main and more important navigation of this river must ever be that of descending boats, *yet no scheme* of improvement can fully *meet the requirements* of the case *without* considering and aiming to *counteract* this *induced obstacle* to navigation" (id. p. 498; R. 2332).

---

[1] While in canalizing a river for commercial purposes current velocities in excess of 3 miles per hour are not considered tolerable, nevertheless it is undoubtedly true that a river vessel of sufficient horsepower could ascend a current of 5 or 6 miles per hour (Pet. Br. 64). This entirely disregards any factor of commercial feasibility and the more important factor of "squat" which, in view of the grossly inadequate depths, makes it simply absurd to consider velocities from the standpoint of what a power-driven river vessel could do on New River.

However, he found no way of overcoming this obstacle other than by recommending a radically different type of improvement—necessary in his opinion "not only for the contemplated steam-navigation, but *even* for the *bateau* navigation and rafting" (Ex. 35; R. 2340)—stating that *even* with the open sluices

> "some system of *towing up* ascending boats, by *cables* on the bottom, the motor being steam or air, located on the banks, or better, on large floats fixed in the still upper pools, will, in my judgment, be *found essential.*" (Ex. 35; R. 2341-2).

A. M. Scott and William Proctor Smith, assistant engineers, each subsequently in immediate charge of the federal work, for different periods, likewise thought that the expedient of using cables for towing or ropes on which the steamers could "wind", should be resorted to, and they so reported to their superior, Colonel Craighill. Scott stated:

> "Steamers will be obliged to 'wind' through some of the chutes and must be provided with steam capstans for this purpose." (Ex. 35; R. 2346).

Also that:

> "It is thought a permanent winding-line or wire-rope will be advisable at this shoal (War Ford), and some arrangement of this kind is likely to be found *expedient* at *other points*" (Scott to Craighill, May 26, 1879, Ex. 35; R. 2347).

And Smith wrote that:

> "Ring-bolts, to which lines are attached to 'wind' through the difficult 'chutes' have been placed at frequent intervals" (Ex. 36; R. 2367).

However, their superior, Colonel William P. Craighill, did not share their optimism, he being of the view that the hauling of boats over steeper places would be unprofitable and unsatisfactory. On this subject he reported to the Chief of Engineers, as follows:

> "More mature reflection, with a study of the results of the survey, induces the conclusion that a steamboat navigation, *impeded* by the *necessity* of *hauling up the boats* over the *steeper places*, would be *unprofitable* and *unsatisfactory*, and that for steam navigation to be efficient *such drawbacks must be done away with*" (Col. Craighill to General Humphreys, Jan. 9, 1873, Ex. 31; R. 2296).

It would appear that Colonel Craighill's judgment was correct, for despite Smith's optimistic report to the effect that the S. S. "*Cecilia Miller*" "'winds' through (Bull Falls) without difficulty," nevertheless it is to be noted that in the course of a season or two this boat had been withdrawn (Report of C. of E. 1882, Ex. 38, R. 2383). Incidentally even Smith stated that

> "Owing to the strong current it was very difficult to make the shelter-dams stand in these falls" (Ex. 36; R. 2367).

The swift current of the stream also caused trouble in connection with attempts to transport pig-iron on the middle division of the river. The work on that division resulted in a channel only 10 feet in width for over one-half of the 29¼ miles which it covered. The channel was never widened, although the engineers reported

> "Ten-foot channels are not wide enough, as the current is too rapid for the boats in use" (Ex. 38; R. 2387).

Thus the velocity of the current, while only one of the obstacles to navigability-in-fact, was nevertheless a perplexing one which the Army Engineers did not succeed in overcoming in the attempt to create artificial navigability on New River.

As though they were significant, petitioner makes reference (Pet. Br. 65) to so-called *measurements* as to depths, widths, velocities, etc. made, in the midst of the trial of this case, by its witness Gerdes. However even though these Gerdes measurements are set forth in tabular form (Pet. Br. 70) and in precision terms, i. e., depth and velocity measurements are carried out to one decimal point, nevertheless, the fact is that Gerdes, even on his own statement, did not purport to do a precision job. He did not make an instrument survey. Instead, his *measurements* were largely mere estimates made from the bank (R. 929) after he had prepared himself for this task by "sharpening his judgment". As he states it:

> **"Now when I started in I spent quite a bit of time on Wiley's Shoal and at Shumate's Fall, I spent some time *fooling around there* and *sharpening up my judgment* as to the depth of the water from its appearance, and that is a specialized kind of judgment that can be acquired in a couple of days, and lost just as quickly[1] but I did that. As I went along I used that knowledge as to each shoal, one, two, three, and when conditions were the most important, then I would go out to these one, two, three or four places and make actual measurements" (R. 930).**

However, Gerdes' method of measuring the velocity in many instances in which he actually went down to the water and made what he refers to as "actual measurements" was as follows:

---

[1] This brand of *sharpened judgment* which "can be acquired in a couple of days and lost just as quickly" apparently differed from that brought into play by Gerdes in the case of estimating velocities, for, although in the latter case Gerdes also stated that "it will have to be kept sharpened" (R. 933), nevertheless when it came to making his "measurements" he did not regard the fact that he had not used his *sharpened judgment* for a period of a year as a disadvantage, because, as he explained it, this latter brand of sharpened judgment "is like swimming—once learned, it is not easily forgotten" (R. 933).

> "I measured the velocity near the side and then tossed chips into the stream where the maximum thread was and observed the ratio of flow, as to whether it was 120, 130 or 150% in comparison" (R. 933).

Yet, despite the fact that Gerdes was merely *estimating* velocities—by *estimating* how much faster the water was flowing at the place in the stream that he *estimated* to have the maximum velocity than it was flowing at the side of the stream where he was standing—petitioner, in an effort to place a halo of scientific and mathematical accuracy upon these *estimates,* has set them forth in tabular form and carried them out to one decimal point, thereby superficially conveying the impression that Gerdes made precision measurements. The character of this "measurement" work, plus the fact that Gerdes was obviously a very strongly biased witness vitiated the value of Gerdes' testimony. Even in his testimony with respect to current velocity, and after stating with regard to a particular shoal that the current "was more than it appeared a man could stand up in while holding a current meter", he was unwilling to admit that it was "unsafe" and again, he would not admit the current was "hazardous" even if one of his own party, in an effort to make a mid-stream measurement, were washed downstream and had to have a rope hitched around him to pull him out (R. 934).

Questions directed to the reason for his failure to make measurements in mid-stream—where the current was swift and the answer obvious—received such responses as these:

> "it cost a number of dollars a day in expense to do the work and *there was no use wasting time around there*" (R. 934).

or

> "I regarded it to be most practical to measure *where I did*" (R. 934).

It was such of petitioner's witnesses as Gerdes—who testified on a variety of subjects—including power waves, that undoubtedly prompted this (very mild under the circumstances) observation on the part of the trial court:

> "I think it necessary to say that the witnesses who furnished the bulk of plaintiff's testimony on the subject of power waves displayed a bias, an evasiveness and an unwillingness to admit even obvious facts hostile to their contentions, to such an extent as to deprive their testimony of much value" (R. 130-131).

The testimony that respondent has cited as to depths, velocities, etc. is from the reports of Army Engineers made prior to the trial of this case and not in a spirit of partisanship or in the heat of advocacy.

(f) Photographs of Ledges and Shoals.

Petitioner is critical of respondent's photographs, apparently because they show ledges and shoals exposed which at high water might be submerged partially or wholly (but not sufficiently, from the standpoint of navigation) (Pet. Br. 72). Petitioner seems to prefer its own photographs because they largely show pools or in some instances falls, taken from such a distance that they are scarcely discernible. While vitally affected by other physical characteristics such as slope and velocity, the effect of ledges, shoals and falls manifestly depends in a large degree upon their frequency and extent. Photographs of pools are manifestly irrelevant and of no value; for as petitioner stated before the Trial Court:

> "In litigating the issue of navigability, attention naturally turns to the shoal portions of a stream as distinguished from the pool sections" (Pl. (Pet.) Br. before District Court 132).

Petitioner's satisfaction with certain of its photographs, in which the ledges and rocks are covered by the water, arises from petitioner's failure to realize that submerged and partially submerged ledges and boulders make navigation even more hazardous and impractical than those which are exposed (Pet. witness Lt. Col. Watkins, R. 968; Major Putnam, R. 1785). Actually (if it were practicable), one of the best ways to reveal the character of the river bed particularly the rocks and ledges, which at other times, are dangerously submerged, would be to take photographs at times when the river is practically dry.

Something of the character of the rocks, ledges, shoals and rapids which abound in New River can be gathered from an examination of the photographs offered by the respondent (Resp. (photo) append. B; *Ex. 549; Ex. 554; Ex. 555;* and *Ex. 592*). Perhaps none are more striking than those offered by the witness Prof. Matthews (*Ex. 549*), which were not taken for the purpose of this case but as a part of his official geological studies of New River in behalf of Virginia Geological Survey. One has only to examine these photographs to realize that the character of the upthrust rock ledges, boulders, rapids and shoals relegate any claim of navigability to the field of fancy.

Again, petitioner states (Pet. Br. 72) that:

> "The real condition as to navigability can, in truth, be determined only from petitioner's aerial photographs".

In this connection, it should be noted that petitioner's aerial photographs, taken at approximately average flow, not low flow (*Ex. 273; Ex. 69*), do not cover all of the pertinent portions of New River. For instance, in what we style the 60-mile middle or intermediate section, Round Bottom, West Virginia-Radford, Virginia, the length of river covered by the aerial photos (*Ex. 273*) is only 79% of the total length of that section. Moreover, a considerable part of the 79% comprehended within the field of the respective photos was so distant from the camera, or taken at so flat an angle or so obscured by shadows, that for practical purposes it is useless. After deducting for such part of the 79%, it may reasonably be said that the aerial photos of *Ex. 273* show only about 70% of the length of the middle section.

Among the impediments to navigability which are not covered by, or visible upon, these aerial photos are such as Barnett's Falls (Resp. (photo) Append. B, No. 54), Lower Pepper Falls, rapids in vicinity of Berton, Va., rapids at Pearis Island, Bluff City, etc. Not all of such impediments (not visible upon petitioner's aerial photos) are covered in Respondent's (Photo) Appendix B, and some are not shown by any ground photo in the record, but the point is that petitioner's aerial photos by no means cover the river, particularly the middle section, completely.

The detail of the petitioner's aerial photos is far less than that of the ground-photos, due to the fact that the aerial photos were taken from far greater distance and from the fact that such distance involved great height. Moreover, even in the cases of ground photos, one needs to bear in mind the belittling effect when, as is true particularly of various of petitioner's photos, the photos are taken from a considerable distance downstream and the further fact that, if the photos are taken from upstream, they may fail entirely to show a rapid or falls of importance (e. g. Little Pepper Falls, per petitioner's *Ex. 193,* Photos 34 and 35).

Respondent's (Photo) Append. B (comprising 55 photographs) relating to the middle or intermediate section of New River, between Round Bottom, West Va. and New River Bridge at Radford, Va., by no means constitutes a complete record of the important obstacles to navigability within that section. The total number of falls or series of rapids shown in Resp. (Photo) Append. B is 50. This number obtains after allowing for the following partial duplications:

Name of Impediment	*No. of Photos*
Wiley's Falls at State Line	3
Shumate's Falls below Glen Lyn, Va....	2
Principal Falls at the Narrows..........	2
Big Falls at Walker Mountain..........	2

There are between Round Bottom, W. Va., and New River Bridge at Radford at least 70 falls, shoals or rapids, the existence of which is shown by the photographs[1] in the record, the Hutton survey-map (*Ex. 190*) or the U. S. Geological Survey Map, Peterstown Quadrangle (*Ex. 185*), and of which Resp. (Photo) Append. B, as above stated, shows only 50. Petitioner's aerial photos (*Ex. 273*) show only 48, while petitioner's witness Gerdes listed only 41 (Pet. Br. 70).

The following are a dozen of the more important falls, shoals or rapids of which no photographs are included in respondent's photo appendix:

1. Cooper's Falls, at Cooper's Branch, being about half way between the State Line at Wylie's Falls and Glen Lyn: These appear in aerial photo 57, Ex. 273, lower left corner. See also the Hutton map, Ex. 190, Sheet 9.
2. East River Falls, about one-quarter mile below Glen Lyn, Va.: See Aerial photo 57, near top thereof; see Hutton map, Sheet 8. For this point Hutton considered a *dam* necessary if 3 ft. depth was to be attained in the sluice to be constructed (ibid; R. 2279).
3. Rapids at about mile 103 (above mouth of New River): These rapids are shown even on U. S. G. S. map, Narrows quadrangle, but appear only indistinctly on aerial photo 52. They were recognized by petitioner's witness Gerdes; shown on Hutton map, Sheet 7.

---

[1] Of course this does not mean that there are merely 70 obstructions; for example, even on aerial photo 46 (Pet. *Ex. 273*), one can count fully 50 separate lines of ledges (not including Walker Mountain Falls) in a river distance of approximately 2 miles.

4. Rapids approximately one-half mile upstream from preceding item: Shown on U. S. G. S. Narrows quadrangle; on aerial photo 54, upper left corner, but only indistinctly on aerial photo 52; and on Hutton map, Sheet 7.

5. Rapids at Klotz, Va.: Shown on aerial photo 50, Hutton map, Sheet 7.

6. Walker Creek Rapids: Shown on Hutton map, Sheet 7. Hutton proposed *three* dams within distance of 0.3 mile. There is no aerial photo of this stretch of river.

7. Rapids just below mouth of Little Stony Creek: Shown at island at left on aerial photo 49 and on Hutton map, Sheet 7. Hutton proposed *wing dams* here.

8. Eggleston's Shoals: Shown on aerial photo 47, right side; also on Hutton map, Sheet 6. Hutton proposed a *dam* here.

9. Rapids about ¼ mile upstream from Barnette's Falls: They were not reported on by petitioner's witness Gerdes. However, they are shown upon Sheet 5 of the survey map by Hutton, who considered that a *dam* would be necessary here.

10. Lower Pepper's Falls: No photo of this series of ledges and rapids is in record, but falls were purportedly reported on by petitioner's witness Gerdes (R. 924). Shown on Sheet 5 of map by Hutton, who proposed *two* dams here.

11. Upper Pepper's Falls: Comprises all of the ledges and rapids shown in middle of aerial photo 43; shown also on Sheet 5 of map by Hutton, who estimated *four* dams necessary here.

12. Rapids at Radford: This series of ledges and rapids shown on aerial photo 42; also on Sheet 4 of map by Hutton, who estimated *three* dams necessary here.

Respondent welcomes any comparison which the Court will make between the aerial photos of petitioner and respondent's photos. However, any such comparison should be made between Pet. Appendix Volume III (reasonably good photostats) and the corresponding photos in

Resp. (Photo) Append. B (largely photo-prints, supplemented by relatively good photostats)—and *not* Pet. Appendix Vol. V (poor photostats) as requested by petitioner (Pet. Br. 72, footnote).

(g) Ledges and shoals—their character and extent.

Petitioner introduced in evidence as a part of its case a report made by the U. S. District Engineer (Ex. 145, R. 2710) which included the following as a part of the general description of New River:

> "Ledges of limestone, sandstone, and shale crossing the river at frequent intervals create rapids and waterfalls. The waterfalls vary in height up to about 18 feet. Between the ledges there are usually short pools of varying depths. The low water depth in the channel varies from a few inches to more than 6 feet."

This description was quoted by both the Trial Court and the Court of Appeals as part of their respective opinions (R. 108; 2898). Petitioner in the C. C. A. has specified this description as error (R. 163). However, even if, contrary to the fact, the other evidence in the case did not amply support this part of the opinions of the courts below, nevertheless there could be no justification for petitioner's complaint concerning this portion of the courts' opinions when it is substantiated *in haec verba* by petitioner's own evidence (Ex. 145, R. 2677, 2710).

Again, petitioner has heretofore asserted that there is no "abrupt vertical fall" in the middle section of the river, citing (App. (Pet.) Supp. Br., in C. C. A. 191) the Hutton report (Ex. 31, R. 2280). Of course, the significant consideration is the presence of ledges, shoals and falls, not whether the water falls over them vertically or falls over them at a 45 degree or a 30 degree angle. Nevertheless, a reading of the very Hutton report which petitioner has heretofore cited as its authority would have disclosed that there are *abrupt vertical* falls of water in the very reach of the river in which petitioner stated that there were none. For example, Peter's Mountain Falls is to be found in this middle section of the river. Hutton describes it as "terminating in an *abrupt* fall of 5 feet" (Ex. 31; R. 2286). Also, in the case of Neilley's Falls and rapids, Hutton states the whole fall is "11 feet, 6 of it nearly *vertical*" (Ex. 31; R. 2286).

Moreover, in the same report Hutton, referring to means of improvement, speaks of making improvements by clearing sluice-ways through the shoals and rapids "and by opening through the *vertical* falls and ledges sluices with a slope not exceeding 1 to 10"; (Ex. 31; R. 2288). In the same report of the Chief of Engineers, Major Craighill, speaking of methods of improvements, states:

> "Some of the falls which are almost always *vertical* and of an average height of about 4 feet, could be greatly improved by blasting sluices * * *" (R. 2279).

Thus, it may readily be seen that even petitioner's statement, that the term "falls" frequently used in the descriptions and surveys of the river does not refer to vertical falls, disregards the fact.

Petitioner, disturbed by the prevalence and problems of rock ledges, rapids, shoals, and obstructions in New River, has heretofore undertaken to show that ledges and shoals comprise only about 15% of the river bed. It endeavored to substantiate this by referring to the mile-by-mile survey (App. (Pet.) Br. in C. C. A. 22) made by Hutton in 1873 (Ex. 31, R. 2282) and by citing the testimony of its witness Gerdes.

With respect to the former, petitioner's assertion was that Hutton's report gives sufficient detail to enable one to calculate that the section of the river from Pine Creek to New River Bridge contains 18.7% of shoals and ledges, that the section of the river from New River Bridge to Wiley Shoals contains 14.5% of shoals and ledges, and that the section of the river from Wiley Shoals to the Greenbrier

River contains 15.9% of shoals and ledges. However, an inspection of Hutton's report (Ex. 31, R. 2282) reveals that it does not afford the basis for such calculation for the reason that the lengths of *all* shoals and ledges are not given. While in many instances the length of shoals or ledges is given,[1] nevertheless, in other instances, Hutton did not purport to give the lengths but merely noted the existence of a ledge or shoal.[2]

With regard to the testimony of petitioner's witness Gerdes—one of the Federal Power Commission's employees who during the trial testified several times on several different subjects and who served petitioner in the capacity of a handy all-purpose witness—to the effect that the river consisted to the extent of about 15% of ledges and shoals and the echoing of this percentage figure by petitioner's witnesses Watkins and McWhorter—without a shadow of support for their views other than the estimates made by Gerdes based on his own "sharpened judgment", it will be noted that such testimony cannot be reconciled with the Reports of the Chief of Engineers. The latter, made long before the present litigation and not in a partisan atmosphere, show that the ledges and shoals prevailed throughout more than one-third of the reaches of the river under improvement[1] and that the depths (not low water depths) over the ledges and shoals were *"rarely over one foot"* (R. 2382).

---

[1] For example:

"14th and 15th miles. Consist of shoal rapids for 9,000 feet, falling over 16 ledges of shale and limestone about 12 feet vertical."

"17th mile. A succession of 9 ledges 2,000 feet over all; fall, 5 feet."

[2] For example:

"23rd mile. Wide and shoal; river falls over 6 ledges; will require some work the whole distance; fall, 9 feet."

"24th mile. River narrowing, but still falling over ledges of limestone and shale; about six ledges crossed, 7½ feet fall."

"29th mile. River falls 8 feet over a succession of 9 ledges of shale."

"45th mile. 7 ledges; fall, 7 feet in 1000 feet."

"56th mile. 2 ledges very narrow; fall, .5 feet."

"65th mile. Continuation of Sifford's Shoals; river very wide and shallow; fall, 10 feet, over slate ledges about 200 feet apart, with 3 feet water between them."

The extent of ledges and shoals is disclosed by the reports of the Army Engineers. During the course of the federal work, done on the 26½-mile reach of the river above Hinton, it was found that more than 9 miles (*actually 47,875* feet[2]), or approximately 34% of this 26½-mile reach of river bed, consisted of ledges and shoals.

Similarly during the course of the federal work done on the 29¼-mile reach of the river from New River Bridge to about Calfee's Ferry (public), it was found that more than 12 miles (actually 64,131 feet[3]) or approximately 41% of this 29¼-mile reach of the river bed consisted of ledges and shoals.

Also during the course of the federal work done on the 7 9/10-mile reach of the river from the Lead Mines to the "Gulf" it was found that more than 3½ miles (actually 17,572 feet[4]) or 44% of this 7 9/10-mile reach of the river bed consisted of ledges and shoals.

---

[1] Which improvement "was limited to the most easily improved places" on "3 widely separated stretches with long unnavigable reaches between them" (General Taylor, C. of E., *Ex. 572,* same text as Ex. 97, R. 2531).

[2] This figure appears in the report of the Chief of Engineers for 1883 (Ex. 39, R. 2398) where the extent of the actual cutting from ledges and shoals on that 26½-mile stretch of river is referred to as follows:

> *"Actual cutting* through ledges 47,875 feet."

This figure also appears (Ex. 39, R. 2402) in the same report under the column headed "Length" of the Table No. 1.

[3] This figure appears in the report of the Chief of Engineers for 1883 (Pl. Ex. 39; R. 2403) under the column headed "Length" of Table No. 2.

[4] This figure is obtained by adding the figure of 15,840 feet, appearing under the column headed "length" of the table ap-

(Footnote continued on next page)

The mile-by-mile survey made by Hutton in 1872 (Ex. 31, R. 2282 et seq.) of the 128-mile reach of the river between Hinton and the Lead Mines indicates that, for the 26½-mile and the 29¼-mile reaches of the river on which the federal work was done, ledges and shoals were at least not more prevalent and apparently were less prevalent than in the balance of the 128-mile reach on which no work was done.

Furthermore, the mile-by-mile survey made by Smith in 1878 (Ex. 35, R. 2351) of the 62-mile reach of the river from the Lead Mines to the mouth of the Wilson in Grayson County, indicates that the same may be said as to the relative prevalence of shoals and ledges as between the 7 9/10-mile reach of the river above the Lead Mines on which federal work was done and the balance of this 62-mile reach on which no work was done. Hence it may be stated conservatively that more than ⅓ of the river between Hinton and the mouth of the Wilson consisted of ledges and shoals. It borders on the absurd to urge that a river so obstructed is navigable in fact, particularly in view of the limited depth over the ledges and shoals—"rarely

---

pearing in the Report of Chief of Engineers for 1890 (*Ex. 563, p. 2251*) entitled:

> "Statement showing the distances from Ivanhoe Furnace, Virginia, to foot of shoals or ledges, their length and difference of level between head and foot of same; also the quantity and quality of material excavated in making and improving the channel in 1899 from Ivanhoe Furnace, Wythe County, to the Gulf in Carroll County, Virginia."

to the figure of 1,832 feet, which is the sum of the lengths of the first four ledges and shoals listed in Table No. 3 appearing in the report of the Chief of Engineers for 1882 (Ex. 38; R. 2390). The report for the year 1890 listed shoals and ledges beginning with Ivanhoe Furnace instead of the Lead Mines as the initial point. Hence the length of the four ledges and shoals immediately above the Lead Mines was not included in the figure given in the 1890 report; therefore, their combined length of 1,732 feet must be added to the figure given in the 1890 report, viz., 15,840 feet, in order to give a figure representing the total length of shoals and ledges from the Lead Mines to the "Gulf".

over one foot"—hereinafter discussed at pages 36-38 *infra.*

Petitioner has heretofore complained that, in arriving at the figure of 64,131 feet as representing the total length of ledges and shoals on the 29¼-mile reach of river covered in the federal work (New River Bridge Division), respondent had included two ledges, viz., Howard's and Moore's, having a length of 4200 and 2200 feet respectively upon which little or no federal excavation work or "actual cutting" was done. While such a complaint could only arise from a misconstruction of what respondent had stated and a misconception of that which is *significant,* nevertheless we desire to make respondent's position abundantly clear on this point. We do not claim that federal work on the *New River Bridge Division* involved cutting through all of the ledges and shoals shown by the Army Engineer's Report in the 29¼-mile reach of that Division.

What respondent states is that the reports of the Chief of Engineers show that in the federal work on the *Greenbrier Division* there was a certain amount of "actual cutting" through all of the ledges and shoals in the 26½-mile reach involved and that, with respect to the *other two Divisions,* (viz., the New River Bridge and the Lead Mines Divisions) ledges and shoals made up 41% of the 29¼-mile reach of river bed upstream from New River Bridge and 44% of the 7 9/10-mile reach upstream from the Lead Mines. We have not stated that all of the ledges and shoals on the latter (upstream) two Divisions were actually cut through, even though the fact is that the Engineers' Reports show that with the exception of Howard's Ledges and Breeden's Ledges in the New River Bridge Division there was some excavation work at *all* of the ledges and shoals in the reaches of the river worked by the federal government on both the New River Bridge Division and the Lead Mines Division.

However, in so far as excavation work is concerned the total quantity on the New River Bridge and Lead Mines

Divisions was even more scant than that on the Greenbrier Division. For example, on more than ½ of the 29¼-mile reach of the New River Bridge Division, instead of the project widths of 30 feet, there were attempted only 10-foot widths. Such latter widths were reported by the Engineer in charge to be insufficient (Ex. 38; R. 2387). Nevertheless, due evidently to the fact that the excavation work was not progressing in proportion to the mounting cost thereof, it is obvious that certain ledges and shoals received only minor attention or none at all.[1]

The *significant* fact, however, is not the extent to which the federal government either carried out or failed to carry out proposed excavation work but that (a) the river bed —irrespective of work done on it—actually consisted of ledges and shoals to the extent of 34% on the 26½-mile reach above Hinton, 41% on the 29¼-mile reach above New River Bridge and 44% on the 7-9/10-mile reach above the Lead Mines; and (b) the *depth* over these ledges and shoals—and these were not low water depths as petitioner has suggested—*was rarely over one foot.*

However, even if from the 64,131 feet (total length of ledges and shoals on the 29¼-mile reach above New River Bridge) we were to deduct the 2200-foot length represented by the ledges at Moore's Gravel (on which comparatively little work was done), the 4200 feet represented by Howard's Ledges (on which no work was done) and the 750 feet represented by Breeden's Ledges (on which no work was done), nevertheless we would find the total length of ledges and shoals on that 29¼-mile reach to be 57,181 feet, or approximately 10.8 miles. Thus, *even with the elimination of all ledges and shoals on which no excavation work was done*, we would still find that *the remaining ledges and shoals would aggregate more* than 36% of that 29¼-mile reach.

---

[1] Despite the fact that the Army Engineers' Reports show the percentages of ledges and shoals to be 34, 41 and 44, respectively, on the reaches in which federal work was done that the Chief of Engineers reported that this federal work on New River "was limited to the most easily improved places" (R. 2531), the dissenting judge incorporated in his opinion (R. 2926) the estimate of witness Gerdes, viz., 15% ledges and shoals and 85% pools. Of course the latter was the most superficial kind of an estimate, subject to all of the infirmities which have heretofore been pointed out, see pages 22-24 hereof—in complete disregard of the reports of these Army Engineers.

Of course it should not be overlooked that the effect of numerous ledges, shoals and rapids cannot be appraised without taking into consideration accumulative effect of slope and velocity. Thus, on a stream with a relatively flat gradient, the effect of ledges and shoals would be less serious than in the case of a stream like New River with a very steep gradient and high velocity.

(h) Natural Depths.

U. S. District Engineer Conklin reports in 1934:

> "* * * Between the ledges there are usually short pools of varying depths. The low-water depth in the channel varies from a *few inches* to more than 6 feet" (Ex. 145, R. 2710).

In the record of mile-by-mile survey set forth in Hutton's report to Col. Craighill, December 17, 1872, (Ex. 31, R. 2282), Hutton states that, commencing with the Lead Mines where the river had an average depth of 5 feet, it gradually expands and deepens until an average depth of 6 feet is reached just above the Greenbrier. Of course the reference is to depths in pools.

Smith, who made a mile-by-mile survey in 1878 of the portion of the river between the mouth of the Wilson and the Lead Mines, states that the average depth in the pools at the mouth of the Wilson is 4 feet, and the average depth in the pools at the Lead Mines is 5 feet.

However, the crux of navigation in so far as depths are concerned is the limiting depths over the obstructions, such as the rock ledges and shoals. On this subject, the report of the Chief of Engineers for the year 1881, states:

> "Throughout this distance (from the mouth of the Wilson to the mouth of the Greenbrier) the navigable channel originally consisted of natural chutes through the *ledges and shoals,* of varying widths, rarely *over 1 foot in depth,* in some places so tortuous as to render navigation extremely difficult and dangerous" (Ex. 37, R. 2376).

Of course, these depths often were actually considerably less than 1 foot. For example, Captain Cuyler in a letter to Colonel Craighill dated March 15, 1879, with reference to Peak Creek Shoals states:

> "the map shows this, the natural channel running for ¾ of a mile over a gravel slope underlaid by flat rock *no lower than 1 foot,* with the river over 400 yards wide, and most of its water in the deep pools barred by ledges on the other (easterly) bank. As was to be expected, *4 to 6 inches* of water was *often alone available,* and no loads at all could get over;" (Ex. 35, R. 2339-40).

When it is borne in mind that more than one-third of the bed of New River consists of *ledges and shoals,* it can readily be seen that the depths in themselves—averaging less than 1 foot through these ledges and shoals—constitute an insuperable obstacle to navigability-in-fact.

Petitioner's assertion—based on the statements of its witness Gerdes whose "measurements" of depth, tabulated at page 70 of petitioner's brief, are subject to the infirmities heretofore indicated,[1]—that natural depths through the ledges and shoals exceed 2 feet except at 2 shoals (Pet. Br. 71), cannot be reconciled with the various reports of the Chief of Engineers made during the Federal work and long before the present litigation and not in a partisan atmosphere, which state that these depths (not low water depths) were "rarely over 1 foot"[1] (Reports of Chief of Engineers 1881, R. 2370; 1882, R. 2382; 1883, R. 2394; 1885, R. 2405; 1886, R. 2407; 1892, R. 2413; 1897, R. 2416).

---

[1] As to Gerdes' "measurements" (see pages 22-24, *supra*), they were largely mere estimates made from the bank (R. 929). They resulted as he said, from "fooling around there (certain falls) and sharpening up my judgment." Only in a few cases did he make actual measurements (R. 930).

The foregoing discussion of physical characteristics, as well as other evidence that could be cited, amply substantiates the observations of the Court of Appeals concerning physical characteristics:

> "A mere description of the physical and natural characteristics of the river is very persuasive that it is not susceptible of that character of navigation which is necessary, under the decisions above cited, to support the claim that it is navigable water of the United States. It is properly said to be sui generis, and is unlike many of the numerous rivers which have been described and held either navigable or non-navigable in Supreme Court decisions which we have noted. It is characteristically a mountain stream with steep gradient, relatively rapid current, and comparatively narrow stream bed, the river running in many places over limestone and sandstone, rocks and shale, the boulders frequently jutting above the surface of the water, with alternating comparatively still pools of varying length and numerous rapids, falls and shoals in many of which the depth of the water over the rocks is only about one foot, and frequently only a few inches." (107 F. (2d) 769, 780-1, R. 2893.)
>
> * * * * * *
>
> "Among mountain streams it seems to be unique in the peculiar geologic formation of its rocky bed due to folds and faults in the rock strata, producing ledges running across the stream in many places. In a thirty-five mile stretch of the river in Giles County, Virginia, (an important section in this case, as is

---

[1] However, despite the reports of the Army Engineers, the dissenting judge, adopting Gerdes' "sharpened judgment" estimates of depths, stated in his opinion that there was "a minimum depth of approximately two feet even in low water" (R. 2926).

> hereinafter particularly discussed) the geologic environment is 'markedly unusual' in that it has been the scene of four predominant breaks or faults; and the slope or gradient of the rocks in the river bed is very unusual in that the incline 'is downward in an upstream direction rather than in downstream direction', with the result that the water falls over the ledges almost vertically. Some of the ledges are upthrust above the surface of the water, and some are barely submerged, and this relative condition varies naturally with the depth of the water in alternate wet and dry periods. The difficulties and dangers of navigation caused thereby, both downstream and upstream, are obvious." (107 F. (2d) 769, 781; R. 2894.)

2. *The absence of any use of New River for trade, travel or transportation by early traders, industries or even military expeditions, or indeed any use before the experimental local use under the stimulus and novelty of artificial local federal improvements is compelling evidence of its non-navigability:*

(a) History does not record any use of New River as a means of trade, travel or transportation by early settlers, traders or explorers.

Although the petitioner assigned error (amended assignment of error No. 24; R. 165) to the Court's finding to the effect that early historical descriptions of New River by explorers, etc. do not show it available for navigation in its natural state, and purports to discuss the matter of "early navigation" (Pet. Br. 41), it nevertheless will be seen that the Court's finding is not only amply supported by the evidence but that the evidence precluded any other finding.

New River was discovered in 1671 by Col. Abram Woods (Kegley, R. 1581). According to the best available records, settlements were begun in the New River valley in 1744-1745. These settlements were in various places along the Valley, including those in the vicinity of the Horseshoe Bend (below Radford), Bingeman's Bottom and Poplar Camp (below the lead mines), Dunkard's Bottom (above Radford), Draper's Meadows, Neck Creek and Back Creek in Pulaski County and others along various tributaries of upper New River (Kegley, R. 1581-2).

The earliest record of any attempt to use New River as a means of transportation or travel is the account of the trip of a small party headed by John Peter Sally, who, in 1742, proceeded from a point on New River somewhere west of the natural bridge down to the Ohio River, and who, for part of the trip, attempted to travel on New River in a small boat made from five buffalo hides. His account, although somewhat confused and dealing with a portion of New River well below Radford, does demonstrate the great difficulties encountered. It recites that his party was compelled frequently to take even this small boat from the stream and finally to abandon the River entirely for a distance of more than eighty-five miles. Indeed, it is disclosed that Sally's party did not finally return to the water until somewhere down on the Kanawha River (Kegley; Sally's Journal, R. 1591-3).

In 1756, during the French and Indian War, Governor Dinwiddie authorized an expedition against the Shawnee Indians. This expedition was under the command of Major Andrew Lewis, who assembled the men at Fort Frederick on Dunkard's Bottom. Leaving Dunkard's Bottom on the bank of New River, they went west and overland to Burke's Garden, a point now in Tazewell County, Virginia, and then struck the East Fort (generally known as Tug Fort) of the Big Sandy River which empties into the Ohio. The expedition encountered difficulties and finally disbanded (Kegley, R. 1594-5). It is manifest that this expedition, which attempted to use water transportation on a tributary of the Big Sandy River, regarded the possibility of navigating New River as too impracticable even to attempt. Obviously, the expedition would not have travelled through a mountain wilderness with all the labor and difficulty which that involved had there been any possibility of going down New River.

The Point Pleasant Expedition of the Virginians against the Indians on the Ohio River occurred in 1774. The Western Division of that expeditionary force under the command of the same Lewis (now Colonel) assembled at William Thompson's on Back Creek, which is now known as the Cloyd Plantation in Pulaski County. From this point they proceeded down the New River by land on a course generally parallel with New River, which they crossed, and then proceeded toward the Greenbrier River near what is now Lewisburg, West Virginia. The Expedition thereafter forded the Gauley River and made no use of water transportation until it had reached the mouth of Kelly's Creek on the Kanawha River near the present site of Charleston (Kegley, R. 1596-7).

In 1790, Charles Johnston and John May of Botetourt County, Virginia, made a trip to Kentucky by use of the Kanawha and Ohio Rivers. Johnston's own account of the trip discloses that they travelled overland until they reached Kelly's Creek on the Kanawha River where their travel by water began (Kegley; Incidents Attending the Capture, Detention and Ransom of Charles Johnston of Virginia, R. 1597-9).

Likewise, in 1798, when Moses Austin left Austinville, Virginia, for Missouri and Texas, he travelled overland to Kelly's Creek on the Kanawha, and there began the water stage of his journey. Austin's diary states that he left Austinville on June 8, 1798, with nine loaded wagons and a coach and four horses. He took the road to Morse's Boatyard located on the Kanawha at the mouth of Kelly's Creek. From that point, he travelled by water down the Kanawha and Ohio Rivers to Kaskaskia.

The foregoing are the only early trips down the New River Valley which history authenticates. With the exception of the unsuccessful attempt of Sally, none of them attempted to use water transportation above Kelly's Creek on the Kanawha River. Travel overland was then extremely difficult; thus it is plain that in its natural condition, New River was not susceptible of use as a means of trade, travel or transportation, and, indeed, that even the Kanawha[1] could not be practically used above Kelly's Creek.

Petitioner, while carefully refraining from making the assertion itself, makes full use of a relatively unimportant, though erroneous, statement appearing in the opinion of the District Court, which petitioner distorts to serve its own purposes by adding a further error of its own. Petitioner states:

> "The first account of navigation on New River, according to the District Court, is that of an exploration trip in 1742; thereafter, a number of expeditions navigated the river over the reach now in issue (R. 111-112). It is true that the trips were difficult and that portages were necessary (R. 112), but the important fact is that they were made" (Pet. Br. 41).

Sally's trip in the canoe made of five buffalo hides and the 85-mile "portage" has been discussed at page 40 hereof. The other trips, exploratory in nature, on which petitioner has heretofore relied, occurred at a somewhat later date and we briefly comment upon them.

In 1812, a Virginia Commission, headed by John Marshall, made an exploratory trip to report upon the possibility of connecting the James River and the Ohio River, either by turnpike or canal. This Commission travelled from the James River across the mountains, down the Greenbrier River and thence down the New River to the Kanawha region (Ex. 189, R. 2716-2723).

In 1817, Laomi Baldwin, who was an engineer employed by the State of Virginia to survey and recommend a practical means of connecting the James River with the Ohio River made a trip from the James River down the Kanawha River, as far as what is now Charleston. His official report to the Board of Public Works of the State of Virginia discloses that he did not use New River on this exploratory trip and did not recommend the use of any part of New River, either in its natural condition or if artificially improved, as a part of a route connecting the James and the Kanawha Rivers. His report affirmatively discloses that he used no water transportation until after he had reached the Kanawha River where he planned to have a boat from Charleston meet him *(Ex. 556)*.

---

[1] Even as late as 1876, one of the Army Engineers, William R. Hutton, stated: "Although the Kanawha is not navigable at low stages, there is no *flood* in which boats do not run" (Pl. (Pet.) *Ex. 245*, p. 76).

In 1819, the State of Virginia sent Moore and Briggs, likewise engineers, upon another expedition for the same purpose. They travelled from the head waters of the James River across the mountains, down various creeks, down Greenbrier River, up New River as far as Sinking Creek and also down New River to its mouth (Ex. 32, R. 2298-2301). It will be observed that the larger part of their trip on New River involved the admittedly unnavigable section below Hinton. Their "boat drew about nine inches of water" (R. 2307).

Neither the expedition of the Marshall Commission or that of Moore and Briggs was in the usual course of trade, travel or commerce. Each expedition was exploratory, and an experimental attempt to ascertain a feasible route of transportation by land or water from the James River to the Ohio River. Neither expedition reports observing any use of New River, or indeed the observation of a single boat of any character other than its own. Although the accounts of the trips of the Marshall Commission and of Moore and Briggs are colored by the natural optimism of the promoter and enthusiast, they nevertheless disclose numerous obstacles to any practical use of New River and make clear that no use of the River was practicable in its natural condition other than by artificial improvement. Indeed, the trip of Moore and Briggs was such a hazardous undertaking that they felt compelled to commend their men for their "courage, skill and dexterity exhibited in conducting our boat through the long and tremendous rapids of New

River" and expressed the view that it was "a voyage fraught with as much difficulty and danger as ever was completed with perfect safety" (Ex. 32, R. 2324).

In 1828, Capt. William G. McNeil, U. S. Topographical Engineer, made a report upon the prospective Roanoke and Kanawha Canal. It is significant that this report not only contains no reference to any use of New River for transportation purposes, but in suggesting to the Chief of Engineers the course to be followed by that canal, Capt. McNeil even fails to recommend as a possibility the use of the bed of New River as a part of the projected water highway. Instead, *he suggests that the canal be run along the bank* of New River, stating: "From the mouth of Little River, it (the canal) is prolonged on the right *bank* of New River to its intersection with the James and Kanawha Canal; and to the mouth of the Greenbrier, for most of the distance, the canal occupies very favorable ground through extensive flats which border on the river" (*Ex. 245,* p. 103).

The foregoing, we think, conclusively establishes that New River, in its natural condition, was not susceptible of practical use for trade, travel or transportation. Moreover, history affirmatively establishes that the routes of travel used by early settlers, traders and travelers were land routes over and along New River.

For example, one of these routes, perhaps the earliest, was known as the "Traders Path" (R. 1582). Then there was a route along the South Branch of the Roanoke River, and one along the North Branch. The one following the South Branch crossed New River near Dunkard's Bottom, thence continued westward through Dublin Hollow and over the divide which separates the water of the New and Holston Rivers (R. 1583).

Still another route came up the Catawba Valley in Botetourt County (R. 1583). This route was an extension of the Old Indian Trail through the Shenandoah Valley. It divided at Amsterdam, with one branch extending west near Catawaba Ridge. It followed the Catawaba Valley for some distance, thence after crossing the Ridge, down the North Fork of the Roanoke River and over the dividing Ridge to Drapers Meadows, thence on to New River (R. 1583). The other branch of this valley trail extended from Amsterdam southward into Carolina. There was an overland route which ran down New River from Walker's Creek to the mouth of East River (R. 1583-4).

Then there was the Midland Trail, the western terminus of which was Kelly's Creek near the present site of Charleston, West Virginia (R. 1589), although there was an extension thereof which continued down to the mouth of the Big Sandy River and also one to Point Pleasant, West Virginia. There was also the Newbern-Red Sulphur Turnpike (R. 1590) later known as the Giles, Fayette and Canawa Turnpike (R. 1590), which turnpike ran from Newbern to Red Sulphur Springs, thence down Indian Creek crossing New River at Pack's Ferry, thence along the west side of New and Kanawha Rivers to the Ohio by way of Fayette Court House to Charleston, at which point it connected with the Midland Trail.

There was also the old Cumberland Road from Cumberland Gap, which followed East River to its mouth and then continued in the general direction up New River on to Blacksburg (R. 1590). Then, of course, there was the famous "Lead-Mines Road", one branch of which led to lower Virginia, following in part the old "Traders Path" and the other of which led to Ingle's Ferry, passing through Christianburg and Salem (R. 1600--1).

These overland routes and trails were the customary highways of trade and travel—the head of water transportation at that period for the New River Valley settlers being down on the Kanawha River at Kelly's Creek or Kelly's Station, near the present site of Charleston, West Virginia (R. 1599-1601). None of this testimony was controverted by the petitioner.

However, in seeking to avoid the inescapable fact that history establishes that New River was not used by early settlers, traders or explorers, the petitioner has heretofore asserted that there was no occasion for its use because the tide of migration crossed New River and proceeded overland to the head waters of the Tennessee and other western rivers. The futility of such an attempt to escape the results of the undisputed facts on this point is apparent in many ways.

The record clearly shows that historically there was nothing that could be called use of New River. Was there any occasion for its use?

It is plain that had New River been susceptible of practical use, it would have been the natural road of migration to the rich western country. The fact that it was not so used would, alone, be of controlling significance. But laying aside that circumstance, the Court will take judicial notice that Kentucky was admitted into the Union in 1792, Ohio in 1803, Indiana in 1816, Illinois in 1818 and Missouri in 1821. The importance of communication to the westward, down the Catawba and Ohio Valleys, is therefore manifest. For years, Cincinnati, known as the Queen City of the west, was the largest city west of the Allegheny Mountains. Likewise, on the Ohio, Louisville, then as now, was the metropolis of Kentucky. From the New River region, the natural route for trade, travel and commerce with these important western settlements was down New River and the Kanawha to the Ohio and to the whole western country.

Indeed, the record shows that in 1790 Charles Johnston and John May travelled from Botetourt County to Kentucky by way of the Catawba Valley and the Ohio River (R. 1598-9) and that in 1798 Moses Austin travelled from Austinville, Virginia, to Texas by this same route (R. 1599-1600).

The uncontradicted record of each of these trips shows that each party travelled overland to Kelly's Boatyard on the Kanawha River near the site of the present City of Charleston, West Virginia, and there took boats for their travel down the Kanawha and Ohio Rivers to Kentucky and Texas, respectively.

Petitioner has made no serious attempt[1] to explain why Johnston and Austin travelled overland through a rugged country and a practically virgin wilderness at a time when (as one of the petitioner's exhibits shows) "the only means of transportation were the rivers, as no highways or railroads existed in that part of the country" (Ex. 145, R. 2704). If it had been practicable to use the much more comfortable and expeditious means of transportation which would have been afforded by a river susceptible of practical use, it is plain that Johnston and Austin would have taken advantage of the method of travel. Not only are these trips themselves eloquent testimony of the importance of such a route and of the need for water transportation had it been available, but if there was no occasion for river travel, why did Kelly's Boatyard on the Kanawha River exist?

However, the end is not yet. In 1812, we find the State of Virginia sending the Marshall Commission to locate a route to connect the James River with the Kanawha and the Ohio Rivers. Can it be supposed that the State of Virginia was expending a large sum of money to establish a route for which there was no use?

If the fact did not otherwise appear as it does, this circumstance alone would make clear that the absence of any use of New River could be explained not by the lack of any occasion for its use as a route to the rich western country, but upon the ground only that it lacked capacity for practical use.

---

[1] Surely petitioner does not seriously urge that a single Falls (Kanawha Falls), standing alone, constituted a barrier to early river use (Pet. Br. 41), for portaging would make light of a single Falls. The significant thing in the case of New River is not that it contains a single Falls 18 feet high around which portaging would have been tolerable had there been expanses of good water on either side. Rather the significant thing in the case of New River is the series of rocks, ledges and shoals which would have made necessary a successive series of portages making river use intolerable.

The inconsistency of petitioner is apparent in view of the fact that it would have this Court believe that, not merely a single Falls, but (upon the erroneous premise that the improved Hinton and Radford stretches are navigable) a 60-mile series of such obstacles is not sufficient to constitute a barrier to navigability in fact as well as in law.

Thus, in view of the pressing need felt by the people of the Eastern Seaboard, and particularly of the eastern portion of Virginia, as well as by the inhabitants of the upper New River region for a highway of commerce to the northward and westward, it is plain that there was ample occasion and reason for the use of New River which it was never feasible to make.

(b) Although the lead and iron industries were established on upper New River in very early days, history not only fails to disclose any use of New River for the transportation of either product but affirmatively establishes that neither product was ever transported, even locally, on New River, except a limited experimental and temporary local movement in 1881-1882.

The lead mines on upper New River, near Austinville, Virginia, were discovered in and have been worked continuously since 1756. During colonial times, and for a considerable time thereafter, these lead mines were the principal, if not the only source of lead. Much of this lead was transported northeasterly to Baltimore and to other eastern markets. Some of it was sent to Pittsburgh and down the River to supply the frontier forts and settlers of early days. There is no historical record that New River was used for the transportation of lead from these mines, either northeastwardly toward Baltimore and to the eastern markets, or northwestwardly toward the Ohio River and the western outposts.

New River flows in a northeasterly direction from the lead mines to and beyond the present site of Radford; and transportation by water for that distance would have been a great advantage and saving in transporting lead to Baltimore and other eastern markets. As early as 1780, Thomas Jefferson noted the great advantage which would accrue if it were possible to make New River navigable from the lead mines northeastward, so as to shorten the land-carriage of refined lead to the eastern markets. History not only fails to record any use of New River for the transportation of lead, either to the eastern limits or down the Kanawha to the western outposts, but affirmatively shows that lead was transported by land routes (Kegley, R. 1587 (Jefferson's "Notes on Virginia"), 1601-2; R. 1733-4).

Manifestly, the great advantage of water transportation for heavy commodities would have caused the lead industry to have taken advantage of even a difficult and precarious navigation had that been possible, but the record shows that no such use was attempted—not even at the height of the short-lived enthusiasm engendered locally by the Federal work.

Charcoal iron furnaces were established along and upon upper New River as early as 1788; and they continued to operate for more than a century. Dr. Holden, who, we think, is the greatest living authority on the history of the lead and iron industries of southwestern Virginia, testified that there is no reliable historical evidence that there was any use or attempted use of New River for the transportation of pig iron from these furnaces, except a very limited and temporary local movement in 1881 and 1882.

The size and importance of the charcoal industry on upper New River is manifest from Doctor Holden's testimony (Holden, R. 1723-33).

The movement of charcoal pig iron in 1881 and 1882, which was only downstream and in small open boats propelled by poles, included only a portion of the output of but two of the numerous furnaces along New River above Radford, and extended over only a short reach of the river above the rail-head at New River Bridge. This limited temporary local movement was obviously experimental, stimulated by the attempts of the Federal Government to create a shallow artificial channel for a short distance upstream from the railhead of New River Bridge. It was abandoned after a year or two.

Even if this limited local and temporary movement of pig iron had not been abandoned, such a course would not establish that New River was naturally navigable, but only that it was possible to create limited and precarious artificial navigability in a stretch of the river for a few miles above New River Bridge.

The iron, lead and zinc industries are included in what are known as the "heavy" industries. Water transportation, where practical, is of greater benefit to heavy industries than to any other type of industry (Holden, R. 1736). This charcoal iron, for instance, was marketed not only in the eastern markets but in Cincinnati, St. Louis and Louisville (Holden, R. 1733). It is plain that if New River had been susceptible of practical use for water transportation, it would have been used to tremendous advantage by those industries of upper New River. On the contrary, it clearly appears that the land routes were the means of transportation for the marketing of products of the lead and zinc mines and smelter work charcoal iron furnaces, both before and after the coming of the railroads (Kegley, R. 1587, 1601-2; Holden, R. 1732-33).

None of this testimony with reference to the early means of transportation to and from the lead and zinc mines and the charcoal-iron furnaces on upper New River was controverted by any testimony offered by the Government. Indeed, as shown by many of the exhibits which the appellant itself introduced, even when the War Department sent Army engineers to the river for the purpose of examining it and inaugurating a federal attempt at improvement, they did not report that such industries were using the river. Instead are to be found such reports as that of S. T. Abert which states that

> "Nearly all the agricultural products of Pulaski, Floyd, Carroll and Grayson Counties, Virginia * * * have to be *hauled* from *ten* to *sixty* miles, *over mountain-roads*, and at a cost, in many cases, of from 40 to 50 cents per 100 pounds, * * * These rates render

> exportation from the back counties *unprofitable*, and they are, except for livestock, shut out from market. The *opening* of the river would stimulate the cultivation of resources *now without value*.
>
> * * * * * * *
>
> "The agricultural resources are, however, exceeded by the *mineral*. These extend along the course of the river and beyond the limited section assigned to me for examination. But in *all this region* the *cost of hauling*, when added to railroad freights, *destroys the profits*." (Abert to General Humphreys, Feb. 7, 1875, Ex. 559, R. 2816-7).

Abert also found that there were several furnaces operating along the river:

> "* * * The following furnaces are in active operation, and are all situated only a few miles from the river, mostly under three miles; Graham & Robinson's, two furnaces; Radford Iron-Works, one ten-ton furnace; Howard & Saunders, one; Painter & Co., one; Huddle, one; Crocket & Sanders, one; Sayers & Oglesby, one; Speedwell, one; some others are in course of erection. Beside the blast furnaces, several bloomeries and forges exist on or near the river for manufacturing blooms and bars, direct from the ores, or otherwise converting pig-metal."

and that these furnaces were

> "capable of producing about 10,000 tons per annum of the best cold-blast, car-wheel, charcoal iron,"

despite the fact that it

> "costs, on an average, $4. per ton for haulage to railroad, * * *". (Abert to General Humphreys, Feb. 7, 1875, Ex. 559, R. 2817.)

Then there is the Report of C. R. Boyd, Assistant Engineer who collected data "bearing upon the value of the improvement of New River to the adjacent country" and who likewise emphasized the lack of suitable transportation.

> "Their (Counties of Grayson and Carroll) large deposits of copper and iron have long since induced enterprising men, of their own and neighboring counties, to devote capital and time to the raising of ores to find themselves *prohibited* from realizing a *safe return* by the *imperfect* means of *transportation.*" (Boyd to Col. Craighill, Dec. 17, 1872, Ex. 31, R. 2290.)

Although, despite the imperfect transportation, several furnaces and forges were operating:

> "From the head of Cripple Creek, in Wythe County, extending north by east along the Creek, crossing New River, and extending through the southern portion of Pulaski and Montgomery Counties, is a great lead of iron ore, as represented on the map, varying in breadth, as shown by its furnaces and forges, from half a mile to two miles, sending off now and then arms but little less extensive than the main lead, giving the capital and labor invested along it remunerative returns, although the *imperfect means* of *transportation* for metal and supplies would appear to be prohibitory" (*id.;* R. 2290-1).
>
> * * * * * * *
>
> "The furnaces and forges above enumerated (Radford Iron-Works on Mack's Creek, Messrs. Graham, McGavock, Howard, and Saunders, Painter, Pierce, Chatwell, Huddle, Gallup, Crockett & Sanders, and Sayers & Oglesby) are now shipping 12,000 tons of metal annually, with a supply of charcoal timber so greatly diminished as to cause many of the proprietors to look abroad rather anxiously for supplies of stone-coal or coke" (*id.;* R. 2291).

However, Boyd saw the trade and industry as taking on greater importance if a better means of transportation were provided:

> "The zinc ore to the southwest of and near the mouth of Reed Island Creek, appears near the surface in masses, giving upon assay a percentage which has induced purchases by experienced miners, and it

> would be extensively worked were a *more certain means* of *transportation* provided" (*id.;* R. 2292).
>
> * * * * * * *
>
> "To sum up, a *sufficient transportation* will throw open to the world great metalliferous deposits, with the extent of which I was scarcely even in part acquainted, until that cursory examination of which this is the report" (*id.;* R. 2294).

Further, there is the report of N. H. Hutton, Assistant Engineer, who in recommending that the river be improved, stated *inter alia,* as follows:

> "Carroll and Wythe Counties abound in rich deposits of copper, iron, lead, zinc, and manganese, which are yet hardly developed, *owing to the want of economic means of transport,* though there are now in operation, within a length of 20 miles *along the river,* 9 iron furnaces, and the Wythe Union Lead Mines, which have been worked for *more than a century,* and still yield abundantly of lead and zinc ores of great purity." (Hutton to Craighill, Dec. 17, 1872, Ex. 31, R. 2287.)

(c) There is no other evidence of any substantial use of New River, even local in character, before the Federal work.

Petitioner states: (1) That the report of N. H. Hutton, Assistant Engineer, who surveyed New River in 1872 makes plain that "the river was then navigated" (Pet. Br., 42);

(2) that "the improvement was to facilitate the already existing navigation" (Pet. Br., 43-44);

(3) that "the engineers reports from 1872 until 1899 speak of an existing navigation which reached throughout the Allisonia-Hinton stretch" (Pet. Br., 20);

(4) that the existence of "a Radford-Hinton Commerce" is indisputable (Pet. Br., 43); and also

(5) that the navigable channel "ran 'throughout this distance' from above Allisonia to Hinton (R. 2370; see, also, R. 2394, 2406-07)" (Pet. Br., 43).

Thus petitioner implies that the Army Engineers' reports showed that the river in its natural condition was being navigated throughout the entire section from Hinton, West Virginia, to Radford, West Virginia, and even from Hinton to Allisonia, Virginia. This simply is not the fact.

An analysis of the Army Engineers' reports shows that the only references in any of these reports to the use of boats on New River prior to the Federal work are the following appearing in a letter (printed in the Annual Report of the Chief of Engineers for 1873) from the above-mentioned N. H. Hutton, Assistant Engineer, to Colonel W. P. Craighill, in which Hutton states:

> "The present system of transportation on this portion[1] of the river is by keel-boats which carry from two to three tons, and are rowed or floated down the river and poled up. An expenditure of $100,000 would greatly ameliorate the condition of the river for this trade, and enable the trips to be made with *so much more certainty* as to induce a considerable increase of trade" (Ex. 31, R. 2288);

and such phrases as "keel-boats now in use" which appear in a few instances; for example, this phrase is to be found in the Annual Reports of the Chief of Engineers for 1877, 1878 and 1879 (Exs. 33, R. 2324; 34, R. 2362 and 35, R. 2333).

While Hutton's characterization of the localized, sporadic, and uncertain use of New River as a "system of transportation" possibly indicates that Hutton was one who did not blink at the use of superlatives, nevertheless it is most probable that this characterization actually referred to such intermittent use as keel-boats made of the limited pools[1] and possibly to an occasional use made of other local reaches of the river in time of high water, for in the Army Engineers' reports it is stated of even the relatively flat Kanawha River, which, of course, is downstream from and larger than the New, that "although the Kanawha is not navigable at low stages, there is no *flood* in which boats do not run * * * " (*Ex. 245*, p. 76; Report of William R. Hutton to Col. William P. Craighill, 1876), and that

---

[1] Although not a single Army Engineer's report states that "'keel-boats' or bateaux" (Ex. 34, R. 2328) were navigating "throughout this distance from above Allisonia to Hinton" *even after* the Federal work was completed, much less *before* the Federal work, and the inescapable conclusion is that such was not the case (see page 56 hereof), nevertheless petitioner has left the erroneous implication, whether intended or not, that the Army Engineers were referring to trips made by boats between such terminals as Hinton, West Virginia and Allisonia, or Hinton, West Virginia and the lead mines in Virginia.

> "The navigation above Charleston was more obstructed than below. Above, it was almost suspended in summer. The coal and salt were generally sent out on *rises*, which enabled the boats to pass safely over the obstructions, which otherwise would stop their movements entirely. The use of the river for the movement of these valuable products was therefore *unsatisfactory* and *intermittent*." (Report of C. of E., 1882, *Ex. 38*, p. 142.)

However, any inference or deduction from the phrases "present system of transportation on this portion of the river" and "keel-boats now in use" to the effect that there was any real, substantial, or continuous transportation system on the river is quickly dispelled when it is observed that even after the attempt at improvement had been under way for three years on the lower division of the river and four years on the middle division of the river, there were only eight keel-boats and two keel-boats on the two divisions respectively, or ten keel-boats on the entire river (Report of Chief of Engineers, 1881, Ex. 37, R. 2371). Any improvement of the river would, of course, have stimulated any use of keel-boats; hence in 1872, at the time Hutton was writing, there certainly was not a greater number of keel-boats in use than in 1881, and presumably fewer.

---

[1] Hutton states that the river "presents the usual features of mountain streams; reaches of comparatively still and deep water *separated* by rapids and shoals" (Ex. 31, R. 2282). Obviously the fact that the pools were *separated* by ledges and shoals and that the depth over ledges and shoals was "rarely over 1 foot in depth" imposed physical limitations, which necessarily served to confine any use that could be made of the river to the pools, and the pools, of course, were too short for anything except the most local sort of use. In the upper portion "whole miles being composed of ledges of slate or limestone, *200* or *300 feet* apart, with *small* pools between," and even the lower portion "though the rapids are more concentrated, yet even there the pools will hardly average more than *one mile* in length" (Ex. 31, R. 2282).

Moreover in 1883, which was six years after the improvement work had been inaugurated, the Chief of Engineers reported that:

> "The navigation of the river *not being continuous* as yet, it is *practically a feeder to the railroads* which cross it and run along portions of it." (Ex. 39, R. 2396.)

Also

> "It has hardly been practicable to accomplish at any one of the very many points needing improvement all that has been desirable, but the worst places have been worked upon to the greatest extent and efforts thus been made to increase the available navigability of the river over as long stretches as possible, and to increase the facilities for *access* of the greatest number *to the railroads* touching the river, and thus connecting with the eastern and western markets districts otherwise *much isolated* and *hitherto dependent* on *teaming* to *railroad stations* over *long* and *bad roads*" (Ex. 39, R. 2396).

Hence it is obvious that any inference or deduction to the effect that there was any substantial or continuous system of transportation on New River in its natural condition is wholly unwarranted.

However, Hutton's letter itself contains a refutation of any such inference or deduction, inasmuch as Hutton states that the very object to be accomplished by the proposed improvement of the river was

> "* * * to *connect* the iron, lead and zinc deposits of Wythe County and the copper of Carroll (Va.) with

> the coal of the Kanawha Fields (W. Va.)" (Report of Chief of Engineers 1873, Ex. 31, R. 2287),

clearly showing that *such connection* was *then* lacking.

Furthermore, Hutton referred to the various products in the region which could be marketed "*if* an *outlet* were offered to a market", (Report of Chief of Engineers 1873; Ex. 31, R. 2288) and he again shows the lack of any substantial use of the river in its natural condition by alluding to the benefit *expected* to be derived from the proposed improvement stating:

> "The improvement, *if effected*, would, in about 40 miles below the Lead Mines, intersect the Virginia and Tennessee Railroad and the Chesapeake and Ohio at the mouth of the Greenbrier, thus *opening* to both eastern and western markets a large area of productive country, *now* practically *shut up*" (Ex. 31, R. 2288).

Numerous other references throughout the Engineers' reports portray a lack of use of the river as a highway of commerce in its natural condition. Instead, the reports stress (a) the need of improving the river in order to provide an outlet for the country, or (b) the need of improving the river in order that mineral and agricultural products might be shipped by water, or (c) what boats could do as a result of the improvement which they could not do prior thereto.

(i) Respecting the necessity of *providing* outlets:

> "That the proposed improvement will be of real and decided *local benefit*, I consider now proven. It, and it alone, can and will afford an adequate *outlet* for a region good agriculturally; and with ascertained workable mines of the ores of lead, zinc, coal, and iron, and a considerable lumbering district all favoring the building up of local manufacturing interests, an *outlet* alone is *needed* to put in motion at once a considerable and increasing trade" (Cuyler to Craighill, March 15, 1879, Ex. 35, R. 2342).

"June 30, 1880, there was a channel 50 feet wide and 2 feet deep from Hinton Landing to Hubbard's Ripple, a distance by river of 12½ miles, *giving an outlet* to the products of Mercer County, West Virginia.

"At the close of the season's work for 1880, there was a channel of the same width and depth, from Hinton Landing to McDaniell's or Harvey's Falls, a distance of 17¾ miles, *giving an outlet* to the farmers and graziers of Crump's Bottom and the Indian Creek country. And in addition to the above there are 12 miles of improvement from New River Bridge to Peak's Creek, with a channel 30 feet wide and 2 feet deep, *giving an outlet* for timber and farm products, *but not available* for iron or ores *until* Radford Furnace *can be reached*" (Smith to Craighill, April 8, 1881, Ex. 37, R. 2376-7).

"The appropriation for the fiscal year ending June 30, 1882, will carry the improvement on the Greenbrier Division through Wiley's Falls, 26 miles above Hinton, passing the mouth of Lick Creek, 20 miles above Hinton, *thus opening up the trade* from Tazewell and other rich counties adjoining" (Smith to Craighill, April 8, 1881, Ex. 37, R. 2377).

"The appropriation for the fiscal year ending June 30, 1882, will carry the improvement on the New River Bridge division to Carter's Ferry, 33 miles above the bridge, and *give an outlet* to the iron from Radford Furnace, 18 miles above the bridge, to the ores from an iron mine 8 miles beyond, to Graham's new furnace and iron works, the former 31 miles and the latter 33 miles above the bridge, as well as to two zinc mines in the same section" (Smith to Craighill, April 8, 1881, Ex. 37, R. 2377).

"The channel *gives outlet* to Reed Island Furnace at the mouth of Big Reed Island Creek, 26¾ miles above the initial point. In the 8 miles referred to seventy-three ledges were encountered, twenty-seven of which were improved for the 10-foot channel, and nearly all will have to be worked at when the 20-foot channel is made, which should be as soon as Barren Spring Furnace is reached; to do this it is thought it will be best to go back to the beginning of the 10-foot channel, at the foot of Cecil's Ledges, 14½ miles above the bridge. The increased width is rendered necessary in some places where there is loose rock and gravel, as 10 feet is not wide enough for the current to keep the channel clear; as, for instance, at Jones' Ford and Crumm's Shoals; in fact, the narrow channel was only adopted to give *temporary* relief to the furnaces" (Smith to Craighill, May 21, 1883, Ex. 39, R. 2400).

"From the lead mines up, it is proposed to make a channel as below, 2 feet deep and 20 feet wide, a width sufficient for bringing charcoal for the furnaces down in bateaux, and for rafts of timber, of which there is an abundance in this region; there are also large deposits of copper in Carroll County, which it is thought will be *eventually* mined and *shipped* over this route" (Smith to Craighill, April 8, 1881, Ex. 37, R. 2375).

"The above (a table showing tonnage sent from and received at various railroad stations for the year ending December 31, 1880) is all from the two upper sections of New River now being improved, and it may be safely asserted that not less than one-third of this amount *will be shipped* by water as soon as the channel is made.

"Of the products of the mines, which amount to 7,044 tons, exclusive of coal ⅞ths *will be carried* in boats down to New River Bridge Station.

"The proportion of tonnage received, that *will be sent* over this route, could not be ascertained" (Ex. 37, R. 2380).

"Breeden's ledges, nearly 25 miles above the initial point, were improved for the shipment of iron ore from the mines to Radford Furnace" (Smith to Craighill, April 28, 1882, Ex. 38, R. 2387).

"To finish Pine Run Shoals will require cutting through four ledges, about 15 feet wide, and *give outlet* to Barren Spring Furnace, 30.9 miles above the bridge" (Smith to Craighill, May 21, 1883, Ex. 39, R. 2400).

"8 keel-boats on this division, with a small side-wheel steamboat, 75 feet long, 8 feet wide, and drawing 3 feet. 18 charcoal furnaces, 4 forges, 4 zinc mines, 1 lead mine, and many deposits of copper *await shipment by the river,* and vast forests of the

> most valuable timber, on the upper division, are *kept from market by the non-completion* of this work" (Smith to Craighill, May 21, 1883, Ex. 39, R. 2400-01).
>
> "The improvement, when it reaches a point 35 miles above Hinton, will give *outlet* to Peterstown, Monroe County, West Virginia, a thriving place, about 2½ miles from the River, at which there are three mills with a capacity of 58 barrels of flour and one hundred and twenty bushels of meal per day, three tanneries using 1500 hides per annum, three stores, one saw-mill, and one cabinet shop" (Smith to Craighill, May 21, 1883, Ex. 39, R. 2399).

The foregoing excerpts from the Engineers' Reports clearly imply that the river in its natural condition did not serve as an *outlet* for any substantial commerce but that instead real improvement would be necessary before a river *outlet* would be available.

(ii) Respecting the necessity of improvement in order that mineral and agricultural products might be shipped by water:

> "The freshet of September, 1878, undoubtedly went to impair much the improvement made, involving an expenditure of from $2,000. to $3,600. to do over work once completed; but with this, even, there has been a decided betterment of navigation effected. The fact, however, originally set forth must not be lost sight of—that if any marked benefit is to accrue from the improvement it must be extended up 5 miles—to make the 19 miles first projected—or to Mac's Creek, at a cost of $7,600. more. This point is in this region of the downstream boundary of an extensive and rich mineral-producing district, which is the *main interest* to be served by the improvement, and which *alone* can and *would inaugurate* full use of it *when once made.* To *utilize,* then, the work already done commensurately with its cost, necessitates as immediate a *completion* to Mac's Creek as possible" (Cuyler to Craighill, March 15, 1879, Ex. 35, R. 2340).

"The owner of Radford Iron Furnace, 18 miles above New River Bridge, as well as those of a furnace on Little Reed Island Creek, 26½ miles from the bridge, are *anxious to send* iron and ores down *by bateaux;* and, in addition, the following *may be expected* to ship: Forge at mouth of Little Reed Island Creek; Barren Spring Furnace; furnace near this belonging to Graham and Robinson; Bertha Zinc Works; Falling Cliff Zinc Works, to be started soon, and yet another, by a New York company near the Bertha Mine." (Smith to Craighill, April [illegible], 1881, Ex. 37, R. 2374.)

"*Shipments* of iron by river *only commenced* in December, 1881, and are not shown. *When* the river is *fully improved* it is *thought* that *boats will carry* one-third of all the products and seven-eighths of those of the mines, exclusive of coal. The tonnage from these stations is one-third more than in 1880." (Smith to Craighill, April 28, 1882, Ex. 38, R. 2392.)

Referring to New River Bridge Division "Eight keel-boats on this division, with a small side-wheel steamboat, 75 feet long, 8 feet wide, and drawing 3 feet, eighteen charcoal furnaces, four forges, four zinc mines, one lead mine, and many deposits of copper *await shipment* by the river, and vast forests of the most valuable timber, on the upper division, are kept from market by the non-completion of this work." (Smith to Craighill, May 21, 1883, Ex. 39, R. 2400-01.)

"The work stops almost in the middle of Wilkinson's Shoals, which are 1¾ miles long, and *until they can be finished the improvement amounts to nothing;* in fact, *to be useful* for the shipment of timber and charcoal, it should be carried at least 4 miles farther, to Crooked Creek." (Smith to Craighill, April 28, 1882, Ex. 38, R. 2388.)

The foregoing excerpts from the Engineers' Reports clearly show that New River in its natural condition was not used for any substantial amount of shipping of mineral and agricultural products. Instead, they show *expectations* which would be realized *only after the improvement* of the river.

(iii) With respect to facilitating the passage of boats:

> "The improvement, as now made, enables the steamboat to go up 12½ miles at ordinary low water, and with a rise of 7 inches she can go, and has gone, up above Crockett's store, 15 miles from Hinton.
>
> "The work is of great benefit to bateaux, enabling them to get through with a great deal of ease and to carry much larger cargoes than formerly, and, in fact, they can run now where it was *utterly impossible before,* owing to low water. Of these lines there are three, one to Bluestone, 5 miles, one to Crockett's store, 14½ miles, and one to Lick Creek, 20 miles above Hinton." (Smith to Craighill, March 30, 1880, Ex. 36, R. 2366.)
>
> "Four lines of keel boats, eight in all, now run regularly on this part of the river, the improvement enabling them to carry two-thirds more freight than formerly; for instance, 1500 feet of lumber used to be a load; now it is 4500 feet." (Smith to Craighill, April 8, 1881, Ex. 37, R. 2373.)

Likewise the foregoing does not portray a river capable of continuous navigation in its natural condition but instead they portray the value of the improvement work by showing what a boat could do, on a local reach of the river, as a result thereof, which could not be done before.

The *local nature* of any use made of the river prior to improvement is further shown by the fact that Smith, in 1882, states:

> "The work is now in Virginia, but as only a small point of that state puts in here the work will essentially be for the benefit of West Virginia, as the Counties of Monroe and Mercer in the latter state will supply *all* of the freight, *until* the improvement reaches the Narrows, 40 miles above Hinton" (Ex. 38, R. 2385).

Of course, the federal work never reached the Narrows.

The fact that prior to the federal work river transportation was unimportant and that instead of products customarily being carried to market by boat they were taken there by wagon, as well as the fact that there was no continuous navigation of the river, is shown by the Report of the Chief of Engineers, 1883:

> "It has hardly been practicable to accomplish at any one of the very many points needing improvement all that has been desirable, but the worst places have been worked upon to the greatest extent and efforts thus been made to increase the available navigability of the river over as long stretches as possible, and to increase the facilities for *access* of the greatest number to the *railroads* touching the river, and thus connecting with the eastern and western markets districts otherwise much isolated and *hitherto* dependent on *teaming* to railroad stations over *long* and *bad roads*" (Ex. 39, R. 2396).

In fact, even after the work on the lower and middle divisions was finished, the Chief of Engineers (1883) expressly states that there was no continuous navigation of the river.

> "The navigation of the River *not* being *continuous* as yet, it is practically a *feeder* to the railroads which cross it and run along portions of it" (Ex. 39, R. 2396).

from which follows the inescapable conclusion, that there could have been no continuous navigation of the river prior to the federal work.

3. *The nature and extent of the federal work on New River and its subsequent abandonment not only failed to support an inference of navigability but constituted strong evidence of lack of practical utility for navigation.*

Beginning in 1877, the Federal Government undertook to create an artificial channel relatively shallow and narrow in three widely separated local stretches of New River. Within the period from 1877 to 1889 a total expenditure of approximately $110,000 was made—a meager expenditure over a period of 12 years! Work was limited to the stretches most easily improved and an effort was made artificially to provide local navigation.[1] The project proved impracticable and ineffective and was abandoned by the Federal Government. Reserving a more detailed description of the nature and scope of the Government work for later consideration, we first examine the evidence to determine what, if any, effect the Government work had on the use of New River.

---

[1] POINTS REACHED BY FEDERAL WORK IN VARIOUS YEARS.

KEY: (a) Refers to Lower, or Greenbrier, Division.
(b) Refers to Middle, or New River Bridge, Division.
(c) Refers to Upper, or Lead Mines, Division.

1877 (b) (Work completed from New River Bridge to Falls Branch, a distance of 9 miles (Ex. 34, R. 2330).

1878 (b) (Work completed to Peak Creek Shoals. Distance 13½ miles above New River Bridge (Ex. 35; R. 2339).

(a) (Partial improvement to Land Craft Shoals, 5⅞ miles Ex. 36; R. 2368) above Hinton (Ex. 35; R. 2345).

1879 (a) (River partially improved to downstream end of Crump's Bottom (Ex. 36; R. 2366) about 15 miles above Hinton).

1880 (a) (Improvement carried as far as Harvey's or McDaniel's Falls 17¾ miles above Hinton landing (Ex. 37; R. 2373).

(b) (The channels on the middle division which were damaged by the freshet of 1878 were cleaned out (Ex. 37; R. 2374).

1881 (a) (Work reached about 26½ miles above Hinton (Ex. 38; R. 2385).

(b) (Improvement reached 22 miles above New River Bridge—some work done on Breeden's Ledges 25 miles above New River Bridge (Ex. 38; R. 2386-7).

(c) (River worked for a distance of 5½ miles above the Lead Mines or to Wilkerson's Forge (Ex. 38, R. 2388).

1882 (a) (Continued work to Wiley's Shoals, about 26½ miles above Hinton (Ex. 39; R. 2398).

(b) (Continued work to a point in Pine Run Shoals—29¼ miles above New River Bridge (Ex. 39; R. 2400).

1885 (c) (Work carried to 6¼ miles above Lead Mines (Ex. 42; R. 2412).

1889 (c) (Work continued to the "Gulf" 7-9/10 miles above the Lead Mines (*Ex. 563*, p. 2250).

(a) The Use During and After the Federal Work Was Essentially Limited in Amount, Local, and of Relatively Short Duration.

(1) *Miscellaneous use of river by bateaux or "keel-boats".*

The Engineers' reports show that such use of the river as was made by bateaux was almost entirely of a local nature.

Capt. Cuyler, who had charge of the first work on the river in 1877, in reporting to Col. Craighill, refers to the fact that after the flood of September 13, 1878, the Government property used in the improvement work was collected and repaired and then "all boated[1] down to Hinton".

---

[1] If this were to be stated less euphoniously, it would be said that the Government work boats "all were washed down the river". The witness Knode, who had charge of collecting the Government work boats after the flood of 1878 and taking such of those as he could find and which were fit for use, on to Hinton, is illuminating on the subject of this *boating* down to Hinton. He states (R. 1566-7):

> "It was 11:30 when we went out of there, I remember, and those boats broke loose and I was two miles below at my home where my father lived, and those boats came along; we could not catch them then.
>
> "Later on I took a force of men and gathered up such Government property as would be of any account, from there to Hinton, after the river went down. I recall finding one boat at Dry Branch; it was, possibly was not a quarter of a mile—but some several hundred yards from the river. I did not find any other boats which were any good. There were four boats that we used for gravel boats. We found them, one at Dry Branch, one at Narrows; one was torn all to pieces—it had a small derrick on it. There was a tide in the river when we went down, there had to be, or we could not have gotten down."

The foregoing is the unexpurgated story of the "flotilla of boats" to which the petitioner referred "as having navigated the river for a distance of 84 miles down to Hinton, West Virginia" in its brief before the Court of Appeals (App. Supp. 196) and which petitioner, in its present brief (p. 178) refers to as the transportation of the "Government surplus property" from "Mack's Creek to Hinton," and it was this flood movement—not to mention destruction—of the Government work boats of which petitioner said in its brief before the Court of Appeals (App. Supp. 197): "These

(*Footnote continued on next page*)

(Ex. 35, R. 2337-8). Significantly, he does not record that any commerce, even local, was being carried on by means of the river.

In 1880, Smith referred to a use being made of the river stating in his discussion of the federal work:

> "The work is of great benefit to bateaux, enabling them to get through with a great deal of ease and to carry much larger cargoes than formerly, and, in fact, they can run now where it was utterly impossible before, owing to low water. Of these lines[1] there are three, one to Bluestone, 5 miles, one to Crockett's store, 14½ miles, and one to Lick Creek, 20 miles above Hinton." (Smith to Craighill, March 30, 1880, Ex. 36, R. 2366).

---

uses of the river *really are commercial uses"*, and which, in its present brief, petitioner lists under the heading: "Commercial Navigation on New River between Hinton, West Virginia and Allisonia, Virginia" (Pet. Br. 178).

On one other occasion the Government work boats were taken from Radford to Hinton. This 84-mile trip was made in 29 days 'flat'. Smith, writing of it, states:

> "On the 17th of March, J. F. Palmer, to whom much praise is due * * * for the energy and ability displayed in this movement, commenced that work, and after much difficulty, on account of the weather, low water, and scarcity of labor, succeeded in getting it all at the proper point [Hinton] on the 14th of April * * * " (Ex. 39, R. 2401).

Petitioner refers to this (Pet. Br. pp. 51-52) in connection with its recital of the testimony of its witness Owen to the effect that the boats were taken from "Radford down the river to Hinton where they were sold".

The entire "flotilla of boats" on this occasion sold for $415.26 (R. 2397), hardly more than the price of a second-hand automobile. The money was turned into the Treasury and the federal work on the Greenbrier and New River Bridge Divisions of the River was ended.

[1] The phraseology used in the pertinent report is "three lines of keel-boats". However, in the terminology of the river, a "line of keel-boats" meant two keel-boats (see more complete phrase used by Smith elsewhere, viz., "four lines of keel-boats, eight (boats) in all" (Ex. 37; R. 2373).

In 1881, Smith wrote that:

> "Four lines of keel boats, eight [boats] in all, now run regularly on this part of the river, the improvement enabling them to carry two-thirds more freight than formerly; for instance, 1500 feet of lumber used to be a load; now it is 4500 feet." (Smith to Craighill, April 8, 1881, Ex. 37, R. 2373).

and that there were eight keel-boats on the lower division and that on the middle division there were two keel-boats which "are in use carrying ores"[1] (Ex. 37, R. 2371).

Major Alstaetter, in 1912, stated:

> "In 1883 there were about seventeen keel boats in this traffic, and there are *said to be*[2] ten or twelve such boats now on the river. * * * The commerce is *altogether local*" (Ex. 46; R. 2423-4).

Several witnesses from the vicinity of Hinton, West Virginia, were produced by the petitioner for the purpose of testifying with respect to the boating of lumber, tobacco, and miscellaneous products in the religions below and above Hinton. Most of this testimony had to do with the carrying of forest products downstream to Hinton for shipment by rail.

---

[1] This carrying of ores was in essence little more than a ferrying operation. That is, the ore was brought by wagon from Clark's Ore Bank (on the west side of the river) to the river, there loaded on a boat and taken downstream and across the river about one and one-half miles to the foot of Breeden's Hill, now Hiawassa, and thence transported by wagon over the hill several miles to Radford Furnace (*Ex. 550;* R. 1725; deposition of R. H. Moore, R. 450).

[2] Petitioner (Pet. Br. 38) has given footnote emphasis to Maj. Alstaetter's statement (although not referring to him by name) that "there are *said to be* ten or twelve such boats now on the river". Of course, this was purely hearsay. Indeed, Alstaetter does not record that he, himself, observed a single boat anywhere on the entire 84-mile reach from Radford to Hinton which his examination covered. And, even with respect to these "said to be" boats, Alstaetter does not state that they were "said to be" as far upstream as *Glen Lyn*, as might be inferred from petitioner's use of the words "Glen Lyn-Hinton stretch". In fact, he does not state that they were "said to be" *in use* at all.

Any evidence of even a sporadic and unusual trip as far as or above the vicinity of Wiley's Falls, was enshrouded with vagueness and indications of irregularity and in general was of such character as to make it preponderantly clear that such sporadic trips formed no part of any appreciable commercial transportation (R. 114). It clearly appears that boating was practically confined to the movement of forest products from a short distance above Hinton to the railroad at Hinton.

This limitation is clearly recognized by the report of the Chief of Engineers for the year 1882 in which it is stated:

> "The work is now in Virginia, but as only a small point of that State puts in here, the work will essentially be for the benefit of *West Virginia,* as the Counties of Monroe and Mercer in the *latter State* will supply *all* of the freight, until the improvement reaches the Narrows, 40 miles above Hinton" (Ex. 38, R. 2385).

(2) *Transportation of Pig Iron.*

During the course of the trial, testimony was offered by various aged witnesses—petitioner, in its brief (Pet. Br. 178 *et seq.*) has purported to tabulate some of this testimony—concerning the alleged boating of charcoal or pig-iron from one furnace known variously as Boon, Boone, Boom, and Reed Island Furnace, and another known as Radford or Mack's (Mac's) Creek Furnace.[1] It would appear that there

---

[1] During the course of the federal work certain of the Army Engineers apparently came to realize that if the improvement in the short stretch of river above Radford could be of benefit to anyone it would be to the furnace industry and mineral interests. Cuyler refers to this, stating:

> "The fact, however, originally set forth must not be lost sight of—that if any marked benefit is to accrue from the improvement it must be extended up 5 miles—to make

(*Footnote continued on next page*)

is little to be gained from discussing such testimony in detail, inasmuch as it is clear that such boating was not only temporary and very limited but was only over the short stretch above New River Bridge where the Government had attempted a local improvement.

Furthermore, the testimony of many of these aged witnesses is so vague as to the time when such boating began, the period it covered and the amount of boating done as to be uninformative, and, in the cases of others of these witnesses, the testimony is so obviously in error, being predicated upon memories that have been dimmed by the passage of many years, that the sum total of their testimony is a series of contradictory and uncertain statements which preclude it from being a source of reliable information.

For example, the petitioner's witness, J. G. Graham, thinks that the boating of pig-iron covered a period of three or four years (R. 236). On the other hand, the respondent's witness, A. Moore, thinks that it continued off and on possibly for a year or year and a half (R. 1556). He states that

---

> the 19 miles first projected—or to Mac's Creek, at a cost of $7,600. more. This point is in this region the down-stream boundary of an extensive and rich mineral-producing district, which is the *main* interest to be served by the improvement, and which alone can and *would* inaugurate fully use of it *when once made*. To utilize, then, the work already done commensurately with its cost, necessitates as immediate a completion to Mac's Creek as possible." (Cuyler to Craighill, Mar. 15, 1879; Ex. 35, R. 2340).

And Smith listed certain furnace owners; etc., above Radford who were anxious to make use of the river, stating:

> "The owner of Radford Iron Furnace, 18 miles above New River Bridge, as well as those of a furnace on Little Reed Island Creek, 26½ miles from the bridge, are *anxious* to send iron and ores down by bateaux; and, in addition, the following *may be expected* to ship: Forge at mouth of Little Reed Island Creek; Barren Spring Furnace; furnace near this belonging to Graham and Robinsion; Bertha Zinc Works; Falling Cliff Zinc Works, to be started soon, and yet another, by a New York company, near the Bertha Mine." (Smith to Craighill, April 8, 1881; Ex. 37, R. 2374.)

it was not a continuous thing, due to the condition of the river; that they would make a trip and then perhaps not carry any more iron for two or three weeks (R. 1556). Petitioner's witness, D. R. Peterson, thought that the pig-iron boating only lasted for possibly one year (R. 448) and then only occasionally. Moreover, it was necessary to wait until there was something of a tide in the river—"They didn't haul regularly, couldn't get through" (R. 448). The Mack's Creek Furnace hauled its iron by wagon to Dublin "most of the time" (R. 448). "They (the operators of the furnace) finally quit the boat business and hauled it (iron) with wagons again all the time" (R. 448).

Again we find that the petitioner's witness A. S. Breeding, states that so far as he knows (R. 255-260) boating of pig-iron ceased before the flood of 1878, although he could not recall whether or not the Cripple Creek Railroad was constructed prior to the flood (R. 260).[1] On the other hand, the petitioner's witness, Eli Duncan, does not think that pig-iron boating ceased before the flood of 1878. Instead, and although he was but five years of age in 1888, he thinks that there was pig-iron boated as late as that time. He could not say definitely that this was the case, but he says that he saw keel-boats in 1888 and thinks that they were carrying pig-iron (R. 273).

Petitioner's witness, J. D. Haley, had an even more ancient account of pig-iron boating than the petitioner's witness, A. S. Breeding, his recollection being that pig-iron boating was begun in 1870 or 1872 (R. 279). Similarly, on the other hand, petitioner's witness, James Howard, has a still more modern version than petitioner's witness, Eli Duncan, for he claims to have seen pig-iron boated from Boom Furnace some thirty-five or forty years ago—1896-1901 (R. 336).

Actually, it is clear from the army engineers' reports that "shipments of iron by river only commenced in December, 1381 * * *" (Report of Chief of Engineers, 1882, Ex. 38, R. 2392). That report states that "four boats are being used to carry iron from Boone and the same number from Radford Furnace" (*id.* R. 2393). Likewise, (1) from the report of the Chief of Engineers covering the fiscal year from June 1882 to June 1883, which states:

---

[1] Actually it had not been constructed until October, 1886 (Ex. 548, R. 2812-A).

> "Something over 900 tons of pig iron were shipped from Reed Island Furnace, 26¾ miles above New River Bridge, to the Norfolk and Western Railroad at the latter point, and 256 tons from Radford Furnace, 18 miles above the Bridge"[1] (Ex. 39, R. 2400).

and (2) from the fact that *in none of the reports for subsequent years does any army engineer speak of having observed further pig-iron boating* and Dr. Holden's testimony to this effect (R. 1733), it seems clear that it ceased some time during the years 1882 or 1883.

There is other testimony which shows that this boating had ceased by 1882-83 and which, incidentally, controverts the contention made by petitioner (Pet. Br. 37-38) that the completion of the Cripple Creek Railroad late *in 1886* was the cause of cessation of this boating.

First (and disregarding the statement of petitioner's own witness, A. S. Breeding, who thought the boating of pig-iron ceased before the flood of 1878, and whose statement belies petitioner's contention), there is the testimony of John Knode, whose deposition had been taken by the petitioner at Radford, Virginia, in February, 1936. His deposition was to such effect that petitioner did not choose to produce him as a witness at the trial; hence he was called by the respondent as a witness. He stated that he made a contract for the hauling of pig-iron in 1881 or 1882 (R. 1569) and that he boated pig-iron for about two months (R. 1569). When he started this boating he thought he could make something out of it, but discovered after "a thorough trial" that he could not (R. 1568). The boats stuck on the river bed frequently and boatmen had to throw the iron out into the river in order to lighten the load (R. 1568). Often boats "rubbed a rock too hard" (R. 1570) and would get holes punched in them (R. 1568; 1577). Hence Knode stopped boating and moved to Dunkard's Bottom (R. 1569). He lived there alongside the river, for the next twelve years or until 1895 (R. 1569), but never thereafter did he see any boating of pig-iron (R. 1569, R. 1572). For that matter he saw no boats other than his own carrying pig-iron during the time that he and his men were engaged in this hauling (R. 1572).

---

[1] This 1156 tons, i. e. 900 plus 256, is the tonnage to which petitioner refers (Pet. Br. 37). It, of course, was only a small fraction of the production of even these two furnaces (Holden, R. 1729).

Furthermore, the respondent's witness, Isaac Huff, an employee of Boom Furnace, states that he moved to that Furnace in 1882 (R. 1561), at which time the iron was being hauled to Dublin and Martin's Tank (Pulaski) by wagon (R. 1561). This hauling by wagon continued until the trains started running to Allisonia in 1886 (R. 1561). Between 1882 and 1886 iron was hauled to Dublin and Pulaski by wagon, but no pig-iron was boated (R. 1562-4).

Similar in effect is the testimony of the petitioner's witness, Z. Farmer. His testimony shows that the boating of pig-iron ceased some three years before the completion late in 1886 of the Cripple Creek Railroad. He states that the boat which he bought had been sold at Casey's execution sale (R. 294), Casey being one of the boatmen who met with financial failure in the course of his boating operations (R. 294). Farmer states that he bought the boat about a year after the hauling of pig-iron ceased, paying $15. for it (R. 294). He kept the boat two years (R. 294) and then sold it to some men who were at work on the construction of the Cripple Creek Railroad Bridge (R. 294).

The testimony of respondent's witness, E. C. Gannaway, also shows that the boating of pig-iron had ceased long before 1886. He states it had stopped by June 1882. While some iron was shipped by boat from Boom Furnace in 1881 and early 1882, nevertheless he saw none subsequent to June 1882, when he returned from college to his home on New River at the end of the school year (R. 1634).

In short, the evidence is convincing that the boating of pig-iron on New River did not begin until December, 1881, and had ceased by 1882-83; that such use as occurred in that short period was of an irregular experimental character during highwater and confined to a short reach of the river above Radford; and that, because the railroad was not opened until late in 1886, this cessation of pig-iron boating was not due to the paralleling of the reach of river above Radford by the Cripple Creek Railroad.

(3) *Furnaces along New River continued to operate after the experiment in pig-iron boating ceased.*

Petitioner in its brief before the Trial Court (Pl. Br. in District Court, 219-227) indicated that it was considerably disturbed by the evidence of the respondent establishing that the experimental boating of pig-iron terminated in 1882-83 (prior to the opening of the Cripple Creek Division of the Norfolk & Western Railroad in 1886), and that the furnaces on New River continued to operate for several years after that time.

This quarrel was particularly directed at the testimony of Dr. R. H. Holden, the man who was best informed on the subject and was so known to R. J. Noel, who procured evidence for the petitioner (R. 1754-5).

Petitioner there characterizes as somewhat unusual the statement that these furnaces continued subsequently to 1884 and 1885 (R. 1729, 1749):

> "in view of the fact that no historical references are cited and since his table showing production of charcoal pig-iron in the State of Virginia—this being the type produced at the New River furnaces—indicate no production after the year 1884."

However, it cannot properly be said that the records "indicate no production after 1884." To be sure, 1884 is the last year for which figures showing the total Virginia production for charcoal pig-iron are listed separately from those showing total coke pig-iron production, but the record shows that up to and including the year 1888 there are figures available for the combined tonnage of charcoal pig-iron and coke pig-iron produced in Virginia, and that this combined production, except for a slight decrease in 1886, mounted steadily during each year from 1883 to 1888 inclusive.

Of course, just how much of the total production after the year 1882 came from the furnaces along New River is unknown, but, in view of the fact that during that year (the last for which separate records of these furnaces are available) the furnaces along New River produced three-fourths of the entire Virginia tonnage of charcoal pig-iron (R. 1730); in view of the fact the record shows that charcoal pig-iron continued to be produced in Virginia at least until the year 1888 (R. 1730, 1749-50); and particularly in view of the fact that the record shows that the total combined annual production of charcoal and coke pig-iron produced in Virginia from 1883 to 1888 increased between those years, it is only reasonable to assume that the furnaces along New River continued to contribute to the total Virginia production. On the other hand, in view of the foregoing, it is wholy unreasonable to assume that, either with the close of the year 1882 (the last for which separate records of the individual furnaces are available) or with the close of the year 1884 or 1885, as counsel for petitioner suggested (R. 1749), the furnaces along New River closed down and failed to contribute a single ton thereafter to the total Virginia production.

However, putting aside the unreasonableness involved in the assumption that the furnaces closed at such time, nevertheless the fact remains and the testimony of various witnesses shows that this was not the case. Thus Dr. Holden testified that the records indicate that the furnaces along New River did not cease production, but instead continued to produce (R. 1749-50). This testimony is borne out by the witnesses Isaac Huff (R. 1562-5) and A. Moore (R. 1557), who testified that Boom Furnace, for example, continued operations for a number of years after the Cripple Creek Division of the N. & W. R. R. was placed in operation (in 1886) and this is further supported by petitioner's own witness Howard, whose testimony shows that the Boom Furnace continued to operate at least until the opening of the Cripple Creek Division (R. 213-4).

Hence, it is clear that, although the short period of experimental pig-iron boating ceased in 1882-83, nevertheless, inasmuch as the production of charcoal pig-iron by the furnaces along New River continued for several years thereafter, such cessation of the boating could not have been due to the closing down of the furnaces.

(4) *Steamboats.*

Petitioner cites a report predicting the improvement would benefit light steamboats (Pet. Br. 43) and a reference to a small steamer operating above Radford (Pet. Br. 37) which leads us to a consideration of New River "steamboating."

The first steamboat on New River was built at Hinton in 1878 by the New River Steamboat Company (Ex. 35, R. 2346). Her glorious expectations were sufficient to stimulate an enthusiast among the Hinton citizenry to pay $100 for the high privilege of having the craft christened the "Cecilia Miller" after his wife (R. 469). After being launched in the middle of December of that year (Ex. 35; R. 2346) the "Cecilia" made a few trips at high stages of the river and then was withdrawn because she was "thought to be rather to large for the navigation intended, * * *" (*id.* R. 2346) and this despite the fact that she drew "when light and under way *less than 12 inches*" (id. R. 2346).

The father of petitioner's witness, Z. V. Burk, organized a company which also built a steamboat (R. 425). It operated for a short time near Hinton and then the machinery was taken off and the hull left on the river bank (R. 427). Another steamboat, which operated for a short time in the vicinity of Hinton, was the Hodge boat. Its career was short but the memory of it, long. Its hull may still be seen near Hinton where it lies in state on the rocky bed of New River (R. 414).

The most extensive trip geographically ever taken by any craft of the steamboat order was a trip made by Robert C. McWane's boat, the "Altha", from Radford to Hinton. This boat was built by McWane with the objective of engaging in the transportation business in the short improved stretch above New River Bridge at Radford (R. 1657-8). On the first trip with the boat to Ingle's Falls (2½ miles above the bridge) he became apprehensive that his venture was a mistake (R. 1665), which apprehension was confirmed in the course of a few trips on this stretch of the river. As a consequence he decided to take the boat to Hinton where he had understood that there were 8 or 10 miles of good water (R. 1660). He waited for a rise in the stage of 5 or 6 feet and then made the trip to Hinton, which he described as "just one series of chute the chutes all the way down, over one falls after another. In some places we made a sheer drop of 5 or 6 feet and struck the water with such force that I was fearful many times that we would jar the engine loose from the beams and put our power plant out of commission" (R. 1661).

However, they were unable to do anything with the boat at Hinton (R. 1661) and so McWane sold to John W. Eades at a price of $65. the boat which had cost him $1100. only the year before (R. 1661). Eades had the boat shipped to Lynchburg by railroad and used it as a tugboat on a short stretch of the old James River Canal (R. 1661).

There were two or three other attempts at steamboating on New River between the time of the "Cecilia" and that of the "Altha". However, each of the subsequent attempts suffered the same fate as had the first steamboat, the "Cecilia". The story of the "Cecilia" is the story of all steamboating on New River. Indeed—at least viewed in retrospect—it may truly be said of the "Cecilia" that she represented both the Alpha and Omega of New River steamboating.

The evidence on this subject clearly sustains the trial court's statements that

> "this attempt at steam navigation was likewise purely local and notably unsuccessful * * *. In each instance they (attempts at steam navigation) were local to short stretches of improved portions of the river and were of short duration. They were merely the manifestations of a spirit of impractical optimism, with perhaps a tinge of curiosity" (R. 116).

Petitioner has heretofore attributed (App. Supp. Br. 194) the lack of success of steamboat navigation to the fact that "the boats built were not suitable for navigation on this river;" but a verity it is that from the time of the "Cecilia" to date no steamboat has ever been built that was suitable for navigation on "*this* river".

(5) *"Stunting"*.

The petitioner, apparently realizing its complete inability to establish practical use of the river in normal or customary trade or travel, sought to supply this deficiency by arranging some exhibition or "stunting" trips on the river. Accordingly, it had its employees Gerdes and Gragnon (who later testified as to this stunting) load a 16-foot motor-boat in a truck and take it to various parts of the river for the purpose of putting on this exhibition both a few days before the opening of and likewise during the midst of the trial of this case.

In addition, Gerdes took a small motor-boat down to the London pool and the Hawks Nest pool and finally demonstrated to a gasping world that all that was needed in order to navigate these two pools was a waiting truck to get the boat from one pool to the other. Gerdes and

Gragnon further demonstrated to their own satisfaction that it was physically possible to drag this outboard motor through Bull Falls (R. 942), through Harvey's Ledge (*id.*), through Wiley's Falls (*id.*), through Peters Mountain Falls (*id.*), and through Shumate's Falls (*id.*), Gerdes and three of his assistants (all wearing life preservers, lest they violate the Engineers Department regulations!) (R. 954) made a second attack on Bull Falls on July 27th, 1936, amazing themselves by getting their outboard motorboat—this time equipped with a propeller guard—through Bull Falls[1] (R. 948).

The witness Gragnon states that this was done not with a view to testifying in this case but for the "purpose of replenishing the store of knowledge of New River" (R. 1223). In just what respect the "store of knowledge" was replenished is not clear, but, irrespective of the purpose of these "stunts", they, of course, have no significance in so far as the issues of this case are concerned.

No question is answered after the completion of these "stunts" that common sense could not have answered before. Obviously, it is physically possible to do any number of things which lack the characteristics of being practicable, let alone economically feasible.

Undoubtedly, with proper machinery, hoists, etc. plus the expenditure of sufficient energy and money, it would be physically possible to pull a boat even larger than the craft used by the petitioner's witness up over any of the numerous falls of the River. Indeed "stunsters" have demonstrated that it is physically possible to roll peanuts from one point to another, using the human nose as the motivating force, or that it is physically possible for a professional strong man (if he is willing to let his hair grow) to pull an automobile with the hair of his head. However, the rank and file of mankind have not regarded the transportation of either peanuts or automobiles by such methods as being practicable or economically feasible. They are merely "stunts", a demonstration of physical possibility, not economic practicability. Similarly the Gerdes-Gragnon nautical efforts of 1936 were merely "stunts"—a demonstration of physical possibility, not economic feasibility.

---

[1] Gragnon testified that this outboard motor boat drew 2½ to 3 feet when operating with a full load at maximum speed (Pet. Br. 55). It should be noted however that Gragnon admitted that the boat drew only 8 or 10 inches of water when similarly loaded, except possibly for the absence of the motor weighing about 112 pounds (R. 1194). However, the weight of such a motor (if the boat were kept on an even keel) would increase the average draft of the boat by less than one-half inch. It is evident from the photos (Exhibits 149 and 150) that, when passing through the rapids of Bull Falls, the boat was kept on a fairly even keel by means of having men in the bow. Thus, it seems on the basis of the pertinent photographs that the boat did not draw more than 10 or 12 inches in going through Bull Falls.

(b) The nature and scope of the Federal Work were insignificant as to aim and ineffective as to accomplishment.

Petitioner (Pet. Br. 43) refers to the report of the Chief of Engineers which contains a statement of the plan of improvement of New River, which leads us to a consideration of what was contemplated and what was accomplished.

Apparently what the local promoters of the scheme for obtaining Federal funds for work on the River proposed was to create a water highway connecting the mineral deposits of Carroll and Wythe Counties, Virginia, with the coal fields of West Virginia.[1] Whether they were more interested in providing such a connection or merely in attaining expenditure of Federal funds in their locality is another matter. At any rate, there is some question whether Congress and the Army Engineers had the same intention as was expressed by the promoters, as may be seen from a statement appearing in a memorandum transmitted to the Senate by the Secretary of War April 18, 1913 (Sen. Doc. 15, 63rd Cong., 1st Sess., p. 20), where it is stated:

---

[1] "the object of the improvement, as expressed by the promoters of the scheme, is to connect the iron, lead and zinc deposits of Wythe County and the copper of Carroll with the coal of the Kanawha fields" (Rep. of C. of E. 1873, Ex. 31, R. 2287).

> "* * * it was not contemplated by the Engineers of the Army or by Congress to make a continuous navigable waterway of this stream, but only to afford access by water to the railroad as it was then located, * * *" (Ex. 47, R. 2441).

Whatever may have been the conception and scope of the Federal work, its nature was insignificant, as is evidenced by the fact that it was proposed only to construct a channel 30 feet wide with a depth of 2 feet below "lowest water".[1]

Let us now examine the facts as to actual accomplishment, especially compared with what was originally proposed:

First, the 2-foot depth "below the *lowest* water" was not attained. The report of the Chief of Engineers 1879 gives testimony as to this failure, stating:

> "With such grades, a depth of not more than about 2 feet (equal to an *available* low water depth of *about 18 inches*) could be made; and this was finally adopted and worked for throughout.
>
> "By extending the side-walls somewhat, and the occasional use of short wing-dams (the rock excavated for channels was used for these purposes as far as it went), it is thought an available ordinary low water depth, of from *20 to 22 inches*, can be made at very reasonable expense" (Ex. 35, R. 2346).

Again in the annual report of the Chief of Engineers for 1881 the plan is stated as calling for a channel, not 2 feet deep at "lowest water" but "2 feet deep at ordinary low water and *18 inches* deep at extreme low water, * * *" (Ex. 37, R. 2381).

---

[1] "*Improvement of New River, from Lead Mines in Wythe County, Virginia, to mouth of Greenbrier River, West Virginia.*—The plan adopted for the improvement of this river contemplates a channel-way *30 feet wide* and *2 feet* deep below the *lowest* water, suited for the keel-boats now in use, but at the same time capable of utilization and adaptation, at *some future day*, in a *further improvement* of the navigation for light steamboats, should means be provided therefor (Rep. of C. of E., 1878, Ex. 34, R. 2326).

This change of proposed minimum depths from 2 feet to 18 inches may have been prompted by any one or all of several difficulties which were observed by the engineers in the course of the actual work and some of which apparently had not been taken into consideration prior thereto. For example, Captain Cuyler discovered after he had conducted a series of gagings, that

> "* * * observations extending over some time and nicely conducted are required, *so great* and so *sudden* are the *variations* in the *stages* of this river, and so many *anomalous features* does its upper course of 128 miles present" (Ex. 34, R. 2331).

And later, in the following year, he states:

> "A study of (gage) readings * * * shows some *anomalous features*, due, it is believed, to special local conditions predominating at each locality; on no gage did synchronous readings give corresponding levels for the water surface, the differences being as small as ⅜ inch, and as large as 5½ inches, and apparently not governed by any periodic or other continuous and distinct law or ratio, but subject to *unaccountable fluctuations;*" (Ex. 35, R. 2339).

Further difficulties were observed in the way of very limited depths. Of one of the shoals, viz., at Peak Creek, on which his men had been working, Captain Cuyler says:

> "* * * the map shows this, the natural channel running from ¾ of a mile over a gravel slope underlaid by flat rock no lower than 1 foot, with the river over 400 yards wide, and most of its water in the deep pools barred by ledges on the other (easterly) bank. As was to be expected, *4 to 6 inches* of water was often alone available, and no loads at all could get over;" (*id.* R. 2339-40).

Again, a most important problem was presented in connection with the attempt to achieve adequate depths by blasting sluiceways through shoals and rapids. Of this Captain Cuyler observes:

> "Here the simple go-ahead work of blasting down to a depth and clearing out obstructions is ineffective, as *by as much* nearly as the *bottom* is so *lowered* does the *surface fall shortly afterwards*" (Ex. 35, R. 2341).

That is, the sluices served to drain the pools to the extent of lowering the water levels in them.

Possibly the idea of giving up the originally proposed depths resulted from the experience gained during the summer of 1879 when the river dropped 7 inches below the zero, which had been established as ordinary summer low water (Ex. 36, R. 2364). In any event and irrespective of what the cause for doing so may have been, it is clear that the minimum depth that was finally adopted was 18 inches, instead of 2 feet. Colonel Craighill makes this clear in his report to the Chief of Engineers in 1881:

> "The general plan of improvement adopted * * * has consisted of making a channel 2 feet deep at ordinary low water and *18 inches deep at extreme low water.*" (Ex. 37, R. 2381).

However, that the attainment of even such lesser depth was a hope rather than a reality[1] is shown by the fact that in the year 1882 the river dropped even lower. The Greenbrier division of the river at that time reached a low of "1 foot below zero" (Ex. 38, R. 2385); the middle division of the river a low of ".92 foot below zero" (Ex. 38, R. 2386); and the upper division of the river reached a low of ".88 foot below zero or ordinary summer water" (Ex. 38, R. 2388).

---

[1] Captain W. E. Craighill in 1903 in a report to the Chief of Engineers respecting the work, contents himself, on the matter of depths, by saying, not that the work gave an 18 inch *extreme* low-water depth or even that an 18 inch *low*-water depth was *attained*, but that the work was "*intended* to give a depth of 18 inches at *low-water*" (Ex. 565, R. 2837).

Smith, writing to Colonel Craighill with respect to the effect of this low water on the season's work on the lower division, the middle division and the upper division, respectively, states:

> "The extreme low water affected the cost of this work less than on either of the other divisions, but still it was somewhat more expensive, as the estimates were made for the work with a depth of water nearly *6 inches* greater than it proved to be (Ex. 38, R. 2385).
>
> * * * *
>
> "The extreme low water, this season, increased the amount of work at the points cut through at least fourfold; hundreds of feet had to be taken out, which, with the water *6 inches* higher, would not have had to be touched (Ex. 38, R. 2386).
>
> * * * *
>
> "The same difficulties attending the work on the middle division, with regard to labor and low water, were experienced here" (Ex. 38, R. 2388).

Indeed, in appellant's own evidence appears a report by U. S. District Engineer Conklin[1] made as recently as 1934, which states that the low water depth in the channel varies from six feet to only *"a few inches"* (Ex. 145, R. 2710).

Thus, after working on a channel designed to provide a minimum depth of 2 feet, it appears doubtful whether an actual minimum depth of more than 1 foot was attained.

Likewise, the originally proposed widths were not achieved. Instead, as shown by the annual report of the Chief of Engineers for 1883,

---

[1] Petitioner has heretofore (App. Br. in C. C. A. 20) criticized, as misleading, the description of the river given by Col. Conklin, which description is quoted by the Trial Court in its opinion. However, criticism by petitioner of Col. Conklin's description came with poor grace at that late date, in view of the fact that Col. Conklin is one of the Engineers of the War Department whom petitioner could have produced as a witness (as both the Trial Court and respondent requested) for the purpose of having Col. Conklin give more precise information had petitioner entertained a sincere desire to obtain more precise information.

> "* * * the *width* of channels on the middle and upper divisions has been *reduced* to *20 feet*, and on the former *to 10 feet* for several miles, to allow iron to be shipped from the furnaces above." (Ex. 39, R. 2395).

Actually, that report shows that, of the 29¼ miles of the middle division of the river on which Federal work was done, *14¾ miles, or more than half thereof, was only 10 feet wide* (*id.* R. 2395). No further work was ever done despite the fact that the assistant engineer, in charge of the work, was clear that such channels were inadequate. He states:

> "*Ten-foot channels* are not wide enough, as the current is too *rapid* for the boats in use" (Report of C. of E. 1882, Ex. 38, R. 2387).

Furthermore, and irrespective of whether or not Congress and the War Department initially intended to carry out the proposals voiced by the promoters, it is clear that any such thing as continuous navigability-in-fact was never accomplished.

Intimation that such would be the case began to appear in the reports of the Chief of Engineers as early as 1879 when, after the experience gained by two seasons (1877-1878) of actual work on the river, Captain Cuyler, the engineer in charge of the work, writing with reference to the necessity of pushing the work on the Middle Division up to the mouth of Mac's Creek, pointed out that the mineral industry was the *only one* which would make *full use* of any improvement, if and when completed, stating:

> "This point is in this region the down-stream boundary of an extensive and rich mineral producing district, which is the *main interest* to be served by the improvement, and which *alone can* and *would* inaugurate fully use of it when once made. To *utilize*, then, the work already done commensurately with its cost, necessitates as immediate a completion to Mac's Creek as possible" (Ex. 35, R. 2340).

Captain Cuyler also took pains in his report to consider critically the work that had been carried on up to that time and to make recommendations as to the type of future work to be done, and while he stated in this connection (presumably out of deference to his predecessor who made the survey and helped plan the initial work on the project) that "the practicability of the project had been fully proven", nevertheless this was only by:

> "*abandoning* the idea of selecting the present natural sluices to patch up, not only for the contemplated steam-navigation, but even for the *bateau* navigation and *rafting*" (Ex. 35, R. 2340).

It was necessary in his opinion

> "to adopt a more *general* and *radical* method to effect a permanent improvement than has heretofore been tried" (*id.* R. 2340).

He recommended the

> "free use of dams to collect into pools the water, which constructions should be *much* more elaborate than any heretofore attempted" (*id.* R. 2340).

stating that

> "The mere rock ledges, *per se*, form a minor type of obstructions, as always they have above and below them pools more or less deep, and blasting through them readily gives a good sluice with regular grade. The velocity is *certainly hereby injuriously affected;* but low regulating dams or long training walls below always can be put in to better distribute, and thus rectify this *induced obstacle* to navigation" (*id.* R. 2340-1).

However

> "With the shoals and rapids the case is different. Here the simple go-ahead work of *blasting* down to a *depth* and *clearing* out *obstructions* is *ineffective, as by as much* nearly as the *bottom* is so *lowered* does the *surface fall shortly afterwards*" (*id.* R. 2341).

Hence Captain Cuyler stated it was necessary that

> "The supply of water must, firstly, be augmented by going up to the very head of the obstruction, probably 1, 2, or 3 miles up, and constructing the waterway by building out bodily from the banks low but solid dams, followed down stream by guide-walls. In such structures I should use largely brush in mats or bundles; for, while the river does not carry in it much sediment, and the dams would generally find rock to rest on, yet it would allow of broad bases, and would make thus not only a cheaper but a more water-tight dam than rock alone.
>
> "I should project for future work more construction of this kind, much less blasting" (*id.* R. 2341).

Captain Cuyler recognized that the new system which he was recommending would be more expensive stating:

> "The new system * * * would probably entail a cost beyond that of the original estimate for this improvement" (*id.* R. 2341).

and that it

> "would be unquestionably slow of execution, too slow for those requirements other than the engineering ones; the main dams, all requiring correct location, would necessitate a study of and acquaintance with, the river throughout the year—a residence on it, by the engineer in immediate charge. In this country, where to move from point to point, to transport supplies, etc., is slow work at best, it is impossible for the engineer to properly manage works spread over any considerable stretches, and yet in any extended operations, to attain the desired execution, such spreading out is necessary, as 100 men to a locality and camp are about the advantageous working maximum. On this basis, working on the present plan, not more than $18,000. can be expended in one season, so short are these. Every preparation must be completed before work actually begins, as also the essential duty of examining and locating by permanent marks the works proposed for that season; this would require the maintenance of a small permanent party making

> surveys, maps, etc., and a large quantum of labor and exposure for the engineer" (*id.* R. 2341).

but he viewed this "*new system*" as necessary "to effect a *permanent improvement.*"

Furthermore Captain Cuyler observed that the open river system of improvement

> "* * * from Hinton up to Sifford, 64 miles * * * will, I think, be found to be but partially applicable" (Ex. 35, R. 2341);

instead

> "the dimensions of the river and of the main falls will necessitate the construction, at these latter, of *locks* and *dams;* with the *open sluices,* some *system of towing up ascending boats,* by *cables* on the bottom, the motor being steam or air, located on the banks, or better, on large floats fixed in the still upper pools, will, in my judgment, be found *essential*" (Ex. 35, R. 2341-2).

Despite these recommendations, in Captain Cuyler's opinion, necessary "to effect a permanent improvement",[1] there is no evidence that any of them were carried out.

After the above report of Captain Cuyler little is said in ensuing reports concerning the creating of a continuous navigable waterway.

The report of the Chief of Engineers in the following year, 1880, for example, gives primary consideration to a local and minor objective, viz.: that of carrying the work on the lower division far enough up the river to reach intersecting wagon roads. As to this the report states:

---

[1] However, even with the "new system" of elaborate improvement work which he recommended as necessary "not only for the contemplated steam navigation, but even for the bateau navigation and rafting", an accomplished fact (which it never became), nevertheless, Captain Cuyler did not envision continuous navigation for the stream; instead he merely viewed the river, if so improved, as being of a "real and decided *local* benefit." (Ex. 35, R. 2342).

> "Notwithstanding the heavy grade a *large number of wagons,* laden with agricultural products of a rich portion of Mercer County, *daily uses a road* which crosses the river by ferry just above Bull's Fall, and leads thence down the stream to the Chesapeake and Ohio Railroad at Hinton.
>
> "Going up farther, to the mouth of Indian Creek, *another road* is met, which leads, with a fine grade, to the Red Sulphur Springs and beyond, and as this celebrated watering place is only 6 miles distant, it would be a pleasant trip for persons wishing to visit it to take boat at Hinton, pass delightfully the few hours occupied in making the 16 miles in relaxation from railroad travel and in viewing the beautiful scenery. Arriving at the point referred to, coaches could carry them to their destination.
>
> "The *best road* in the country, however, comes to and crosses the stream at the *mouth* of *Lick Creek,* 20 miles above Hinton. By this route nearly all of the marketable stuffs from the rich counties, Tazewell, Mercer, and Monroe, seek an outlet. Taking this into consideration, it is regarded as *very desirable* to push the improvement to that point next season, if possible" (Ex. 36, R. 2366).

Likewise, in the report of the Chief of Engineers for 1881, almost nothing is said with respect to the original proposal beyond the suggestion that a survey be made at Shumate's Falls and Foster's Falls with reference to the possibility of improving these places by the construction of locks and dams (Ex. 37, R. 2370-5); instead, a minor objective, viz., that of carrying the improvement to Lick Creek in order "to get freight from the rich counties adjoining * * *" is again mentioned.

That no water highway connecting the mineral deposits of Virginia with the coal fields of West Virginia was even close to achievement appears also from the fact that large unimproved gaps were left in each section of the river on which work was done. Of the total distance of 191½ miles from Hinton, West Virginia, to the mouth of the Wilson, only on about one-third thereof was improvement even attempted. The report of the Chief of Engineers for 1883 (Ex. 39, R. 2402) shows this:

> "From Hinton, W. Va. to mouth of Wilson Creek, Virginia, the extent of this work is 191½ miles. Lower Division 86½ miles; improved 26 1/5 miles. Middle Division 43 miles; improved 29¼ miles. Upper Division 62 miles; improved 5⅓ miles. Total 191½ miles; total improved 60.78 miles."

Thus, between the head of navigation on the Kanawha and the mouth of the Wilson there still remained after the federal work was done unimproved gaps as follows:

> (a) A gap 68 miles in length from the head of navigation on the Kanawha to Hinton, West Virginia;
>
> (b) A gap nearly 60 miles in length from New River Bridge to Wiley's Falls or Shoals;[1]

---

[1] With reference to petitioner's statement (Pet. Br. 38) that the river was improved "for 26½ miles above Hinton, to Wiley's Shoals", it should be observed that although some work was done in Wiley's Shoals, improvement work was not completed above Wiley's Falls. William Proctor Smith, Assistant Engineer, states (Ex. 39; R. 2399) with reference to this that such a large part of the appropriation was spent on Wiley's Falls that there was not enough money left "for the few shoals above" that had been contemplated for the season of 1882 (which was the last season of the Federal work on the Greenbrier Division).

In the same connection it should be noted that petitioner states (Pet. Br. 79) that the "Hinton-Glen Lyn stretch" is suitable for boats drawing 2 feet of water. Although not cited, petitioner's assertion is based on the depths which Alstaetter estimated would prevail on the improved stretch from Hinton to the *vicinity* of Glen Lyn. Petitioner heretofore, in discussing the "improved reach from *vicinity* of Glen Lyn to Hinton", has not improperly used the phrase "*vicinity* of Glen Lyn", as the equivalent of Wiley's Falls or Wiley's Shoals (App. Br. in C. C. A. 12) and Alstaetter likewise used this phrase. However, petitioner now lapses into the short terminology and refers to the stretch from Hinton to the *vicinity* of Glen Lyn as the "Hinton-Glen Lyn stretch" which is somewhat misleading. This is called to the Court's attention in order that the Court may not get the erroneous impression that the 30-mile reach from Hinton to Glen Lyn was improved. Instead, the upper end of the improved reach was practically at Wiley's Falls. The

(Footnote continued on next page)

(c) A gap of approximately 14 miles from Calfee's Ferry (the public one), near Allisonia, Va., to the Lead Mines; and

(d) A gap of 54 miles between the "Gulf" and the Mouth of Wilson.

Further evidence of the failure to carry out the original proposal of creating continuous navigation on New River appears in other reports of the Chief of Engineers. For example, the report for the year 1883 which was made after completion of the work on the Lower and Middle Divisions of the river, emphasize that navigation was not continuous. It states:

> "It has hardly been *practicable* to accomplish at *any one* of the *very many* points *needing* improvement all that has been desirable, but the worst places have been worked upon to the greatest extent and efforts thus been made to increase the available navigability of the river over as long stretches as possible, and to increase the facilities for *access* of the greatest number *to the railroads* touching the river, and thus

---

only work above Wiley's Falls was inconsequential, and even petitioner's witness, Gerdes, said that he could see no sign of a channel having been cut at Wiley's Shoals (R. 936) only about 26½ miles above Hinton—not 30 miles above Hinton as is Glen Lyn itself.

One further observation in relation to Alstaetter and to petitioner's citation of his report, viz., that contained in the War Dept. report of 1912 (Pet. Br. 54) is pertinent. It is that Alstaetter's consideration of the physical characteristics of the river led him to the conclusion that the "river between Hinton and Radford" was not "worthy of further improvement", and he "recommended that no survey be made." He noted that the river "partakes of the characteristics of a mountain stream, with very rapid current and bad rapids, and therefore navigation is dangerous on it" and that this swift current "could be obviated only by slack water improvement, which would require ten dams with a lift of 13 feet each, or their equivalent" (R. 2422, R. 2425), and his superior, Colonel Roessell, for the Board of Rivers and Harbors, reported to the Chief of Engineers that those expressing interest in the improvement recognized "that the great fall in the river would preclude any form of *continuous navigation*, except through slack water in the stream," and that physical conditions were "such that it could not be improved for *useful navigation except at prohibitive cost*" (Ex. 46, R. 2420).

> connecting with the eastern and western markets districts otherwise much isolated and *hitherto* dependent on *teaming* to railroad stations over *long and bad roads*" (Ex. 39, R. 2396).

Also from the same report is the following:

> "The navigation of the river not being *continuous* as yet, it is practically a *feeder* to the *railroads* which cross it and run along portions of it" (R. 2396).

And the report for the year 1886 states:

> "Hitherto the obstruction offered to navigation by Foster's Falls, about 6 miles below the mines, almost rendered it useless to expend the money appropriated for the division under consideration. The construction of the Cripple Creek Railroad, however, abrogates this and puts *this division on a par with those of Greenbrier and New River Bridge,* for *its objective point is a railroad* as well as that of the *other two,* and timber and minerals can just as easily be taken to market therefrom" (Ex. 42, R. 2412).

Again, in the report of the Chief of Engineers for the year 1887 there is this:

> "As *Congress has never given such a sum of money* as would justify the *proper beginning* of a *connected* project for a *continuous* navigation from the North Carolina border to Hinton, the effort has been to apply such funds as were supplied in *ameliorating* the condition of the river * * *."
>
> "* * * *As it is not likely Congress will in the near future supply the money necessary* to make Foster's Falls passable and thus *connect* the upper and middle sections, it is supposed the same policy should continue of *partial improvement* in connection with the railroads" (Ex. 560, R. 2826-7).

The lack of any attempt to accomplish continuous[1] navigability in fact is further evidenced by the statement of

---

[1] Petitioner's inference (Pet. Br. 43, footnote), that the references in the various Army Engineers' reports to the fact that navigation on the river was "not continuous as yet", means merely

(Footnote continued on next page)

Colonel Craighill, who had charge of the work, which is as follows:

> "For reasons often mentioned in annual and special reports, *no attempt has been made to give a continuous navigation* of the New River (which rises near the line between North Carolina and Virginia, runs nearly north, receiving many tributaries) to Hinton, on the Chesapeake and Ohio Railroad, where the Greenbrier empties into it. A short distance above the Falls of the Great Kanawha River, it unites with the Gauley to form the Great Kanawha River. The part of the River below Hinton is incapable of being navigable except at very great expense, and by resorting in some places to side canals" (Rep. of C. of E. 1887, Ex. 560, R. 2826).

And the futility of the attempted improvement on the upper division is emphasized in a paragraph of a sub-report by Colonel Craighill dated April 17, 1891, which paragraph was omitted when that report in turn was embodied in the printed report of the Chief of Engineers for 1891. This paragraph[1] was as follows:

---

that navigation could not be carried on at all times of the year, is simply an abortive effort at distortion. The statements of the engineers are clear. They refer to the fact that the Federal work had not been sufficient to make the river available for *through* traffic. This of course is obvious from the fact that the improvements were confined to three widely separated stretches which left large unimproved gaps on which no work was attempted. These separated local stretches of the river could at most serve as feeders for the railroads which cross the river. That petitioner's suggestion is a distortion of the meaning of the above-quoted phrase is clear from both the foregoing quotations from the Army Engineers' reports and the following quotation.

[1] Petitioner—critical of the Trial Court which embodied in its opinion this paragraph from Col. Craighill's report—has heretofore stated in its brief in C. C. A. (App. Supp. 73) that: "* * * the court below did not see fit to explain that the language quoted above was restricted to a section of the river far above appellee's project, where physical conditions were altogether different from those found in the reach between Allisonia and Hinton, * * *", and

(Footnote continued on next page)

> "The last directions of Congress have been practically complied with by the expenditure of 75% of the last appropriation. The last work done, however, under those directions was a subject of ridicule by the community near its locality because of its *evident uselessness,* except to put money into the pockets of a few men and to lead to the probable control of a few votes. The expenditure of the remaining balance almost entirely in the *excavation of rock* on the *limited part* of the river to which it is specifically applicable under the law *would not accomplish* the *smallest useful result* and would in my judgment be a *shameful waste of public money.* It is recommended that it be covered into the Treasury as no longer required for expenditure" (Ex. 528, R. 2758-9).

In the statement of the Chief of Engineers to the Secretary of War, July 13, 1911, as quoted in a memorandum for the Secretary of War from the Chief of Engineers, May 19, 1916, on

> "Pollution of the waters of New River and its effluent, the Kanawha River, by the flowing of ore washings, from the mines and furnaces located on the former river and its tributaries."

---

now states (Pet. Br. 38) that this paragraph of the Craighill report "related to the third stretch, above the Radford-Allisonia stretch and reaching upstream from Austinville (at mile 190) rather than to any part of the 111-mile stretch here in issue". Actually, of course, the improvement work referred to by Col. Craighill was the short stretch of Federal work beginning at the Lead Mines which are *only* about *15 miles* above *Allisonia,* not at some far distant place. But, wholly aside from this fact, there was no occasion for the Court to do any explaining, first, because the petitioner urged before the Trial Court that New River was navigable from its junction with the Gauley River in West Virginia to the mouth of its tributary, the Wilson, in Virginia, some 75 or 80 miles upstream from Allisonia—or, stated differently, petitioner urged, not only that the very part to which Col. Craighill referred was navigable but, also that New River was navigable for a distance of 55 or 60 miles further upstream; second, because the quotation itself contains the words of limitation, viz.: "on the *limited part* of the river to which it (the appropriation) is *specifically applicable* under the law," showing that it did not refer to the entire improvement project on New River.

there appears the following:

> "*There has been no useful navigation on New River at any time, and none is possible under existing natural conditions, nor without the expenditure* of *vast* and *prohibitive* sums in improvement work. While the discharge of ore washings in New River may produce conditions in Kanawha River injurious and obstructive to navigation, in the various ways alleged by the petitioners, it is probable that in most instances the effect is too remote, and too much complicated with other causes to warrant the action desired by the petitioners; and it is extremely doubtful that such action, if taken by the Department, would be sustained by the Courts" (Ex. 566, R. 2844).

The report of the Board of Engineers for Rivers and Harbors, 1912 (House Doc. 1410, 62nd Cong., 3rd Sess., Ex 46; R. 2420) states:

> "Physical conditions are such that it *could not be improved for useful navigation except at prohibitive cost.* The board, therefore, reports, concurring with the views of the district officer and the division engineer, that *it is not advisable for the United States to undertake the improvement of New River from Radford, Va., to Hinton, W. Va.*"

And Lt. Col. George R. Spalding reported to the Chief of Engineers under date of October 24, 1930, that New River

> "*was not made navigable* in fact except for precarious and occasional navigation by the Federal improvements, and that it *is not now navigable* in fact or capable of being made so at any reasonable expense" (Ex. 579-C, R. 2864).

The non-navigable character of the river after the so-called "improvements" is further evidenced by the report of the Chief of Engineers dated December 29, 1925, (*Ex 572* (same content as Ex. 97, R. 2529)), wherein that officer states:

> "I am of the opinion that the data and information disclosed in the Department's records and reports do *not support* the conclusion that New River affords *a channel for useful commerce* or that it is *navigable in fact.*"

And with respect to the section of the river which Appellant has heretofore characterized as "the lower part", the Chief of Engineers stated:

> "That section of the river between its mouth and the town of Hinton, having a fall of about 735 feet in a distance of less than 60 miles, may be dismissed from discussion. This Department has reported that the *whole section is unfavorable for navigation* and that it *could not be connected with navigation in the Kanawha* by the expenditure of any reasonable amount." (*id.*)

He concluded:

> "The detailed, mile by mile, data given in the reports fully justify these concrete statements, and it seems unquestionable that the river was *not navigable in fact* in its *original natural condition.*
>
> It is my opinion that these *natural conditions were not changed by subsequent improvements to the extent of making the river* a highway for commerce" (*id.* R. 2530).

* * * * * * * *

> "It is evident that the work executed by the Government during the years 1877-1882, *did not materially change the natural non-navigable conditions* of the river. The improvement effected was at most slight and fragmentary, and the small channels worked over are reported to have deteriorated due to the natural action of ice and the current". (*id.* R. 2531).

General Taylor further made it clear that the river *never was navigable in interstate commerce,* stating: "*Continuous navigation* on the river has never been possible, and whatever commerce has existed has been *altogether local* apparently confined to the 25-mile section in West Virginia ending at Hinton" (*id.* R. 2531).

Subsequently on June 1, 1927, the Federal Power Commission, in response to the declaration of intention with respect to respondent's project, formally made the finding that:

> "Said river (New River) in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said Act" (Seventh annual report of Federal Power Commission; Ex. 574-B, R. 2853).

Furthermore, the Federal Power Commission through Patrick J. Hurley, Secretary of War, and Acting Chairman of the Commission, on July 1, 1930, certifying to the Attorney General of the United States (through the President of the United States) the facts in connection with Defendant's Declaration of Intention, stated categorically "*New River is neither navigated or navigable-in-fact*" (Ex. 531, R. 2779).

In the light of all of the foregoing, it is respectfully submitted that the evidence clearly establishes that, in its certification to the Attorney General, the Federal Power Commission stated the truth.

4. *The petitioner failed to show practical use, or susceptibility for practical use, in interstate commerce of substantial and permanent character.*

(a) Testimony dealing with alleged uses of New River.

Petitioner's contention that there ever has been any practical or substantial use of New River is based upon a complete disregard of admitted and controlling facts and a romantic interpretation of the largely hearsay testimony of aged witnesses. The testimony upon which petitioner relies, when shorn of exaggeration and romantic interpretation, consists largely of vague, uncertain and unsatisfactory generalities relating to events which the witnesses believe may have occurred during their childhood and is frequently inconsistent even with documentary evidence. Manifestly it would be inadmissible to consider such testimony apart from and in disregard of the definite and well-authenticated evidence, such as that relating to the physical characteristics of New River, which plainly established its non-navigable character. Such testimony, where inconsistent, would necessarily yield to the more authoritative and trustworthy evidence and the known facts, but, even when such testimony is unwarrantably considered apart from and in disregard of the other and more reliable and trustworthy evidence, it fails wholly to sustain the conclusion which the petitioner seeks to draw.

The respondent submits that the oral testimony may be fairly analyzed and appraised as follows:

(1) *Alleged uses during Civil War Era.*

There had been no use whatsoever of New River prior to the Civil War. Under the compelling stress of a war emergency, the Confederacy probably attempted to use the river to some slight extent for the downstream transportation of military supplies from Radford to the commissary at Narrows.

Manifestly such a use, if it in fact occurred, would deal with physical possibilities and not with practical operations and would be no evidence of practical and general public usefulness by the customary modes of trade and travel by water.[1] Later, the boats having been abandoned, it is not unlikely that some negro boatmen, having nothing but time on their hands, attempted to make some temporary use of these craft for a few years in some of the better pools—such as that around the Horseshoe (R. 2078). This attempted use was not only local in character but insignificant in quality and extent and falls far short of showing that practical and general usefulness as an avenue of transportation, which, under all of the decisions, is essential to the imposition of a Federal servitude because of capacity as a navigable water of the United States.

---

[1] In this connection see footnote, p. 100 *infra.*

(2) *Alleged uses during period of unsuccessful Federal work.*

During the attempted Federal improvement of three local, isolated, and widely separated stretches of New River,[1] there was a temporary and experimental use of a short reach just above Radford and also a local use on a portion of the river just above Hinton, consisting largely of the floating of timber products *downstream.* It will be noted that these two portions of the river were separated by a gap of almost 60 miles, lying between New River Bridge (above Radford) and Wiley's Falls and that such boating as there was took place during and after the attempted improvement which, on the petitioner's own evidence, was merely an attempt on the part of the Federal Government to make feasible in some measure local traffic to the railheads[1] (at Hinton and Radford). In fact, even after the work on the lower and middle divisions was finished, the Chief of Engineers (1883) expressly states that there was no continuous navigation of the river:

---

[1] Any contention that these attempted local improvements were undertaken in the sections of the river most unfavorable to navigation is shown to be without foundation by a multitude of facts established in the evidence. But it is sufficient to point out that such a contention involves the assumption that the Gorge is the most favorable section of the river from the standpoint of navigation —an assumption which is patently untrue. The facts on this point were accurately stated by General Taylor, Chief of Engineers, as follows:

> "Of the 190 miles of river embraced in the adopted projects, work was carried on only on about 60 miles, and this 60 miles was divided into 3 widely separated stretches with long unnavigable reaches between them. *Work was limited to the most easily improved places* and effort made to so ameliorate conditions as to permit local navigation. The results were not satisfactory or important and Congress discontinued appropriations after 1886, less than one-third of the funds required for any effective improvement having been provided" (*Ex. 572* (same content as Ex. 97, R. 2531)).

> "The navigation of the river *not* being *continuous as yet,* it is practically a feeder to the railroads which cross it and run along portions of it" (*id.*)

from which follows the inescapable conclusion that prior to the Federal work as well there could have been no continuous navigation of the river.

(3) *Even the localized uses elsewhere did not extend into the 60-mile gap below New River Bridge.*

In view of the holding of the trial court to the effect that there was some sort of use of New River as far as 23 or 24 miles upstream from Hinton, and in view of the desperate effort of petitioner to stretch such holding of the Court, indeed to connect it with the reach immediately above Radford, where the trial court likewise found that there had been some sort of local use, it is pertinent to inquire into the evidence of any use of New River within the intervening 60-mile gap.

As regards any evidence of further use of New River: The testimony itself is negligible in quality and extent; it relates to such an inconsequential and negligible supposed use of the stream that, even were it shown by definite and reliable evidence, it would fall far short of that practical and general public usefulness which is essential to a navigable water of the United States. The testimony is manifestly the most unreliable, vague, uncertain and untrustworthy of this category of unsatisfactory evidence; and the testimony is plainly shown by other competent and more satisfactory evidence in the record to be largely erroneous.

---

[1] Report of Chief of Engineers, 1883:

> "It has hardly been practicable to accomplish at any one of the very many points needing improvement all that has been desirable, but the worst places have been worked upon to the greatest extent and efforts thus been made to increase the available navigability of the river over as long stretches as possible, and to increase the facilities for *access* of the greatest number of the *railroads* touching the river, and thus connecting with the eastern and western markets, districts otherwise much isolated and hitherto dependent on *teaming* to railroad stations over *long and bad roads*" (Ex. 39, R. 2396).

Although there is little to be gained from a detailed discussion of this vague, generalized and uncertain testimony, we examine it in the light of the claims advanced by the petitioner with respect to the alleged transportation of (i) supplies for railroad construction, (ii) tobacco, (iii) fertilizer, and (iv) forest products. In this connection it will be recalled that in July 1881, the Norfolk & Western Railroad began the construction of an extension from New River Bridge downstream to Glen Lyn and thence on to the Pocahontas region (Osborne, R. 1649-50), and that the improvement of the Hinton section of the river by the Federal Government reached Wiley's Falls in October, 1881 (Ex. 38, R. 2390).

(i) Next to a military operation, the *building of a railroad* would seem to present the most urgent need for use of a river for transportation, particularly where the railroad is constructed along the banks of a river.[1] While

---

[1] Moreover the movement of machinery, material and supplies for a construction job does not represent a normal but only an emergency operation. The exigencies of temporarily conducting construction work in inaccessible places generally requires recourse to means and methods of transportation normally unfeasible and uneconomical, particularly where the provision of better means of access, such as a hard road, would require effort and expense justifiable only for much more extensive and permanent use.

In such cases the problem is not whether the movement of the machinery, material or supplies is practicable as a normal, regular or customary mode of transportation but merely whether it is physically possible no matter how difficult. Thus machinery may be moved into an inaccessible construction job on rollers; and even houses, with furniture and occupants undisturbed, may be and

(Footnote continued on next page)

there is some suggestion of a very unconvincing character that the river was used to supply the builders of this railroad *from an upstream direction,* it is believed beyond any question that no such use was made beside one or two experiments.

The material which would have lent itself to river transportation more readily than any other conceivable is bridge timber. The record shows that, with the two following noted exceptions, all of the bridge timber for the bridges on the N. & W. between the points above mentioned was framed at Belspring and was not floated or boated down the river, but on the contrary was carried out on work trains (Hundley, R. 1647-8; Gerald, R. 1548; Osborne, R. 1650). There were two trestles in Pulaski County, the timbers of which were not framed in that framing yard but were hauled to the sites of the trestles by team, or framed on the ground (Hundley, R. 1648; Osborne, R. 1650). Captain Osborne—who had temporarily been auditor and paymaster for the Norfolk & Western Railroad Company, partly in connection with some road-bed grading which had been under way by the Railroad Company (presumably for franchise-holding purposes) along New River in West Virginia between Crump's Bottom and Round Bottom, in July, 1881—was the one who took charge, as Division Engineer, of the construction work of the New River division from New River Bridge down to Walker's Creek.

This witness, whose testimony cannot fairly be questioned (and he was substantiated by the witness Gerald who was engaged in the work), testified that no supplies or materials were shipped by boat on the river to the work under his daily supervision, which work embraced the

---

sometimes are moved on rollers. But such instances of transportation are not a practical or ordinary mode of transportation or travel.

Manifestly, such an unusual use of a river, where the question is physical possibility and not practicability, would be no evidence of capacity for practical and general public usefulness by the ordinary modes of trade and travel by water.

division from New River Bridge to Walker's Creek and then the laying of track from Lurich to Pocahontas (Osborne, R. 1650-6; Gerald, R. 1647-9). It is to be noted that Captain Osborne did testify that one of the contractors along his (Osborne's) division told him that some bridge-iron had been transported by the Clark Bridge Company by boat from Radford to Belspring (which section consisted in the main of the longest and flattest pool on the whole river (R. 2078) and that he (the contractor) was going to try to use boats, but that shortly thereafter the contractor told him that the result of his attempt had been unsatisfactory and that he had abandoned the use of the boats (R. 1651).

It is also to be noted in this connection from the testimony of the witness Skeen (who testified as to the section around Lurich) that possibly one or two boatloads of hay or straw had been brought to the sub-contractor Pedigrew, who had charge of grading a portion of the roadbed between Narrows and a point near Glen Lyn (R. 340). Pedigrew, however, received his materials and supplies in the main by wagon from Lowell, a station on the C. & O. Railroad (Skeen, R. 342) and from this it is a reasonable inference that the material observed by Skeen on the river had originated from a point near its destination or else that the attempted use was not satisfactory; otherwise it would have been continued, because, as was brought out so pointedly by the petitioner, the roads in those days were in an almost impassable condition.[1]

Likewise the witness Snodgrass testified as to boating for this railroad construction, but he shows that the extent of his knowledge was limited to the observation of two bateaux unloading at the commissary at Eggleston (R. 304).

---

[1] Furthermore, any inference that might be drawn from the testimony of this witness that there was any consequential use of New River, even during the exigencies of railroad construction, is negatived by the fact that Skeen states that he, the Dunns and the Spanglers engaged in wagoning machinery and supplies for Pedigrew, from Lowell, West Virginia, a station on the Chesapeake & Ohio Railroad (R. 342).

Surely, if there had been any substantial use of New River for transportation of supplies in connection with this railroad construction, there would have been available testimony of an entirely different order than testimony such as that of Skeen and Snodgrass.

Captain Osborne, by his evidence, establishes that the work on the railroad from New River Bridge to Pocahontas was not begun until July, 1881 (R. 1650) and that also there was railroad grading done by the employees of the Railroad Company (*not by contractors*) along the New River in West Virginia below Round Bottom in 1880 and probably some in the latter part of 1879 (R. 1652). He also showed that it was *contractors who did all of the railroad construction work in Virginia* between New River Bridge and Pocahontas, except that the track from about Lurich to Pocahontas was laid by the Railroad Company (R. 1650-6).

With reference to the testimony of Calloway, petitioner's witness, it is to be noted, first, that it was hearsay on his part, and that petitioner's witness Flannagan, whose assistant Calloway was, made no mention of any such boating. Calloway testified that the supplies were for the Norfolk & Western R. R. Co. and were checked out to *its order* and delivered to a *representative of the Company* (R. 483-4). This demonstrates that, if such supplies were taken by river from Hinton, it was to the grading work *in West Virginia*. Moreover, Capt. Osborne neither knew nor had he heard of anything carried by boat to the railroad work at Glen Lyn (R. 1654-5). Any weight that might otherwise be given to the testimony of Calloway was destroyed by his statement (R. 484) that the man upon whose order the material was delivered out "came in an *auto*"—*in 1883!*

The testimony of the witness Hoover to the effect that grain was boated upstream for the railroad construction men is likewise a matter of hearsay. He did not know that any work had been done along the river in West Virginia

(R. 417), nor did he know whether the contractor was working on the railroad or where he was working (R. 417). On cross-examination he testified that all he knew was that the boats came to the mill and "got the grain and took it up the river to the place where the construction of the railroad was going on" (R. 417).

Respondent submits that the rational interpretation of the somewhat hazy and conflicting evidence is that any boating from Hinton of supplies for use in connection with railroad construction was for the purposes of that work which was nearest Hinton, and hence did not extend further upstream than the work itself, namely, either to Mercer's Salt Works at Lick Creek or to Round Bottom. It is incomprehensible that supplies would have been boated from Hinton *upstream* to Glen Lyn (even if the river had capacity for navigation as the petitioner would have us believe), because the "navigation" from Radford *downstream* to Glen Lyn would have been much easier.

In fact, petitioner's witness Lewis M. Smith, who worked on the boats five or six years, and then owned and operated one himself for the next 15 years (R. 411), which embraced the period in question, testified that supplies for use in connection with the Norfolk & Western Railroad grading in West Virginia (as to which Captain Osborne testified) were taken "up there" to Lick Creek (R. 411); also, that he, Smith, never saw a boat above Lick Creek (R. 411).

The reference to this matter in the Report of the Chief of Engineers for the fiscal year ending June 30, 1882, to be sure, is that four keel-boats ran up to Shumate's Falls, 28 miles, carrying supplies to the New and East River Railroads (R. 2383). However, in view of the facts and circumstances cited hereinabove, it is evident that the author of the report must have been under a misapprehension as regards the upper limit of such boat transportation as took place from Hinton upstream in connection with the railroad work in point. That the official in charge should have been misinformed in this respect is not to be wondered at in view of the fact that the subject-matter was not work of which he was actually in charge and hence did not fall within the scope of his official duty.

It is by no means unlikely that the mention of Shumate's Falls was due to the fact that it was a matter of common knowledge that, under even the most favorable circumstances and with the greatest of incentives for travel upstream from Hinton, Shumate's Falls constituted an insuperable barrier and hence represented the upper limit within which even any emergency or experimental use of the river could have been made at all.

Petitioner's witness, J. W. Reed, testified that he engaged in the transportation of railroad supplies; that he always unloaded below Shumate's Falls. However, at the time he was engaged in this work the Government improvement was not complete through Wiley's Falls (R. 406); in fact, Reed states: "I quit the river and went to railroading *before* they put the channel through there (Wiley's Falls)" (R. 409). Thus, even if this testimony were to be accepted at its face value, it is apparent that, inasmuch as (1) the railroad construction did not begin even at the "take-off" point (New River Bridge) until July, 1881 (Osborne, R. 1650), and (2) the report of the Chief of Engineers for 1882 (Ex. 38, R. 2382) states that a channel had been built through Wiley's Falls by the time work ceased, October 31, 1881, it follows that any transportation of supplies for railroad construction upstream from Round Bottom in which Reed engaged must have been of negligible duration or, more likely, a figment of his imagination.

Because, as Reed says, he was hauling for Lewis A. Pine (R. 406), who had the store at Round Bottom at the upper end of the West Virginia railroad grading, and because he admitted that he had not even seen the construction work at Glen Lyn *nor the store of his employer Pine, at Round Bottom* (R. 408), it is fair to believe that what little boating, if any, he was engaged in was *no further upstream than Lick Creek* (see testimony of Smith, R. 411; p. 104 *supra*), and that his statement with reference to Shumate's Falls must have been suggested by the statement in the Chief of Engineers' report. The same thing must be true of the testimony of the witness Dickinson in this respect, who was not engaged in any such boating.

The evidence of the petitioner's witness Peters on its face, on account of its numerous contradictions, is unreliable. He said that he was engaged in the transportation of Norfolk & Western supplies by means of boats belonging to his father (R. 319-20), yet his father's boats were not built until 1885—at least two years after the completion of the railroad in the vicinity of Glen Lyn (R. 323). Again, he had working for him on the alleged boating some Medley, Smith, and others (R. 320), yet neither Medley nor Smith, who testified for the petitioner, claim ever to have engaged in any such boating. Indeed, witness Medley testified that he was then living with old man Tom Dickinson and carried dinner to the bosses of the people working on the railroad at Round Bottom, for whom some supplies were brought by boats to Lewis Pine's store at Round Bottom (R. 378).

That any use was made of the river for the transportation of any Norfolk & Western supplies to a point above Wiley's Falls is practically denied or at least shown to be negligible by the facts testified to by the witnesses Rufe Spangler, W. H. Spangler, S. L. Buckland, Captain Osborne, W. R. Gerald, W. R. Hundley, and petitioner's witness Skeen, whose testimony shows that the supplies for the building of the railroad from New River Bridge to Pocahontas were hauled in by wagons from New River Depot and Lowell on the C. & O. until work trains operating from New River Bridge took over that business (R. 1498-9, 1503-4).

It is submitted that the testimony regarding any transportation from Hinton of supplies for railroad construction greatly exaggerated whatever use there may have been of the river for that purpose, as compared with the preponderant transportation by wagon-hauling, and that in *any event any such use extended no further above Hinton than the upper limits of the railroad grading between Crump's Bottom and Round Bottom.*

(ii) While it may be true that some *tobacco* was taken down from Lick Creek and perhaps Round Bottom to Hinton, it is hardly within the realm of possibility that any such tobacco was moved down the river from above Wiley's Falls *subsequent to* the building of the New River Division of the Norfolk & Western Railroad to Glen Lyn, with its direct access to Virginia tobacco markets. It is to be recalled that the round trip from Hinton to Round Bottom took about three days (R. 401), which method of transportation would hardly have been used in preference to a five-mile wagon haul from Wiley's Falls to Glen Lyn. Moreover, there is not even credible evidence that *prior* to the building of the New River Division of the Norfolk & Western Railroad tobacco was boated from above Wiley's Falls down to Hinton. In view of all of their testimony the witnesses B. T. Johnson and Peters are hardly to be believed on that point.[1] What seems to be a complete disproof of any such contention is the testimony of petitioner's witness Dickinson, who lived on a farm on New River between Glen Lyn and Wiley's Falls on which there was grown tobacco which was transported, partly by boat, to Hinton.[2] This witness testified that tobacco from that section was hauled by wagon to

---

[1] See page 106 *supra*, and page 118 *infra*.

[2] "Q. The tobacco you raised and sent down the river you put on the bateau at Round Bottom? A. That is just where we put our tobacco on, about Round Bottom.

Q. You say the toll was 25¢ a hundred from there down to Hinton on the tobacco? A. That is my recollection, that that is what they charged, about 25¢ a hundred.

Q. When you were testifying about the traffic on the river *from the vicinity of Glen Lyn, you were referring to the shipping of tobacco from Round Bottom,* were you not? A. Well, yes sir, there in Virginia we would haul our tobacco down to the Round Bottom *or two or three miles below that.*

Q. You would put it on a wagon and haul it down there and ship it by water? A. Yes, sir" (R. 394-5).

Round Bottom below Wiley's Falls and there loaded on boats and taken down to Hinton (R. 395).

(iii) The alleged carrying of *fertilizer* by bateau from Glen Lyn down the river likewise is shrouded in a maze of uncertainties and inconsistencies. The testimony on that subject is that given by the witnesses Peters,[1] Medley, and Jim Smith. It is to be recalled that Smith and Medley worked for Peters' father and that Peters testified that he had charge of his father's boats, built in 1885 (R. 319-20; 353; 372, 376). These witnesses are inconsistent as to where the fertilizer was loaded on the boats and as to how it was taken through Shumate's Falls (R. 349-50, 364, 381, 385). At most any such use was seasonal and only occasional.

It is also to be noted in this connection that the witness Dickinson, who between 1863-1888 (R. 392) lived on a farm located on the river between Wiley's Falls and Glen Lyn (R. 391-2) and later at Crump's Bottom (R. 392-3), used fertilizer frequently, but that this was never brought to him *except by wagon* (R. 394-5). It is believed that testimony of this character, that is, by a person who had occasion to make use of this supposed boating, but who did not, is most eloquent in demonstrating that the "navigation" did not have that quality of usefulness which is requisite to the imposition of a Federal servitude.

(iv) The petitioner has made much of the moving of *forest products* by river. Fairly appraised, however, the record demonstrates that there was no such use of any consequence except locally immediately above Hinton. Although petitioner, through its diagram and chart (Pet. Br. Append. opp. 48, 178), asserts over and over again that forest products were moved by the river from as high up as the Narrows, but those assertions can be based solely on the testimony of its witness James; and even that testimony is based in turn on nothing but hearsay on James' part.[1]

---

[1] "* * * We took a load of *fertilizer* down the river in the spring. I couldn't say where it had been hauled from or how it got to Glen Lyn from Dublin, but it was loaded on the boats there. I understood that it came from Dublin. It didn't come down the river—it was conveyed. I don't know whether the Norfolk & Western was running at that time or not. I couldn't say. If it was not running, it was hauled in there by wagon. We never hauled any fertilizer but one year. We hauled a load one spring. I can't recall how old I was when we hauled that fertilizer down there. I must have been sixteen or seventeen years old—maybe eighteen. I won't say for certain" (R. 328).

As to any suggestion of rafting from above Wiley's Falls, attention is invited to the testimony of the witness Buckland (R. 1511) and to that of the witness B. T. Johnson (R. 369).

Furthermore, the record shows that the *stave traffic*, which by comparison was far the most important in the locality above Hinton, *did not extend above Round Bottom;* indeed it is a fair inference that Round Bottom itself was too high up the river for substantial use even for moving forest products.

Thus petitioner's witness Wauhop, who was engaged in the most extensive stave operation on the entire river, testified that he cut one "yard" of staves at Island Creek (some miles below Round Bottom) but found that it was impractical to boat them down the river and too far to haul them to Glen Lyn (R. 466). This fact is substantiated by the experience of Buckland, who cut staves which he intended to have boated down the river from a point near Pendleton's Ferry (in West Virginia) (R. 1510), but which he finally had to haul by wagon to Lurich (Virginia) (R. 1511); also by the testimony of Adair who was engaged in wagoning staves from Round Bottom to Glen Lyn (R. 1526).

In the section of New River immediately upstream from New River Bridge (located just above Radford) there were instances of temporary and experimental local use. (See 68-73 *supra*). The goal of such sporadic local uses was, of course, the Norfolk & Western Railroad at the bridge, where there was a station called New River Depot or simply New River. However, it is noteworthy that in this locality, as elsewhere on the river, the limited local attempts to make practical use of the river took form primarily in movements of loads, if any, in a *downstream* direction. Thus, there is no indication that there was more than an occasional trip of a boat from the pool in the Horseshoe, below Radford, *up* to Central Depot (at Radford) or New River Depot, nor for that matter is there any evidence of more than an occasional trip *downstream* over the same stretch. See pertinent discussion at pages 114-5, *infra;* also footnotes at pp. 110-111.

---

[1] "* * * My uncle and my father bought timber wherever they could. I heard them speak of going up as far as the Narrows and up Little Blue Stone and Big Blue Stone and anywhere along the three rivers that they could get timber" (R. 310-311).

It will be noted that, aside from those witnesses who refer to the Army Engineer work-boats being taken down from New River Bridge to Hinton in 1878,[1] the second (and this time certainly intended) movement of the Army Engineer work-boats from the upper river to Hinton, after the cessation of all work, in early 1883, with its attendant difficulties due to low water (Ex. 39, R. 2401), the alleged Crockett furniture transportation venture[1] and of course the feat of McWane, who managed to bring a power boat down to Hinton on a 5-foot tide,[2] apparently *not a single witness from the Hinton region knew of or had even heard of a boat of any kind coming down New River from Radford or any point above,* let alone covering that distance in the upstream direction.

---

[1] It is plain, first, that these Government work-boats, which reached Hinton from the middle (Radford) division (Report of C. of E., 1879, Ex. 35, R. 2345), went down on a high "tide" (Knode, R. 1567) and in fact, at least some of the boats indeed in all probability had been washed a good part of the way down by the flood of September 13, 1878 (*id.* R. 1567), and, second, that, even if the movement had not been due to that terrific flood, it would at most have been intended as a mere part of the construction work, where the question was, not whether the ordinary use of the river was practicable and useful but, whether a single movement necessary to the construction work was physically possible, even though manifestly impracticable as a regular means of transportation.

Obviously, had there been any other instances of such "navigation", petitioner's thorough investigation and preparation of the navigability phase of the case, involving apparently a person-to-person canvass of the Hinton region, would have enabled it to produce at least one witness to testify to that effect.

Another indication that whatever New River boating there may have been was of a local character is the fact that the names of Quinn, Orbinson, Pack, Medley and Merchant, who boated in the locality of Hinton, were not referred to by the witnesses who testified as to the use of the river in the Radford locality. Similarly, the names of Tate, Beverly, and Myers, who are reputed to have boated above Radford, were unfamiliar to petitioner's witnesses whose testimony related to the use of New River above Hinton.

---

[1] Indeed, it is significant that among the Hinton witnesses the outstanding happening on the river was the legend that on one occasion part of a Colonel Crockett's furniture was moved by bateau from Crump's Bottom to Radford. But, even assuming that the evidence did not belie the legend, the fact, that the one outstanding tale of New River 'travel' was the single movement of Colonel Crockett's furniture from Crump's Bottom to Radford, portrays the non-navigability of New River more eloquently than anything respondent could say.

It may be noted that on a subsequent occasion (Adair, R. 1525) Colonel Crockett had his furniture transported by wagon from Radford to Crump's Bottom (obviously a *downstream* river trip would be much simpler than an upstream one), which would seem to indicate that the Colonel's fame for having arranged the only trip from the Hinton region to Radford had been too dearly bought to lead him to seek additional laurels.

[2] McWane described the trip, which he took after waiting for a 5 or 6-foot tide, as "just one series of chute the chute all the way down, over one falls after another. In some places we made a sheer drop of 5 or 6 feet and struck the water with such force that I was fearful many times that we would jar the engine loose from the beams and put our power plant out of commission" (R. 1661).

Furthermore, it is noteworthy that, of the host of local "navigability" witnesses produced by petitioner, none testified that the limited local use outside of the 60-mile gap, between Radford and Round Bottom, was even sporadically extended in any worthwhile manner into that intervening section.

In this connection, and bearing in mind petitioner's own statement in the court below (App. Br. 13-14), that no improvement of the river was attempted between the vicinity of Wiley's Falls and Radford, it is of interest to note that some of the documentary evidence introduced by petitioner in the form of various Army Engineer reports is diametrically opposed to its contention that there was some continuous use of the Hinton to Allisonia portion of the river. Thus, immediately *after the work* between Hinton and the vicinity of Wiley's Falls, on the one hand, and between New River Bridge and the vicinity of Allisonia, on the other hand, *had been completed*, the report of the Chief of Engineers for 1883 contains the words "the navigation of the River *not* being *continuous* as yet" (Ex. 39, R. 2396).

Other portions of those Army Engineer reports are more specifically pertinent to the fact that the limited local use above Hinton did not extend upstream beyond Lick or Island Creeks, or at most Round Bottom (Ex. 545, R. 2806-A). Thus, in the report of the Chief of Engineers for the year 1882 it is stated that:

> "The work is now in Virginia, but as only a small point of that State puts in here, the work will essentially be for the benefit of *West Virginia,* as the Counties of Monroe and Mercer in the *latter State* will supply *all* of the freight, *until the improvement reaches the Narrows,* 40 miles above Hinton" (Ex. 38, R. 2385).

Manifestly, the significance of the foregoing statement is that the Virginians were unable to make any use of New

River, particularly not as a means of commerce by water with the section below Wiley's Falls (above which the Federal work had not been completed).

And in the report of the Chief of Engineers for the following year, 1883, it is stated that:

> "The improvement, *when it reaches a point 35 miles above Hinton, will give outlet* to Peterstown, Monroe County, West Virginia, a thriving place, about 2½ miles from the river, at which there are three mills with a capacity of 58 barrels of flour and one hundred and twenty bushels of meal per day, three tanneries using 1,500 hides per annum, three stores, one saw-mill, and one cabinet shop" (Ex. 39, R. 2399).

Surely, bearing in mind the fact that the "improvement" had at the time of that report reached the total, *and final,* distance of about 26 miles above Hinton, it is clear that the significance of the latter statement is that the inhabitants of the vicinity of Peterstown, Virginians, as well as West Virginians, would normally reach and utilize New River, if they were to utilize it at all, at and from "a point 35 miles above Hinton", and that those inhabitants were unable to utilize the river, in its then condition, for commerce by water with any of the country downstream from that 35-mile point.[1]

The situation becomes all the more apparent when one considers that such local use as was made of New River clearly was in the main—and of necessity—for the movement of loads, such as they were, *downstream.* Thus such use as there was above Hinton was primarily *downstream* to the Chesapeake & Ohio Railway at Hinton. (The upper limit of such local use has already been discussed at p. 99, *supra.*) Such use as there was above Radford was primarily *downstream* to the Norfolk & Western Railroad at New River Bridge.

---

[1] Apparently that point was at the mouth of Rich Creek, practically opposite Lurich, Virginia (See Ex. 545, R. 2806-A).

(4) *Dearth of personal experiences of commercial use by those of petitioner's witnesses who testified concerning vicinity of the Horseshoe.*

Such unimportant boating as took place in the locality of the Horseshoe (see Ex. 545, R. 2806-A) was of course limited in the upstream direction by the ever-prevailing difficulty of poling or pushing boats, even partially loaded, against the current and over the shoals and falls; and evidently was substantially limited on the downstream side as well, that is, by the difficult stretch beginning at the head of Siffords Falls (see Ex. 600, R. 2874-E). Downstream from that point there is, of course, a succession of important obstacles, including Siffords Falls itself, Big Falls at the Montgomery-Giles County Line, Snidows Falls, Peters Mountain Falls at the Narrows, Shumate's Falls, Wiley's Falls, etc. (see Ex. 545, R. 2806-A).

It is not strange, therefore, that the sum total of instances of commercial use personally experienced and testified to by petitioner's witnesses in respect of the relatively long Horseshoe pool and extending in either direction therefrom was represented by and limited to the insignificant bartering of farm products by the negro boatmen (R. 206) who for a short period following the Civil War apparently attempted to make use of the pool around the Horseshoe and on occasion went as far up as Radford; the transportation of about 500 bushels of grain in 100-bushel instalments from the Horseshoe to Radford (with a few loads of plaster or fertilizer brought back on the return trips) (R. 225); the movement of a few boat-loads of lumber downstream from the mouth of Little River to the Horseshoe (R. 434-6); and the temporary operation of carrying or ferrying construction materials for about two miles down to the Pepper Tunnel Bridge of the Norfolk & Western Railroad about 1900[1] (R. 202, 1652).

---

[1] Reference has been made (100 *supra*) to the fact that, under the exigencies of railroad construction, particularly when it be-

(Footnote continued on next page)

That this negligible and inconsequential use was purely local is demonstrated further by the fact that the name Bannister and the Bannister bugle or horn (Price, R. 346; Webb, R. 227; Linkous, R. 206), were unknown, except locally to the vicinity of the Horseshoe Bend, and were not known in the locality above Radford nor to the West Virginia inhabitants.

(5) *Testimony of local witnesses of petitioner largely lacked probative value.*

Of course, there can be no doubt that, generally speaking, the local witnesses called by both sides tried to be as accurate and helpful as they could be in dealing with matters long gone by and obscured by the frailties of human memory; but such testimony is subject to numerous and very serious faults which necessarily minimize, and indeed often destroy, its weight.

In the first place, much of such testimony deals with matters which are supposed to have happened long ago. We are all conscious of the tricks played by our memories. We are all familiar with the unconscious and perfectly normal romance which commonly grows up about things which we heard in our youth or which happened in our childhood. The summer sun is never so hot, the winter winds are never so cold, the snows never so deep as they were when we were boys. In the words of Mr. Justice Stone in *United States* v. *Oregon*, 295 U. S. 1, 19, such testimony is "often vague and untrustworthy, * * * because based on * * * unaided recollections over long periods of time."

Furthermore, these statements, drawn by witnesses from the wells of childhood recollection, are in many instances contradicted by clearly established and known facts.

---

comes necessary to reach an otherwise inaccessible point (such as that involved in the above mentioned operation, R. 202), resort may be had to methods of transportation which, although physically possible, are by no means economically feasible and which cannot by any stretch of the imagination be deemed one of the usual and ordinary modes of transportation.

For example, petitioner's witness, W. P. Snodgrass, testified that he remembered seeing boats in 1867 (R. 303). It was not until the Court reminded him that he would have been only one year old that he modified his statement to that of having seen the boats several years later (R. 303).

Hence, such testimony must be carefully sifted and must yield to clearly established facts and to evidence of a more certain and therefore higher order. One might well apply the statement of the Supreme Court in *Oklahoma* v. *Texas*, 258 U. S. 574, 586, with reference to a somewhat analogous situation:

> "The evidence bearing on this question is voluminous and in some respects conflicting. A large part of it deals directly with the physical characteristics of the river, comes from informed sources and is well in point. A small part consists of statements found in early publications, and repeated in some later ones, to the effect that the river is navigable for great distances,—some of them exceeding its entire length. These statements originated at a time when there were no reliable data on the subject, and were subsequently accepted and repeated without much concern for their accuracy. Of course, they and their repetition must yield to the actual situation as learned in recent years. The evidence also discloses an occasional tendency to emphasize the exceptional conditions in times of temporary high water and to disregard the ordinary conditions prevailing throughout the greater part of the year."

If this view is properly applicable, even to written statements, ordinarily at least prepared with more care than is attached to the casual conversations of the fireside, it must of course apply with even greater force to early recollections of a similar character.

The unreliability of such testimony may be plainly shown by a few examples.

Petitioner's witness Collins, with more originality than accuracy, avows that the bateaux which were accustomed to carry iron from the Mack Creek Furnace to Radford would then continue on downstream to Hinton before returning to the Furnace (R. 218, 219, 223). Just what advantage the boatmen may have expected to gain by a 170-mile round trip *between the two railheads* at Radford and Hinton is something which both the witness and the petitioner have naively failed to explain. The utter absurdity of this witness's testimony may be fairly measured by his statement, that all of the falls of New River between Radford and Hinton (including, of course, those in the section of nearly 60 miles in which no improvement was attempted), have, chutes or sluices cut through them (R. 220-1).

The witness E. H. Linkous, whose qualifications for testifying in this case were based upon the fact that he had as a boy sold some eggs to some negro boatmen when he lived at Whitethorne, in the Horseshoe region a few miles below Radford (R. 206), had only hearsay knowledge as to any trips to or from Hinton (R. 206). On cross-examination he admitted that he had only seen bateaux on the river some three or four times a year during about the same number of years (R. 206). It is to be noted that, although this witness's home was located along one of the longest and flattest pools of the entire stream (R. 2078), his father never used a boat to transport the farm produce, which he sold in Radford, but always relied upon a horse and wagon (R. 206).

Aside from the fact that the petitioner's witness J. W. Flannagan was obviously prejudiced against respondent, he apparently confused what he actually knew about New River boating with the stories he had been told about it. He finally admitted that all of his testimony with reference to alleged trips to Hinton was based entirely upon hearsay (R. 195). This witness also experienced some difficulty in determining just how many bateaux he had ever seen at one time. He first said that he had seen as many as four or five together. When confronted with his statement, in the depositions in this case taken at Radford at the instance of the petitioner, to the effect that he had seen only two bateaux at one time, he finally compromised on having seen three together (R. 191).

The witness Price, who gave his age as 76, admitted that he did not actually know how old he was (R. 347). He testified that he had lived at a point near the mouth of Tom's Creek all his life and that on a few occasions he had been allowed to ride downstream on a batteau from a point just below Barnett's Falls to Cowan's Mill[1] (a distance of about 3 miles); that once he had even ventured to come all the way down from Radford (R. 346); that he was told that boats went down to Hinton, though he himself had never gone there (R. 344). Obviously this witness did not and could not have known the destination of the boats which he occasionally saw on the Horseshoe.

Petitioner's witness B. T. Johnson, aged 75, who was accompanied to the trial by his physician, testified on direct-examination that he had had hogsheads of tobacco boated down to Hinton from Narrows, and that boats used to bring salt, coffee, sugar, rice and other products from Hinton up to points above Narrows (R. 365). On cross-examination this witness admitted that on November 10, 1931, i. e., when he was about five years younger, he had been interviewed with reference to any use which may have been made of New River, and that on that date he had given a signed statement in which he said, "never seen any use by boats. I tried to raft some logs myself, but too rough. Lost a lot of logs and gave it up. This was from Ripplemead down to Narrows" (R. 369). The necessity of petitioner's having to adduce such testimony as this reveals the fancifulness of its navigability argument.

---

[1] Reference has already been made to the pool-like character of that portion of the river around the Horseshoe, *supra*, pp. 102, 114. In fact, the five-mile stretch upstream from Sifford's Falls is the flattest portion of the river between the North Carolina line and its mouth (R. 2078), in striking contrast with the steep slope of the 40-mile section between the head of Sifford's Falls in Virginia and Round Bottom in West Virginia.

Petitioner's witness A. W. Snidow, aged 78, *supposes* that the bateaux, which were engaged in transporting military supplies from Radford to the Confederacy's Commissary located in Narrows, went on down to Hinton (R. 296-7). While the State of Virginia, under the dire necessity of the struggle, probably did bring a few boats and experienced boatmen from the James over to the New and attempted to make temporary and precarious use of that stream, there is certainly no justification for the witness's supposition that these boats went down to Hinton, particularly in view of the fact that at that time there was neither a settlement nor a railroad there.

This witness also states that the timbers for the Walkers Creek Bridge of the Norfolk & Western Railroad and for other bridges located at points below were boated down New River, although he did not actually see these timbers being boated (R. 300). This belief on the part of the witness is clearly shown to be erroneous by the deposition of W. R. Hundley, a foreman at the Norfolk & Western Framing Yard located at Belspring, who testified that, with the exception of the timbers used in the Wilson and Back Creek trestles, every chord used in the Norfolk & Western line from New River Bridge to Pocahontas was framed at the yard at Belspring and then transported by work-train as the road was built (R. 1647-8).

The testimony of A. W. Snyder, aged 81, relating to the alleged Civil War use by a few bateaux engaged in transporting military supplies to the Commissary at Narrows, is extremely vague and based almost entirely upon hearsay. A further indication of the unreliability of this man's testimony is the fact that he asserted that his father was boating sugar, coffee and molasses from Hinton up to Belspring some five years before Hinton was settled and before there was a railroad there or in that vicinity (R. 266).

(6) *High water in relation to local uses.*

In any appraisal of the extent to which the residuum of oral testimony, after sifting out that which is unreliable or patently unfounded, is indicative of isolated instances of actual use, no matter how local, it is important to differentiate further in respect of the conditions of stream flow. Thus various witnesses mention the fact that this or that accomplishment of boating or rafting on New River was possible only during or because of high water.[1] A colloquial expression for such excess in stream flow and water stage over and above the ordinary condition is "tide."

For illustration, whether voluntary or involuntary, the movement of the Federal Government's work boats from the upper river to Hinton following the flood of 1878 was accomplished on a "tide" (Knode, R. 1567). Similarly McWane with his motorboat had to await "a 5 or 6-feet flood tide"[2] (R. 1661).

---

[1] Regarding the significance of the requirement that for navigability in fact the stream must be capable of general and substantial use in its *ordinary condition*, and not merely in times of *high water* (which in the case of New River is necessarily temporary), see page 36 of Resp. Br.

[2] Petitioner makes a painful attempt (Pet. Br. 53) to discredit the statement of witness McWane that when he ended his maritime venture with his boat, the "Altha", by taking her from Radford to Hinton in the mistaken hope that he profitably operate the boat on the 8 or 10 mile stretch of good water that he had heard was available at Hinton, or find a purchaser for it there (R. 1660), he had the benefit of a "5 or 6 ft. flood tide" (R. 1661). For its purpose petitioner chooses to quote McWane as saying positively that he made the trip "between the 15th and 20th of September 1901" whereas actually McWane, testifying in 1936 regarding an occurrence in 1901, purported only to be approximate and used the words "As I recall" (R. 1661). Having so sought to fix the time, within which there happens actually to have been a rise in New River, viz., September 17 (Ex. 68, p. 26), petitioner proceeds to disregard the fact that the stream flows shown in water supply paper 536 are daily averages and that the peak flows are necessarily much greater, and then to the erroneous estimates of extreme flow, it applies a

(*Footnote continued on next page*)

Again, the witness Harvey testified that when he lived at Crump's Bottom in West Virgina, he had an agreement with Mr. Meadows who lived at Mercer's Salt Works (located at Lick Creek), whereby a load of corn should be boated down to Hinton at a certain time, if there was a "tide". Unfortunately, the hoped-for tide or high water did not make its appearance sufficiently soon, and Harvey therefore had to resort to the more reliable wagon haul to Hinton (R. 1637-8). With reference to the appearance of bateaux in the vicinity of Crump's Bottom, this witness also testified that

> "When the river was up—had a *tide,* you would see them, and when it was down, you didn't see them" (R. 1637).

Even when a tide did make its appearance, it was not always wholly beneficial. For example, the petitioner's witness Owen states that if the tide was too high, the boating became dangerous because of the impossibility of following the "chutes" (R. 248).

---

rating-table which, although petitioner saw fit not to designate the location or time of applicability, actually relates to a point about 5 miles away and to a condition some 26 years later than 1901.

However, a reading of ~~McWane's testimony~~ (R. 1660, 1663) shows clearly that this man of standing, who had been Resident Manager of the Radford Pipe Works, associated the time of this "flight" of the "Altha" with the removal of his family to Lynchburg in October 1901, it having occurred just before he moved from Radford, whereas *Ex. 68* (p. 26) shows that on September 29th, 1901 there occurred an unusual flash flood or tide which carried the average discharge of New River at Radford from 4220 second feet, on September 28th, up to an average of 22,700 second feet on the 29th, with, of course, a much higher flood-peak flow. In short, critical and honest analysis of the testimony necessarily points to this flood as the one of which McWane took advantage, apparently riding down the river on the receding tide.

Moreover, petitioner's own witness, Coleman, who accompanied McWane on this trip, although he was unable definitely to fix the time within six months, corroborated the McWane testimony by saying:

> "I think we had about a 5 ft. tide". (R. 200)

Even the loquacious Medley, the man who "didn't have time to keep count of nothing" (R. 384) and who made the most pretentious claims of all of petitioner's witnesses, stated that, when he made the alleged trip with the Crockett furniture, there "*was a tide* all right" in the river (R. 380).

J. H. Knode, who rafted logs through Ingles Falls (about 4 miles above Radford), testified that he always tried to wait for at least some "tide" (R. 1570). Sometimes such a tide was not forthcoming, and the rafts would be torn up in going through the falls (R. 1570).

With respect to the boating of pig-iron, which he unsuccessfully attempted for a short period, Knode states that the river was not deep enough during normal stages to accommodate the boats he used. On the other hand, when there was a tide in the river, the current became so rapid as to make it hazardous (R. 1576).

The witness Moore testified that he did not know how long the pig-iron boating continued—possibly off and on for 12 or 18 months—and that this boating, *due to the condition of the river, was not a continuous thing* (R. 1556).

The witness Buckland, too, testified to the fact that necessary as they were, tides had their *hazards*, for he said that in his youth he had rescued one, Alex Skeens, who had ventured to ride down on a raft which broke up just below the Wiley house when the river was several feet above its normal stage (R. 1511).

That tides or high stages of water were not of frequent occurrence is shown by the testimony of W. R. Gerald who for several years lived in the Horseshoe Bend region and without difficulty forded New River in a wagon day after day (R. 1547, 1552).

(7) *Any appreciable use of New River in West Virginia was not only limited to a short reach above Hinton but was not permanent in character.*

Petitioner, utterly without warrant, stated in C. C. A. that the Trial Court found the "river is navigable and has borne appreciable commerce for a distance of 23 or 24 miles above Hinton * * *'' (App. Br. in C. C. A. 10). Indeed, in its Petition for Writ of Certiorari (p. 13) it took like liberty with regard to the characterizations by the Court of Appeals and still greater liberty as regards the distances involved. In its brief here petitioner modifies its former categorical statement but still insists that, "although they" (the lower courts) "did not in terms" hold this lower stretch navigable, nevertheless "this is the clear inference of their discussion" (Pet. Br. 35).

Clearly even the latter position is unwarranted; yet petitioner immediately proceeds to attempt to elongate the 23 or 24 mile distance by several miles, e.g., by referring to the "27 mile section from Wiley's Shoals to Hinton" (Pet. Br. 35). Then, as though navigability were conceded for even a greater stretch, petitioner states, in absolute contradiction of the facts, that "There is no dispute as to the impairment of the navigable capacity of the section of the river between Hinton, West Virginia, and Glen Lyn, Virginia" (Pet. Br. 79).

The unjustifiable attempt of the petitioner to stretch the characterization (not a finding of navigability in fact) by the Trial Court of the 23 or 24 mile stretch above Hinton so as to include "Wiley's Shoals to Hinton" finds visual illustration in the unwarranted indication on the map captioned "Index of Photographs" which it has inserted at the beginning of each of the volumes Nos. II, III and IV of photographs labeled "Original Exhibits". By this misleading effort to extend the effect of what the trial court actually did hold, petitioner would have this Court believe that the characterization by the trial court was not limited to the 23 or 24 mile stretch above Hinton but included several more miles of stream, namely, Wiley's Falls or Shoals, which was the upstream limit of the federal improvement, whereas the fact is that there is nothing in the opinions of the lower courts to warrant such tampering with the distances set forth therein. In this respect the tactics of petitioner are analogous to its showing on its Exhibit 196 (Pet. Vol. I of "Original Exhibits"), where there is an implication that, over the entire length where any federal work was done at all, there was attained a "2 ft. minimum depth of improved channel," whereas the fact is that the 2 ft. depth was merely the aim of the project and was actually not attained (See pp. 80-3 *supra*).

With regard to the above statements of petitioner, several observations are pertinent: First, the lower courts nowhere found or stated that the stretch from Hinton, W. Va., to Glen Lyn, Va., was navigable; second, the lower courts nowhere found or stated that the stretch between Hinton and Wiley's Falls or Wiley's Shoals was navigable; third, neither court, we submit, found that even the stretch for 23 or 24 miles above Hinton was navigable-in-fact.

Although it is undoubtedly true that use to some extent and of some character was made of that part of New River which extends as far upstream as Round Bottom, i.e., 23 or 24 miles above Hinton, and although the Trial Court in effect so stated, yet clearly such mention by the court is in the sense that it represents an upper limit of such use as there was, without in any way passing upon the character of the use or its extent, in point of distance or time, within the stretch above Hinton (R. 114, 115). Moreover, the section of the river upstream from such 23 or 24-mile reach above Hinton differed and differs from that reach both as regards physical characteristics[1] and as regards the federal effort

---

[1] One of these differences in physical characteristics is in respect of slopes. Thus, whereas according to petitioner's tabulation (App. Supp. Br. in C. C. A. 52) the slope in New River for the first 24 miles above Hinton is 3.7 feet per mile, in contrast the slope for the much longer section of 40 miles (which begins at the upper end of the said 24-mile reach and is the lower part of the 60-mile gap between Round Bottom in West Va. and Radford, Va.) approximates 5.5 feet per mile for such distance of 40 miles! (*Ex. 196,* Pet. Vol. I).

(*Footnote continued on next page*)

to ameliorate the obstacles to navigability due to the physical characteristics. Apart from these controlling considerations, however, it seems plain that the court did not hold the 23 or 24-mile reach above Hinton to be navigable-in-fact.

The actual use of this 24-mile reach was, of course, not uniform throughout. The lack of uniformity of use was due to several factors, of which one was that the federal work began at Hinton and progressed upstream. For that reason, as well as because of the natural physical conditions, the heaviest use was within a short distance above Hinton, it being impossible initially to make any use as far upstream as Round Bottom or even for half of that distance. The heaviest use was within a distance of from 5 to 10 miles immediately upstream from Hinton. The 8 or 10-mile stretch of good water above Hinton had been heard of even at Radford (McWane, R. 1660). This permitted some rafting of lumber and permitted staves to be brought down the river from the region of the Bluestone River (Ex. 36, R. 2366), "the mouth of Bluestone River being 4½ miles above Hinton" (Ex. 36, R. 2365).

Another factor limiting use was the physiography of the river. Two serious obstacles were Bull Falls and War Ford Shoals. Both occurred in the eleventh mile above Hinton, the current in Bull Falls being 7 miles per hour and the gradient for a river distance of 300 feet at that place being 47 feet per mile[1] (Ex. R. 2367).

Again, in that 24-mile reach above Hinton there is no section which even remotely approaches the steepness of slope of the 2.7 mile section between Big Walker Mountain Falls and the upper end of Sifford Falls, which section likewise is in the Virginia portion of that 60-mile gap and where for a distance of 2.7 miles the slope averages 13 feet per mile.

---

[1] As important as was the obstacle of Bull Falls, the gradient there, of course, is not as great as that for certain stretches of like distance in the middle section. For example at Barnett's Falls we find a 300-foot stretch with a slope of approximately 117 feet per mile (*Ex. 558-G*).

War Ford Shoals, 2200 feet in length (Ex. 36; R. 2367), had a fall of 15 feet per mile (Ex. 36; R. 2367). The cumulative effect of Bull Falls and War Ford Shoals was to cause use of the river through or over these barriers to be so difficult and impractical that few ventured beyond them even after the federal work had been done and while the resulting channels were still open. Consequently the bulk of the traffic extended no further upstream than Bull Falls, if indeed its upper terminus was not substantially short of this. True, some sparse use was made of the river further upstream after work had been done on various ledges, and in particular after work had been done at McDaniels (Harvey's) Falls 17¾ miles above Hinton, where the gradient over a distance of 660 feet was 25 feet to the mile (Ex. 38, R. 2390), and at Anderson's Falls, where the gradient over a river distance of 300 feet was 35 feet per mile (Ex. 38, R. 2390).

However, even after the federal improvements, local use above Hinton beyond the more favorable portion terminating at the foot of Bull Falls (in which portion such use chiefly occurred) was so difficult that it rapidly thinned out and any practical use gradually disappeared. While occasional trips may have been made as far up as Round Bottom, it is clear that they were comparatively rare and difficult. Thus petitioner's witness Wauhop testified that the highest upstream he had ever cut staves (timber products being the principal thing moved on New River immediately above Hinton) was Island Creek (some miles below Round Bottom), whence he found it impracticable to boat them down to Hinton (R. 461). Any evidence of trips farther upstream is, not only vague and inconclusive, but it shows that such trips, if they occurred, were occasional and unusual and accomplished at a period of temporary highwater when some peculiarly favorable "tide" happened to occur.

The river improvement work was a novelty. Undoubtedly it stimulated interest. Presumably there were a few who were determined as a matter of local or personal pride to get their boats up the river in one way or another for the purpose among others of showing that the improvement would be used if it were continued and of adding weight to appeals to Congress for more local expenditures on the river. (Similar, for example, to McWane's endeavor in respect of the stretch above Radford. McWane R. 1659; Ex. 547; R. 2807 et seq.) Undoubtedly there were a few who took particular pride in being able to do anything that was regarded as a feat of dexterity and strength.

It is probable that some of these persons may, but only on rare occasions, have ventured above Round Bottom. However, any evidence concerning trips above Round Bottom is of such a character as to leave doubt whether they in fact occurred and at most shows that, if they did occur, they were unusual and rare and in the main were the result of taking a precarious advantage of some temporary "tide". Indeed this is confirmed by the physical characteristics of the stream above Round Bottom.

In order to proceed upstream from Round Bottom, if only for the next few miles, there were involved even further difficulties. Thus, at once they were faced with King's Ripple covering a river distance of 100 feet with a gradient of 10 feet to the mile (computed from table, Ex. 38, R. 2390); Pennington's Ledge covering a river distance of 60 feet with a fall of 30 feet to the mile (*id.*); Pennington Shoal covering a river distance of 1900 feet with a fall of 13½ feet per mile (*id.*); Kidwell's Ripple covering a river distance of 170 feet with a gradient of about 17 feet per mile (computed from table, Ex. 39, R. 2402); and then Wiley's Falls, with a rise of 4 feet in a distance of only 10 feet (Ex. 31, R. 2236). And, even though federal work reduced this tremendous gradient at Wiley's Falls to one of 35 feet per mile over a river distance of 495 feet (computed from table, Ex. 39, R. 2402), it nevertheless remained a most important obstruction in a series of river obstacles. Moreover, this was the upstream limit of that portion of the Lower or Greenbrier Division within which the federal work was completed.

After the close of the season of 1882 (when the last work was done on this section of the river) no effort was made to do, or to cause to be done, any further work on the ledges or shoals above Wiley's Falls (where the line between West Virginia and Virginia crosses the river). But, of course, those ledges and shoals remained as real obstacles. Immediately there was Wiley's Shoals, covering a river distance of 465 feet with a fall of 17 feet per mile (*id.*), and only a mile or so beyond, not to mention intervening ledges and shoals, was Shumate's (Neilley's) Falls where there was a rise of 11 feet, 6 of it nearly vertical (Ex. 31, R. 2286).

Another factor which the trial court undoubtedly had in mind was that even such work as was done was *not of a permanent* character, for there is embodied in its opinion the statement of Capt. Cuyler that "to effect a *permanent* improvement" it would be necessary "to adopt a more general and radical method" of improvement (R. 117). Cuyler further stated that improvement work, similar to slackwatering (Ex. 35, R. 2341), was necessary for the purpose of making the improvement *permanent* in character even for bateau navigation and rafting (R. 2340). He also stated—the obvious—that it would be necessary to provide funds for annual maintenance and repair (Ex. 35, R. 2336). Of course the permanent type of improvement was never adopted, nor were funds provided for the necessary annual maintenance and repair.

Indeed all of the reports of the Corps of Engineers, as well as all the other evidence, make clear that the federal work in this stretch, as elsewhere, was not of a permanent character and that such use, or susceptibility of use, as was made possible by these temporary artificial improvements was likewise not permanent in character.

Thus, the Board of Engineers for Rivers and Harbors reported December 23, 1912, "in regard to the reach between Glen Lyn and Hinton", that "the great fall in the river would preclude any form of continuous navigation except through slack watering the stream at prohibitive cost" (Ex. 46, R. 2420). Of course a slack-watering system would, in contrast with the character of 'improvement' actually made, be permanent.

Indeed the filling of channels by reason of freshets began in the second season of work (Ex. 37, R. 2374); remedial work to clear and maintain channels was done throughout the very period of the 'improvement' (Ex. 37, R. 2374; Ex. 38, R. 2385; Ex. 36, R. 2367; Ex. 37, R. 2372).[1] Subsequent reports of Army Engineers referred to the deteriorated condition of the channels (Ex. 46, R. 2423; Ex. 572, R. 2851).[2] Content same as Ex. 97, R. 2531. Under the stimulus afforded by and the novelty of federal improvement work there was an increase, beginning with the federal work in 1878, until in 1880 there were 8 keel-boats on the reach above Hinton (Ex. 37, R. 2370) and in 1883 there were 17 in that reach (Ex. 39, R. 2399).

However, as petitioner has conceded, "After 1883, navigation on New River was *definitely* on the decline."[3] (App. Supp. Br. in C. C. A. 202.) Thus it is clear that the five-year period 1878-1883 not only ushered in but also ushered out the golden age of New River boating.

The facts that the use was concentrated near Hinton and had practically thinned out to the vanishing point at Round Bottom; that the federal 'improvement' was not of a permanent character and deteriorated, causing both the use and susceptibility of use to be short-lived; and that the opinion of the trial court nowhere states that the 23 or 24-mile reach above Hinton was "navigable" throughout, combine to establish, so we think, that the fair construction of the opinion is that it was not intended to hold even the 23 or 24-mile reach above Hinton to be navigable-in-fact.

---

[1] Congressman Peter Otey in 1901 sought (vainly) an appropriation to clean out the channels which the Government had made (Ex. 547, R. 2807).

[2] Even petitioner's witness Johnston conceded, that in order to use the river, the channels would have to be cleaned out (R. 1345-6).

[3] While not material at this point, the reasons assigned by petitioner for this decline are elsewhere shown to be fallacious (See p. 135 et seq.).

Indeed, as concerns its claim of navigability of New River, not merely over the 23 or 24-mile reach within which the lower courts found that some sort of use had been made, but even as far as points in Virginia variously fixed by it at Glen Lyn and Allisonia, petitioner has heretofore found it necessary to caution that "This is not a fanciful suggestion" (App. Supp. Br. in C. C. A. 137). However, the fancifulness of the suggestion and the reason for the apology in respect thereof are apparent when one considers that at the present petitioner's War Department, the guardian of navigable waters, is about to construct[1] its Bluestone Dam, which will be located about 3 miles above Hinton; which, being without any navigation facilities, will interpose a 150-foot high barrier in the very heart of the short 'navigable' reach above Hinton. Indeed "the government's Bluestone Dam will destroy any possibility of navigation from Glen Lyn to Hinton" (107 F. (2d) 769, 790; R. 2909).

The fancifulness becomes the more apparent by reason of the fact that, when petitioner's agency, the Federal Power Commission, inserted certain conditions regarding regulation of flow in its tendered license (Ex. 131, Art. 15, R. 2670), it provided for the prevention of "undue interference with navigation on the Kanawha River" but included *not a word for the protection of the 'navigable' New River.*

(8) *Inaccurate nature of petitioner's tabulation and diagram of alleged uses.*

Inasmuch as the findings of the Trial Court are abundantly supported by substantial evidence and were concurred in by the Court of Appeals, respondent does not deem it worthwhile to trespass upon the time of this Court by engaging in any prolonged discussion of the minutiae petitioner has purported to set forth in its tabulation (Pet. Br. 178 *et seq.*) and diagram (Pet. Br. opp. 48). However, respondent does desire to invite the court's attention to illustrative instances of the glaring discrepancies between the diagram and tabulation and the actual testimony of the witnesses themselves and also to some of the patent inaccuracies in the tabulation and diagram.

---

[1] Condemnation proceedings for the acquisition of lands for the Bluestone Reservoir Project have been instituted by petitioner.

In some instances the distances indicated on the diagram are inaccurate, then too various points are incorrectly located; for example, Parrot is located 2 miles *above* Cowan's Mill and it should be placed 4½ miles *below* Cowan's Mill. Again Sulphur Springs Branch is shown 3 miles further upstream than its true location (Ex. 545, R. 2806-A).

Moreover, there have been diagrammed numerous trips (usually unjustifiably prolonged in the depiction thereof) which in actuality represent merely the admitted local experimental traffic above Radford or local lumber traffic for a short distance above Hinton (*49A*[1], *48A, 42A, 31B, 24A, 5B*).

Furthermore, much of the testimony purported to be reflected on the diagram is inconsistent within itself and contradicted by the testimony of other witnesses. Despite the fact that the testimony of Medley[2] (the witness who didn't have time to keep count of nothing R. 384) was contradicted partially by the dates he gives and partially by petitioner's witnesses Peters and J. R. Smith[2] in so many instances as

---

[1] This reference and similar references hereafter appearing in this brief are to the lines, indicating movement by water, of petitioner's chart of 'commercial navigation', or to respondent's revised chart entitled "Alleged Commercial Navigation", etc., as the text may indicate, each of which lines of the former petitioner has designated by numeral and letter, e. g., 6D, 33D, 47J. Respondent has used the same designations on its revision (of petitioner's chart) inserted opposite page 134 hereof.

[2] Some idea of the weight (or lack of weight) to be attributed to the testimony of witnesses such as Medley and J. R. Smith may be gathered from scanning portions of their cross examination.

The following excerpts show the response of Medley when questioned about the alleged Crocket venture:

(*Footnote continued on next page*)

to deprive it of probative value, petitioner (apparently in an effort to fill up its diagram) has seen fit to show ten lines with reference to his testimony! Indeed two of the ten lines (*47I* and *47J*) refer to the same alleged trip (R. 382, 383).

> "Q. How long did it take you to get to Radford, Uncle Andy? A. I told you we didn't keep count of it, mister.
>
> Q. Was it a week? A. I couldn't tell you. I said we didn't keep count of it.
>
> Q. Can't you tell things you don't keep any account of? A. I could tell you a lot of things I kept account of, but I ain't going to do it."
>
> * * * * *
>
> "Q. Where were these eddies, do you remember any of them? A. No, after we left Glen Lyn we didn't keep count of nothing, didn't have time to keep count of nothing.
>
> Q. You didn't see any railroad bridges? A. How in the name of the Lord could we keep an account of that and go down there and shove like dogs, how could we count the bridges and things? Mister, we couldn't have done it.
>
> Q. I thought you might have peeped up on some occasion and caught a glance of some of them, but you didn't have time to do that? A. No, sir.
>
> Q. Did you see anything going up that river you remember? A. Geese and ducks and birds and things like that and skiffs.
>
> Q. Did you see Walker's Creek? A. I never paid no attention to Walker's Creek or John's Creek, either." (R. 383-4).

J. R. Smith responded in similar vein when he was cross examined with reference to this matter:

> "Q. Jim, I asked you what year it was? A. I wouldn't tell you that because I don't know what year it was because I didn't pay that much attention to it.
>
> Q. Will you tell me within ten years of it? A. I am telling you the way we worked it and I wasn't paying no attention to the years.
>
> Q. And you don't remember whether you were working for Squire Peters or—— A. I told you I run with Squire Peters and I run with Mr. Bal Shumate and Mr. Joe Meadows.
>
> Q. I want to find out for whom you were working at the time you were on the boat to move Col. Crockett from Crump's Bottom? A. Squire Peters was the man that had the boat.

(Footnote continued on next page)

Line *1A* of the tabulation purports to represent a trip from Eggleston to True and is based upon the questionable testimony of a witness who indicated that, when he was a child he, his mother and father and his brothers and sisters had made this trip with all household furnishings (R. 458-9) at night on a bateau propelled by two negroes. Indicative of the value of this testimony is the fact that this witness had first testified that this trip occurred in 1870 (R. 458)—*which means that it would have taken place one year prior to his birth* (R. 458, 460). Also it is remarkable, to say the least, that there should have been undertaken *at night* a trip which involved negotiating the falls of the Narrows, Shumate's Falls, Wiley's Falls, McDaniel's Falls and Bulls Falls.

Based on the fantastic tale of its witness Collins, who stated *inter alia* that the bateaux which carried iron from Mack Creek to New River Bridge would then continue on downstream to Hinton before returning to the furnace (R. 222-3, 218-9), petitioner has placed on its diagram a total of seven lines (*3A-3G*)! The utter absurdity of this testimony may be measured by the statement of Collins that all of the falls of New River between Radford and Hinton (including, of course, those in the section of nearly 60 miles within which no improvement was attempted) had wing walls, and channels and sluices through them! (R. 220-1)

Q. Jim, do you remember the Spanish American War? A. I know it was going on but you needn't ask me about what year but I ain't going to tell you because I never paid no attention to it.

Q. I am not going to ask you what year it was. A. I wasn't in it.

Q. Was that the time you moved Col. Crockett? A. I don't know. I couldn't tell you that. I never paid any attention whether it was before or whether it was after. If you will pay attention to me, I am a man that don't lie and I try to tell the truth and when I tell anything once I mean just what I said. I aim to tell the truth. I live that way around my home. I have got plenty of witnesses and things around my home. I try to tell the truth." (R. 361-2)

Line *27C* is based upon nothing more substantial than the testimony of an 81-year old witness (R. 261) that his father boated sugar, molasses and *coffee* from Hinton to Eggleston some five years before there was a Hinton (R. 263-6) and even before there was a railroad in that vicinity (R. 1674-5).

Line *55A* is based on the testimony of the witness E. M. Smith, who claimed to have boated merchandise from Hinton to Glen Lyn around 1906 (R. 398, 399). It is unlikely in any event that he would have boated merchandise upstream to Glen Lyn at that time—more than 20 years after the Norfolk & Western R. R. had reached Glen Lyn; this would have involved carrying his 'cargo' from one town served by a railroad upstream to another town served by a railroad. But his own testimony, that the channel went as far up as he had ever been, proves that he never went to Glen Lyn (R. 400, Ex. 46, 2418, 2423, 514).

Line *61A* purports to represent boating from Round Bottom to Hinton. It is based on the testimony of Wauhop, who actually stated that he had had about 5,000 barrel staves boated down from Island Creek (R. 461-6) some miles below Round Bottom. And this was accomplished with so much difficulty that he never again cut staves so high upstream.

For additional inaccuracies and discrepancies in petitioner's diagram, see Respondent's Brief, pp. 49-52. The attention of the Court is called to the fact that the items pointed out above, as representng diagramming without warrant, involve no duplication of the items correspondingly set forth in Respondent's Brief. Moreover, in bringing these items to the attention of the court, respondent has by no means exhausted the list of those which might properly be included with the foregoing if space permitted.

For instance, in making the diagram no account was taken of the bearing of the witness, his credibiilty or his responsiveness to suggestion. Even a witness who addressed dignified government counsel familiarly as

"Honey", and who was wont to dissipate his *ennui* by going to the river brink to observe a modern Pan upon a raft, pouring out his soul through a reed, merited two lines on petitioner's chart (*31A-31B*, R. 239).

Respondent has prepared the accompanying revision of petitioner's chart. To some extent it exhibits in brief compass other criticisms to which petitioner's chart is subject. The residuum of lines shown thereon is by no means conceded to be correct or supported by substantial evidence. In fact, it is submitted that the Trial Court could not have found that there was substantial evidence of even as much movement as is indicated on respondent's revision. In this residuum there are numerous repetitions, as for instance, where a witness, who answered a question generally, by saying that he had seen boats on the river, and who had then specified the instances, is given a line for his general statement and in addition lines for each of the alleged specific instances. (E. g., *47* J. A. Medley, Pet. Append. 182-3 and *56* Smith, J. R., Pet. Append. 183-4).

Noticeable on the respondent's revised chart is the striking extent to which the range of alleged use agrees with the length of stream which had been somewhat improved. Significant, too, the limited amount of alleged use prior to such attempted improvement.

In connection with this diagram respondent also calls the attention of the Court to the fact that, whereas petitioner upon its diagram and elsewhere shows the State line between Virginia and West Virginia as though it were located at Round Bottom Branch or Creek at the upper end of Round Bottom, respondent has placed it at its correct position at Wiley's Falls, a position substantiated even by Judge Parker in his dissent (R. 2938).

(b) The reports of the Army Engineers show that the work on the river was discontinued, not on account of the opening of the railroad nor on account of the exhaustion of natural resources but, because the cost was greatly exceeding the estimates made by the Army Engineers.

Petitioner has heretofore stated that the reports of the Chief of Engineers for 1882 and 1883 show

> "that a *continuous* project was in contemplation *even up to the time* that the work was *actually terminated*" (App. Supp. Br. C. C. A. 81).

and that

> "After 1883, navigation on New River was definitely on the decline. One of the reasons has already been mentioned, namely, the construction of the railroads. * * * also * * * because of the fact that the *natural resources,* like *minerals, coal,* and *timber* * * * became *almost entirely exhausted*" (App. Supp. Br. 202-203).

and that

> "cessation of improvements * * * was coincident with the construction of paralleling railroads" (App. Br. 33).

In its present brief petitioner reiterates (Pet. Br. 37-38) that the decline was due to railroad construction.

With respect to petitioner's assertions, several observations are pertinent:

First: The very Engineers' reports cited by petitioner, specifically state, optimistically, that

> "It is probable that when the river is fully improved boats will transport one-third of the *products* of the *fine agricultural country* through which it flows and seven-eighths of those of the *mines*, exclusive of coal." (Ex. 38, R. 2384; Ex. 39, R. 2396)

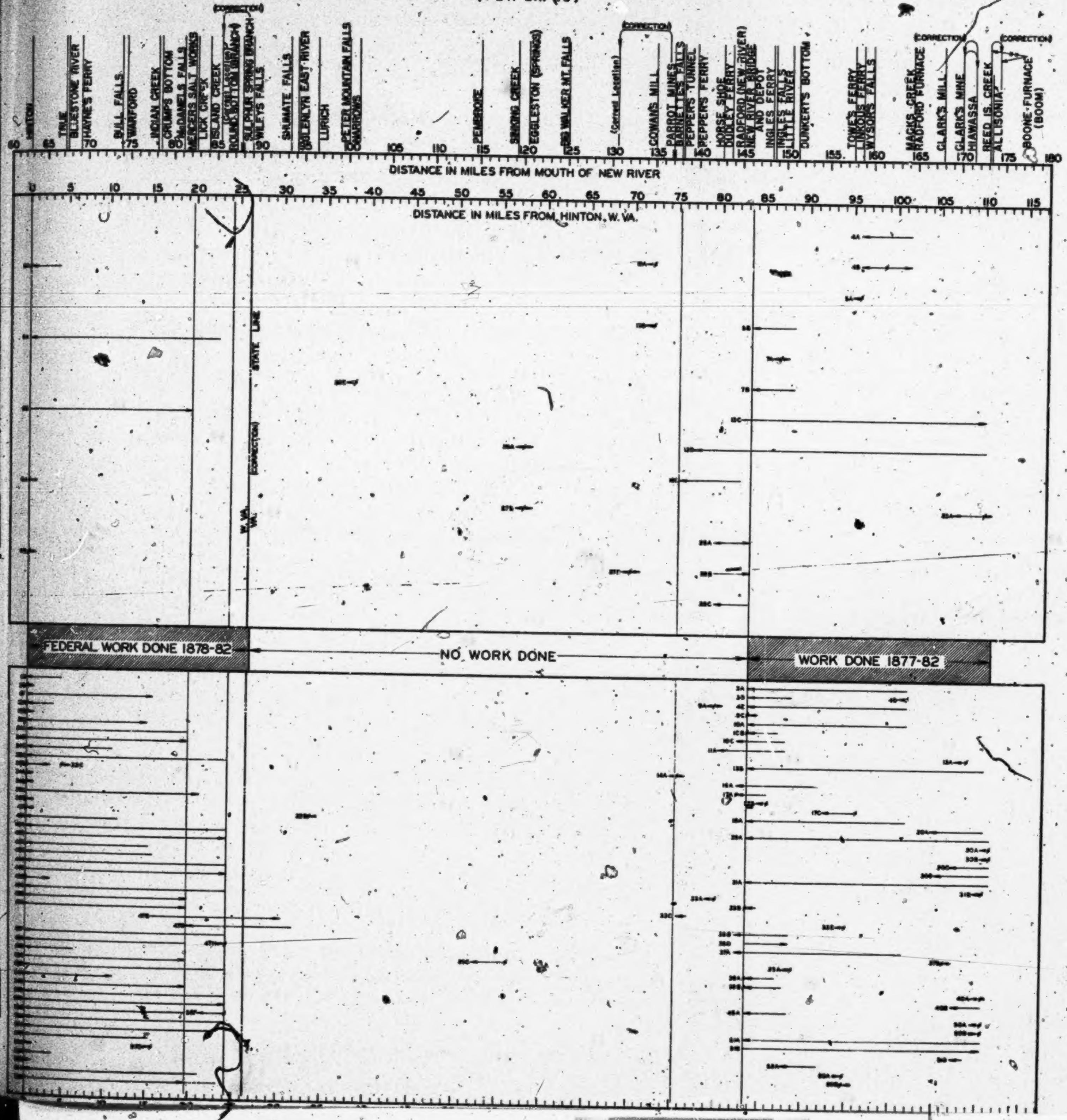
thus in themselves containing refutation of petitioner's assertion that the discontinuance of Federal work was due to the fact that the *natural resources* were "almost entirely exhausted". Actually, of course, the natural resources remained in abundance (see also 50-3, 57-60 *supra*), for this very report of the Chief of Engineers of 1883 refers to the charcoal furnaces, forges, zinc mines and lead mines, and further states that

> "many deposits of copper await shipment by the river, and vast forests of the most valuable timber,

UNITED STATES
V
PALACHIAN ELECTRIC POWER CO.
NO. 12. OCTOBER TERM, 1940,
U. S. SUPREME COURT

RESPONDENT'S REVISION* OF PETITIONER'S CHART RE ALLEGED COMMERCIAL NAVIGATION ON NEW RIVER BETWEEN HINTON, WEST VIRGINIA AND ALLISONIA, VIRGINIA

(PET. BR. 48)



LEGEND:

⟵ = "Line" representing a boat or raft or logs alleged to have been seen at a given place, going in or coming from the indicated direction, but with distance of movement indefinite.

⟷ = Alleged movement between given points.

⟶ = Alleged direction of movement.

4A, 49B, etc. refer to tabulation in Petitioner's Appendix "B".

* **NOTE A:** As compared with Petitioner's chart, lines for which Petitioner's purported bases fall within one or more of the following categories have been appropriately eliminated, shortened or relocated †:

- I Incorrect use of testimony as actually recorded
- II Duplication
- III "Hearsay"
- IV Non-commercial items
- V Items based on testimony lacking probative value—
  - (a) Testimony inconsistent with other evidence in the case.
  - (b) Testimony inconsistent with well-known facts.

* **NOTE B:** Certain lines, because they refer to the period after the beginning of federal improvement, have been transferred from the upper to the lower portion of the chart †.

---

† For numerical identification of the lines in point and pertinent citations to the record, see reverse hereof.

THE LINES ON THIS CHART CAN NOT BE ACCEPTED AS ESTABLISHING THE OCCURRENCE OF ALL OF THESE ALLEGED MOVEMENTS OF BOATS, RAFTS OR LOGS, OR THEIR WEIGHT AND SIGNIFICANCE IF THEY DID OCCUR. THE LINES NECESSARILY FAIL TO REFLECT MANY FACTORS, SUCH AS CREDIBILITY, OCCURRENCES AT HIGH WATER, DIFFICULTIES ENCOUNTERED, ETC., WHICH WOULD JUSTIFY OR REQUIRE THE REJECTION OR DISREGARD OF SUCH TESTIMONY BY A TRIAL COURT. (SEE TEXT, ADJACENT PAGE)

Tightly Bound

on the upper division, are kept from market by the non-completion of this work" (Ex. 39, R. 2400-1).

Second: The New River Division of the Norfolk & Western Railroad was not constructed suddenly or over-night; instead, its construction had been known of and had been going on for a period of approximately two years before it was placed in operation (May 21, 1883). Consequently, if petitioner's thesis that the railroads took the business away from the river and thereby caused a discontinuance of the Federal work were sound, then there would have been no basis for a continuation, right up to the time that the Federal work "actually terminated", of the expectation that a continuous navigation project would be created. On the other hand, if petitioner should contend that the matter of whether or not the railroad would take the business away from the river could not be anticipated but could only be learned after the railroad had been placed in operation, then the commencement of railroad service on May 21, 1883, could not have been the reason for Congress's discontinuance of appropriations for improvement work, on the pertinent division of the river, prior to the time that railroad service commenced. Yet the fact is that the last appropriation by Congress for improvement work on the pertinent division of the river was on August 2nd, 1882 (Ex. 39, R. 2396).

Third: Irrespective of what others may have contemplated, there certainly is no evidence that Congress contemplated a continuous navigation project *"even up to the time* that the work was actually terminated". Moreover, it appears that the Chief of Engineers clearly entertained doubt that the work would be continued, for his report for 1883 expresses no intention of continuing the work. Instead, he merely states:

> *"Should work be resumed,* it will be found difficult to collect and organize as efficient a force * * *" (Ex. 39, R. 2396).

theless less than one-third of the river had been "improved", and even then a portion only of the work on the "improved" parts had been carried to project widths, viz., more than one-half of the work done on the middle division was a 10-foot width, instead of 30 feet as called for by the plans, and all of the work done on the upper division was of a 20-foot width, instead of the 30 feet called for in the plans. Moreover, the project depths had not been attained (see pages 80-83, *supra*).

Another consideration was that the original project channel widths on certain reaches of the river (which were factors bearing on the amount of the original cost estimates) were insufficient. On this subject the report of the Chief of Engineers (1881)

> "With a channel, as now proposed, 20 feet wide and 2 feet deep, the estimate of $181,000. would be sufficient to complete it, but as that portion from Hinton to New River Bridge has to be made 50 feet wide, at a cost of about $2,000. per mile, the above amount should be increased to $275,000., and if it becomes absolutely necessary to use locks and dams for the improvement of some of the falls, this estimate will have to be further increased by the amount of their cost" (Ex. 37, R. 2371).

While the cost of these locks and dams had not been taken into consideration in the original cost[1] estimates,

---

[1] The significance of the Report of the Board of Engineers for Rivers and Harbors stating

> "Physical conditions are such that it (New River) could not be improved for useful navigation except at *prohibitive* cost" (Ex. 46, R. 2420)

is more fully appreciated when it is realized that these early estimates of cost were predicated upon very low labor costs viz.:

> "Price of labor, 10¢ per hour up to the middle of September, when it was increased to 12½¢ per hour" (Report of C. of E. 1882, Ex. 38, R. 2388)

particularly low not only because of the hard labor involved in rock and stone excavation work, but for the additional reason that the men had to stand in the water while doing the work (Ex. 35, R. 2345).

The implication contained in the foregoing quoted portions of petitioner's brief below, that the building of railroads caused a discontinuance of improvements, likewise disregards the well-known fact that improvement work on practical waterways continues even today.

The real reason for the discontinuance of the improvement was that after the experience gained by a few seasons of actual work on the river, both the War Department and Congress had abandoned any intention of making a continuous waterway of this stream. For one thing, the cost was greatly exceeding the original estimates. Thus, after $102,000. of the total estimated cost of $215,000.[1] had been appropriated and spent in the "improvement" of a total of 191 miles, it was apparent (particularly in view of the fact that the work had been limited to the most easily improved places[2]) that the project could not be kept within any reasonable bounds in so far as the cost aspect alone was concerned; that, although approximately one-half of the money, estimated as necessary, had been spent, never-dence the increase in water borne commerce which the dissenting judge, in accordance with the assertion in petitioner's brief in the C. C. A., infers from it (R. 2931). For example, the dissenting judge quotes (R. 2932) from a report by William Proctor Smith which appears in the report of the Chief of Engineers for 1883, as follows:

---

[1] "The plan of improvement adopted for the whole river was that which would cost the least, $215,000., and called for a navigation of 2 feet at low water" (Ex. 528, R. 2756).

[2] Petitioner has implied that the work was done only in the difficult places, stating that the reason that no improvement work was done on the "60 mile stretch from Radford downstream was because it wasn't necessary" (Pl. (Pet.) Br. on Motion to Strike Answer, p. 151). Any contention that these attempted local improvements were undertaken in the sections of the river most unfavorable to navigation is shown to be without foundation by a multitude of facts established in the evidence.

The facts on this point were accurately stated by General Taylor, Chief of Engineers, as follows:

> "Of the 190 miles of river embraced in the adopted projects, work was carried on only on about 60 miles, and this 60 miles was divided into 3 widely separated stretches with long unnavigable reaches between them. Work was *limited* to the *most easily improved places* and effort made to so ameliorate conditions as to permit local navigation. The results were not satisfactory or important and Congress discontinued appropriations after 1886, less than one-third of the funds required for any effective improvement having been provided" (Ex. 97 and *572*, R. 2531).

> "Of the freight sent from Hinton in 1882, 95 per cent. came from New River, an increase over 1881 of 46 per cent.
>
> Of the freight received at Hinton in 1882, 43 per cent. went up the river; 24½ per cent. increase on shipments from Hinton in 1882 over 1881; 9 per cent. increase on freight received at Hinton in 1882 over 1881 (R. 2396)."

An analysis of that report reveals that the quoted statement was based on the table appended to Smith's report. That table is captioned as follows:

> "Statement of tonnage sent from and received at Hinton and Lowell stations, on the Chesapeake & Ohio Railway from January 1, 1882 to January 1, 1883—furnished by Robert H. Fisher, Auditor" (evidently auditor of the railway company) (R. 2403-4).

It purports to show not only that of the 12,532 tons of freight *sent* from or *received* at the Chesapeake & Ohio Station at Hinton, 9,953 tons was river traffic, but that of the total of 10,957 tons sent from both the Hinton and Lowell stations on the Chesapeake & Ohio Railway, 8,544 tons came "from New River". If in that particular table Hinton alone had been mentioned, the table might reasonably imply that certain tonnage had reached Hinton *via New River.* However, the inclusion of Lowell in the tabulation proves conclusively otherwise, because Lowell is located 18 miles up the Greenbrier River easterly from Hinton, and New River. Obviously, any material which nevertheless the need for them was felt, Capt. Cuyler having reported that "the dimensions of the river and of the main falls will necessitate the construction, at these latter, of locks and dams;" (Ex. 35, R. 2341).

Hence it is not surprising to find that "Congress adjourned March 3, 1883, without making provision for further work, * * *" (Report of C. of E. 1883, Ex. 39, R. 2395). Thus, it would seem reasonably clear that the discontinuance of the work to which petitioner refers was not caused by the beginning of operation on May 21, 1883 of the New River Division of the Norfolk & Western Railroad nor to the exhaustion of the natural resources but by the realization that the physical characteristics of the river were such that it could not be improved for ordinary navigation except at "*prohibitive cost*".

(c) The Army Engineers' reports, fairly analyzed, show that petitioner has exaggerated the extent of water borne commerce during the period of the federal work.

While it is not thought to be of consequence, we nevertheless note that petitioner cites reports of the Army Engineers to substantiate its claims respecting water borne commerce during the period of the federal work (Pet. Br., 37). For example, petitioner states:

> "In the same year (1882) of the 12,532 tons of freight sent from or received at the Chesapeake & Ohio Railway at Hinton, 9,953 tons was river traffic (R. 2400)"[1] (Pet. Br., 37).

While it would be surprising if the Government work had not stimulated at least some interest in any possibilities of using New River, nevertheless it is submitted that the Army Engineers' report, viz. that of 1883, cited by petitioner, when fairly analyzed and appraised, fails to evi-

---

[1] The record citation, viz.: R. 2400 is an error. The pertinent record citation should be R. 2403-4.

Moreover, considering the primary point as to the origin of the tonnage in question, it will be observed that the report of the Chief of Engineers for 1881 (Ex. 37, R. 2370) carries its own refutation of the interpretation that petitioner has placed on the pertinent passages from the reports of the Engineers (that these statements refer merely to tonnage reaching Hinton via New River itself). In the report of 1881 (Ex. 37, R. 2377), Smith states:

Commodities	*Total tonnage sent from Lowell*		*Portion coming "from New River"*		
Bacon	3.85	tons	.96	tons exactly	¼
Butter	1.19	"	.40	" "	⅓
Cattle	1528.22	"	1017.72	" "	⅔
Eggs	1.05	"	.26	" "	¼
Horses	11.25	"	5.62	" "	½
Sheep	64.08	"	42.72	" "	⅔
Wool	7.38	"	1.85	" "	¼
Dried Fruit	11.05	"	5.52	" "	½
Rye	1.63	"	1.08	" "	⅔
Wheat	56.92	"	37.94	" "	⅔
Flaxseed	.47	"	.23	" "	½
Leaf Tobacco	115.83	"	77.22	" "	⅔
Sundries, Merchandise	32.14	"	16.07	" "	½
Sundries, Miscellaneous	47.46	"	23.73	" "	½

Similarly, there was guessing with respect to the proportion of commodities sent from Hinton which had come "from New River."

Commodities	*Total tonnage sent from Hinton*		*Portion coming "from New River"*		
Butter	4.04	tons	1.01	tons exactly	¼
Eggs	.61	"	.20	" "	⅓
Lard	1.58	"	.54	" "	⅓
Oats	6.01	"	4.00	" "	⅔

However, even these estimates or guesses in several instances run counter to well-known rural customs; for example, horses and cattle were customarily driven to market before the introduction of trucks. Smith himself states this

> "Horses, stock cattle, and sheep are raised in very considerable quantities, but of course *they* are *driven to market* and *do not affect the water route.*" (Report of C. of E. 1887, Ex. 560, R. 2829).

might have been transported *on New River* to *Hinton* would have been transferred to the railroad at Hinton and *would not have been transported up the Greenbrier River 18 miles from Hinton to Lowell,* there to be transferred to the railroad.

Similary Smith's report for 1882 (Ex. 38, R. 2389) states:

> "The tables following show that of the freight shipped from the stations on the Chesapeake & Ohio Railway, which are outlets to the river on the lower division, 70 per cent. is from New River, an increase over 1880 of 36½ per cent."

which statement is quoted by the dissenting judge (R. 2931) and appears in petitioner's brief in the court below (App. Supp. Br. 63f). It is based on a table, set forth at page 917 of that Report (R. 2391), entitled:

> "Table No. 5—Statement of tonnage sent from and received at Hinton and *Lowell* Stations, Chesapeake and Ohio Railway from January 1, 1881, to January 1, 1882 (in tons of 2,000 pounds)—furnished by Robert H. Fisher, Auditor."

Thus again appears the significant fact, viz.: the inclusion in the table, not only of commodities sent "from New River" to Hinton but, also those sent "from New River" to the Lowell Railroad Station[1] which shows that petitioner has misinterpreted these reports.

---

[1] A further fact showing the untrustworthiness of the figures appearing in the table furnished by Fisher is that it is evident, in the case of many of the commodities listed as having come "from New River," that Fisher was making mere estimates or guesses. The following comparisons taken from the table (Ex. 38, R. 2391) prepared by Fisher show that, in each instance below, the portion of the total tonnage sent from Lowell which Fisher designated as having come "from New River" is an almost exact fraction of the total.

(Footnote continued on next page)

any alleged commerce on the Hinton Division was local in nature and extent, for that report states:

> "The improvement, *when it reaches* a point 35 miles above Hinton, *will give outlet* to Peterstown, Monroe County, West Virginia, a thriving place about 2½ miles from the river, at which there are three mills with a capacity of 58 barrels of flour and one hundred and twenty bushels of meal per day, three tanneries using 1500 hides per annum, three stores, one sawmill and one cabinet shop" (Ex. 39, R. 2399).

And that local nature is further emphasized from the report of the Chief of Engineers for 1882 where it is made clear that the improvement on the Hinton Division could not benefit Virginia until it was carried as far as the Narrows. That report states:

> "The work is now in Virginia, but as only a small point of that State puts in here, the work will *essentially be for the benefit of West Virginia,* as the *Counties* of *Monroe* and *Mercer* in the *latter State* will supply all of the freight, *until the improvement reaches the* Narrows, 40 miles above Hinton" (Ex. 38, R. 2385).

The improvement, of course, ended some 14 miles downstream from the Narrows.

5. *Although neither Congressional nor official action can make a river navigable, all considered action of Congress and the War Department sustains the conclusion that New River is non-navigable.*

(a) All considered action by the War Department has reflected the view and the fact that New River is non-navigable.

Petitioner concludes its discussion (Pet. Br. 42-47) of the attitude of the War Department with respect to New River by stating:

> "It will thus be seen that the War Department from 1872 through August 20, 1925, was of the opinion

> "The tables give a clear exhibit of the products shipped *from the Valley of New River* at the various railroad stations in 1880 and also the tonnage received *for the same section.*"

At the foot of the table purporting to give statistics for Hinton, Smith states:

> "This table shows that 41½ per cent. of the products shipped from and to Hinton is *from the section of New River now being improved;* 409 tons *from New River* were shipped at Lowell, a station on Greenbrier River, and 87 tons sent thereto" (Ex. 37, R. 2379).

It will be noted that, with respect to Lowell, Smith lapses into a shortcut terminology and uses the words "from New River" in lieu of the more complete phrase "from the section of New River now being improved" or "from the Valley of New River."

In the same report following the tabulation of tonnage received at nine stations on the Atlantic, Mississippi & Ohio Railway (subsequently the Norfolk & Western) during 1880, Smith states:

> "The above is all *from the 2 upper sections of New River now being improved, and it may be safely asserted* that not less than one-third of this amount *will be shipped by water as soon as the channel is made*" (Ex. 37, R. 2380).

From the foregoing it is evident that the interpretation placed by petitioner on various passages from Smith's reports is erroneous. Instead of *via New River,* the meaning was *from the valley* or *drainage area of New River.* The fact is that the tabulations embodied in the reports so cited contain no evidence that any of the tonnage in point whatsoever was actually transported *via New River.*

However, in any event, it is clear from the quotation from the Report of the Chief of Engineers for 1883 that poses of navigation.[1] These acts were doubtless sought as in the case of the Wilson Aluminum Company's application for a permit for its dam at Kanawha Falls on the Kanawha River, i. e., "out of abundant caution" (*Ex. 123-a,* 2nd sheet); but in any event it is plain that Congress, if it acted at all, would incorporate such provision both as a natural precaution and because otherwise there would be no occasion for Congressional action. That is, if, as was the fact, the river was non-navigable, the Congressional Act would be of no effect and, if by any chance it were navigable, such a provision would be normal and proper.

The further citations (R. 2452-53) at page 44 of Petitioner's Brief are replies to inquiries, by a private individual and a member of Congress; and obviously neither is preceded by any investigation or consideration. In the case of the reply to E. W. Saunders, the very reference to (and apparently reliance on) merely an "interstate stream" (R. 2453), surely in itself an inadequate basis for federal jurisdiction, shows how superficial was the thought given the matter at the War Department.

But, what are the really pertinent facts which define the attitude of the War Department whenever the question of navigability of New River was presented for careful consideration? In the first place, there is not a single dam on New River that has been constructed or operated under a license except the small Washington Mills Dam at Fries in Grayson County, Virginia, which was apparently built under the authority of an Act of Congress approved June 4, 1900. But even in that case the plans were never approved by the Chief of Engineers and the War Department did not take action against the owner for any failure to present the plans to or have them approved by the War Department (Ex. 47, R. 2455). The dams at Buck and Byllesby have been maintained in New River by respondent for many

---

[1] Of course none of the acts reciting the construction of dams on New River, referred to by petitioner, contained any requirement for the construction and maintenance of navigation locks.

> that New River was navigable. After December 29, 1925, it was of the view that the river was non-navigable, because of its physical characteristics and its impression of the extent of the actual navigation during the period 1870-1900" (Pet. Br. 47).

Petitioner's account of the attitude of the War Department is remarkable not only for the character of the material cited, but likewise with respect to the pertinent material omitted.

The citations to Hutton's report made in 1872 (Pet. Br. 42) and to the Report of the Chief of Engineers for 1878 (Ex. 34, R. 2326), the Report of 1880 (Ex. 36, R. 2360), the Report of 1881 (Ex. 37, R. 2370), the Report of 1882 (Ex. 38, R. 2384) and the Report of 1883 (Ex. 39, R. 2394), all cited in the petitioner's brief at page 43, do not contain statements that the River is a navigable water of the United States; rather, they place emphasis on efforts to make it useful. The same is true of the Report of the Chief of Engineers of the year 1881 (Ex. 37, R. 2370) cited at page 44 of petitioner's brief.

The citation to a report dated November 9, 1899 (R. 2429), is merely an answer to an inquiry of a Congressman which states that, although there is no navigation

> "it would appear that the action heretofore taken by Congress has indicated its opinion that New River is a navigable water of the United States."

It is not only apparent that the reply rests upon no investigation or consideration but also that the conclusion is based on a mistake of law, viz., that a river is navigable merely because federal expenditures have been made thereon.

Petitioner also cites (Pet. Br. 44) two special Congressional acts (R. 2441-47) for the construction of dams which provided that the owners shall be required to make any modifications that at any time may be required for pur-

> "I, therefore, report that in my opinion New River in its present condition is not a navigable stream * * *" (*Ex. 572*, same text Ex. 97 R. 2528, 2533).

Colonel (then Major) Herman's opinion, dated October 18, 1930, rendered likewise in the course of his official duties as District Engineer at Huntington, W. Va., after a detailed consideration of the facts respecting the river, is as follows:

> "16. After review of all of the facts, the District Engineer has reached the conclusion that New River, especially in the *vicinity* of the highway bridges now under construction over that stream by the Commonwealth of Virginia, Department of Highways, at *Glenlyn,* Virginia, and Jackson's Ferry, Virginia, respectively, is not susceptible of being used in its natural or ordinary condition, as a highway for commerce over which trade and travel may be conducted in the customary modes of trade and travel on water, nor does it afford in its natural and ordinary condition a channel for useful commerce. It is the District Engineer's opinion, therefore, that New River is not navigable in fact either at Jackson's Ferry or Glenlyn, or at any other point in its course" (Ex. 579-B, R. 2862).

General (at that time Lieutenant-Colonel) Spalding's opinion, dated October 24, 1930, which also was rendered, in the course of his official duties as Division Engineer, Upper Mississippi Valley Division, after a full consideration of the facts with respect to New River, is as follows:

> "I therefore concur in full with the District Engineer in his statement that 'New River is not navigable in fact either at Jackson's Ferry or Glenlyn, or at any other point in its course' " (Ex. 579-C, R. 2864).

The opinion of General Brown, rendered in the course of his official duties as Chief of Engineers of the War Department, is set forth in a letter dated November 11, 1930 years. More recently a dam has been placed in New River at Hawk's Nest by Electro-Metallurgical Co.

Instead of explaining the significant circumstances, that these dams are without federal permit or license, the petitioner has heretofore sought refuge in an unjustifiable[1] statement that respondent had notice through its predecessor in title that the federal government had asserted its jurisdiction over New River as early as the construction of the Buck and Byllesby dams in 1912.

Secondly, the facts show that in all cases where the question of the navigability of New River was squarely presented to the War Department for determination, after careful examination and consideration, the Department held the river to be non-navigable. A summarization of the several maturely considered statements and opinions is set forth below. These reports were made by distinguished engineers of the United States Army, not in the heat of advocacy or controversy, not in partisanship or bias, but in the discharge of their official duties.

These reports are not confined to conclusions or mere expressions of opinion; in nearly all instances they include a recital of numerous facts, descriptions of physical conditions and other matters which lead inevitably to the conclusion of non-navigability, and upon the basis of those facts the War Department Engineers have added their official opinions that New River is not navigable at any point in its course.

For the convenience of the Court we briefly review the reports of these Army Engineer officers, which include such distinguished engineering officers as General Taylor, General Brown, General Spalding and Colonel Herman.

The opinion of Major-General Harry Taylor, rendered December 29, 1925, in the course of his official duties as Chief of Engineers of the War Department after a careful consideration of all the facts involved, stated as follows:

---

[1] See p. 154 *infra*.

Therefore, in order to sense the real federal attitude one must not be content with statements hastily made and only briefly considered, or not considered at all, but rather one should turn to instances where there have arisen issues of real importance and ascertain what has been the ultimate attitude or disposition in the light of those issues.

In passing, let it be noted that the record in the present case contains various statements by federal officers that New River must as a matter of course be treated as a navigable water because of the federal expenditures of 1877-1889.[1] Rather we shall concern ourselves with more significant statements and actions representing the attitude of the Federal Government.

Turning now to such aspects of the record: The first expressions of federal interest in New River were in connection with the urge, indeed the need, of finding a suitable route for travel and transportation of commodities between the Eastern seaboard, particularly in the region of Virginia, and the Ohio River and other Western points. The several investigations, expeditions, reports of engineers, etc. were significant of nothing more than the strong incentive to utilize New River (they concerned New River from Little River, just above Radford, to its mouth). They did not involve any determination as to whether New River was a navigable water, excepting in so far as the outcome of all of these investigations showed that, despite the strength of the incentive, there resulted no use of New River for commercial purposes.

Next there are the investigations and the appropriations which led to the federal attempt in 1877-1889 to create navigability in certain isolated stretches of the river. Clearly these did not result from any investigation of the navigability of the river and any determination that it was navigable, let alone that it constituted a navigable to the Federal Power Commission. Contrary to petitioner's statement (Pet. Br., 47), General Brown did not decline to reconsider the previous opinion of the War Department, but instead stated:

---

[1] Such a conclusion is of course invalid, *Oklahoma* v. *Texas*, 258 U. S. 574, 590.

> "After *a careful consideration* of the *material submitted*, I have reached the conclusion that there is no reason for changing the previous report of this office dated December 29, 1925, with respect to the navigability of New River. It is my opinion that New River is not navigable at any point in its course" (Ex. 539-B, R. 2795-6).

(b) Significance of attitude of Federal Government regarding New River.

It is, of course, true that, as a matter of law, administrative attitudes and actions are not conclusive. However, in the present case a brief review of the record of the attitude of Federal representatives in respect of New River is, we believe, of considerable interest. It shows that, up to the time of the first so-called new River case *(Appalachain Electric Power Company* v. *Smith, et al.)*, the attitude of the Federal Government was such as to warrant the States through which New River flows and the riparian owners along the river in believing and acting on the belief that New River is not subject to a Federal servitude.

Where the question arises as to whether or not there is Federal jurisdiction, the normal tendency and practice of Federal representatives and bureaus is off-hand to "play safe", that is, to state, and at least temporarily to proceed upon the assumption, that Federal jurisdiction attaches. The tendency and practice in point are particularly marked when there comes before a Federal department or officer a question as to whether or not Federal permission is needed for this or that. Federal representatives by inclination and training do not readily admit a lack of federal jurisdiction. The case of New River is not an exception.

The petition and complaint of that State gave rise to investigation, a public hearing, a report, and argument by attorneys on both sides of the controversy, in consequence of which the Chief of Engineers in a report to the Secretary of War July 13, 1911 stated:

> "There has been *no useful navigation* on New River *at any time,* and *none is possible* under existing natural conditions nor without the expenditure of vast and prohibitive sums in improvement work. While the discharge of ore washings in New River may produce conditions in Kanawha River injurious and obstructive to navigation * * *, it is probable that in most instances the effect is too remote * * *" etc. (Ex. 566, R. 2844).

Finally, in what appears to be the last official expression of considered opinion in this matter of ore-washings being emptied into New River in the vicinity of Ivanhoe, Va., the Chief of Engineers, General W. M. Black, reported to the Secretary of War May 19, 1916, that

> "The turning loose in the Kanawha [manifestly he meant the New] River, *at a point over 180 miles above the navigable portion,* of 5,000 or even 50,000 cubic yards of fine material per year cannot possibly produce any appreciable injury to navigation" (Ex. 566, R. 2847). (Bracketed material supplied.)

Thus the issue in point resulted in no action predicated upon any federal servitude in respect of New River. Indeed, such action as was taken and such opinions as were expressed were *predicated upon* the navigability of the Kanawha River, the *non-navigability of New River* and the fact that any effect of those ore-washings upon navigable capacity was limited to the navigable capacity of the Kanawha River.

During the pendency of the ore-washing controversy Congress itself had taken significant action in rescinding the authorization for the attempt to create a navigable condition in New River. This was by virtue of the Act of June water of the United States. Instead they were either the result of the continuing incentive and need for a better means of transportation than the then extremely inferior system of roads,[1] particularly with a view to reaching railheads, or the result of the all too common efforts to obtain the expenditure of federal funds in given localities primarily for the sake of the expenditures, i. e., of "pork-barreling". Whichever the motivation may have been, the record reveals no mature consideration nor any deliberate finding upon the question as to whether New River was or became subject to a federal servitude. Reports on the progress of the work no more indicate any "finding" of navigability than do similar reports on the progress of other works depending upon the artificial creation of navigability, such as the Hennepin Canal or the Florida Ship Canal, indicate any conclusion that the routes of such purely artificial waterways were navigable waters of the United States.

Indeed, the first time that such an issue was squarely presented to the Federal Government was in connection with complaints as regards the practice of emptying ore-washings into New River from the mines in the vicinity of Ivanhoe. That controversy persisted from 1894 to 1916 (See Ex. 566, R. 2840-8). The War Department was importuned by various parties and by the State of West Virginia to take preventive action. The issue was sufficient to bring forth significant expressions of maturely considered views. Thus, the complaint of the State of West Virginia was not with regard to the effect of the ore-washings upon any alleged navigability of New River, but rather

> "That the ore washings caused solid deposits in *Kanawha River* to which New River is tributary, thus decreasing navigable depths of the channels" (Ex. 566, R. 2843).

---

[1] See pp. 50-1, 56 *supra.*

the very subject of this case, namely, by virtue of the Declaration of Intention made by respondent's predecessor in 1925. We do not pause here to do more than call attention to the pertinent and maturely considered report of the Chief of Engineers, General Harry Taylor, December 29, 1925 (*Ex. 572,* text same as Ex. 97, R. 2528-33), in which he found that New River "is not a navigable stream", and the fact that the Federal Power Commission itself on June 1, 1927 made the finding that

> "said river (New River) in the part thereof involved in said declaration is not 'navigable waters' within the definition thereof in said Act" (Ex. 574-B; R. 2852-3).

Indeed, as late as July 1, 1930, the Federal Power Commission through its Acting Chairman certified to the Attorney General of the United States the pertinent facts, including the fact that

> "New River is neither navigated nor navigable in fact" (Ex. 531, R. 2779).[1]

Even as late as April 3, 1931, the Commission left unaltered the 1927 finding of non-navigability (11th Annual Report, Federal Power Commission; Ex. 91, R. 2509-12).

In the meantime there had been made by the United States Engineer Department a careful examination of the question as to whether New River is a navigable water of the United States. This examination was made because there had arisen the question as to whether War Department authorization was necessary for highway bridges

---

[1] Counsel for petitioner, because of the devastating effect of this certification, have sought heretofore to impugn its official nature. But see the statement made by the Commission itself in its own report (10th Ann. Rep. 1930, Ex. 577, R. 2855) viz.:

> "In order that the Commission might have *reliable guidance* on the legal aspects of the question, the *advice of the Attorney General* of the United States *was requested* relative to the pending application for a development on New River * * *."

13, 1902 (32 Stat. 331). Needless to say, this action was in the very opposite direction from fastening any Federal servitude upon New River. See *Oklahoma* v. *Texas,* 258 U. S. 574, 590-591.

In 1912, as a result of one of the many requests that Congress appropriate funds for improvement of this or that river, the Board of Engineers for Rivers and Harbors reported upon the question as to whether federal funds should be appropriated for work between Hinton and Radford. The Board reported that those expressing interest in the improvement recognized "that the *great fall* in the river would preclude any form of *continuous navigation,* except through slack watering the stream", and that physical conditions were "such that *it could not be improved for useful navigation except at prohibitive cost*"[1] (R. 2420). The Board recommended against such appropriation and its recommendation was supported by the Chief of Engineers (R. 2418-9).

At about the same time, however, there arose in an important case the issue as to whether or not New River is subject to a federal servitude. We refer to the facts that the Byllesby and Buck dams of Appalachian Power Company (subsequently merged with the respondent corporation) had been constructed in 1911-1912 (R. 2026); that it was officially called to the attention of the Chief of Engineers that such dams had been built without federal supervision, and indeed without any form of federal authorization; and that no action was taken by the War Department or any other federal agency to require the obtaining of any federal authorization, let alone to abate the two dams (R. 2077-9; Ex. 47, R. 2454-5). Such status in respect of the Byllesby and Buck dams still continues.

The next issue involving any question of a federal servitude in respect of New River arose in connection with

---

[1] Clearly this evidences a *need* for *improvement* throughout the entire section from Radford to Hinton (although the cost thereof would be prohibitive) if useful navigation *were ever to be an accomplished fact?*

When these official reports, made after careful investigation of the facts upon issues squarely presented for definite official action, are considered, it is plain how insubstantial is the argument of the petitioner. Furthermore, in the light of such a record of Federal attitude, it is clear that New River, except for this *tour de force* in 1932, was treated by all federal agencies in connection with all important issues as being *free from any federal servitude.*

Surely it cannot now be contended with any degree of support, in reason or in fact, that, in the conduct of their affairs and the making of their investments, riparian owners and other private parties were not justified in proceeding on the belief that no federal servitude in respect of navigable capacity had attached to any part of New River.

In the light of that consideration, as well as of the record, it appears further that nothing short of a factual basis clear beyond the peradventure of a doubt (and we submit that no such basis exists) could at this late date warrant a holding that New River is subject to a federal servitude by virtue of being navigable-in-fact.

6. *Although comparison with other rivers (held navigable or non-navigable) is irrelevant in fact and law, petitioner's comparisons serve only to confirm the non-navigability of New River.*

When the navigability of a particular river is the subject of judicial inquiry, evidence of the physical characteristics and other criteria of navigability on other rivers is plainly inadmissible; and it is even clearer that a comparison of other rivers without the benefit of receiving evidence in detail upon their physical and other material characteristics is irrelevant and inadmissible. Such is the law.

> "Each determination of navigability must stand on its own facts." *United States* v. *Utah,* 283 U. S. 64, 87.

across the river at Jackson's Ferry and Glen Lyn, Virginia. The reports on this by the various Engineer Officers were as follows:

On October 18, 1930, Lieut. Colonel (then Major) Herman, as District Engineer, officially reported that in his opinion

> "*New River is not navigable in fact* either at Jackson's Ferry or Glen Lyn or at any other point in its course" (Ex. 579-B, R. 2862).

On October 24, 1930, General (then Lieut. Colonel) Spalding, as Division Engineer, stated that after a careful consideration of the facts he fully concurred in the statement of the District Engineer that New River

> "is not navigable in fact at Jackson's Ferry or Glen Lyn or at any other point in its course" (Ex. 579-C, R. 2864).

And on November 11, 1930, General Lytle Brown, as Chief of Engineers, rendered an official opinion in which he said that

> "It is my opinion that *New River is not navigable at any point of its course*" (Ex. 539-B, R. 2795-6).

Moreover, when petitioner's agency, the Federal Power Commission, inserted certain conditions regarding the regulation of flow in its license tendered May 5, 1931 (Ex. 131, Art. 15, R. 2670), it provided for the prevention of "undue interference with navigation on the Kanawha River" *but not a word with regard to the protection of the 'navigable' New River.*

It was not until Columbus Day of 1932 that the Federal Power Commission embarked upon the self-serving proposition that New River is navigable—a proposition which shows on its face that it was made in an attempt to bolster its position in the then pending suit (the first New River case):

Green River, each held navigable in the *Utah* case, yet "in general, as the spring high water has receded these sand bars have constant and fixed locations" (*id.* 85). There were occasional "crossing" sand bars, in which instances there was some difficulty in ascertaining the course of the channel, or the depth of a bar was less than that prevailing in the well-defined channel (*id.* 85). However, the slope of the 150-mile section of the Colorado:

> "is gentle, being less than 2 ft. per mile" (*id.* 80).

The Court stated that the rapids were few. "There were four drops in elevation which may be called small rapids, but it appears that these do not ordinarily make necessary any portage of boat or cargo" (*id.* 85). This slope of the Colorado, of less than 2 feet per mile compares, with an average slope of 7.1 feet per mile for New River.[1] As to depths in the Colorado, the Master found that they ranged from between 3 and 4 feet for 17 days in the year to over 8 feet for 124 days ~~in the year~~ (*id.* 81).

As to the Grand River, found navigable by the Master over a distance of 79½ miles, 65½ miles thereof had a gradient of "only a little over 1 ft. per mile" (*id.* 79) and the remainder had a gradient of 3.5 ft. per mile (*id.* 79). The Master found that there was a stretch of about 3 miles at the upstream end "in which there were 3 small rapids", but he held this 3 miles to be navigable along with the balance of the 79½ mile section even though in this 3-mile stretch "the river is less susceptible of practical navigation for commercial purposes than in the remainder of the river" (*id.* 79). The Master found that in the Grand River "for 349 days in the year there is a depth of 3 ft. or over" (*id.* 79).

As to the 95 mile reach of the Green River held navigable, there was a gradient of less than 1.2 feet per mile (*id.* 78) and "for 312 days in the year there was a depth of 3 ft. or over" (*id.* 78).

---

[1] This is the slope between the mouth of New River and the "mouth of Wilson" the portion of the river claimed by the Federal Power Commission to be navigable and shown on Plates I-IV.

This principle does not depend alone upon the rule which precludes the injection of collateral issues in a suit. As we have previously shown, the physical characteristics of the stream are its peculiar "hallmarks" and the effect of any particular type of obstruction can be determined only in relation to the presence or absence and the character of other types of obstructions in the same river. In no case will any particular type of obstruction be precisely the same upon any two rivers; much less will it ever happen that the existence and relation between all of the various types of obstructions to navigability is the same upon two given rivers. But, did such comparison constitute an admissible method of proving navigability or non-navigability of a river when that becomes the subject of judicial inquiry, the comparisons urged by petitioner would here serve only to confirm the fact, shown by the evidence and found by the court, that New River is non-navigable.

(a) Comparison with Colorado, Green and Grand Rivers.

On Plate I[1], at the end of this appendix, are shown the profiles of New River and those of parts of the Colorado, Green, Grand and San Juan Rivers, of which the navigability was the subject of judicial determination in *United States* v. *Utah,* supra. Even a superficial inspection of the plate shows that the slope of New River is throughout very much steeper than the slopes of those parts of the Colorado, Green and Grand Rivers, which were held navigable in the *Utah* case (those parts being indicated by hatching under the profiles).

While, as petitioner implies, there were some shifting sand bars (not rock ledges as in case of New River) on the 150-mile section of the Colorado River immediately above the Arizona-Utah line, and likewise some on the 79½-mile section of the Grand River and the 95-mile section of the quently with almost limitless reaches on either side of excellent water having little or no slope. It is, of course, manifest that, if this short reach of the Fox had not lain between waters of gentle or no slope and excellent navigability over immense distances, it would not have been held to be part of a navigable waterway.

---

[1] All data shown on Plates I-IV are derived from the instant record or official documents. The relative scales of all plates have been made to conform to those of the Government exhibit in the *Utah* case upon which Plate I is directly based.

On the other hand, an inspection of the profiles of Plate II shows that the slope of New River from its mouth to the mouth of Wilson Creek is generally comparable to that of this short reach of the Fox, which, as the petitioner says in its brief, could not be passed except by portages. To suggest that, merely because a short interrupting reach in one of the greatest and most favorable waterways on the continent was held not to destroy the character of that waterway as a navigable water of the United States, a stream upon which any attempted use would involve one long portage from its mouth to its upper reaches might be considered navigable, is plainly absurd. It was, of course, the long and almost endless reaches of good water on each side of this short difficult stretch of the Fox which made portaging through that reach of the Lower Fox tolerable and practicable. Indeed, the evidence shows that from the earliest settlement of the country, up to and including the time of the Montello decision, this great waterway had been practically utilized in commercial navigation. It was then being regularly traversed by steamboats.

On the contrary, the evidence in the instant case shows that there was no use of New River by early traders, settlers or industries, even though land travel was immeasurably more difficult than in the territory through which the Fox flowed. Obviously, this was because, although it would have been practicable to endure even difficult portages for a short distance in the course of an otherwise excellent waterway thousands of miles long, such as the Great Lakes-Fox-Wisconsin-Mississippi route, it was utterly impracticable to use a stream which would have involved one continuous succession of portages between its mouth and its source and traversed a mountainous territory throughout.

As may be seen from Plate I, the portions of the Colorado, Green and Grand Rivers held to be navigable have a slope approximating that of the navigable Kanawha rather than that of any part of New River. On the other hand, the San Juan River, held in the *Utah* case to be non-navigable, obviously had a steep slope quite comparable to that of New River.

(b) Comparison with Fox River.

In its discussion of *The Montello,* 20 Wall. 430, petitioner refers particularly to a short reach of the Fox River in which there was an average fall of approximately 8 feet per mile concentrated in large part at one point and to the fact that in this short reach portages were necessary (Pet. Br. 64, 66). It would be enough to point out that the average fall of the Fox River (which was a link in the Great Lakes-Fox-Wisconsin waterway to the Mississippi River System) from its mouth to the point where it almost touches the Wisconsin River (the point of portage to the Mississippi system) is less than 1.15 feet per mile, in comparison with an average fall of 7.1 feet per mile on New River! (Report of Chief of Engineers, 1936, pp. 1182-3).

In *The Montello* case, the question was not merely whether this one short reach of the Fox, separately considered, was a navigable water, but whether the Fox River as a whole was a navigable water. It was an admiralty case, in which the question was whether a vessel which plied only between Oshkosh (far upstream from this short difficult reach) and the city of Portage on the Wisconsin River was subject to the admiralty jurisdiction of the United States (*The Montello,* 11 Wall. 411, 412).

On Plate II, at the end of this brief, there are shown profiles of New River and of the Great Lakes-Fox-Wisconsin route to the entire Mississippi River System, in which the Fox was a vital link. Mere inspection discloses that, although the slope of the relatively short difficult reach of the Fox is comparable to the slope of the entire New River, it was merely a single, concentrated interruption in a continuous waterway extending over 3300 miles and conseproof lies in the fact that no practical early use of New River was made despite the most compelling incentive to use any available waterway, no matter how difficult.

It is also to be remembered that this extensive use was made of this Lake Michigan-Desplaines-Illinois waterway even though it flowed through an open prairie where land travel, not only by foot and pack-train but even by ox-cart and wagon, was entirely practicable and indeed easy.

On the other hand, the evidence conclusively shows that, although the difficulties of land travel down the New and Kanawha Valleys were of the most severe character, no use whatever was made of New River. Another striking thing is that on three occasions the State of Virginia caused exploratory trips to be made in order to locate a practical route by turnpike or canal between the head of the James River and the Kanawha and Ohio Rivers. No one ever sent an exploratory expedition to make a location for the Lake Michigan-Desplaines-Illinois route. That was not necessary, because that route had been in practical use from the days of the earliest settlement of the continent.

(d) Comparison with Tennessee River.

Petitioner (Pet. Br. 67) and the dissenting judge (R. 2935) make comparison with the Tennessee River. However, what has been said with regard to the Fox (pp. 160-1 *supra*) and the Desplaines (pp. 162-3 *supra*) Rivers is generally applicable to the Tennessee.

The important obstacle in the case of the Tennessee was Big Muscle Shoals, a stretch of 14 miles having a gradient of 5.93 feet per mile. This obstacle, however, was situated in an otherwise extremely flat river, 652 miles in length, with an average gradient throughout that entire distance of only 0.79 feet per mile. Plate IV at the end of this Appendix reveals the striking contrast between the gradient of the Tennessee River and that of New River. It will be seen from the profiles that the gradient of the Tennessee River is even less than that of the navigable Kanawha.

(c) Comparison with Desplaines River.

Petitioner refers to the Desplaines River which was held navigable in *Economy Light & Power Co.* v. *United States,* 256 U. S. 113, at least at the point, about half a mile above its mouth, where the power dam in controversy was located.

We invite the Court's attention to the profiles and the comparative slopes of New River and of the Lake Michigan-Desplaines-Illinois River Waterway between the Great Lakes-St. Lawrence System and the Mississippi System, which are shown on Plate III, at the end of this Appendix. It will be noted that the *Economy* case, like *The Montello* case, dealt with a situation where a relatively short stretch of difficult water was a comparatively minor inconvenience in the use of the almost limitless reaches of fine navigation on either side—the greatest and finest inland waterways on the Continent, with a length of more than 3000 miles.

In connection with petitioner's reference to portages (Pet. Br. 66), it must be recalled that there was always a portage over the divide between the Chicago River and the Desplaines on this water route between the Great Lakes-St. Lawrence System and the Mississippi River System. Obviously, this was a case where portages in a short reach of a waterway with almost limitless reaches of good water on either side manifestly do not preclude practical use for trade and commerce.

On the other hand, if portages were required on this short reach of the Desplaines, then a mere inspection of the profiles of Plate III shows that portaging would be the continuous and ordinary condition—the rule and not the exception—throughout the entire length of New River, and not merely an occasional and relatively brief inconvenience between limitless reaches of good navigation as in the case of the Desplaines. On New River portages throughout the entire length of the stream would be the rule rather than the exception. To suggest that such a condition would permit practical use for commerce of a substantial and permanent character is manifestly absurd, and the incontestable

(3) That there is great difficulty in maintaining project depths on these streams during low water; and

(4) That, consequently, navigable capacity of these streams will be impaired (Pet. Br. 81-83).

We now examine more fully the evidence pertaining to these factual premises.

Petitioner's first premise is that during an allegedly critical low water period occurring between August 24 and August 31, 1918, New River at the damsite contributed 38% of the flow of the Ohio below the mouth of the Kanawha. This computation is based upon certain alleged estimates of flow at the damsite, at the mouth of the Kanawha and at old Dam 25 in the Ohio River, just above the mouth of the Kanawha. The Ohio River flow used by petitioner was an estimate of its witness Davenport, hazarded 18 years after the alleged flow occurred, without benefit of any flow records or measurements, under conditions which made it impossible to use the "accepted method" (R. 1439) and for a period when the Ohio River dams above the mouth of the Kanawha were under construction, so that no reliable flow estimates were possible (R. 649-53; 1436-41; 1311-3). The flow estimated by witness Davenport was 1210 c.f.s. (R. 1421). The official report of the Army Engineers on the Ohio River, dated August 14, 1935, shows that the flow of the Ohio River was lower during the fall of 1930 than it has ever been since records of this nature have been kept and that the lowest flow at Dam 25 was 2120 c.f.s., or nearly twice as great as Davenport's admittedly unreliable estimate (*Ex. 602*, being table 45 of House Doc. 306, 74th Cong., 1st Sess. (*Ex. 601*, p. 146, par. 263)). The flow figures used by petitioner for the damsite and at the mouth of the Kanawha River were similarly, not flow *measurements* (there were no gauges at, or rating curves for, either place at the time) but, merely *estimates*, in the making of which different methods and dates erroneously chosen, were used in estimating the two flows, with the result of obtaining an ab-

PART II.

Analysis of evidence relevant to issue of impairment of navigable capacity.

Any attempt adequately to review the voluminous evidence upon this subject—much of it scientific and technical in character (R. 2904, 129, 130-1)—would extend this Part II of our Appendix beyond any permissible compass, and we shall not burden the Court with such an exhaustive review. The purpose hereof is merely to provide, for the convenience of the Court, a somewhat more comprehensive analysis of certain lines of evidence on the subject in case the Court should be interested in a more detailed review of such evidence than that found in the summary in our brief.

A. Petitioner's allegedly undisputed evidence (Supplementing summary discussion in respondent's brief 71-74).

In our brief we point out that petitioner's argument, under its heading—"The undisputed evidence", rested in fact upon, not undisputed evidence but, evidence which is, not only contradicted but, shown to be grossly erroneous by the record. Petitioner's factual premises are:

(1) That, during allegedly "critical low water periods", New River at the site of respondent's dam had on one occasion, in September, 1930, contributed as much as 70% of the flow of the Kanawha River, and on another occasion, in August 1918, as much as 38% of the flow of the Ohio River just below the mouth of the Kanawha;

(2) That in the operation of respondent's project weekend (Sunday) shutdowns (only contingently possible) would cut off the flows of the above-mentioned streams, in the respective proportions, for 34 hours during such allegedly critical low water periods;

Rivers of contribution from above Radford. In addition to the evidence cited in our brief, much other evidence plainly shows the error in this hypothesis of petitioner. In this connection, it may be helpful to review the behavior of the tides or so-called "waves" (variable discharge); because the evidence on that subject makes clear why petitioner's hypothesis is greviously in error.

The back or "tail" of a so-called "wave" or any other discharge preceding an interruption of flow, lags so that the front of the following "wave" soon overtakes it, the trough between "waves" gradually becomes filled with water from the crest and the flow of the stream has a progressive trend toward uniformity (R. 837, 1860). This is a process which begins immediately below the dam, 160 miles above the head of navigation, and one which is clear and undisputed in the record. Yet, this fact is wholly ignored by petitioner.

The "tail" of a "wave" will lengthen out to a d (time of flow) of between two and three days in passing down New River (R. 1860). It is plain that the respondent's intended acts will involve at the most (and even that is only a contingent possibility) a maximum shut-down of 34 hours (Pet. Br. 78).[1] It is thus obvious that, in the case of an assumed Sunday (34 hour) shut-down, the following "wave" would overtake or overrun the tail of the preceding "wave" long before the latter had passed down New River and that, even without regard to the increase in low water flow provided by respondent's reservoir, such a shut-down would not materially reduce the natural flow of the Kanawha and the Ohio. And, when the increase in low-water flow provided by respondent's project is taken into consideration, the evidence clearly establishes that the normally and disproportionately larger flow at the damsite and smaller flow at the mouth of the Kanawha (R. 567-78; cf. R. 1232-3).

---

[1] Ex. 594 represented the upper limit of any variable operation of respondent's project. It affirmatively appears that the operation would be less variable during seasons of very low water. This is dictated and controlled by the essentials of practical operation (R. 2905; 2038-9; 2043-8; 1954-6; 2007-8).

However, quite apart from the obvious errors in these estimates, the flows used, and the computations made, by petitioner are plainly irrelevant. Petitioner's argument is directed to an alleged possibility of impairment during allegedly "critical low water periods" (Pet. Br. 81-2). The estimated flows for the damsite and the mouth of the Kanawha (used in petitioner's computation of contribution from above the damsite to the flow of the Ohio below the mouth of the Kanawha during the allegedly critical low-water period in August 1918) are respectively 2260 s.f. and 4737 s.f. (R. 559, 1317). It is undisputed that the natural low-water flow at the damsite is 600 s.f. and at the mouth of the Kanawha is from 1,000 to 1,100 s.f. Consequently, if any such flows prevailed at the damsite or at the mouth of the Kanawha during this period, neither reflected a low-water condition but instead one of a flow unusually high for the summer season and one under which there would be far more water than needed or useful for navigation, even under petitioner's indefensible assumption of an absence of any or all contribution from above Radford.

What petitioner obviously did, in addition to taking erroneous and discredited flow figures, was to select a short period during a low-water season when there was a temporary freshet on the New and Kanawha Rivers and none on the Ohio, so as to obtain a temporarily distorted but immaterial relation between the flows of the Kanawha and the Ohio—and to call the result "evidence" of the relation between the flows "during critical low-water periods."

In our brief we have shown that a much graver and more indefensible error in petitioner's argument is the assumption, squarely refuted by the record, that, even if petitioner's flow figures were correct, the operation of respondent's project would, under conditions assumed by petitioner or otherwise, deprive the Kanawha and Ohio discharge somewhat greater than would be possible during an extreme low water period. However, assuming for purposes of argument that the average discharge from respondent's project would have been no greater than during extreme low water periods, it is still plain that respondent's project would have produced no material effect upon the flow at the mouth of the Kanawha.

As pointed out in our brief, even during a week of extreme low flow (600 c.f.s.), the average flow below the damsite with respondent's project in continuous operation would be 1230 c.f.s. If a shutdown for 34 hours did occur in such a week of extreme low flow, utilization of the available water during the remaining 134 hours of the week (as is, of course, the purpose of a power reservoir) would result in an average flow of 1540 c.f.s. Consequently, the contribution from above the damsite to the flow at the mouth of the Kanawha would not fall below approximately 850 c.f.s., even at the brief period of maximum effectiveness of such a shutoff, and to this would have to be added approximately 400 c.f.s., being the flow of the drainage area of the Kanawha basin below the project site, affording a total flow at the mouth of the Kanawha of approximately 1250 c.f.s. Thus the flow at the mouth of the Kanawha would not be materially less than the 1297 c.f.s. natural flow at the mouth of the Kanawha as claimed by petitioner. And, even on the basis of applying the results of operation of respondent's project during such a period of low flow, the resultant flow at the mouth of the Kanawha would be substantially greater than the natural low flow at that point (1100 c.f.s., Resp. Br. 72).

It is also obvious that resulting flows would have been far larger than necessary or useful for navigation (See Resp. Br. 70), and except for the brief peak of maximum effectiveness, the flow during the period selected by petitioner would have been substantially larger than under natural conditions.

Of course, as pointed out in our brief, the matter of contribution above the damsite would be material, if ever, effect of respondent's project during extreme low-water periods will be to increase the low-water flow of those streams as compared with the natural condition.

This may be shown, for the period selected by petitioner, by the testimony of petitioner's own witnesses. One of petitioner's witnesses claimed that, if the flow of the damsite were shut off for 57 hours (about 2½ days), such a shutoff would reach a point of maximum effectiveness of 75%, for a relatively short period only, at the mouth of the Kanawha River (R. 803-4). The Trial Court found "that the witnesses who furnished the bulk of plaintiff's testimony" on this subject were so biased and evasive that their testimony was entitled to little, if any, weight (R. 130-1); and this estimate of 75% is excessive. However, assuming *arguendo* the correctness of this estimate of petitioner's witness, it is clear upon the evidence that, had respondent's project been in operation during the 10-day period in 1930 (September 21-September 30 inclusive) when petitioner claims that New River above the damsite contributed 70% of the flow of the Kanawha River at its mouth, respondent's project would have produced no adverse effect.

It is undisputed that the effectiveness at an assumed shutoff at the damsite would be far less for 34 hours than for 57 hours. We may assume, for purposes of argument, that the effectiveness of a 34-hour shutoff (the maximum contingently possible in respondent's operations) would be directly proportional to that estimated by petitioner's witness for a 57-hour shutoff, although it would not unlikely be somewhat less. By accepting that basis for present purposes, the effectiveness of a 34-hour shutoff would reach a brief maximum of 45%, leaving a minimum residual of at least 55% of the previous flow. According to the flow figures of petitioner, the flow at the damsite during this period was, not an extremely low flow (600 c.f.s.) but, 908 c.f.s. (R. 564). Under these circumstances the normal operation during the period in question would involve an average credited by the fact that, while seeking to support the claim by means of incompetent and uniformed witnesses, petitioner refused to call, or to permit to appear, Colonel Conklin, the U. S. District Engineer in charge of these waters.

Thus, the testimony of petitioner's witness McWhorter (Pet. Br. 81) consisted merely of simple arithmetical calculations based upon the discredited Ohio flow figures hereinbefore discussed and upon alleged temporary or instantaneous flows during early years, caused by manipulations for navigation during a period when, as the witness knew, there was an Ohio River practice (no longer existing but then indulged in because the dams on the Ohio had not been built below the mouth of the Kanawha) of holding back the water to create a tide on which to float coal-barges down that part of the river not yet improved. (R. 1309-13; 739-40.) This witness admitted that he did not know how much water was required for the operation of the dams on the Ohio or Kanawha Rivers and that he had never operated or had charge of similar dams. (R. 1313-4.) He also admitted that the dams on the Ohio above the mouth of the Kanawha require substantially the same amount of water for their operation as those below, but nevertheless insisted that the Ohio dams below the Kanawha could not be operated with 500 c. f. s. more water than would be needed or useful for the dams above the mouth of the Kanawha. (R. 1314-20.) He was one of the witnesses whose bias and evasion was the subject of a finding of the court (R. 130-1).

Douglass and Stone (whose testimony related to conditions either before any improvements were made or before the existing projects were constructed) were bargemen who were in no way qualified to testify on the subject (R. 1116, 1105-6; 1121-3). Trippe's testimony, vague and contradicted by his own report (R. 745-6, 743), related chiefly to a situation no longer existing, namely, when the old during a period of extreme low flow; and it is there shown that the operation of respondent's project, even if a maximum shutdown of 34 hours should occur during such a period, would at all times substantially increase the natural low water flow (See Resp. Br. 72-3).

Since any effect of respondent's project upon water supply during an allegedly critical "low water period" would be beneficial, petitioner's assertion that there is great difficulty in maintaining project depths on the Kanawha and Ohio Rivers would be immaterial, were it true. However, in support of this contention, petitioner cites only the disputed, contradicted and largely discredited testimony of its own witnesses (Pet. Br. 81). The claim was completely refuted by the testimony of Dr. Mead, Colonel Scheidenhelm, and Major Putnam and the report of General Taylor, Chief of Engineers. This testimony and evidence are reviewed in respondent's brief at pages 70-1. This testimony was given by highly qualified and informed witnesses.[1] And the claim was further dis-the result of the test waves in 1930 with tests by integrating models, found that the maximum rate of increase at Kanawha Falls (somewhat above the head of navigation) of a "wave" corresponding to the maximum of any operations intended by respondent, would be 800 second-feet an hour and that the maximum rate of decrease would be 250 s. f. an hour (R. 1862-3, 1869). Something of the signifieance of this may be understood from the fact that, at low water, when petitioner insists that any effects are most important, a change in flow of 1,000 s. f. just below the London dam (the upstream dam on the Kanawha) would make a change in depth (always above and never below project depths, in a canalized river like the Kanawha) of only about ⅕ of an inch! (R. 1304; *Ex. 116,* R. 644) Indeed, the rate of change in flow provided by the Government for the operation of the power projects at the Kanawha navigation dams, is 3,000 s. f. per hour (R. 2192). In view of the foregoing the irrelevancy of petitioner's reference to alleged changes in navigable depths of 5 inches (Pet. Br. 85) is thus apparent. For that matter, "Time and again natural tides occur which substantially exceed in amplitude and in volume any of the 1930 test tides." (R. 2057)

---

[1] Mead, Dr. Daniel W., Consulting Engineer with offices in New York City and Madison, Wisconsin; 50 years experience in the design, construction and supervision of operation of hydroelectric plants; consulting engineer for the Miami Conservancy District; consultant on Wilson Dam; consultant on Boulder (Dam) Canyon project; consulting engineer for Tennessee Valley Authority; member of Engineering Board for Flood Control on Huai River, China; consultant on numerous projects in Virginia and West Virginia, including Radford project; for 28 years head of Hydraulic Engineering Department, University of Wisconsin; author of first textbook on "Water Power Engineering" and other related subjects; then President of American Society of Civil Engineers (R. 1942-52).

Scheidenhelm, Col. F. W., Consulting Engineer in New York City; 30 years experience in the design, construction and supervision of operation of electric plants and systems; extensive experience in connection with hydro-electric developments in Virginia and West Virginia; consultant on the Radford project; consulting engineer to the Public Service Commission of New York on appraisal of water power sites; member of Board of Consulting Engineers on Norris Dam of Tennessee Valley Authority, served as officer in Corps of Engineers during the World War (R. 2012-6).

For qualifications of Major Putnam, see p. 173, *infra.*

Indeed, such changes in depths as could occur would be far less than the variation of 3/10ths of a foot which is a regular incident of the normal operations of the Kanawha navigation pools. (Ex. 263, R. 2750-2; 2193; 2206-7) In fact, variations in pool level at the foot of Marmet dam, due to the operation of the Government licensed power station, are shown to equal at least 1.3 feet (R. 1855; *Ex. 229A,* R. 2268) and on some occasions even 3 feet (R. 2207).

Major Putnam[1] testified that a rate of increase in the

---

[1] Major R. W. Putnam, officer of the Corps of Engineers from his graduation from West Point in 1913 until his resignation in 1926; as Chicago District Engineer made exhaustive study of Illinois waterway, Chicago Drainange Canal and the peak load operation of the hydraulic-electric plant at Lockport; made exten-

(Footnote continued on next page)

(and since displaced) dams on the Kanawha were so dilapidated and leaky that they would not hold water (R. 752-4). Of course, a dam creates a pool and changes the natural slope of a stream; and obviously, unless the dam retains water, the stream will seek its natural slope.

B. Supplementary review of certain evidence relating to the alleged effect of so-called power "waves" or tides upon navigable capacity

(Supplementing discussion in respondent's brief, pp. 74-79).

In our brief, we point out that the size and rate of any variations in flow which will exist in the Kanawha River will be determined by the operation of the Government licensed projects at the Kanawha navigation dams and not by respondent's project. However, we also point out that, quite apart from that fact, it would be physically impossible (by any manipulation of respondent's project although wholly unrelated to any intended acts of respondent) to produce any variations in flow in the Kanawha River which would impair navigable capacity there (Resp. Br. 75-78). We now review the pertinent evidence in more detail.

Professor Thomas,[1] who had supplemented his study of

---

[1] Prof. Harold A. Thomas, who is perhaps the greatest living authority on the irregular flow of water and the behavior of tides or "waves", has had charge of the Hydraulic Laboratory and of all courses in Hydraulics and Hydraulic Engineering at the Carnegie Institute of Technology since 1928; Consultant to the U. S. Engineers on the Bluestone Reservoir on New River; consultant for the U. S. Engineering Offices at Philadelphia, Pittsburgh, Huntington, Mobile and Panama Canal Zone; participated in studies regarding water power and flood protection for the New York State Water Supply Commission; studied the question of flood heights and movements as practical problems on the Snoqualmie, Wabash, White, Miami, Allegheny, Monongahela, upper Ohio and Delaware Rivers; is the author of technical articles and reports upon the hydraulics of flood movements; and has specialized in the study of irregular and fluctuating flows of water (particularly in rivers and other open channels) such as floods and power tides or "waves" (R. 1841-5).

Engineer in charge of such matters, and that of one or two bargemen with reference to certain alleged difficulties of navigation and groundings on the Kanawha River (Pet. Br. 85-87). Manifestly, none of the alleged difficulties of navigation on the Kanawha River could have been caused by operations of the uncompleted Radford plant. However, an analysis of the evidence shows that none of these difficulties was caused even by the operation of the power plants on the Kanawha and that, to the extent they really occurred, they were due to entirely different causes.

Nevertheless, petitioner claims that these alleged difficulties were caused by the operation of power plants in the Kanawha River (Pet. Br. 87, footnote 12). It would be enough to point out that, if such were true (as it is not), these alleged difficulties came from the operation of the federally licensed Marmet and London power plants at the Government navigation dams on the Kanawha River. Manifestly the possibility that those power plants, which discharge directly into the navigation pools, might cause interference with navigation is so much greater than in the case of a plant located 160 miles above the head of navigation as to make the testimony wholly irrelevant. Moreover, it is plain that henceforth, as at the time of the trial, the conditions in these navigation pools below the Government dams on the Kanawha River will depend upon the operation of these federally licensed power plants and not upon the operation of respondent's project.

However, the evidence makes clear that these groundings, in so far as they did occur, resulted from causes totally unrelated to the operation of power plants at the Kanawha River navigation dams. The old navigation project (adopted in 1875) on the Kanawha River was a 6-foot project. After the Government adopted a 9-foot project for the Kanawha River, it commenced the construction thereof in the upper end of the river, with the result that there was a temporary period during which this part of the Kanawha 9-foot project was separated from the existing 9-foot project in the Ohio flow into the various navigation pools on the Kanawha not exceeding 6,000 s. f. per hour and that a rate of decrease of flow into those pools not exceeding 2,000 s. f. per hour would have no effect upon navigation so long as the water supply were not reduced below the requirements for navigation (which we have shown to be impossible) or the total flow did not reach the vicinity of even as high as 22,000 to 30,000 s. f., where obstructive currents would be encountered. The latter limitation had nothing to do with the effect of the *rate* of increase or decrease of flow, but depended upon the total flow existing, independently of rates of change in flow. (R. 1787-91) Major Putnam also testified that a rise in the stage in the various navigation pools on the Kanawha River not exceeding a rate of 1½ to 2 feet per hour or a decrease in the stage at the same rate, would not adversely affect navigation on the Kanawha. (R. 1787-94). It is thus manifest that neither the volume nor the rapidity of any variations which would be produced by any manipulation whatsoever of respondent's works, much less by any intended acts of the respondent, could remotely approach the magnitude or rate of the variations which, the testimony shows, would not adversely affect navigation or which are currently provided for by the Government in the operation of its licensed projects at the Kanawha navigation dams.

C. The testimony cited by petitioner with reference to alleged difficulties of navigation on the Kanawha River is not only largely erroneous but plainly irrelevant.

Petitioner cites the testimony of certain subordinate employees of Colonel Conklin, then United States District

---

sive studies of waterways in Europe and the United States; since resignation, practiced as Consulting Engineer on river and harbor works, including 60 navigation projects scattered throughout the United States; has been actively engaged in the commercial navigation business on inland waterways, including the Great Lakes and Illinois River and the Green River in Kentucky; had examined the Kanawha River with a view of expanding his commercial navigation operations. (R. 1777-80)

More important, it is plain that the landings and their connecting channels on the Kanawha River were designed and constructed to meet the requirements of the old 6-foot navigation project. Manifestly some of these would not meet the requirements of the new 9-foot navigation project unless and until private and municipal interests reconstructed them and dredged the landings and harbors deeper; and hence, until that had been done, groundings were inevitable. Indeed, the evidence discloses that the water level in the Marmet pool under the new 9-foot project is 1½ feet lower than the water level which obtained in old pool No. 3 of the subsequently replaced 6-foot project (R. 2167-8). It was at the Houston landing, formerly in old pool No. 3 but then in the Marmet pool, where, according to the witness Carpenter, boats experienced trouble at times, although he could not mention any specific dates (R. 2166-7). Manifestly one would not expect a landing which had been designed for only the old 6-foot navigation project, and which has been rendered even less adequate through the lowering of the water level 1½ feet by the construction of the new navigation project, to be adequate for 9-foot navigation.

On this point, both on direct and rebuttal, petitioner produced as witnesses bargemen, lock-masters and a civilian assistant. With no desire to criticize them, they neither had nor pretended to have any knowledge of the important hydraulic and other problems involved. Apart from some of the bargemen, all these witnesses were minor subordinates of Col. Conklin, U. S. District Engineer at Huntington, W. Va., who was in charge of both navigation works on the Kanawha River and any pertinent operation of the federally licensed power plants at the Kanawha Navigation Dams. Col. Conklin could have given the Trial Court complete information, based upon a full knowledge of the physical facts with reference to navigation and navigation works and to the operation of the power plants and based also upon a complete understanding of the technical hydraulic, navigation and other problems involved.

River by a section of the old 6-foot Kanawha project then still in use. Most of these alleged groundings occurred in operations extending over both the Ohio River and the Kanawha River or at boat landings. It was plain that these boatmen yielded to the temptation to overload their barges on the Kanawha River so as to take advantage of the 9-foot project on the Ohio River (R. 1181-4; 2126, 2132-3). It is clear that the only substantiated groundings (and these petitioner does not cite) occurred in this temporary intervening stretch of the old 6-foot project at times when the power plants at the navigation dams on the Kanawha were not even in peaking operation and that they were the result of overloading in an attempt to get as large a load as possible out of the old 6-foot project on the Kanawha into the 9-foot channel in the Ohio (R. 2125-6; 2132-3; 2128). As pointed out in our brief, the absence of any claim of groundings in the Ohio confirms the evidence that the groundings in the Kanawha were the result of overloading on the old 6-foot project on the Kanawha, and also shows that the power operations in the Kanawha had not produced any groundings in the Ohio despite the fact that the changes in flow produced by the power operations in the Kanawha are many times greater than it would be physically possible to produce in the Kanawha by any conceivable manipulation of respondent's project.

The reason for groundings at the landings on the Kanawha River is plain. The Federal Government constructs the through navigation channel, but it does not construct landings or the channels leading from the through channel to landings. These are provided by private interests or municipalities (R. 2168-9). Landings require dredging and other maintenance to prevent shoaling from spilling of coal, sand, gravel and other heavy products as well as from silting. Private interests and municipalities very often, and indeed ordinarily, do not effectively maintain their landings (Carpenter, R. 2168-9).

PART III.

LEGISLATIVE HISTORY OF THE FEDERAL WATER POWER ACT AND ANALYSIS OF SECTION 23

(Supplemental to Argument under Point IV-C of Respondent's Brief, pp. 95-103)

A. Legislative history affords no basis for the contention, but in fact denies, that Congress attempted to authorize the Commission to require a license for a project located in a non-navigable stream and not involving any Federal property.

The development of Federal water power legislation was long delayed and its culmination unnatural. If difficulties are encountered in interpreting the resultant Act within the orbit of constitutional powers of Congress, these difficulties may well be attributed to the fact that a deadlock was broken by combining a public lands leasing bill with a navigable waters licensing bill, the bills being based, obviously, on sources of Congressional authority differing widely in scope and extent.[1]

Since we are here concerned not with public lands but only with the extent and nature of the authority of Congress in respect of projects in navigable waters, we shall deal only with the latter and discuss first the growth and scope of legislation to protect navigable waters and then the licensing or consent legislation which in turn was made

---

[1] The authority over projects on public lands is the full proprietary authority "to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States". (Constitution, Article IV, Section 3.) However, any authority to deal with hydro-electric projects on navigable waters is not an authority to deal with the development of water power as such, but such authority as exists arises merely from the authority of Congress to regulate navigable waters, which authority is implied in turn from that under Article I, Section 8, of the Constitution: "to regulate commerce with foreign nations, and among the several States". *Gibbons* v. *Ogden*, 9 Wheat. 1; *Gilman* v. *Philadelphia*, 3 Wall. 713.

Can there be any doubt that the petitioner would have called Col. Conklin had he been willing or able to support its contention? Yet, with such a witness at its command, petitioner chose to rely, and to ask the court to rely, upon the evidence of minor subordinates of Col. Conklin, who were not equipped by education, training, experience or a complete knowledge of the whole situation, to furnish reliable information to the Court. In any case, petitioner can not be heard to contend that either the Federal Power Commission or Col. Conklin were improperly discharging their respective duties in connection with the operation of the federally licensed power plants so far as such operation affects the navigable capacity of the Kanawha.

portions of which lie wholly within the limits of a single State, provided the location and plans thereof are submitted to and approved by the Chief of Engineers and by the Secretary of War before construction is commenced: *And provided further,* That when plans for any bridge or other structure have been approved by the Chief of Engineers and by the Secretary of War, it shall not be lawful to deviate from such plans either before or after completion of the structure unless the modification of said plans has previously been submitted to and received the approval of the Chief of Engineers and of the Secretary of War. (Mar. 3, 1899, c. 425, § 9, 30 Stat. 1151.)

"Sec. 10. (33 U. S. C. 403.) *Obstruction of navigable waters generally; wharves; piers, etc.; excavations and filling in.* The creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited (*1st clause*); and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War (*2nd clause*); and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or inclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same (*3rd clause*). Mar. 3, 1899, c. 425, § 10, 30 Stat. 1151.) (The Rivers and Harbors Act of March 3, 1899.)

(The italicized references to clauses have been inserted in Section 10 for convenience of the present discussion.)

necessary by the strict prohibitions against placing structures in navigable waters.

1. *Prior legislation recognized clearly the distinction between the authority to regulate structures actually located in navigable waters and the authority merely to prevent acts in non-navigable waters which might affect navigable capacity below.*

The sole concerns of Rivers and Harbors legislation have naturally been first, to maintain the navigable capacity of navigable waters of the United States used in interstate and foreign commerce and, second, upon acquisition by the United States of private property rights, to improve streams, that is, to create navigability. In the instant case we are concerned only with the regulatory power to maintain navigable capacity if and to the extent that the private right is already subject to an easement in favor of use of the stream in interstate or foreign commerce.

The Act of March 3, 1899 was a comprehensive compilation and codification, without important change, of various preexisting statutes, enacted on different occasions, for the protection of navigable waters of the United States. It made important distinctions between structures located in navigable waters and those located beyond the limits of navigability.

> "Sec. 9. (33 U. S. C. 401.) *Construction of bridges, causeways, dams or dikes generally.* It shall not be lawful to construct or commence the construction of any bridge, dam, dike, or causeway over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States until the consent of Congress to the building of such structures shall have been obtained and until the plans for the same shall have been submitted to and approved by the Chief of Engineers and by the Secretary of War: *Provided,* That such structures may be built under authority of the legislature of a State across rivers and other waterways the navigable

Obviously the criterion here is not merely the placing of an unauthorized structure in a particular location regardless of its effect, but rather the test is whether or not an adverse effect is actually produced in navigable waters themselves, impairing their navigable capacities. If so, the acts producing such adverse effect can be restrained under Section 12 of the Act, to the extent necessary to prevent any resultant impairment.

The distinctions observed in the Act of 1899 are entirely consistent with the constitutional limitations upon the power of the Federal Government discussed in respondent's brief (Point V). The United States having no power to permit or forbid the erection of a structure in non-navigable waters unless, and except to the extent that, the effect of the operation of such structure would be substantially to diminish the navigable capacity of navigable waters below, Congress did not purport to make such structures unlawful *per se*. Instead it appropriately limited the 1st clause of Section 10 to a general prohibition of any obstruction to navigable capacity, however caused and from whatever source, and limited the remedies of the United States to those of injunction under Section 12 of the Act.

2. *The extent of the power of Congress to require a license was already well defined in the Rio Grande decision and recognized by Congress.*

That the distinctions between navigable and non-navigable streams observed in the Act of 1899 were not

---

See *Sanitary District of Chicago* v. *United States*, 266 U. S. 405, 428.

The other change, though merely in phraseology, is nevertheless significant. Congress thereby expressly recognized that the only "waters in respect of which the United States has jurisdiction" are the "waters of the United States", viz., navigable waters.

As pointed out at page 227 *infra*, the fact that these expressions have been considered synonymous effectively negatives the contention which petitioners made in the Court of Appeals, but which they now apparently have abandoned (Pet. Br. 91, 92), that the 1935 amendments of the Power Act enlarge the licensing authority of petitioner beyond that conferred by the Act of 1920.

It is readily observed that Section 9 and the portions of Section 10 which are labeled '2nd clause' and '3rd clause' relate to the placing of structures in or over navigable waters themselves and that under the statute such structures are unlawful *per se* unless specified authorization shall have been obtained. Here, over structures actually located in navigable waters, Congress in the exercise of its power to protect navigable capacity of navigable waters of the United States has proscribed, as unlawful *per se*, the placing of any structure without the specified consent.

However, in the only provision which could possibly have application to structures placed in *non-navigable* waters, viz.: the first clause of Section 10, Congress designedly has not attempted, as indeed it has no authority, to make a construction unlawful *per se*, but merely has prohibited any act, wherever or however performed, which will actually produce an adverse effect in navigable waters, i. e., which will create an obstruction to the navigable capacity thereof.[1]

---

[1] It was under the precursor of this provision, viz. Section 10 of the Act of September 19, 1890 (26 Stat. 454 § 10), as amended by the Act of July 13, 1892 (27 Stat. 110), that the decision in *United States* v. *Rio Grande Irrigation Co.*, 174 U. S. 690, was rendered. The section of the 1890 Act, as amended in 1892, read:

> "The creation of any obstruction, not affirmatively authorized by *law*, to the navigable capacity of any *waters in respect of which the United States has jurisdiction, is hereby prohibited.*"

In the Act of 1899 the corresponding clause differs from that quoted above only in the words italicized in the following transcript:

> "The creation of any obstruction, not affirmatively authorized by *Congress*, to the navigable capacity of any *of the waters of the United States* is hereby prohibited."

Thus the only change of substance in the later Act is that the authorization must now be "by Congress" instead of "by law", the reason being that an obstruction authorized by a State had been held to be authorized "by law", *United States* v. *Bellingham Bay Boom Co.*, 176 U. S. 211, and it was the desire of Congress to make it clear in the Act of 1899 that consent of Congress is required.

(Footnote continued on next page)

States has jurisdiction."[1] This expression, it is noted, goes to the full extent of the power of Congress in the subject matter. Indeed in its brief before this Court, by Hon. John W. Griggs, Attorney General, at page 38, petitioner then urged that this expression was broader and more inclusive than the expression "water over which Congress has jurisdiction," which Congress adopted at the instance of the Federal Power Commission in the 1935 amendments to the Federal Water Power Act.[2] This Court, however, did not even mention the contention and clearly treated the expression as synonymous with "navigable waters of the United States."

Another interesting feature of the *Rio Grande* decision was that the Bill of the United States alleged that the Rio Grande was navigable at the point of proposed diversion of the water, where the dam was being constructed. The lower Court took judicial notice that, although the Rio Grande is navigable in its lower reaches, it was not navigable at the point of the proposed construction and the Supreme Court confirmed the conclusion as to non-navigability. It was not contended that the proposed dam was "affirmatively authorized by law". Hence, if, as petitioner has heretofore fortuitous was clearly borne out by the decision of this Court in *United States* v. *Rio Grande Dam and Irrigation Co.*, 174 U. S. 690, rendered at about the time of Congress' re-statement of provisions for the protection of navigation in the Act of March 3, 1899. To refute completely any possible contention of support in legislative history for the extended jurisdiction which petitioner now claims under the Federal Water Power Act of 1920, it further appears that throughout the Congressional debate leading up to enactment of the Federal Water Power Act the limitations upon the authority of Congress and the distinctions between navigable and non-navigable waters, which petitioner now urges this Court to ignore, were forcefully presented in Congressional debate.

---

[1] See note 1, p. 182, *supra.*

[2] Attorney General Grigg's brief states:

> "Observe the broad generality of this language.
>
> * * * * *
>
> " 'In respect to (sic.) which the United States has jurisdiction.' Not 'over which', or 'on which', or 'in which', but 'in respect to which', thereby including every possible feature of Congressional regulation and control."

Nevertheless, petitioner now contends, without justification, that "A hypothetical project might not obstruct navigable capacity under Section 10 of the Rivers and Harbors Act, yet affect the interests of interstate commerce under Section 23" of the Federal Water Power Act (Pet. Br. 92, note 17).

For the manner in which the 1935 amendments were adopted and their effect see pp. 225-230, *infra.*

(a) The Rio Grande decision confirmed that Congress did not and cannot require its authorization for structures in non-navigable streams.

In the *Rio Grande* case action was brought by the United States under the Rivers and Harbors Act of 1890 (26 Stat. 454), as amended by the Act of 1892 (27 Stat. 110), to enjoin the defendant from constructing a dam across the Rio Grande River in the territory of New Mexico, and appropriating the waters of that stream for the purposes of irrigation. It was said that the dam would "create the largest artificial lake of water in the world" and a substantial part of the water would be diverted and permanently lost to the stream. The bill alleged the navigability of the Rio Grande at and below the site of the dam and that the dam would deplete and prevent the flow of water below so as to interfere seriously with the navigable capacity of the river throughout its entire course. The bill also *denied that any authority had been given by the United States for the construction of the dam.*

The law invoked prohibited "the creation of any obstruction, *not affirmatively authorized by law,* to the navigable capacity *of any waters in respect of which the United*

The Court did hold, and this is what has frequently given rise to misconstruction, that the power to restrain an act extends to acts done beyond the limits of navigability, but only if such act "tends to destroy the navigable capacity of one of the navigable waters of the United States" and, if so, only to the extent necessary to prevent substantial diminution of navigability where navigation is a recognized fact. The authority arises only by virtue of the effect actually experienced in navigable waters of the United States, since only the navigable waters themselves are subject to the jurisdiction of the United States. (See Resp. Br. 115).

This is clearly confirmed by the disposition of the case. This Court did not grant the injunction against the unauthorized construction of the dam, as prayed, unless and until it should have been "affirmatively authorized by law." Instead, it ordered an inquiry into the question

> "* * * whether the intended acts of the defendants in the construction of a dam and in appropriating the waters of the Rio Grande will substantially diminish the navigability of that stream within the limits of present navigability, and if so, *to enter a decree restraining those acts to the extent that they will so diminish*" (p. 710).

The opinion clearly shows that the consideration of the Court was fully directed to "the extent of the right of the Government to interfere" (p. 701). It is quite apparent that, if the Court had found the United States to have any "jurisdiction" in respect of non-navigable waters or the power to require a license or permit for *structures* in non-navigable streams, as petitioner now contends, the disposition of the case would have been quite different. If the Court had been of the opinion that, upon a finding that its *operation* would obstruct navigable capacity below, Congress' prohibition had been directed to the *structure* itself, in a non-navigable stream, unless "affirmatively authorized by law", obviously the mandate would have been, as prayed contended in the instant case,[1] non-navigable tributaries are included within the "waters in respect of which the United States has jurisdiction" the Court would have held the proposed dam unlawful *per se,* and clearly prohibited as an "obstruction, not affirmatively authorized by law"; and consequently the United States would have been entitled *in limine* to a decree enjoining the construction of the dam until "affirmatively authorized by law". Clearly this Court did not so hold and did not regard the proposed structure as unlawful *per se,* requiring affirmative authorization or license. On the contrary, it clearly held that the only waters "in respect of which the United States has jurisdiction" are navigable waters of the United States, navigable in interstate commerce, and that the statute, even under its broadest prohibition, did not make the structure an unlawful one. Regarding the statute the Court said:

> "its only purpose, as is obvious, was to affirm that *as to navigable waters* nothing should be done to obstruct their navigability without the assent of the National Government" (p. 708).

and again:

> "The question always is one of fact, whether such appropriation substantially *interferes with the navigable capacity* within the limits where navigation is a recognized fact" (p. 709).

---

[1] In the Court of Appeals petitioner strenuously contended that the 1935 amendments proposed by the Federal Power Commission, by which Congress substituted waters "over which Congress has jurisdiction" in lieu of "navigable waters of the United States", extended *ipsis verbis* the jurisdiction of Congress to non-navigable tributaries. Petitioner erroneously claimed that the power to prohibit the doing in non-navigable waters of an act which would produce an impairment in navigable waters, gave Congress a certain "jurisdiction" over the non-navigable waters. Whether recognizing the unsoundness of its contention or desiring to avoid in this Court the accusation that the representative of the Commission misled the House Committee in assuring them that the proposed amendments did not enlarge the jurisdiction of the Committee (See p. 228, *infra*), petitioner seems no longer to advance this contention.

gation is a recognized fact, as of course it does not, petitioner would fail in its contentions for precisely the reasons ennunciated by this Court in the *Rio Grande* decision. There the same contentions were raised and effectively disposed of. Petitioner then sought to enjoin the construction of the dam in question, located in non-navigable waters and designed to divert a substantial volume of water from the stream, without affirmative authorization from Congress. This Court in that decision denied, as it must here deny, petitioner's contention, since, even if operation of the dam were to obstruct navigable capacity below, the structure itself, located in non-navigable waters, is not subject to the prohibition in the Act of 1899, and therefore its unauthorized construction cannot be enjoined; but petitioner's remedy is limited to restraining the operation of the dam to the extent that it will diminish navigable capacity below.

Thus, far from having a cause of action under the Federal Water Power Act when none exists under the Act of 1899 (Pet. Br., 92, Note 17), it is clear that no cause of action exists under the Federal Water Power Act of 1920 to require a license for a project on a non-navigable stream, although in a hypothetical case, on facts different from those in the instant case, petitioner might well have a cause of action under the Act of 1899 where none exists under the Federal Water Power Act. Indeed the principles of the *Rio Grande* decision, when applied to the interpretation of the Federal Water Power Act, necessarily lead to the conclusion (which, as will be shown, is supported by the language of the act) that the authority of the Commission to require a license (viz., the affirmative authorization of Congress) is limited to structures actually placed in navigable waters of the United States, as Congress appropriately limited the basic prohibition in the Act of 1899.

However, despite the clarity of its holding, petitioner continues to misread or misconstrue the *Rio Grande* decision. Petitioner erroneously states (Pet. Br., p, 123) "The *Rio Grande* case would seem on principle to settle the power in the Bill, to enjoin the construction of the dam until "affirmatively authorized by law".

Rather, the decision clearly shows, contrary to petitioner's assertions, that Congress has no jurisdiction over *structures*, as such, in non-navigable streams and cannot prohibit them or subject them to any requirement of affirmative authorization or license-even if it should be found that their *operation* resulted in impairment of navigable capacity, but instead that its power exists only if such impairment is found to result. In such case it cannot require for the structure any affirmative authorization or license, but it can, of course, restrain or prevent acts which result in actual impairment of navigable capacity.

In considering the application of the *Rio Grande* decision to the interpretation of the Federal Water Power Act, let us apply the principles there laid down by this Court to the facts involved in the instant case and consider the contentions which petitioner now makes herein.

Petitioner has applied for an injunction under the Act of 1899 and under the Federal Water Power Act against the construction, maintenance and operation by respondent of its Radford project, alleging it to be located in navigable waters of the United States, and, alternatively, to impair navigable capacity below. Petitioner has conceded that under the facts found in the lower courts it has no cause of action under the Act of 1899. Although there is no new prohibition therein[1], it seeks to invoke the Federal Water Power Act in an effort to enjoin the maintenance of respondent's project in non-navigable New River unless and until the project shall have been "affirmatively authorized by Congress", asserting that the Federal Power Commission, as the Agency of Congress, is empowered to require and grant such affirmative authorization in the form of a license under the Federal Water Power Act.

Even if operation of respondent's project were to obstruct navigable capacity many miles below, where navi-

---

[1] See pp. 199-200, *infra*.

Co., 206 U. S. 230. There Georgia had no jurisdiction over what was done in the State of Tennessee. Its rights were held to rest solely upon the effect produced in the State of Georgia and were limited to restraining the acts in Tennessee to the extent necessary to prevent substantial adverse effect in the State of Georgia.

(b) The limitations upon Congress' authority and the distinctions between navigable and non-navigable waters were clearly borne in mind by Congress in enacting the Federal Water Power Act.

Various Committee reports and the Congressional debate throughout the long period of consideration of water power legislation show that it is not merely a courteous assumption, but a fact, that Congress legislated with a keen realization of the limitations of its constitutional authority. Until 1906 the customary mode of obtaining affirmative authorization from Congress for hydro-electric projects in navigable streams was to apply for a special act of Congress. Numerous such special acts had been passed until President Theodore Roosevelt by letter of April 13, 1908 advised the Senate Committee on Commerce that he would veto any bill which did not provide specifically for a charge or revenue to be paid to the Federal Government.[1] This statement and subsequent vetoes, upon which petitioner erroneously seems still to place some reliance (Pet. Br. 116, 117), putting an end to water power development on navigable streams, brought forth successive bills to of Congress to prohibit the construction of unlicensed projects in non-navigable streams even though their effect were to benefit rather than to obstruct navigable capacity" —whereas, on the contrary, it clearly denies such power. Earlier (Pet. Br., p. 122) it cites the *Rio Grande* decision in support of the proposition that there is no question of the power to forbid or to compel modification of, a project in a non-navigable stream which impairs navigable capacity elsewhere and states "there is an equal power to license such a project". In the *Rio Grande* case, of course, the Court denied the injunction against unauthorized construction of the project, limiting the relief to restraining such acts as would diminish navigability in fact. In support of its contention petitioner continues to cite, as it did with more persistence in the lower courts, *North Bloomfield Gravel Mining Co.* v. *United States,* 88 Fed. 664 (C. C. A. 9th), completely ignoring the fact that the *North Bloomfield* decision preceded the *Rio Grande* decision by a year and never reached the Supreme Court. Indeed the earlier mining debris case, *Woodruff* v. *North Bloomfield Mining Co.,* 18 Fed. 753, was strongly but ineffectually urged upon this Court in argument on the *Rio Grande* case but was not even dignified by mention in the opinion of the Court.[1]

---

[1] This view was directly answered in 1920 by Senator Nelson, who was in charge of the Federal Water Power Bill in the Senate, when he stated:

> "As a matter of law, aside from purposes of navigation, the use of the water in the different streams of the several States belongs to the people of those States and not to the Federal Government. The argument insisted upon amounts to this: That the Federal Government is to sell and to make a charge for water that does not belong to it, but which belongs to the people of the States," (Cong. Rec. Vol. 59, Pt. 2, p. 1430) (Jan. 12, 1920).

The situation of the United States in relation to structures outside navigable waters is in principle similar to that of the State of Georgia in *Georgia* v. *Tennessee Copper*

---

[1] See brief of the United States, by Attorney General John W. Griggs, pages 43 to 47.

Clearly, if it could be given the effect claimed by petitioner the *North Bloomfield* decision was necessarily overruled by the *Rio Grande* decision. Were it necessary it could, of course, be shown that the *North Bloomfield* case involved the actual use of navigable waters for the conveyance of debris to the open ocean and violated a statute prohibiting the use of an instrumentality of interstate commerce for a harmful purpose, in addition to the fact that the legislation there involved was in effect concurrent legislation by the United States and the State of California, having been enacted at the solicitation of the California Legislature and in effect ratified and adopted by the latter.

"3. That the Federal Government in its jurisdiction of interstate commerce has control of navigable streams and has a certain degree of responsibility for their improvement. Under this theory it is maintained that tolls upon the water power developed can be collected and paid into a fund for the improvement of navigable streams, including not only the one on which the toll is charged, but all others capable of improvement for navigation.

"The commission is of the opinion that the Federal Government has no proprietary right or interest in navigable waters which would authorize the collection of tolls. The right, if it exists at all, rests upon either the second or third theory stated. As regards the second theory, it should be said that the imposition of tolls, unless based upon a more substantial foundation than the mere authority to grant or withhold consent—an authority arising solely from the control of the Federal Government for the purposes of navigation—does not commend itself to the commission, and it is to be doubted whether, even in case a bill should be passed or other action taken by Congress for granting this permission, with a provision for charging tolls, such tolls could be collected. Regarding the third theory stated, it should be noted that under the exercise of the taxing power Congress can levy taxes for general revenue purposes upon all classes of water power, whether in navigable or non-navigable streams, and if charges are to be imposed it would seem that this is the normal method. It should further be borne in mind that a requirement for the imposition of tolls where the right to construct dams is hereafter granted would cause a discrimination between water power to be utilized under future permits and those already enjoyed, which are subject to no such charge. It must of course be remembered that whenever the privilege of constructing dams is granted in a navigable stream there is an undoubted right to impose charges sufficient to pay the expenses of examination and supervision and to secure the Government against cost by reason of obstacles to navigation created by the erection of dams; but this rests upon an entirely different principle from the proposal to charge tolls.

authorize licensing of projects in navigable waters and much serious discussion of the proper limitations to which Congressional action in regard to navigable waters must constitutionally be subject. For instance, in the report rendered January 24, 1910, by the Commission created by Act of Congress of March 9, 1909, under the chairmanship of Senator Burton of Ohio, these limitations were clearly recognized:

> "The right of the Federal Government in water power may be viewed from three different standpoints:
>
> "First. Cases in which power is developed on streams located in public lands, where undoubtedly the Government, so far as the rights pertaining to abutting ownership are involved, has full control, and should exercise the greatest care in granting away whatever rights it may have.
>
> "Second. When power is developed in non-navigable streams, where there is private or state ownership, in which case no federal authority to regulate or control exists, except to prevent interference with the navigation of other streams.
>
> "Third. When water power is developed in navigable streams. In this case several plans have been proposed for the collection of tolls upon the water power developed by dams whenever their construction is permitted by Congress. The right of the Federal Government to collect such tolls must rest on one of three theories:
>
> "1. That the Federal Government has some proprietary right in the waters of navigable streams, so that the collection of tolls can be based upon actual ownership of, or right in, the waters.
>
> "2. That, as the right to grant or withhold consent for the construction of a dam in navigable waters rests in Congress, it is allowable to make a charge for the consent or privilege and authorize the collection of tolls.

gress in 1920 intended to assert the extended jurisdiction and authority which the Federal Power Commission itself at first disclaimed but which petitioner now asserts.[1]

---

[1] For the gradual development of petitioner's present contentions, turning away from the limitations recognized when the bill was enacted, and expressed therein, see pp. 206-212, *infra.*

A clearer appreciation of the constitutional limitations upon the power of Congress can hardly be found than that stated by Senator Shields on January 8, 1917, in debate on the feature which had held up for more than ten years legislation authorizing hydro-electric developments in navigable streams—the proposal to exact a federal toll or charge:

> "These authorities clearly and conclusively demonstrate that the United States has no general sovereignty over navigable rivers, that the people of the United States in their national character have no property interest in them, and Congress cannot constitutionally exact rents or royalties, to be covered into the Federal Treasury as proposed, and that such legislation must necessarily be a usurpation of the sovereign powers of the States and confiscatory of their property and that of their citizens. Argument in support of these obvious conclusions would be an abuse of the patience of the Senate and an offense to its intelligence.
>
> "These contentions are now conceded by some of the advocates of these Federal rents and royalties who are familiar with the authorities, and they have been driven to rest the power of Congress to compel the payment of them upon the proposition, as I understand it, that the United States, through Congress, has the power to grant to the States and their grantees permits necessary to authorize them to construct dams in navigable streams, and in exercising this power may impose such conditions as Congress deems proper.
>
> "This must carry with it the assertion that this can be done, although the proposed structure will not obstruct but improve navigation, and the purpose of it be lawful and laudable, and the terms or conditions imposed are beyond the affirmative powers of Congress, and in direct violation of the express provisions of the Constitution.
>
> "Mr. President, these are most astounding propositions of constitutional law and public policy, difficult to reconcile with the spirit and genius of constitutional government and the guaranties which it affords to the personal and property

(Footnote continued on next page)

> "The control of the Federal Government over navigable streams has to do with navigation only, and in the exercise of this jurisdiction the plan commends itself to the commission of inserting in each grant or franchise under which the consent to construct a dam is given a condition that the grantee who constructs the dam must also, whenever necessary to subserve the interests of navigation, construct a lock suited to the locality and to the probable development of traffic, and also furnish power for the proper operation of the lock or locks. These requirements, rather than the imposition of tolls, appeal to the commission because they are free from legal objections and are in entire accordance with the objects for which the Federal Government has jurisdiction over navigable streams." (Senate Doc. 301, 61st Cong. 2d Sess., pp. 23-4.)

Later, much discussion revolved about the Shields Bill for licensing projects in navigable waters. In this debate Senator Shields of Tennessee, the author of the Bill, and Senator Sutherland of Utah, who actively participated in its discussion, clearly recognized the constitutional limitations upon the power of Congress, forcefully pointing out that the only authority the United States has in the premises is to protect the navigability of a stream and that in all other respects the development of water power is a matter wholly within the control of the States. (Congressional Record Vol. 53, Pt. 3, pp. 2580, 2641, 2651, Feb. 15 and 16, 1916; Vol. 53, Pt. 4, p. 3244, Feb. 28, 1916; Report of "Five Ablest Lawyers of the Senate"—Senators Nelson, Root, Chilton, O'Gorman and Culberson, Vol. 54, Pt. 6, pp. 779-84; Vol. 54, Pt. 1, pp. 1006-7 Jan. 8, 1917; Vol. 54, Pt. 4, pp. 1264-68, January 12, 1917; Vol. 54, Pt. 3, p. 2786, February 7, 1917; Vol. 58, Pt. 3, p. 2226, July 1, 1919; Vol. 59, Pt. 1, p. 1041, Jan. 5, 1920; Vol. 59, Pt. 8, p. 7723, May 27, 1920; Vol. 59, Pt. 7, pp. 6529-6531, May 4, 1920.) In the light of the clear discussion of constitutional limitations throughout this period it can now ill be argued by petitioner that Con-clearly shown by the report dated June 24, 1919 by Chairman Esch of the House Committee on Water Power, with reference to a bill presented June 28, 1918 by the Congressional Joint Water Power Committee. That report stated:

> "In a letter dated April 13, 1908, President Roosevelt in a communication addressed to the Senate Committee on Commerce, gave notice that he would not sign any bills hereafter which did not provide specifically for a charge and a definite limitation in time of the rights conferred.
>
> "These vetoes in 1908 and 1909 practically put an end to the introduction of water power bills.
>
> * * * * * * *
>
> "The Ferris bill reported by the Committee on Public Lands and which passed the House on August 24, 1914, relating to water powers on the *public domain,* failed of passage, as did a like bill reported by the same committee and passed by the House January 8, 1916. The Committee on Interstate and Foreign Commerce had no better success with the Adamson bill providing for the construction of dams on *navigable waters,* which passed the House August 4, 1914, and a like bill which passed the House July 14, 1916. Each of these four measures, which received the approval of the House in prior Congresses, contained practically every one of the provisions and requirements set forth in the veto messages of President Roosevelt, but not one of them received the approval of the Senate, due to the objections based largely on the ground that Congress has no right to exact a charge for the development of water power and with special reference to power developed on navigable streams." (House Report 61, 66th Cong. 1st Sess., pp. 3-4.)

The manner in which the deadlock was finally broken, by a combination of two bills based on widely differing sources of authority, is shown in the first annual report of Federal Water Power Commission:

> "*The combined bill* approved on June 10, 1920, *finally broke the deadlock that had existed for more*

It is significant that the Shields Navigable Waters Bill (Cong. Rec. Vol. 53, Pt. 3, pp. 2197-8), as its name connotes, dealt solely with the licensing of projects in navigable waters. The Bill contained no provision for federal regulation of intrastate rates or for recapture, except on the basis of fair value, and observed the criterion for which the Senate had steadfastly contended, that the Federal Government has no power to exact a charge or rental for the use and development by riparian owners of water power rights, even in navigable waters.

The impasse which was created by the early vetoes and the background for the unfortunate combination of a navigable water licensing bill with a public lands leasing bill are

---

> rights of a free people. Is it possible that Congress can by constructive force and duress usurp the sovereign powers of the States and confiscate the property held in trust for their citizens? Can the fundamental law be thus evaded and violated to force the States and their citizens to yield to an unlawful and unjust exaction under the penalty of being arbitrarily prohibited from the use and enjoyment of their property? The premises of this proposition are fallacious. The United States has no general police power over or proprietary rights in navigable waters to grant.
>
> * * * *
>
> "Such legislation would also violate the fifth amendment, ordaining that private property shall not be taken for public use without just compensation. The imposition of a charge or burden, however small, upon private property for a public purpose without compensation is confiscatory and forbidden by the fundamental law. I do not consider it necessary to cite authority to support such an obvious proposition, but the question has been directly passed upon in the cases of *Rossmiller* v. *States* (114 Wis. 169, 188); *Cary Library* v. *Bliss* (151 Mass. 364, 378); *Woodward* v. *R. R. Co.* (180 Mass. 599-603); *Chicago R. R. Co.* v. *Illinois* (200 U. S. 593)" (Cong. Rec. Vol. 54, Pt. 1, pp. 1006-1007 Jan. 8, 1917.)

Obviously the argument against authority to impose federal tolls or charges applies with equal force and like effect to the authority to impose the capture clause and other provisions of the Federal Water Power Act unrelated to the protection of navigation and restricting the use of and return from, and impairing the value of, property of a licensee. See Resp. Br. p. 121, *et seq.*

the navigability of a given stream at a particular point had been recognized by a judicial decision, the point where navigability ceased and beyond which the stream was non-navigable was left undetermined.

In earlier years many parties, solely out of abundant caution, had petitioned for and obtained Congressional approval to construct dams even though there was but slight possibility that the streams might be held to be navigable waters of the United States. After the Presidential vetoes had ended the possibility of obtaining special acts, not only was construction of hydro-electric projects in navigable waters definitely held up but in the many border-line cases of doubtful navigability construction was deterred by fear that the stream at the point in question might subsequently be determined by court decision to be navigable and the structure consequently unlawful. It is not surprising therefore that the legislation finally enacted, so far as concerns navigable waters, attended two purposes: first, to grant the authorizations clearly required and theretofore lacking in streams known to be navigable and, second, to afford to a party intending to construct a development a means of obtaining at least an administrative determination of the character of the stream in cases of doubtful navigability.

It is essential to a true construction of the Act to observe that it was in no sense prohibitory, but in every aspect a consent or licensing statute. This was clearly brought out in debate. On several occasions question was raised as to whether the Bill would prohibit any additional classes of streams. To one such question the late Senator Walsh of Montana replied:

> "Mr. President, I wish to remind the Senator from Utah, that the prohibition *is not in the pending bill. The prohibition is in the law now. A person can not do it at all now without an act of Congress, while under the pending bill he can get a permit from the commission.*" (Cong. Rec., Vol. 59, Part 8, 8349, 1920).

> *than a decade in Federal water-power legislation.*" (Federal Power Commission, First Annual Report, p. 49.)

This ill-advised combination of two bills based on widely differing sources of power is important in several respects:

> First, it extenuates, though it does not justify, Congress' apparent attempt to impose on projects in navigable waters licensing conditions bearing no reasonable relationship to the protection of navigation, and therefore unconstitutional; and
>
> Second, it emphasizes the need, under familiar principles of statutory construction, to restrict rigorously, rather than to extend, the authority which the statute may be claimed to confer.

However, as the record clearly shows, Congress neither revealed an intent nor utilized language to support an extension of the authority now claimed by petitioner to require a license for projects on non-navigable streams not involving federal lands or property.

3. *The Federal Water Power Act was merely a consent statute creating a Governmental Agency to authorize projects (in navigable waters) otherwise unlawful under the Act of 1899.*

The purpose of the early Rivers and Harbors legislation was to maintain and improve inland navigation as the principal arteries of commerce. However, with the turn of the century, the contemplated investment of substantial capital in hydro-electric developments in navigable streams presented more and more cases where, in face of the prohibition of the Act of 1899, a special act of Congress might be necessary, depending upon whether the proposed development was to be located in a navigable stream. The navigability of but few rivers had been determined by judicial decisions and the status of many streams was in doubt. Even when

4. *Section 23 was designed merely to afford intending developers a means of obtaining an administrative determination of the character of the stream in Cases of Doubtful Navigability.*

We deal here with the second paragraph of section 23 of the Federal Water Power Act of 1920. We shall deal later with the 1935 amendments which clearly did not enlarge, and indeed were represented to Congress by the Commission as not enlarging, the power of the Commission.[1]

Section 3 of the Act of 1920 defined navigable waters for the purposes of the Act. Section 4(d) defined the licensing power of the Commission, the authority being limited, so far as relates to navigable waters, to projects "for the development and improvement of navigation, and for the development, transmission and utilization of power across, along, from or in *any of the navigable waters of the United States* * * * or for the purpose of utilizing the surplus water or water power from any government dam." (Italics added.) Section 6 limited the period of license to 50 years. Sections 10 and 14 contained numerous general conditions for the standard form of license, many of which, though perhaps appropriate to a license for a project on public lands or reservations, are not appropriate and are beyond the constitutional power of Congress for projects in navigable waters, where the only source of jurisdiction of the United States is derived from the Commerce Clause.

It is the second paragraph of section 23 of the 1920 Act which petitioner claims has conferred jurisdiction upon the Commission to require and issue a license for projects on non-navigable streams. However, the entire record of au-

---

[1] Neither from the circumstances under which they were adopted nor by the language employed do the 1935 amendments change the necessary interpretation of the pertinent provisions of the 1920 Act. In fact, as will be shown, the language employed prejudices petitioner's interpretation. See pp. 228-230, *infra.*

At another point the same Senator stated:

> "This is the purpose of the bill. Under the existing law anyone who wants to put any *obstruction* whatever in a navigable stream must come to Congress and get a special act. The pending bill is a general act granting power to give permits through this commission. That is the purpose of it." (Cong. Rec., Vol. 59, Part 8, 8349, 1920).

The Federal Power Commission itself, as late as 1924 through an opinion by its chief counsel, recognized that

> "The Commission has not been given general authority to protect navigation or power interests." (Fourth Annual Report of the Federal Power Commission 1924, p. 187).

It was abundantly clear through the period of Congressional discussion that Congress had no intention of extending, if indeed it constitutionally could have extended, the jurisdiction which it had theretofore exercised over navigable waters through the Rivers and Harbors Act of 1899 and prior legislation. When in later years the Commission sought to extend its jurisdiction to embrace respondent's project, it vainly searched for a prohibition which the act did not contain or some provision under which, contrary to the legislative history and the intent of Congress, it could assert authority to require licenses for projects on non-navigable streams. As late as 1930 it had failed to find any such provision and was forced to rely merely upon "suitable inference".[1] It is obvious, however, that this consent Act did not purport to extend, if indeed it could lawfully extend, the jurisdiction of the Commission beyond that theretofore exercised (and still exercised) by the War Department under Act of March 3, 1899.

---

[1] See p. 209, *infra*.

If, as the Managers state and is so abundantly clear, the purpose of the section is to prescribe how a stream of doubtful navigability "may be determined as within the provisions of the law", the section itself clearly prescribes no new criterion as to whether or not a Congressional authorization or license is needed, but can refer only to the criterion established by the Act itself, i. e. location of the structure in navigable waters, under section 4(d). This, of course, is the same criterion as that of structures unlawful *per se* under the Rivers and Harbors legislation, for which the new Act was designed to provide a licensing system or consent. Thus the language employed in the authoritative explanation of the section confirms that its terms do not purport to authorize an extension of licensing authority into new fields of jurisdiction or beyond navigable waters.

If further substantiation of the clear purpose of section 23 be required, it can readily be found in statements in debate by those Senators charged with responsibility for the bill. Thus Senator Nelson of Minnesota, who was in charge of the bill in the Senate, stated on January 6, 1920:

> "I want to call the attention of the Senator in this connection to another provision of the bill, in Section 23, which relates to the construction of dams over portions of streams *that are not navigable.* The commission in that case is authorized to investigate, *and if it finds that they are local streams, not navigable, not used for interstate commerce,* it can grant authority for the improvement of the streams, subject to State Laws." (59 Cong. Rec. 1103.)

Here Senator Nelson used the premise that the section "relates to construction of dams over portions of streams *that are not navigable*", but, despite that premise and in such disregard of it as to show that it is not yet established, he went on to explain that under the section the Commission is to determine the very question whether these thoritative pronouncements in the legislative history of the Act denies that contention.

The second paragraph of section 23 was proposed as amendment No. 58 in the reports of the Conference Committees of the two Houses, as follows:

> "That any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States, may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this Act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws."

The statement of the Managers on the part of the House of Representatives (the only statement from either Conference Committee on this provision) says:

> "*This amendment seeks to prescribe how a stream of doubtful navigability may be determined as within the provisions of the law,* and in substance it provides that the commission shall ascertain whether the interests of commerce are affected; if not, then permission is granted to construct in accordance with the State laws." (House of Representatives Report No. 910, 66th Congress, 2d. Session; 1, 242.)

✓

> ment of the commission with reference to *whether a stream is navigable,* if they desire to do it. That is *for the protection of any person who contemplates putting a dam in a navigable stream.* If they exercise the right given to them in this section of the bill, the commission will first make an investigation *to see whether or not the stream is navigable,* and they can not put their dam in if the commission says that it is navigable; *but if the commission says that it is not navigable,* then permission is granted to put the dam in. However, there is nothing which requires them to come to the commission in the first instance and ask their judgment as to whether the stream is navigable or not." (59 Cong. Rec. 8349)

The premise here, it will be noted, is that a party "contemplates putting a dam *in a navigable stream*", yet the conclusion which the Chairman of the Committee on Interstate Commerce reached was the same as that reached by Senator Nelson on the opposite premise, that the duty of the Commission under the section is to make an investigation and verify the premise.

What more convincing proof could be had that the section was designed to deal with streams the character of which was not known at the time the declaration of intention was filed and that it was to provide means for an administrative determination of the character of the stream? Indeed it is obvious that the premise, as to the status of the stream, upon which the declaration of intention is filed is utterly immaterial to the ultimate determination by the Commission. While they were considering the same language (section 23), the Senator in charge of the bill refers to a non-navigable stream as being the subject of a declaration of intention, while the Chairman of the Senate Committee on Interstate Commerce, to which this and preceding bills had been referred, speaks of a navigable stream as being the subject of declaration of intention. This merely confirms the clear intent as shown by the conference reports. Surely the thought is clear, in both of these statements, that at the very streams and the particular portions thereof are in fact non-navigable, i. e. That is, the Commission is to verify the premise. Thus it is clear that when a declaration of intention is filed, it is the premise of non-navigability which itself is in doubt.

In the light of conditions then existing this interpretation is quite natural and fully explains the language actually employed in section 23. This provision was obviously designed to facilitate and encourage the construction of hydro-electric developments which had theretofore been deterred by uncertainty as to the exact character of the stream and uncertainty as to whether, if the stream should later be judicially determined to be navigable, the consent of Congress could be obtained. There were many parties intending to construct projects in non-navigable streams if the uncertainty in cases of doubtful navigability could be dispelled; and it was precisely to enable such parties to obtain an administrative determination of the character of the stream, in cases of doubtful navigability, that this provision was inserted, as clearly appears from the above-quoted statement of the House Managers.

This is further established, and the doubt as to the character of the stream emphasized, by the statement in reference to the same provision made on May 27, 1920, by Senator Jones, Chairman of the Committee on Interstate Commerce, who had an important part in the enactment of the bill. This statement involved a premise opposite to that in the above-quoted statement by Senator Nelson. Yet Senator Jones reached the same conclusion. (The reference to amendment No. 58 is to the provision, which, pursuant to the report of the Conference Committee, became the second paragraph of section 23, here under consideration.) Senator Jones stated:

> "May I suggest further in connection with this matter that the Senate placed amendment No. 58 on the bill, under which it provides a way by which a person or company or corporation may get the judg-

could be acquired." (First Annual Report, Federal Power Commission, p. 54.)

In the fourth year of its administration the Commission still recognized that the Act was only complementary to the Rivers & Harbors Act of March 3, 1899, to provide means for granting the consent of Congress without the need of special legislation in each case. It stated:

> "The Commission has not been given general authority to protect navigation or power interests." (Fourth Annual Report of the Federal Power Commission, page 187.) (Opinion of Chief Counsel, dated February 19, 1924, approved by the Commission.)

Shortly thereafter, however (and also shortly after the filing of the declaration of intention in regard to defendant's project, under section 23 of the Act[1]), the Federal Power Commission began to perceive the possibilities of extending its jurisdiction over further hydro-electric projects. It sought therefore to read into section 23 a purpose beyond that contemplated by Congress, in order that it might claim an authority, which Congress itself had never claimed, to require a license for projects in non-navigable streams which were theretofore subject (and constitutionally so) only to State authority except as to action under the Act of 1899 to restrain actual or threatened impairment of navigable capacity below. To do this, however, it had to reverse a precedent which it had followed for seven years. Until 1927 the Commission itself did not give to the language in section 23 the effect which it now claims, i. e. that section 23 relates exclusively to non-navigable waters and consequently (so it contends) authorizes the Commission to require licenses for projects located therein.

Thus for seven years when declarations of intention were filed before it and the Commission found the contemplated project to be located in navigable waters of the time his declaration of intention is filed the party intending to erect the structure is in doubt about the character of the stream in which his project is to be located and that the sole intent and purpose of the section is to provide for an administrative determination as to navigability.[1] This discussion by authoritative Senators sustains and corroborates the statement by the House Managers that the purpose of the amendment was merely to prescribe how a stream of doubtful navigability may be determined as *navigable vel non.*

---

[1] June 1, 1925.

5. *Petitioner's claim of authority to require a license for projects on non-navigable streams results from a strained and belated administrative interpretation, not from any intent of Congress.*

The Power Act has been on the statute books for more than twenty years. The development of petitioner's present assertion has been of slow growth, but is fully documented in the records of the Federal Power Commission itself.

It is significant that in the first annual report of the Federal Power Commission the purpose of section 23 (second paragraph) of the Act was clearly recognized and was stated in substantially the language employed by the House Managers of the Conference Committee in the only authoritative statement regarding that section.[2] In that report, at page 54, the Commission stated:

> "The Federal Water Power Act did not propose to bring any new streams within the authority of the Federal Government. *It proposed rather to provide a method whereby the status of doubtful streams could be determined,* and to set forth in definite form the conditions under which rights upon such streams

---

[1] Being a jurisdictional determination, it is of course subject to judicial review and determination *de novo. Crowell* v. *Benson,* 285 U. S. 22.

[2] See page 202 *supra.*

However, after this *volte-face* regarding section 23, the Commission was not sure of its ground.

Thus, in 1928 after respondent had been tendered a major or standard form of license and had offered, in order to settle its differences with the Commission and to avoid this extensive litigation, to accept a license containing any provisions reasonably appropriate to the protection of any possible interest of navigation, respondent applied for a minor part license and the Commission referred the matter to the Attorney General for opinion. Upon receiving the opinion of the Attorney General that a license containing solely conditions appropriate for the protection of navigation could properly be issued and that "this interpretation appears necessary in order to avoid serious questions regarding the constitutionality of the Act",[1] and in explanation thereof, the Commission in its Tenth Annual Report (1930) stated:

> "There is no requirement in the law which compels the builder of a project on a non-navigable stream to come before the commission, but if he elects to do so by filing a declaration of intention pursuant to section 23 of the act and the commission thereupon finds that the project may have some effect on navigable waterways, it has been considered that the construction of the project could then be permitted to proceed only under a license authorization in the same form as for projects in navigable waters. *The law contains no express authority for the issuance of licenses for such projects on non-navigable streams, but the authority to do so seemed a suitable inference from the provisions of section 23.*
>
> "The proceedings of this character before the commission have not been numerous and licenses have been issued in only five cases. Nevertheless, a number of the States look upon the practice as the beginning of far-reaching usurpation of power by the Federal Government which will inevitably lead to

---

[1] R. 2781, 6.

United States it did not dismiss the declaration of intention as not involving a project in a non-navigable stream.[1] Rather, it was only when the possibility loomed of imposing the license conditions upon respondent's project, and others similarly located in non-navigable waters, that the Commission arrogated to itself the purported function of complete guardian of the interests of navigation and power. In 1928, in order to lay the basis for its new contentions, it corrected this apparent inconsistency in its prior actions.[2]

---

[1] "Navigable waters" findings on declarations of intention under Section 23 as shown in Federal Power Commission Reports:

Declarant	*Date*	*Annual Report*
F. D. Breit	Oct. 31, 1921,	2nd, p. 89
Pigeon River Lumber Co.	Oct. 31, 1921,	2nd, p. 89
S. A. Tescher	July 3, 1922,	3rd, p. 24
S. A. Tescher	Sept. 9, 1922,	3rd, p. 161
Susquehanna Power Co.	Sept. 30, 1922,	3rd, p. 161
Hydro-Electric Co. of Harrisburg	Sept. 19, 1923,	4th, p. 99
Bowersock Mills & Power Co.	Aug. 11, 1923,	4th, p. 99
Hydro-Electric Co. of Harrisburg	Sept. 19, 1923,	4th, p. 113
John A. Shafer	Nov. 24, 1920,	4th, p. 114
Town of Galena	Dec. 26, 1923,	4th, p. 139
W. J. Loughridge	Dec. 27, 1924,	5th, p. 26
Interstate Power Co.	June 16, 1924,	5th, p. 26
Riverside Irrigation District	Nov. 13, 1924,	5th, p. 26
West Florida Power Co.	Feb. 12, 1925,	6th, p. 33
Ozarks Hydro Electric Co.	Oct. 6, 1925,	6th, p. 33
West Florida Power Co.	Dec. 8, 1925,	7th, p. 35
Priest, Jess, and Williams	Dec. 14, 1927,	8th, p. 42.

[2] Declaration No. 110 was filed by Fox River Paper Company on April 25, 1928, for a project in the Fox River at Appleton, Wisconsin. On September 10, 1928, the Commission advised the declarant that the Fox River was a navigable waterway of the United States, "that this is not a case, therefore, in which a declaration of intention under section 23 of the Federal Water Power Act applies, and that in the event that it is desired to have this structure legalized, it will be necessary to submit an application for license therefor in accordance with regulations 2 and 6 of the Rules and Regulations of the Commission." (Supplement to Decisions of the Federal Power Commission on Declarations of Intention under section 23 of the Federal Water Power Act—December, 1929, page 22.)

for such projects on non-navigable streams, we find the Commission took occasion to propose, in connection with the Public Utility Holding Company Bill of 1935, amendments to the Federal Water Power Act which were represented by the authorized spokesman of the Commission as "not enlarging the power of this Commission"* but which petitioner in the lower courts sought to contend expressly confer upon the Commission the authority to require a license for projects in non-navigable streams.

Thus is charted the progress of administrative interpretation and the disregard and subsequent perversion of the legislative history and intent of Congress. A provision which at first was admitted to be, as Congress intended, a means "to provide a method whereby the status of

---

* The amendments are referred to in the Report of Senate Committee on Interstate Commerce, Senate Doc. 621, 74th Cong., 1st Sess., p. 17, as follows:

> "The amendments to the present Federal Water Power Act have been *requested by the Federal Power Commission* on the basis of its experience in the administration of that act. *Most of them are designed merely to clarify the act in its application to situations that have arisen in its administration.*"

To like effect see Report of House Committee on Interstate and Foreign Commerce, House Doc. 1318, 74th Cong., 1st Sess., p. 7; In testimony at the House hearings on the amendments Dozier DeVane, Solicitor of the Commission, who appeared on its behalf stated:

> "Mr. Mapes. And you are not proposing to amend the licensing section or provisions of the Water Power Act?
>
> "Mr. DeVane. *The new matter makes no amendments to the licensing sections of the Water Power Act.*" (Hearings on Public Utility Holding Company, Bill, 1935 (Part I) p. 450).

And again:

> "Mr. DeVane. * * * *it is my belief that insofar as our amendment is concerned, we are not enlarging the power of this Commission.* We are simply endeavoring to clarify section 4, and if Congress has any additional powers over waters and streams by reason of its war powers, they were not written in the first act and we are not writing them in this act." (Hearings, p. 471.)

> serious conflict with the functions properly belonging to the States. They challenge the constitutionality of the Government's jurisdiction in so far as it may be extended beyond the limits actually necessary for the protection of navigation and contend that the encroachment upon their rightful field of activity introduces confusing duplication of authority. They assert that they are thoroughly capable of managing the development of their own water resources and that interference by the Federal Power Commission on non-navigable streams is substantially hampering development under the State laws.
>
> "The position of the States in the matter is fully illustrated by the communications from Governor Horton, of Tennessee, Governor Conley, of West Virginia, and Chairman Carson, of the Virginia State Conservation and Development Commission, which are included in the appendix to this report. In order that the commission might have reliable guidance on the legal aspects of the question, the advice of the Attorney General of the United States was requested relative to the pending application for a development on New River referred to in the letter from the Virginia authorities." (pp. 7-10)

But the advice of the Attorney General was not heeded. Subsequently, on consideration of respondent's application for a 50-year minor part license containing only conditions for the protection of navigation, in accordance with the opinion of the Attorney General, the minutes of the Commission record:

> "After due consideration the commission declined to take action on the application, favorable or adverse. *It was concluded that in view of the importance of the questions of jurisdiction as between the United States and the State of Virginia involved in this case a court adjudication is desirable.*" (Eleventh Annual Report of the Federal Power Commission: 1931, pg. 123.)

After this recent and categorical admission that the law contains no express authority for the issuance of license

Act to apply to non-navigable streams. In showing that no justiciable controversy existed the Court pointed out (p. 339) that the bill failed to show that the defendants were taking or about to take any definite action except that the Commission was about to consider and act upon various applications from persons in New Jersey for preliminary permits and licenses "to utilize '*navigable waters* on the boundary and inland' for the development of water power".

In describing the Act, the court stated:

> "Some of its provisions are general, some relate to areas containing public and Indian lands, and some have special application to the use of government dams in developing power. As respects the State of New Jersey, the Act may be adequately described for present purposes by stating that it *relates particularly to navigable waters;* subjects their improvement and utilization for purposes of navigation and developing power to stated restrictions and supervision by a public commission, which it creates;" (p. 335).

Indeed, in describing the effect of the second paragraph of section 23 of the Act, which is here involved, this Court stated that it:

> "provides that any person or corporation, including the State or any municipality, intending to construct a dam or other works in a stream not *declared* navigable 'may in their discretion' file a declaration of their intention with the commission, whereupon it shall by investigation ascertain whether 'the interests of interstate or foreign commerce' will be affected thereby, that if it finds they will be affected the construction shall not proceed unless a license is sought and obtained, and that if it finds the other way the construction may proceed without a license." (*New Jersey* v. *Sargent,* supra, p. 336.)

In discussing the basis of Congress' authority the Court again apparently assumed that no contention was made that doubtful streams could be determined" and a few years later was still considered not to confer upon the Commission general authority to protect navigation or power interests was built up after ten years to a "suitable inference" and (despite the warning opinion of the Attorney General of the United States) is now put forward as outright and definite authority for the Commission to impose a license upon projects on non-navigable streams. On the record of the Commission itself it would seem that the petitioner's contentions are founded on the Commission's growing pretensions to jurisdiction and not on any intent of Congress.

B. The language of the Act, as well as Congress' clear intent, negatives the right of petitioner to require a license for a project on a non-navigable stream.

In its argument on the construction of section 23 of the Act petitioner limits itself to characterizing respondent's interpretation as untenable, and quoting reports on the 1935 amendments, omitting, however, any reference to the authoritative report of the House Managers on the 1920 Act (Pet. Br. 89-91). However, consideration of the House Managers' report and of the effect of the language employed in section 23 clearly supports respondent's interpretation and negatives that of petitioner.

This court had occasion to consider the Federal Water Power Act, but did not pass upon it, in *New Jersey* v. *Sargent*, 269 U. S. 328, decided January 4, 1926, when the Court held that the bill of the State of New Jersey did not present a justiciable controversy. However, from the opinion, in its references to the Act and description of its provisions, it would seem to have been the view of the Court that (apart from public lands and Indian reservations) the Act authorizes and requires licenses solely for projects located in navigable waters. Apparently the State of New Jersey did not even surmise, and therefore did not contend, that attempt might be made, at some future date, to construe the obviously apply solely to projects in navigable waters. Surely, if Congress had intended to deal affirmatively with projects in non-navigable tributaries (other than to authorize a declaration of intention to be filed in case of streams of doubtful navigability, which might or might not be non-navigable, in order to determine their navigability *vel non*), it would have referred specifically to non-navigable streams or to non-navigable tributaries in appropriate sections of the Act, and particularly in section 4 (d), which defines the licensing authority under the Act. Constitutional limitations apart, certainly, if it had intended to grant to the Commission a power which it itself had never exercised or assumed to possess (viz., to require a license for a project in a non-navigable stream), "we may well be confident that Congress would have made its meaning far clearer and more direct". *Interstate Commerce Commission* v. *Oregon-Washington Co.,* 288 U. S. 14, 35.

This Court in *New Jersey* v. *Sargent, supra,* would appear to have taken a like view of the general purpose and effect of the Act.

2. *The section of the Power Act empowering the issuance of licenses authorizes them only as to projects on navigable waters.*

Section 4 contains the affirmative grant of powers to the Commission. Section 4 (d), of the original or 1920 Act, defined its jurisdiction to issue licenses as limited to navigation improvements and projects located in navigable waters.

Thus it is obvious that, when section 23, if the Commission finds the interests of interstate or foreign commerce would be affected, remits the declarant to obtain "a license under the provisions of this Act", it can refer only to the licensing authority under section 4 (d). That this is so is clear from the language itself, and it is doubly clear in the light of the House Managers' report that the purpose of section 23 is to provide means to determine whether a the Act might be interpreted to affect any projects other than those located in navigable waters:

> "Rightly to appraise the bill one should have in mind the doctrine, heretofore firmly settled, that the power to regulate interstate and foreign commerce, which the Constitution vests in Congress, includes the power to control, for the purposes of such commerce, *all navigable waters* which are accessible to it and within the United States, whether within or without the limits of a State, and to that end to adopt all appropriate measures to free such waters from obstructions to navigation and to preserve and even enlarge their navigable capacity; and that the authority and rights of a State in respect of such waters within its limits, and in respect of the lands under them, are subordinate to this power of Congress. *Philadelphia* v. *Stimson,* 223 U. S. 605, 634-638; *United States* v. *Chandler-Dunbar Co.,* 229 U. S. 53, 62-65; *Lewis Blue Point Oyster Co.* v. *Briggs,* 229 U. S. 82, 88; *Greenleaf Lumber Co.* v. *Garrison,* 237 U. S. 251, 258, *et seq.; Willink* v. *United States,* 240 U. S. 572, 580; *United States* v. *Rio Grande Irrigation Co.,* 174 U. S. 690, 703." (p. 337).

1. *The statute is unvarying in its reference to navigable waters only.*

In its provisions which in any way relate to projects not on public lands and reservations, the language used throughout the Act shows clearly that Congress intended to deal only with waters actually navigable,—and *not* with non-navigable waters. For instance, among the conditions of a standard form of license, Section 10 (c) prescribes:

> "That the licensee shall maintain the project works in a condition of repair adequate *for the purposes of navigation* * * *."

Section 10 (b) permits changes in the approved plans only "when emergency shall require for the protection of navigation, life, health, and property". Sections 11 and 12

> *mining their liability.* Under this section if the Commission after an investigation found that 'the interests of interstate or foreign commerce' would not be affected, then *the applicant would be freed from the terms of the Power Act and from the Act of 1899*, which required the consent of Congress and the approval of the Secretary of War and the Chief of Engineers to the plans for the construction of the project. Section 23 put the burden upon the applicant to negative the idea of navigable waters in his application." (Brief on behalf of defendants filed on argument before the District Court for the Western District of Virginia, filed July 18, 1932, in *Appalachian Electric Power Company* v. *Smith, et. al.*, 4 F. Supp. 6.)

This was again admitted after the present litigation was instituted when Solicitor Dozier DeVane, the authorized spokesman for the Federal Power Commission, in testifying upon the amendments which the Commission proposed in 1935 stated:

> "Mr. Mapes. Are these two expressions synonymous, or not: the effect upon interstate commerce and the navigability of a stream?
>
> "Mr. DeVane, Mr. Mapes, *I think they are* * * *" (Hearings on Public Utility Holding Company Bill, 1935, Part I, p. 474.)

The contention that since "waters in respect of which Congress has jurisdiction" include "every possible feature of congressional regulation and control" and, consequently, that there might be some interest of interstate commerce affected other than in navigable waters themselves was raised and effectively disposed of in the *Rio Grande* decision in 1899, see p. 185, *supra.*

3. *A "proposed construction" itself cannot affect the interests of interstate commerce unless actually located in navigable waters.*

Throughout the Act, wherever such is the intention, reference is carefully made to "constructing, maintaining stream of doubtful navigability is "within the provisions of the law". This merely confirms the necessary interpretation, viz., that, if the Commission finds that the project is to be located in navigable waters of the United States, the declarant must first apply for and receive a license for such a project, but, that, if the Commission finds the waters non-navigable, the declarant may proceed without federal license upon compliance with State laws.

Petitioner in times past, in referring to the finding to be made under section 23 as to whether "the interests of foreign or interstate commerce would be affected", has sought to treat this language as conferring upon the Commission additional jurisdiction beyond that conferred by section 4 (d). That there is no warrant for such interpretation appears not only from recognized principles of statutory interpretation but from the Conference Report on the provision itself. The statement of the House Managers clearly shows their intention that no additional jurisdiction is conferred by the language in question. Instead, it is merely a method of stating, by reference to the source of Congress' power, that the Commission shall determine whether the stream is navigable.[1] Indeed in the prior litigation regarding the project here involved, petitioner in its brief on its motion to dismiss the amended bill of complaint in the District Court (brought to the attention of the trial court in the instant action) admitted:

> "*Congress, desiring to assist those who were in doubt as to navigability of a stream, provided a method under Section 23 of the Power Act for deter-*

---

[1] In their statement, p. 202, *supra,* the House Managers very evidently considered that a determination "whether the interests of commerce are affected" is, in substance, merely a determination of navigability.

Further, this is fully confirmed, as the necessary interpretation, by reference to the subject-matter of the investigation, viz., the "proposed construction". It is obvious that the proposed construction itself, as distinguished from its operation, as the language of the statute does in fact distinguish, could not affect the interests of interstate or foreign commerce except *in loco.* See subpoint "3" immediately following.

furnished to him by the Acting Chairman of the Federal Power Commission, said:

> "*None of the proposed works* is in navigable waters and none *can in itself offer physical obstruction to navigation.* Only by the operation of the works in impounding and releasing water, and thus creating an uneven stream flow, can any effect upon the navigability of the Kanawha River be produced."

Obviously, if, as section 23 prescribes, there is to be considered only the effect of the "proposed construction", as distinguished from operation thereof, there can be no effect upon distant navigation, but only upon navigation, if existent, at the site of the "proposed construction" itself. On a non-navigable stream a "proposed construction", *per se,* devoid of any "operating" features, cannot affect the interests of interstate or foreign commerce.[1]

In thus limiting the jurisdictional basis to the effect of the "proposed construction" itself, Congress has made clear that it did not intend that there should be taken into consideration any effect on navigable waters from operation of a plant in upstream non-navigable tributaries, as petitioner now contends, but merely the effect of the *proposed construction* itself, *in loco* (because, of course, effect from a "proposed construction" itself would be experienced only if the "proposed construction" were located actually in navigable waters). This further confirms that the finding to be made under section 23 is merely, and clearly, a finding as to whether the proposed construction is to be located actually in navigable waters. Congress was and operating" a project. Careful distinction is made between, on the one hand, mere *construction* and, on the other, the *operation* of a dam.[1] Obviously the mere *construction*, i. e., the dam itself, if located in non-navigable waters, could not of itself affect navigation anywhere. It is, therefore, significant that section 23, in specifying the object of the Commission's investigation and finding, mentioned solely the "proposed construction".

---

[1] Section 23 originally did not contain the words "operation" or "operate" and it is clear that Congress intended "proposed *construction*" to refer literally and solely to the *construction* and not to its operation. Moreover, it is significant that, even after the amendments of 1935, it is still only the "proposed *construction*" and *not operation* which is to be the subject of investigation by the Commission and of its resultant finding. See pp. 228-230, *infra.*

A statement to the foregoing effect and of specific application was made by the Federal Power Commission through its Chairman, Secretary of War Dwight F. Davis, in a letter to the Chairman of the Committee on Interstate and Foreign Commerce, House of Representatives, March 27, 1928:

> "*It is not the construction or existence of a dam* or other work in a non-navigable stream which affects or diminishes the navigable capacity of the navigable section below, *but the manner of its operation.*" Italics added. (Eighth Annual Report, Federal Power Commission: 1928, p. 133).

Indeed, the same facts were clearly brought out in an opinion rendered by the Attorney General of the United States to the President September 22, 1930, in relation to the project here involved (R. 2782). The Attorney General, in reciting the facts, taken from a statement thereof tion quite contrary to the fact, that is, an assumption that the character of the different streams throughout the country, and even the points at which navigability of navigable streams ceases, is already well known and established. Obviously this assumption is belied by the very purpose of section 23, which was of course to provide means for an administrative determination of the character of the particular stream. Consequently, it is neither rational nor even possible to attribute to the language in question (which provides for such administrative determination), the finality of conferring upon the Commission jurisdiction over non-navigable streams, even if such were constitutionally possible.

---

[1] For instance,

Sec. 4(d) "* * * licenses * * * for the purpose of *constructing, operating* and *maintaining* dams, * * *" etc.

Sec. 10(c), 2nd sentence: "* * * licensee hereunder shall be liable for all damages occasioned to the property of others by the *construction, maintenance,* or *operation* of the project works * * * *constructed* under the license, * * *" etc.

Sec. 13 "* * * licensee shall commence the *construction* of the project works * * * shall thereafter * * * prosecute such *construction,* and shall * * * complete and put into *operation* such part * * *."

Sec. 21 "* * * lands or property of others necessary to the *construction, maintenance,* or *operation* of any dam, * * *" etc.

Indeed, the Senators who actively debated the provision would at times refer to the premise of navigable streams and at other times non-navigable streams.[1] They manifestly gave to section 23 and to the particular phrase under discussion the very interpretation which respondent has consistently given it, that the section is intended to deal with streams of doubtful navigability and to authorize administrative determination of the character of the stream.

This too, is the interpretation given to section 23 by the Trial Court (R. 145, 6).

Even if the few words upon which petitioner relies did support its contention, there is much other language in Section 23 which is inconsistent therewith, and which, it must be assumed, Congress would have changed had it intended to give to the section the purpose and effect which petitioner seeks to impute to it. Thus, not only are the very words upon which petitioner places its sole reliance inappropriate, but other changes would have to be made in the language of the section. The modifications necessary to support petitioner's interpretation would be substantially as follows:

> "That any person, association, corporation, State, or municipality intending to construct a dam or other

---

[1] See pp. 203-5, *supra*.

well aware that the Act of March 3, 1899, adequately protected against harmful operation upstream and that there is no constitutional basis upon which it could impose a licensing requirement for projects on non navigable streams.

4. *Petitioner's interpretation requires a tortuous construction of the language of Section 23.*

Petitioner, in support of its claimed extension of jurisdiction to impose the licensing requirement for projects in non-navigable waters, points to the words "other than those herein defined as navigable waters", in section 23 of the Act (Pet. Br., p. 90). On the basis of these few words petitioner claims that section 23 confers upon the Commission affirmative jurisdiction to require and issue licenses for projects in non-navigable streams, a power never theretofore exercised or asserted by Congress itself. No legislative intent is shown in support of that interpretation, and indeed the clear intent is contra.[1] Other language of the section and the Act clearly negatives the interpretation.[2] Petitioner's interpretation would raise grave doubts as to constitutionality of the Act.[3] Under these circumstances, without further citation, the decision of this Court in *I. C. C. v. Oregon-Washington R & Nav. Co.*, 288 U. S. 14, (see pp. 230-3, *infra*) is adequate to refute the contention. However, upon analysis, these words themselves lend no support to the claimed interpretation and seem inappropriate under any interpretation unless read in the sense in which they were understood by the House Managers on the Conference Committee.

In the first place, to give to these few words the significance which petitioner urges upon this Court would be to predicate the interpretation of section 23 upon an assump-

---

[1] See pp. 201-6, *supra.*

[2] See pp. 214-218, *supra.*

[3] See Resp. Br. pp. 107-20.

On the contrary, no change is necessary to sustain respondent's interpretation which represents the plain legislative intent and is demanded by well established rules of statutory construction. To give section 23 a meaning entirely consistent with the legislative history, it is sufficient merely to place proper emphasis upon the word "*intending*" and to bear in mind that at the time declaration is filed the status of the stream is uncertain. Thus, being doubtful as to the status of the stream, a person may in one case intend to construct the project regardless of whether the stream be found to be navigable or non-navigable or in another case he may intend to construct only if the stream be found to be non-navigable and if therefore no license is required.[1] In either case the statute authorizes him to invoke an administrative determination of the character of the stream. Thus, reading the statute in the light of the uncertain status of the stream at the time the declaration is filed, its meaning is clear that any person proposing to construct a project *in a stream not known or declared to be navigable,* i. e., being uncertain as to its precise status, may file a declaration of intention, whereupon the Commission shall cause investigation of the proposed construction to be made and, if it shall find that the stream is navigable, i. e., that the interest of interstate or foreign commerce would be affected by the proposed construction, he may not proceed until he shall have applied for and received a license under the Act, that is to say, under section 4(d), viz.: for a project in navigable waters. This, it is submitted, is an interpretation of section 23 fully supported by project words across, along, over, or in any stream or part thereof, ~~other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States,~~[1] may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation ~~of such proposed construction~~ to be made *of the character of the stream in which such project is to be located, the nature of the proposed construction, its proposed operation and the effect of any such operation upon the interests of interstate or foreign commerce at the site of such proposed construction or elsewhere,*[2] and if upon such investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction *or any such operation,*[2] such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license ~~under the provisions of this Act~~ *which the commission is hereby authorized and empowered in such case to issue.*[3] If the commission shall not so find and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws.

---

[1] The Rules and Regulations issued by the Federal Power Commission required, in regard to declaration of intentions filed under Section 23 of the Act:

> "A statement as to whether, if the commission finds that the project will affect the interests of interstate or foreign commerce, the applicant proposes to apply for a permit or for a license" (Rules and Regulations, Federal Power Commission, 2nd Revised Issue, April 1, 1924).

---

[1] This language is inappropriate, under any interpretation, since the character of the stream is not known at the time declaration of intention is filed, but the section is invoked for the purpose of obtaining an administrative determination thereon by the Commission.

[2] New Matter represents the extended subject matter which under petitioner's contention would have to be considered by the Commission in addition to merely "such proposed construction". (See pp. 217-20, *supra.*)

[3] Since no authority is found under Section 4(d) for the Commission to issue a license in non-navigable streams, Section 23, if petitioner's interpretation is to be sustained, should confer such affirmative authority instead of merely referring back, as it obviously does, to the licensing authority under Section 4(d). (See pp. 215-17, *supra.*)

> tion, such person, association, corporation, State, or municipality shall not proceed with such construction until it shall have applied for and shall have received a license under the provisions of this Act. If the commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with State laws."

The addition of the explanatory expression "*streams patently among*" is really unnecessary because, from the authoritative Statement of the House Managers of the Conference Committee and the statements of those responsible for the Bill in the Senate, the sense of this expression may properly be read into the language actually employed. *Barrett* v. *Van Pelt*, 268 U. S. 85.

Or, as a further alternative, the expression "other than those defined herein as navigable waters" might well, with entire consistency with the legislative intent, be read as "other than those *declared* (or known) to be navigable waters as herein defined". This indeed is the interpretation which this Court apparently placed upon the section in describing it in *New Jersey* v. *Sargent, supra,* as providing that a person "intending to construct a dam or other works in a stream not *declared* navigable" might file declaration of intention.[1]

C. The 1935 amendments do not support petitioner's claimed interpretation.

In the lower courts petitioner urged that the amendments to the Federal Water Power Act enacted in 1935 as a portion of the Public Utility Holding Company Act supported petitioner's contentions. Respondent, however, has shown in prior arguments that the amendments, even though enacted at the instance of the Federal Power Commission, do not in fact support petitioner's contention, but legislative history and entirely consistent with the language used.

---

[1] See p. 213, *supra.*

Alternatively, since, as has been shown, the few words upon which petitioner relies are ambiguous and inappropriate, it is well settled that they may be disregarded if necessary to give effect to the legislative intent. In *Barrett* v. *Van Pelt*, 268 U. S. 85, at page 90, the Supreme Court said:

> "The intention of the lawmaker constitutes the law. *Stewart* v. *Kahn*, 11 Wall. 493, 504. See *Smythe* v. *Fiske*, 23 Wall. 374, 380. Being satisfied of the legislative intention, the court will not be prevented from giving that intention effect by a too rigid adherence to the very word and letter of the statute. *Oates* v. *National Bank*, 100 U. S. 239, 244."

See also: *Fleishmann Co.* v. *U. S.*, 270 U. S. 349 (1926); *Hawaii* v. *Mankichi*, 190 U. S. 197 (1903); *Lau Ow Bew* v. *U. S.*, 144 U. S. 47 (1892); *Church of the Holy Trinity* v. *U. S.*, 143 U. S. 457 (1892); *Oates* v. *National Bank*, 100 U. S. 239 (1879); *Stewart* v. *Kahn*, 11 Wallace 493 (1870).

However, if language were desired to express legislative intent more clearly than the language actually employed, it would at most be to interpolate a few words to confirm the intent already so clearly expressed in legislative history, viz.:

> "That any person, association, corporation, State, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than *streams patently among* those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce between foreign nations and among the several States, may in their discretion file declaration of such intention with the commission, whereupon the commission shall cause immediate investigation of such proposed construction to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construc-

navigable streams. Instead, the amendments proposed by the Commission were couched in terms of general reference to the full power of Congress over navigable waters under the Commerce Clause in the mistaken belief that this would extend the Commission's jurisdiction.[1]

In the provisions here involved amendments were made only in the licensing authority under section 4(d), which became 4(e), and in section 23 itself. No change was made in the definition, for the purposes of the Act, of "navigable waters".

In the licensing provision, which became 4(e), the only pertinent amendment was to change the expression "any of the navigable waters of the United States" to read "any of the streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States." These expressions are clearly synonymous. If anything, it was a retrogression in phraseology, a reversal of the advance made in codifying in 1899 the Rivers and Harbors legislation theretofore in force. At that time, it will be recalled, the expression "any waters in respect of which the United States has jurisdiction" was simplified and stated as "any of the waters of the United States." At about the same time this Court in the *Rio Grande* decision rejected petitioner's contention based on the "broad generality of this language", that the expression "waters in respect of which the United States has jurisdiction", embraced more than navigable waters.[2]

The testimony of Dozier DeVane, solicitor of the Commission, who appeared on its behalf at the House hearings on the amendments, seems conclusive against petitioner:

> "Mr. Mapes. And you are not proposing to amend the licensing section or provisions of the Water Power Act?

---

[1] See pp. 185, 216, *supra*.

[2] See note 1, p. 182, *supra* and discussion of the *Rio Grande* Decision, p. 185, *supra*.

even weaken it. In this Court petitioner questions whether these amendments "have any relevant effect here" (Pet. Br. 91) and admits that "it is a matter of no consequence whether its case be governed by the 1920 or 1935 language". (Pet. Br. 92.)

The 1935 amendments were enacted together with the Public Utility Holding Company Act (1935). The Federal Water Power Act of 1920, as amended, became Part I of Title II of the Federal Power Act. The amendments were proposed by the Commission and adopted practically *verbatim*[1] by Congress upon the repeated assurance from the Commission that they did not extend the licensing power under the Act. But, even so the Commission was apparently loath to ask, and in any event did not ask, flatly for a grant of licensing power over projects on non-

---

[1] See Report of Senate Committee on Interstate Commerce, Senate Doc. 621, 74th Cong., 1st Sess., p. 17:

> "The amendments to the present Federal Water Power Act have been *requested by the Federal Power Commission* on the basis of its experience in the administration of that act. *Most of them are designed merely to clarify the act in its application to situations that have arisen in its administration.*"

Also Report of House Committee on Interstate and Foreign Commerce, House Doc. 1318, 74th Cong., 1st Sess., p. 7:

> "The amendments to the present Federal Water Power Act are all *minor. They have been requested by the Federal Power Commission, largely for the purpose of clarifying the act* in its application to situations that have arisen in its administration, and also to strengthen it in certain particulars."

The only changes (in any of the provisions affecting licensing power) made by Congress from the amendments proposed by the Commission were (1) to correct "commerce *between* foreign nations" to read "commerce *with* foreign nations" and (2) in order to correct an obvious typographical error, to reinsert "interests of" before "interstate commerce".

Compare section 4(e) and 23(b) as proposed by the Commission (Hearings, Committee on Interstate and Foreign Commerce, 74th Cong., 1st Sess., on H. R. 5423, pp. 451-459) with the amendments as adopted.

However, it clearly negatives petitioner's interpretation of section 23 as requiring a license for a project located in non-navigable waters, for, while inserting a prohibition already found in the Act of 1899, the amended section (like the Act of 1899) does not purport to make unlawful the maintenance of any existing projects in non-navigable streams. It was thus a congressional reaffirmation, entirely consistent with the Act of 1899,[1] of the legislative intent that the Federal Power Act requires licenses only of projects in navigable waters of the United States.

The only other changes were: (a) Making the filing of a declaration of intention mandatory; and (b) prohibiting persons from constructing, *maintaining or operating* a project without license, if the Commission shall have found that the *proposed construction* (merely) would affect the interests of interstate commerce.

The first change, as petitioner states (Pet. Br. p. 92), does not affect respondent in the present litigation, for declaration of intention had been filed ten years before the amendment.

The second change, prohibiting a person from constructing, *maintaining or operating* a project without license, after an adverse finding under section 23, merely serves to emphasize the failure of Congress to change the statement of what the Commission is to investigate under section 23, leaving that part as it stood, viz., that:

> "the Commission shall cause immediate investigation of such *proposed construction* to be made, and if upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such *proposed construction,* * * *".

a license shall be required. The retention of the italicized words, while referring in the 1935 amendments to "construct, *operate or maintain*" in the first sentence of this section and to "construct, *maintain or operate* in the second sentence

---

[1] See pp. 180-83 *supra*.

> "Mr. DeVane. *The new matter makes no amendments to the licensing sections of the Water Power Act.*" (Hearings on Public Utility Holding Company bill, 1935 (Part I) p. 450).

Obviously, this was so and is so and petitioner is now constrained to admit (although in both lower courts it strenuously denied) that "it is a matter of no consequence whether its case be governed by the 1920 or the 1935 language." (Pet. Br. p. 92).

Mr. DeVane further stated:

> "Mr. DeVane. * * * *it is my belief that insofar as our amendment is concerned, we are not enlarging the power of this Commission.* We are simply endeavoring to clarify section 4, and if Congress has any additional powers over waters and streams by reason of its war powers, they were not written in the first act and we are not writing them in this Act" (Hearings, p. 471).

Again:

> "Mr. Mapes. Are these two expressions synonymous, or not: the effect upon interstate commerce and the navigability of a stream?
>
> "Mr. DeVane. Mr. Mapes, *I think they are* * * *" (Hearings, p. 474).

Section 23 also was amended but the amendments prejudice rather than aid petitioner's interpretation.

The second paragraph thereof is now designated (b) and a new sentence introductory thereto was added. This makes it unlawful "*to construct, operate, or maintain*" any dam "across, along, or in any of the navigable waters of the United States * * * except under and in accordance with the terms of a permit * * * granted prior to June 10, 1920, or a license granted pursuant to this Act." This prohibition relates exclusively to projects *in navigable waters.* Of course the prohibition was not at all necessary, for it merely duplicates the continuing prohibition of the Act of March 3, 1899.

1. If Congress were intending to grant the Commission a new and drastic power, it would have made its intended meaning clear and direct.

2. If such purpose were claimed, support should be found in legislative history.

3. The Court's duty is to construe the statute, if fairly possible, so as to avoid, not only the conclusion that it is unconstitutional, but also grave doubts upon that score.

The statute involved in that decision was an amendment to the Interstate Commerce Act of 1887, added by the Transportation Act, 1920, consolidating and amending provisions theretofore in force. The new provision read, in part:

> "The commission may, after hearing, in a proceeding upon complaint or upon its own initiative without complaint, authorize or require by order any carrier by railroad subject to this Act, party to such proceeding, to provide itself with safe and adequate facilities for performing as a common carrier its car service as that term is used in this Act, *and to extend its line or lines:* Provided, That no such authorization or order shall be made unless the commission finds, as to such extension, that it is reasonably required in the interest of public convenience and necessity, or as to such *extension or facilities* that the expense involved therein will not impair the ability of the carrier to perform its duty to the public." (p. 34) (Italics added)

The Commission had ordered the defendant railway to extend its line a distance of 185 miles to connect with the Southern Pacific. This court denied that the language in question was sufficient to authorize the new power claimed by the Commission to enter the order in question and stated:

> "The phrase 'and to extend its line or lines' is part of a single sentence committing to the Com-

emphasizes that Congress neither made nor intended any extension of jurisdiction of the Commission to require a license for projects in non-navigable streams, if indeed it had the power so to do.

Obviously, as petitioner now agrees (Pet. Br. 91, 92) the amendments which were made effected no change in the Act so far as concerns this respondent or the present litigation. Clearly if Congress had had any intention of enlarging or attempting to enlarge the Commission's powers it would not have spoken like a Delphic Oracle but "would have made its intended meaning clear and direct". (*Interstate Commerce Commission* v. *Oregon Washington R. & Nav. Co., supra.*)

D. Petitioner's interpretation fails to meet the tests prescribed by this Court.

It is clear, of course, as shown by the *Rio Grande* decision, that Congress had never exercised or attempted to exercise, if indeed it could do so, the power to require a license for a project on a non-navigable stream—or to make such a project unlawful *per se*. It is also apparent that in enacting the Federal Water Power Act in 1920 Congress had no intention to assert such a power nor to give the Commission any control over navigable waters other than authority to license projects which were unlawful under the Act of 1899. Petitioner can point to no clear and direct language employed by Congress. On the contrary, it is abundantly clear that the attempt by the Commission to assert the power to require a license for a project on a non-navigable stream (though at first advanced with some trepidation) was not based upon either language or intent of Congress itself but is merely an attempt by an administrative agency to assert a new and drastic power not theretofore asserted by Congress. Its interpretation obviously fails to meet the tests prescribed by this Court in *Interstate Commerce Commission* v. *Oregon-Washington R. & Nav. Co.*, 288 U. S. 14. The principles there enunciated are:

> quired to build into territory they had not undertaken to serve. The scope of the recommendation was not enlarged in the testimony before the committee of the Senate having the Transportation Act in charge" (pages 35-36). (Italics added)

A third cardinal principle of statutory interpretation, here forcefully present, is found in this same decision where this court, after finding the particular language insufficient for the purpose claimed, and lacking support in legislative history, stated:

> "There is another consideration which supports the construction adopted. *Our duty is to construe the statute, if fairly possible, so as to avoid not only the conclusion that it is unconstitutional, but also grave doubts upon that score"* (p. 40). (Italics added)
>
> * * *
>
> "The construction we adopt makes it unnecessary to pass upon the grave questions of constitutional validity raised by appellants' argument" (p. 41-42).

The principles of interpretation are also well stated in *National Labor Relations Board* v. *Jones & Laughlin*, 301 U. S. 1, 29-30. In that case the validity of the National Labor Relations Act was challenged as an attempt to regulate all industry, thus invading the reserved powers of the States over their local concerns. The argument was based upon the broad language of the Act, much broader, of course, than any provisions of the Federal Water Power Act and the claim was made that its scope could not be limited by interpretation so as to be held within the constitutional powers. In answer, the Court stated:

> "If this conception of terms, intent and consequent inseparability were sound, the Act would necessarily fall by reason of the limitation upon the federal power which inheres in the constitutional grant, as well as because of the explicit reservation

> mission the power to require carriers to provide safe and adequate facilities for car service as defined in the act. The reasonable conclusion is, therefore, that the extensions mentioned have to do with car service, and *are not intended to create a wholly independent subject of jurisdiction.* In the proviso the furnishing of facilities and extension of lines are blended as belonging in a single class. *We should expect, if Congress were intending to grant to the Commission a new and drastic power* to compel the investment of enormous sums for the development or service of a region which the carrier had never theretofore entered or intended to serve, *the intention would be expressed in more than a clause in a sentence dealing with car service.* As said in *Interstate Commerce Commisison* v. *United States ex rel. Los Angeles,* 280 U. S. 52, 70:
>
> "'If Congress had intended to give an executive tribunal unfettered capacity for requisitioning investment of capital of the carriers and the purchase of large quantities of land and material in an adverse proceeding, *we may well be confident that Congress would have made its meaning far clearer and more direct than in the present meager provisions of the Transportation Act'* " (page 35). (Italics added)

In addition to the requirement of *clarity and sufficiency of expression of legislative intent,* this Court pointed out a second requisite to upholding an attempted exercise by an administrative body of a new and drastic power, which is equally compelling in favor of respondent's interpretation of the statute here involved, viz., *support in legislative history,* for it went on to state:

> "Moreover, *if the purpose were that claimed by the Commission, support should be found in legislative history.* But none has been called to our attention. In the report to Congress for 1919, the Commission reiterated an outline of the policies previously suggested for legislative action in view of the approaching termination of federal control. No intimation is given that carriers should be re-

section 23 of the Act to require a license for a project on a non-navigable stream, the effect would be to grant irrevocable permission for the construction, maintenance and operation of a project which under changing conditions might come to impair navigable capacity. Though this contention has now seemingly been abandoned, its refutation brings important practical interpretation to the Act.

The Rivers and Harbors Act of 1899 in protection of navigation has of course not been repealed, expressly or impliedly, by the Federal Power Act or otherwise. Indeed, petitioner is suing under that Act as well and has failed to prove a cause of action thereunder. The Federal Water Power Act of 1920 contained no prohibition against structures but, as was forcefully pointed out in the debate, the prohibition was already in the law, under the Act of 1899, and the 1920 statute was merely a "consent statute", designed to afford a license or permit in the face of the standing prohibition in respect of navigable waters.[1] It has not been, nor could it be, contended that the provisions of the Rivers and Harbors Act of 1899 have proven in any respect inadequate to protect navigation. Indeed, the reverse is true and it is uniformly recognized that the Rivers and Harbors Act of 1899 has been fully efficacious to protect navigation; that violations of its terms have been rare; and that, when occurring, any violations have been quickly remedied, usually without need to resort to legal proceedings under the Act. Clearly, any contention that further and additional protection of navigation by the Commission is required, and that a failure to reach out and extend its control might prejudice the interests of navigation, would only reveal desperation in an attempt to justify the extended authority it claims.

Such a contention not only would be contrary to settled principles of fundamental law, but would involve the paradox of, on the one hand, urging that the power of the federal government to regulate navigation is so great and so broad

---

[1] See pp. 198-200, *supra.*

> of the Tenth Amendment. *Schechter Corp.* v. *United States,* 295 U. S. 495, 549, 550, 554. The authority of the federal government may not be pushed to such an extreme as to destroy the distinction, which the commerce clause itself establishes, between commerce 'among the several States' and the internal concerns of a State. *That distinction between what is National and what is local in the activities of commerce is vital to the maintenance of our federal system.* Id.
>
> "But we are not at liberty to deny effect to specific provisions, which Congress has constitutional power to enact, by superimposing upon them inferences from general legislative declarations of an ambiguous character, even if found in the same statute. The cardinal principle of statutory construction is to save and not to destroy. We have repeatedly held that as between two possible interpretations of a statute, by one of which it would be unconstitutional and by the other valid, our plain duty is to adopt that which will save the act. Even to avoid a serious doubt the rule is the same. *Federal Trade Comm'n.* v. *American Tobacco Co.,* 264 U. S. 298, 307; *Panama R. Co.* v. *Johnson,* 264 U. S. 375, 390; *Missouri Pacific R. Co.* v. *Boone,* 270 U. S. 466, 472; *Blodgett* v. *Holden,* 275 U. S. 142, 148; *Richmond Screw Anchor Co.* v. *United States,* 275 U. S. 331, 346.
>
> "We think it clear that the National Labor Relations Act may be construed so as to operate within the sphere of constitutional authority".

Application of these rules of interpretation, thus recently affirmed by this Court, seemingly compels respondent's interpretation of section 23 of the Federal Water Power Act and effectively negatives that of petitioner.

E. The reasonable interpretation of Section 23, required by its legislative history, its language and recognized principles of statutory construction, leaves every federal interest adequately protected.

The contention has at times been advanced by petitioner that if authority should be denied to the Commission under

The Rivers and Harbors Act of March 3, 1899 was passed under the power of Congress to regulate commerce. As is clearly stated in the *Louisville Bridge Co.* case, *supra,* at page 417:

> "That power is a very great power, and *in its nature continuing,* not being exhausted by any particular exercise."

The federal government cannot be precluded from the exercise of such a power whenever circumstances arise justifying such exercise. *Union Bridge Co.* v. *United States, supra.*

Quite to the contrary of petitioner's contention that the authority of the Federal Power Commission under the Federal Water Power Act extends beyond that exercised and exercisable under the Act of 1899, the legislative intent clearly shows, and the language of the Act confirms, that apart from projects on public lands and reservations, authority to require a license under the Federal Water Power Act is limited to projects physically located in navigable waters; and that as to projects in non-navigable waters continued reliance is and must be placed upon the Act of 1899 rather than the Federal Water Power Act. (See p. 189 *supra.*)

Respectfully submitted,

Raymond T. Jackson,
M. F. Millikan,
A. Henry Mosle,
Creswell M. Micou,
Fraser M. Horn,
Wendell W. Forbes,
M. W. Belcher, Jr.,
John L. Abbot.
Counsel for Respondent.

August 31, 1940.

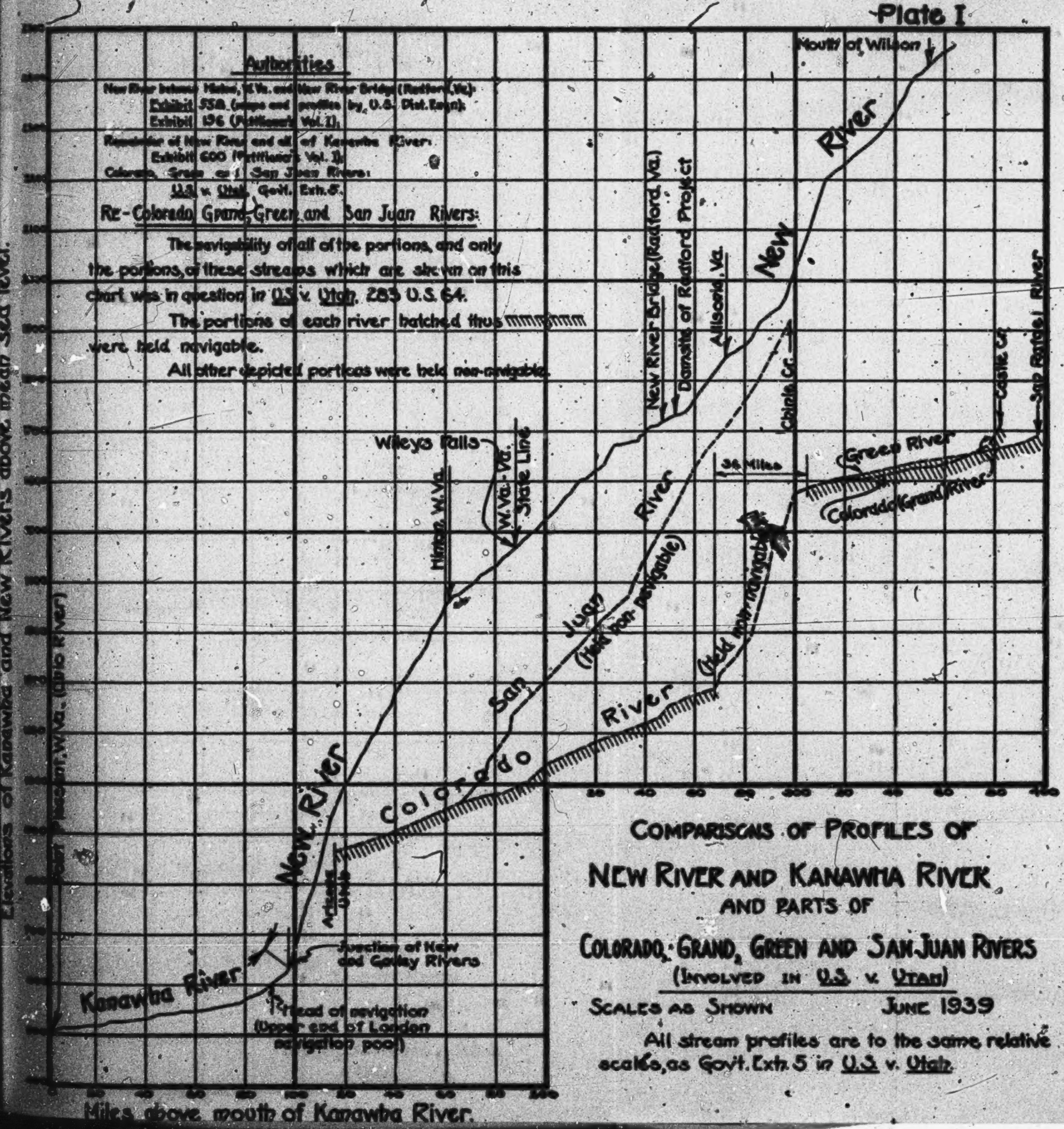
as to permit it, even before occasion for exercise of jurisdiction has arisen, to reach out and impose licensing conditions beyond the recognized limits of constitutional authority and yet, on the other hand, contending that this great and broad power to control navigation is snuffed out by failure to reach out in advance of any occasion for its exercise. Indeed, any contention that the power to regulate navigation could be surrendered, even by the most direct and unconditional assent by Congress itself, has been effectively disposed of by numerous decisions of this Court. *Louisville Bridge Co.* v. *United States,* 242 U. S. 409; *Union Bridge Co.* v. *United States,* 204 U. S. 364; *Greenleaf Lumber Co.* v. *Garrison,* 237 U. S. 251; *Sanitary District of Chicago* v. *United States,* 266 U. S. 405; *Monongahela Bridge Co.* v. *United States,* 216 U. S. 177; *West Chicago Railway* v. *Chicago,* 201 U. S. 506.

In *Louisville Bridge Co.* v. *United States, supra,* Congress itself had expressly consented to the construction of a bridge in a certain location and at a certain height over a navigable stream without reserving any right of revocation or amendment. The Act authorizing the construction set out minimum specifications for said bridge and declared

> "that the bridge erected under the provisions of this Act shall be a lawful structure * * *."

In due course, however, changing conditions of navigation rendered the bridge an obstruction to navigation and the Secretary of War, *proceeding under the Act of March 3, 1899,* and without any further or express authority or direction from Congress, ordered the Bridge Company to alter the bridge in the interests of navigation. This Court held that neither the consent of Congress to the original structure nor the fact that as originally constructed it did not interfere with navigation at the time would bar an action by the Secretary of War under the Act of 1899 to compel alteration of the bridge at the Bridge Company's expense whenever subsequent conditions of navigation required such alteration.

Plate I



Authorities

New River between Hinton, W. Va. and New River Bridge (Radford, Va.):
Exhibit 558 (maps and profiles by U.S. Dist. Engr.);
Exhibit 196 (Petitioner's Vol. I).
Remainder of New River and all of Kanawha River:
Exhibit 600 (Petitioner's Vol. I);
Colorado, Green and San Juan Rivers:
U.S. v. Utah, Gov't. Exh. 5.

Re-Colorado, Grand, Green and San Juan Rivers:

The navigability of all of the portions, and only the portions, of these streams which are shown on this chart was in question in U.S. v. Utah, 283 U.S. 64.

The portions of each river hatched thus ▨ were held navigable.

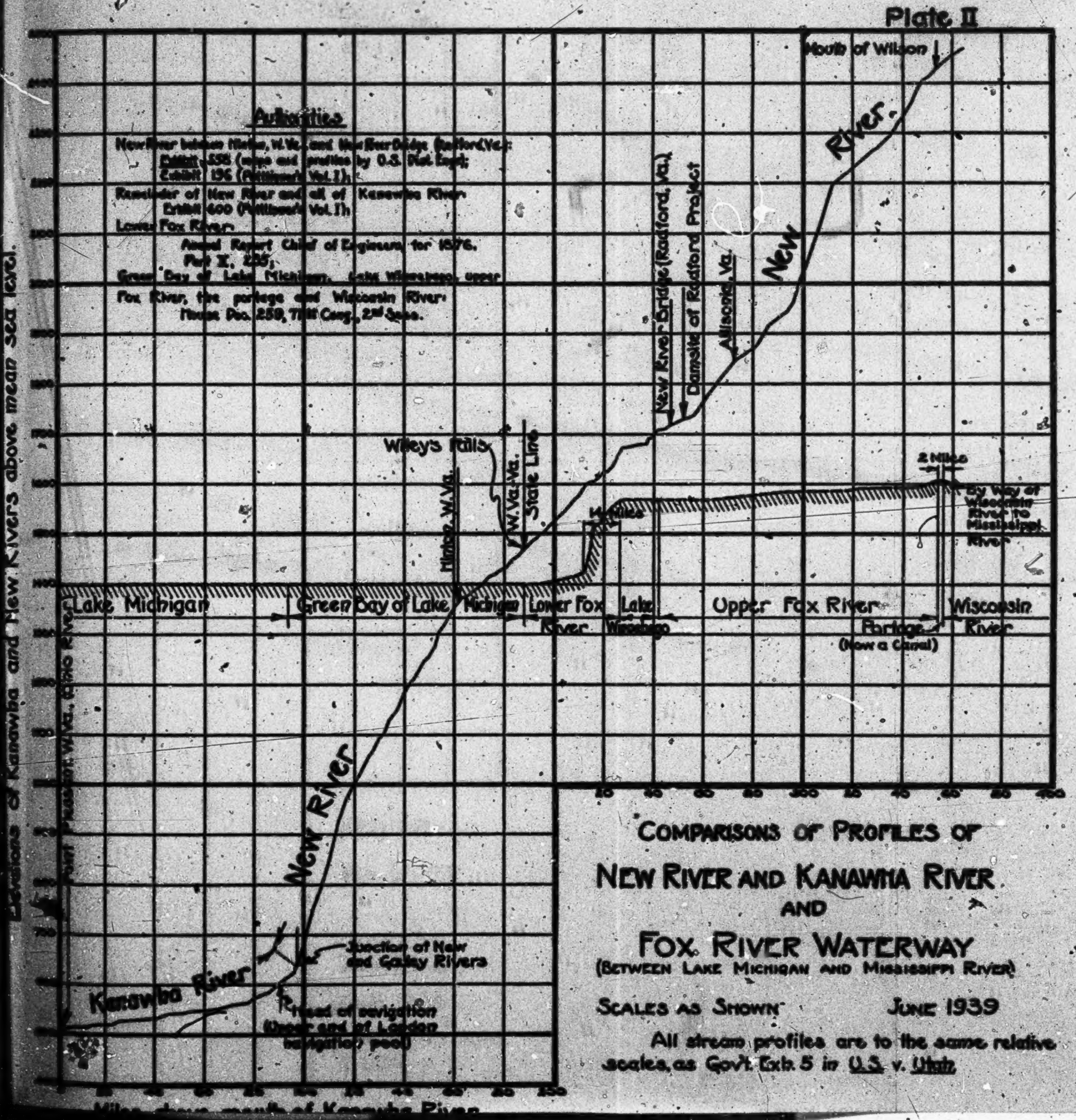
All other depicted portions were held non-navigable.

COMPARISONS OF PROFILES OF
NEW RIVER AND KANAWHA RIVER
AND PARTS OF
COLORADO, GRAND, GREEN AND SAN JUAN RIVERS
(INVOLVED IN U.S. v. UTAH)

SCALES AS SHOWN JUNE 1939

All stream profiles are to the same relative scales, as Gov't. Exh. 5 in U.S. v. Utah.

Plate II



Authorities

New River between Hinton, W. Va., and New River Bridge (Radford, Va.):
Exhibit 558 (maps and profiles by U.S. Dist. Engr.);
Exhibit 156 (Petitioner's Vol. I);
Remainder of New River and all of Kanawha River:
Exhibit 600 (Petitioner's Vol. I);
Lower Fox River:
Annual Report Chief of Engineers for 1876,
Part X, 235;
Green Bay of Lake Michigan, Lake Winnebago, upper Fox River, the portage and Wisconsin River:
House Doc. 259, 71st Cong., 2nd Sess.

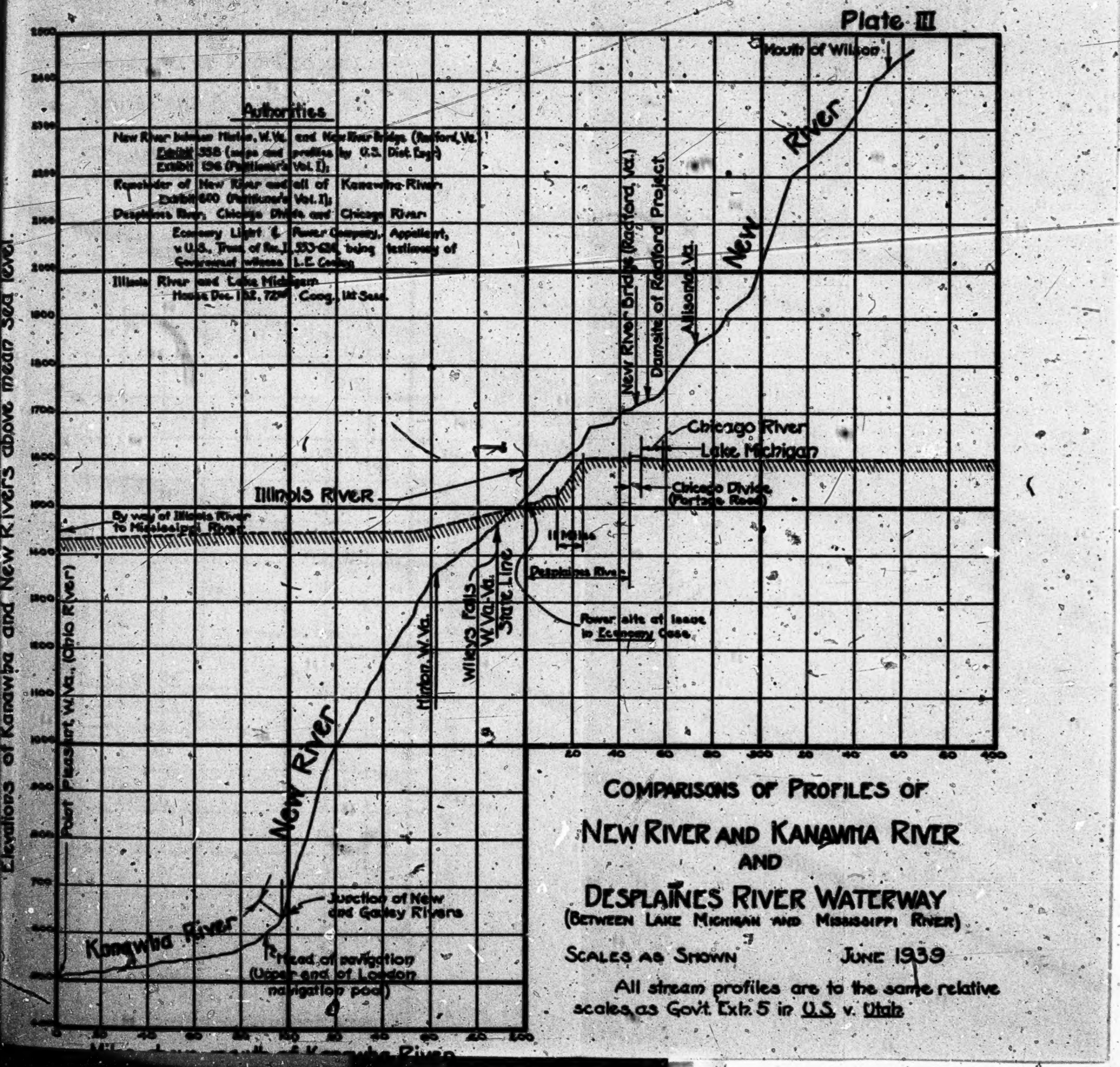
COMPARISONS OF PROFILES OF
NEW RIVER AND KANAWHA RIVER
AND
FOX RIVER WATERWAY
(BETWEEN LAKE MICHIGAN AND MISSISSIPPI RIVER)

SCALES AS SHOWN JUNE 1939

All stream profiles are to the same relative scales, as Gov't. Exh. 5 in U.S. v. Utah

COPY CUT OFF AT BOTTOM

Plate III



Authorities

New River between Hinton, W.Va. and New River Bridge (Radford, Va.):
Exhibit 338 (maps and profiles by U.S. Dist. Engr.)
Exhibit 136 (Petitioner's Vol. I);

Remainder of New River and all of Kanawha River:
Exhibit 640 (Petitioner's Vol. I);

Desplaines River, Chicago Divide and Chicago River:
Economy Light & Power Company, Appellant, v U.S., Trans. of Rec. I, 553-626, being testimony of Government witness L.E. Cooley.

Illinois River and Lake Michigan
House Doc. 182, 72nd Cong., 1st Sess.

COMPARISONS OF PROFILES OF
NEW RIVER AND KANAWHA RIVER
AND
DESPLAINES RIVER WATERWAY
(BETWEEN LAKE MICHIGAN AND MISSISSIPPI RIVER)

SCALES AS SHOWN JUNE 1939

All stream profiles are to the same relative scales as Gov't. Exh. 5 in U.S. v. Utah.

COPY CUT OFF AT BOTTOM

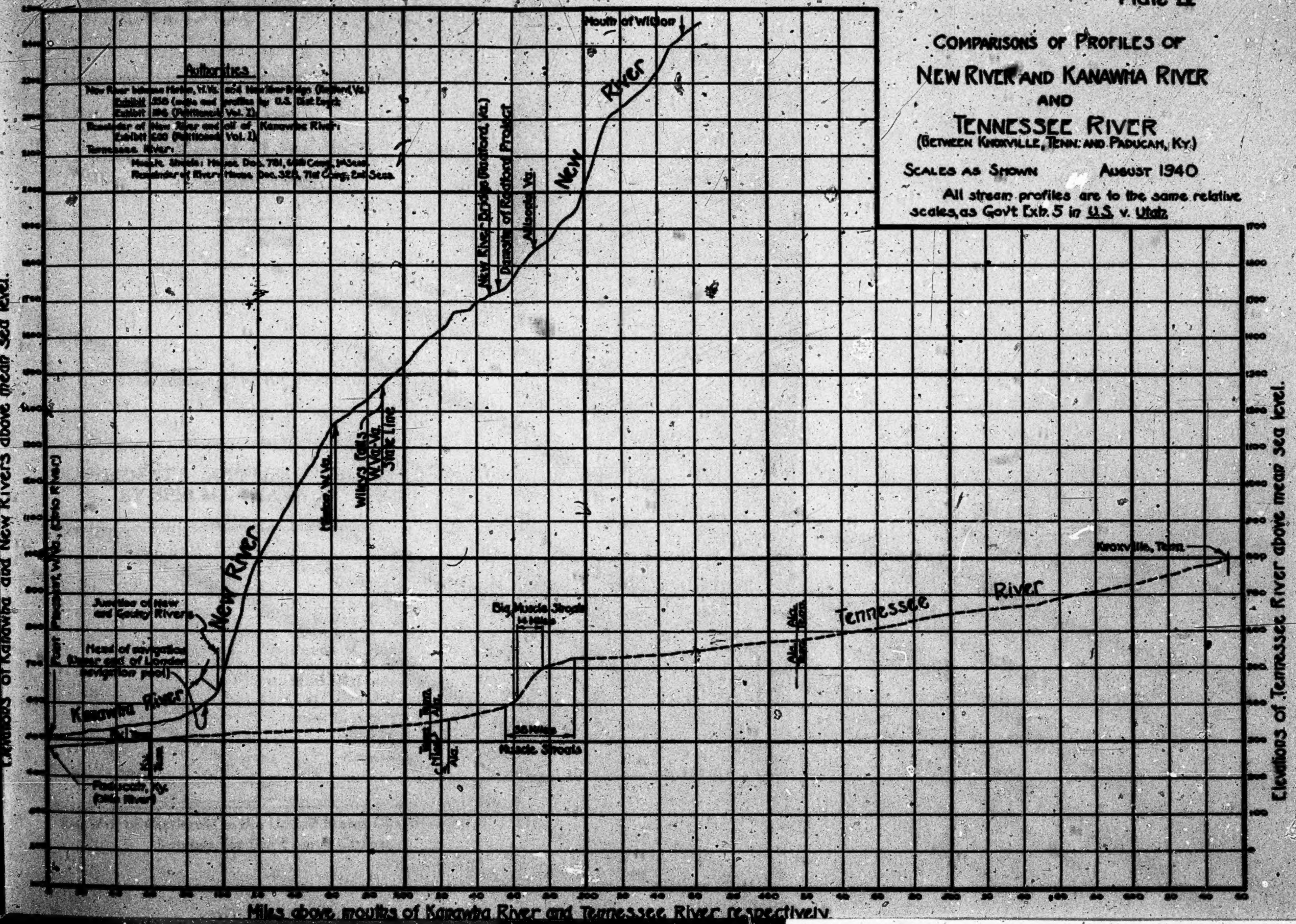
Plate IV

COMPARISONS OF PROFILES OF NEW RIVER AND KANAWHA RIVER AND TENNESSEE RIVER

(BETWEEN KNOXVILLE, TENN. AND PADUCAH, KY.)

SCALES AS SHOWN AUGUST 1940

All stream profiles are to the same relative scales, as Gov't Exh. 5 in U.S. v. Utah



COPY CUT OFF AT BOTTOM

FILE COPY

Office - Supreme Court, U. S.
FILED
OCT 21 1940
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

RESPONDENT'S SUPPLEMENTAL BRIEF FILED BY SPECIAL LEAVE OF COURT.

RAYMOND T. JACKSON,
Cleveland, Ohio

M. F. MILLIKAN,
A. HENRY MOSLE,
CRESWELL M. MICOU,
FRASER M. HORN,
WENDELL W. FORBES,
M. W. BELCHER, JR.,
New York, N. Y.

JOHN L. ABBOT,
Lynchburg, Va.

Counsel for Respondent.

October 19, 1940

On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit.

INDEX.

PAGE

I. VIRGINIA'S POSITION REGARDING CONSTITUTIONAL QUESTIONS 1

II. THE FOX RIVER PAPER COMPANY CASE 3

III. PETITIONER CANNOT, BY FILING EX PARTE DOCUMENTS OR STATEMENTS, SUPPLEMENT THE RECORD IN THIS COURT OR AFFECT THE DETERMINATION OF THIS CAUSE BY THIS COURT ON THE RECORD AS MADE 7

IV. THE CONCURRENT FINDING (OF NON-NAVIGABILITY) OF THE LOWER COURTS IS NOT BASED UPON ERRONEOUS LEGAL CRITERIA OF NAVIGABILITY 10

(1) *The lower courts' comment on difficulties of navigation* 13

(2) *The lower courts' comment that any alleged movement outside of the lower parts of the improved sections above Hinton and Radford was irregular and sporadic and formed no appreciable part of any commerce of the region* 14

(3) *Abandonment and unprofitableness* 15

(4) *Petitioner's contentions erroneous in law* 16

V. PETITIONER'S COMPARISON WITH THE DESPLAINES RIVER 17

VI. PETITIONER'S CRITICISM OF RESPONDENT'S REVISION OF PETITIONER'S CHART IS UNFOUNDED 20

(a) *Incorrect use of testimony as actually recorded* 20

PAG

(b) *Duplication* 2

(c) *Hearsay* 2

(d) *Non-commercial items* 2

(e) *Testimony inconsistent with other evidence in the case* 2

(f) *Testimony inconsistent with well-known facts* 2

VII. CONTRARY TO PETITIONER'S ASSERTION ON ORAL ARGUMENT, THE EARLY ENGINEERING REPORTS ARE CONSISTENT WITH LATER REPORTS AS TO NON-NAVIGABILITY OF NEW RIVER ....

TABLE OF CASES

Economy Light & Power Co. v. *United States*, 256 U. S. 113 ....

Fox River Paper Company v. *Railroad Commission of Wisconsin*, 274 U. S. 651 .... 2, 3, 5

Leovy v. *United States*, 177 U. S. 621 ....

Martin v. *Waddell*, 16 Peters, 367 ....

Montello, The, 20 Wall. 430 ....

Port of Seattle v. *Oregon & Washington R. R. Co.*, 255 U. S. 56 ....

United States v. *Arizona*, 295 U. S. 174 ....

United States v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690 ....

United States v. *Utah*, 283 U. S. 64 ....

In the

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit

---

RESPONDENT'S SUPPLEMENTAL BRIEF FILED BY SPECIAL LEAVE OF COURT.

I.

Virginia's position regarding constitutional questions.

The brief in behalf of the Commonwealth of Virginia, *amicus curiae*, sets forth, as the seventh and last of the series of propositions argued in the brief, that the State is entitled to a decision now on the constitutionality of the capture clause (Section 14) as well as any other license provisions of the Power Act (Va. Br., p. 73). Under the facts concurrently found by the lower courts upon substantial evidence, the Rivers and Harbors Act of March 3, 1899 and the Federal Power Act are so plainly inapplicable to respondent's project that no constitutional questions are presented for decision and, of course, even if either statute were construed as applicable to the respondent's project, the Court would not reach the constitutionality of license conditions if, as we believe, petitioner is without constitutional authority to require any license.

However, if, contrary to our view, the Court should reach the question of the constitutionality of license conditions in its disposition of this case, we fully agree that both the State of Virginia and respondent are entitled to a decision now upon the constitutionality of the capture clause. In addition to the authorities and arguments in our main brief (pp. 131-3), it may be noted that *Fox River Paper Company v. Railroad Commission*, 274 U. S. 651, clearly supports this position. In that case both the Supreme Court of Wisconsin and this Court passed upon the validity of the capture provision of the Wisconsin law and sustained the provision upon the ground that it was not confiscatory under the established law of property as determined by the highest court of that State.

It may also be noted that petitioner's argument in it reply brief, that respondent could not question the licens conditions if its project were located in navigable water or impaired navigable capacity (Pet. Reply Br., pp. 37-8) is not only inapposite on the facts but also erroneous in law Where a project is located on a non-navigable stream th only right of petitioner under Section 10 of the Rivers an Harbors Act is to enjoin such operation as will impai navigable capacity. *U. S. v. Rio Grande D. & I. Co.*, 17 U. S. 690. Petitioner has no right to enjoin the constructio or require a license for such operation of the project a will not impair navigable capacity. Furthermore, as pet tioner concedes (Pet. Reply Br., pp. 38-9), even where pet tioner has constitutional authority to require a license, may only impose license conditions which have a real an substantial relation not only to some constitutional authorit of petitioner but also to the source of its licensing a thority. Consequently, even in a situation where petitioner is authorized to require a license, the petitioner not improvidently concedes that the constitutionality of license conditions is presented for determination.

II.

The *Fox River Paper Company* case.

The case of *Fox River Paper Company* v. *Railroad Commission of Wisconsin*, 274 U. S. 651, dealing with a navigable stream and with riparian rights under the laws of Wisconsin is of course entirely inapposite to respondent's project, located on a non-navigable stream and involving riparian rights under the laws of Virginia. However, the discussion of the case as contained in the brief of the State of Wisconsin, *amicus*, serves to focus the more sharply the distinction between, on one hand, the sovereign power of the States in respect of all streams, including navigable waters of the United States, and, on the other hand, the authority of the Federal Government to regulate navigation upon, and protect the navigable capacity of, interstate navigable waters.

The Fox River Paper Company in its controversy with the Railroad Commission of Wisconsin had, as a riparian owner, only incomplete or limited* rights in the Fox River,

---

* To state the matter in more detail, the State of Wisconsin, on being admitted to statehood, acquired, subject to the limited right of the Federal Government to regulate navigation, the complete "bundle of rights" with respect to those portions of navigable rivers (of which the Fox River is one) located within her boundaries. Thereafter the State granted a portion, but only a portion, of those rights to the riparian owners. Among those retained by the State were certain rights in connection with the erection of structures in navigable streams. Thus, this Court cited the Wisconsin court as holding in effect that, without the consent of the State, "the riparian owner can have no right in the water power created by damming a navigable river" (*Supra*, 656). The Wisconsin Court held in effect that, if the Fox River Paper Company, a riparian owner, desired that the State part with that right, it would have to pay the price which the State by statute had prescribed; and

(*Footnote continued on next page.*)

the full rights of the State never having been granted to the riparian owner, whereas in the instant case respondent, by virtue of its riparian ownership plus its license from the State of Virginia, holds the *full* rights of the State of Virginia for the purposes of its water power development. In other words, respondent stands in the shoes of Virginia. Consequently, even if (contrary to the fact) respondent's project were in navigable waters and petitioner had constitutional authority to require some license, we would be squarely confronted with the question whether the Federal Government might impose such license conditions upon the State of Virginia itself. It would then become pertinent to inquire what rights the State of Virginia has in those parts of navigable waters situated within her borders. The answer to that question is clear. It is that the States hold

> "*the absolute right to all their navigable waters and the soils under them* for their own common use, subject only to the right since surrendered by the Constitution to the general government." (*Martin* v. *Waddell,* 16 Peters 367, 410.)*

On the other hand, the character of that right which, in respect of navigable waters, was surrendered to the Federal Government is described concisely in *Port of Seattle* v. *Oregon & Washington Railroad Co.,* 255 U. S. 56, 63, wherein this Court stated:

> "The right of the United States in the navigable waters within the several States *is limited* to the control thereof for *purposes of navigation.*"

---

that, because its property right under Wisconsin law did not embrace the right to build a dam in navigable waters, this requirement was not a taking of the riparian owner's property. And this Court held that there was no basis for it to disturb the Wisconsin rule of property (*Supra,* 656-7).

The situation as between respondent and the Federal Government is significantly different. Respondent holds not merely that portion of the "bundle of rights" which the State of Virginia has granted to respondent as a riparian owner but, by virtue of the Virginia license, respondent holds the remainder of the "bundle of rights", that is, respondent stands in the shoes of the State of Virginia.

* All italics are supplied unless otherwise specifically indicated.

Certainly, in view of the plenary* power of the State of Virginia on the one hand, and this very limited right** of the Federal Government on the other, it could not seriously be urged that the Federal Government has any authority to impose upon the State itself a requirement that the State agree to cede to the Federal Government a part of its physical domain, its sovereign powers with respect thereto, its soil and its waters, as well as other of its property, as a condition precedent to the State's construction of a water power development within its own borders.

The inappositeness of *Fox River Paper Company* v. *Railroad Commission* to support petitioner's argument, to the effect that (where authority to impose any license exists) its authority to impose license conditions is essentially the same as that held in the *Fox River Paper Co.* case to reside in the State of Wisconsin, is further emphasized if we apply the claimed licensing power of petitioner (in respect of navigable waters) to a hypothetical Fox River Paper Company which in the year 1926 proposed to construct in the Fox River, a navigable water of the United States as well as of Wisconsin, a new dam (not one constructed in 1878, long before the Act of 1899 was passed and of course before the Federal Water Power Act of 1920). Such hypothetical Company could under the controlling Wisconsin statute, as upheld in *Fox River Paper Company* v. *Railroad Commission*, obtain the consent of the State, through its agent Commission, only upon condition that it be subject, "at any time after the expiration of thirty years," to acquisition of its project by the State under the specified conditions of the Wisconsin statute.

Having complied with the Wisconsin statute and having received the requisite permit from the State Railroad Commission, this hypothetical Company would have vested in it the full and complete right to construct its dam and develop thereat water power, subject only to the authority of the United State to regulate navigation (commerce). Such authority on the part of the United States includes the authority to forbid the construction of this hypothetical Company's dam on the ground, but only on the ground, that it will constitute an obstruction to the navigable capacity of the Fox River.

---

* *Cf. Fox River Paper Co.* case, 654.

** This also is plenary but only within its limited sphere.

Thereupon there arises, in the case of this hypothetical Fox River Paper Company, the question as to whether Congress through its agency, the Federal Power Commission, could superimpose upon that Company, already vested with full and complete rights (property and other) under the laws of Wisconsin, license conditions which have no relation to the protection of the navigable capacity of the Fox and which indeed include a contractual right on the part of the United States to take over, at the end of the term of the Federal license, the entire property of the Company. We submit that, as shown in our main brief, pages 121 *et seq.*, no such authority inheres in the Federal Government, and this is quite aside from the confiscatory aspect of the federal capture provision even in the case of a project in a navigable water of the United States.

It is perfectly obvious from what has been stated above, that, if the limited authority of the Federal Government to regulate navigation were sufficient constitutional support for all of the license conditions which the Federal Power Commission seeks to impose, it necessarily follows that the Wisconsin Water Power Act, involved in the *Fox River* case, and the Virginia Water Power Act, with both of which the conditions sought to be imposed by the Federal Power Commission conflict, are as a practical matter nullified.

III.

Petitioner cannot, by filing *ex parte* documents or statements, supplement the record in this Court or affect the determination of this cause by this Court on the record as made.

It is the position of respondent that the factual bases upon which this case must be determined in this Court are conclusively and finally established by the concurred in findings of the lower courts. Manifestly, whether or not those findings are supported by substantial evidence must be determined upon the record.

Nevertheless, on the argument of this cause, petitioner sought to supplement the record by filing two documents, prepared *ex parte* and long after the decree had been entered in the District Court and affirmed by the Court of Appeals, purporting to set forth certain alleged facts in connection with a flood which occurred on Upper New River in August, 1940. The documents in their complete form were handed to counsel for respondent on the morning of the argument.

Neither the Federal Government nor any other litigant can supplement the record *ex parte* in this Court and thereby undertake to have the rights of an adversary determined without due process of law. These *ex parte* documents manifestly could not be treated as any part of the record upon which this case must be determined in this Court, nor could any of the alleged facts set forth in these documents be given any consideration or weight.

While respondent believes that the *ex parte* document, entitled "Flood Conditions in the New and Kanawha River Valleys", does not support any claim of adverse effect upon the navigable capacity of the Kanawha River (the only navigable water of the United States involved), the alleged facts set forth in the report are grossly erroneous and flatly challenged by the respondent. Had such a document been offered and received in evidence in this cause (and, for the reasons hereinafter stated, it could not have been offered and received as an official document), the alleged facts urged by petitioner would have been fully rebutted and refuted by respondent. Indeed, the true facts would show that the effect of respondent's project was to reduce the crest of the flood on the navigable Kanawha River, although undoubtedly such incidental reductions in flood crest have no substantial beneficial effect upon navigation or navigable capacity.

The District Court found, and the Court of Appeals affirmed the finding, that the effect, if any, of respondent's project upon flood conditions would be beneficial. Obviously, if the power reservoir is partially empty when a flood occurs, the incidental effect is beneficial, but, even if the power reservoir should happen to be full when a flood occurs, the evidence clearly established that there would be no adverse effect upon flood conditions. This is squarely supported by the testimony of Dr. Mead, Consultant on the Boulder Dam Project, Tennessee Valley Authority Project, member of the Engineering Board for Flood Control on the Huai River, China, and at the time President of the American Society of Civil Engineers (R. 1991-2; 1942-52). In petitioner's Ex. 145, the Army Engineers, in considering a system of projects of power development on the tributaries of the Kanawha River stated (H. D. 91, 74th Cong., 1st Sess., p. 73, par. 79):

> "Even if all the reservoirs should be full at the time of a heavy run-off, some reduction in the flood crest height would be obtained due to the large surface areas of the reservoir with consequent accompanying surcharge capacities which would have the effect of augmenting the valley storage over that existing under natural conditions."

Although the Solicitor General upon oral argument, by a slip of the tongue, referred to this document, upon which the ink was hardly dry, as a report of the Chief of Engineers, the alleged report in fact contains no comment or review by the division engineer or by the Chief of Engineers.

It has not gone through the well-established official course essential to give a document of this character status as an official document and involving correction and revision by superior officers. *United States* v. *Arizona,* 295 U. S. 174, 190, footnote 11. Indeed, were a private litigant to attempt to offer such a document in the trial of a cause to which the Government was a party, he would be met with the objection that it is a mere inter-departmental communication, that it is subject to revision and change by superior officers and that it is not an official document or report.

While it would be highly improper to attempt to supplement *ex parte* a record even by an official document (which of course is not conclusive of the rights of parties in the United States courts but is always open to rebuttal), the character of this document only emphasizes the impropriety of the attempt here made.

Since the document plainly cannot be considered here, it would be idle to point out the errors which appear even upon its face. However, it may be noted that the flood peak at Radford, as estimated by the United States Geological Survey, was 185,000 second-feet, while as estimated by the acting district engineer it becomes 214,000 second-feet. Undoubtedly this flood was the largest flood on record on upper New River, but certainly any claim that any damage or interference with navigation, or any impairment of navigable capacity of the Kanawha River, was brought about by operation of respondent's project cannot be sustained. If the petitioner thinks otherwise, it is entirely free to file a new suit under the Rivers and Harbors Act, which is the continuing protection of all navigable waters of the United States. Respondent is entirely confident, both that the petitioner will not choose to bring suit upon the basis of the flimsy and erroneous information set forth in the tendered document and also that, if the petitioner does attempt to bring such a second suit, it will entirely fail on the proof, even assuming that the facts alleged were legally relevant, which we deny.

IV.

The concurrent finding (of non-navigability) of the lower courts is not based upon erroneous legal criteria of navigability.

On oral argument and in its reply brief (Pet. Reply Br. 26-30), petitioner, virtually conceding that the finding of non-navigability by the District Court, affirmed by the Circuit Court of Appeals, is supported by substantial evidence, argued that the lower courts did not give proper weight to certain selected items of recollection testimony because, as petitioner claims, the lower courts applied erroneous criteria of navigability. Petitioner has made no attempt to show that the lower courts erred in adopting, as they did, the definition of navigability enunciated by this Court. Instead, it is clear on analysis that petitioner's criticisms are directed, not to the definition of navigability adopted and applied by the lower courts, but to comments by the lower courts upon the nature of, and weight to be given to, certain recollection testimony urged by petitioner.

Among the lines of testimony under consideration by the lower courts upon the issue of navigability were: (1) physical characteristics, (2) the conditions encountered in the limited federal work, (3) uncontradicted evidence of complete lack of use before the Civil War under conditions which would have compelled the use of any practical water transportation, no matter how difficult, (4) the definite reports of Army Engineers that any use was and had been entirely local, (5) the official reports of the Army Engineers that the river is non-navigable throughout its course, (6) the considered action of Congress, (7) the testimony of expert and scientific witnesses, (8) recollection testimony other than that urged by petitioner and (9) the conduct of the Government as evidenced, for illustration, by the construction of the Bluestone Dam* and by the conditions of the tendered license. All of this evidence negatived navigability.

The District Court after carefully weighing all of the evidence touching the issue, found;

> "From a consideration of all of it [the evidence], the conclusion is reached that New River is not and never has been navigable, either in its natural condition or after the improvements made, except in certain short and isolated stretches to each of which the navigation was local and confined within the limits of a single State; and that it has never been used, and has never been susceptible of use, as an avenue of interstate or foreign commerce." (R. 126).

The Court of Appeals, after independently weighing the evidence, affirmed this finding.

This recollection testimony was offered to show alleged trips or movements of small boats at various places on the river. Both lower courts found that the reports of the Army Engineers, many of them contemporaneously made by Army Engineers in charge of the federal work, are the most reliable evidence of use, or lack of use, in the record and that they plainly establish that neither before, nor during, nor after, the federal work was the river used, or susceptible of use, for interstate commence. (R. 2897; 114, 116-7).

---

* Apropos respondent's statement that, were the stretch navigable, the Bluestone dam would constitute a complete barrier to any navigation between Hinton and Glen Lyn, petitioner states that

> "It is not entirely clear whether this dam will be equipped with a barge-lift" (Pet. Reply Br. 31, footnote)

and cites its attempted showing before the District Court in this cause at the trial of the facts in 1936. Were petitioner fully frank, it would admit that the latest approved drawings of the Bluestone dam, filed with petitioner's bill of particulars in its pending condemnation proceeding, are devoid of any indication of any provision whatsoever, present or future, for the passage of boats past the dam; also that the bill of particulars expressly states: "there being no facilities provided for water transportation."

Moreover, petitioner's contention here that the Bluestone dam will create a slack water pool extending upstream for 36 miles, *"when the dam is full"*, is strikingly naive in view of its contention in the said case in the District Court that the dam is to be for flood control, for its flood storage capacity must, of course, be kept *empty*.

The lower court pointed out that the recollection testimony urged by petitioner has inherent infirmities and is obviously not entitled to the weight to be properly given to contemporary official records; that it was to a considerable extent contradicted or qualified by other recollection testimony; that the testimony was of a character "that the trial judge who sees and hears the witnesses is particularly well qualified to appraise"; and that in any event it had to be weighed by the trial court, and is to be weighed, if at all, by a reviewing court, in the light of all the other pertinent evidence in the case. The lower court then said:

> "But even if the recollection testimony of the witnesses on both sides is viewed as a whole *apart from the other evidence*, we do not think that it showed interstate navigability of the river within the requirements of the judicial decisions above mentioned" (R. 2902).

It was in connection with this independent survey of the recollection testimony, and after both courts had found that the progress reports of the Army Engineers are the most reliable evidence of use or non-use in the record, that the lower courts made the comments of which petitioner complains. The specific contention of the petitioner is that the lower courts gave too little weight to selected items of the recollection testimony offered by petitioner to show alleged movements of small boats (erroneously characterized by petitioner as actual navigation) at various places in the river, because such movements, if they occurred, were (1) difficult, (2) irregular and sporadic and formed no appreciable part of the commerce of the region and (3) had proved unprofitable and had been abandoned (Pet. Reply Br. 27-9). Petitioner's contentions are without substance.

(1) *The lower courts' comment on difficulties of navigation.*

As to the possibility that other than purely local movements of small boats may have occurred, the lower courts noted not only that the testimony was very vague and unsatisfactory but that, if such movements had occurred on occasions, they were among other things difficult. Specifically the Court of Appeals said in substance that, considering the recollection testimony urged by petitioner apart from the other evidence on the issue, such evidence at the most showed that "such trips could be made only at particular times when there was unusually high water; *that even then* navigation was not only difficult but also dangerous" (R. 2903). This was a perfectly proper comment upon the testimony, both as to its weight and as to whether or not it was evidence of navigable capacity within the criteria enunciated by this Court. Where the evidence as a whole establishes practical navigable capacity, the fact that navigation is difficult would not require a finding of non-navigability notwithstanding. But, where the question is whether certain recollection testimony, to be weighed with a mass of evidence contradictory thereof, establishes practical navigable capacity, the fact that the alleged trips, if they occurred, were at high water and even then were difficult and dangerous, not only has a proper bearing upon the weight to be accorded the testimony but also, shows that the testimony actually tends to establish non-navigability within the criteria enunciated by this Court.

This Court has had occasion to point out that the mere "physical possibility of passing by a boat" from one State to another is not sufficient to establish navigability (*Leovy* v. *United States,* 177 U. S. 621, 635). Petitioner assumes that, although difficulties may be so great as to preclude practical usefulness, the mere physical possibility of movement of some kind of boat under any conditions is not merely competent evidence upon, but conclusively establishes, navigability, notwithstanding a mass of other evidence showing that the stream is not susceptible of practical navigation. Decisions of this Court deny such a contention.

(2) *The lower courts' comment that any alleged movement outside of the lower parts of the improved sections above Hinton and Radford was irregular and sporadic and formed no appreciable part of any commerce of the region.*

In commenting upon that part of the recollection testimony urged by petitioner, the lower courts noted that any alleged movements of small boats, outside of the lower parts of the improved sections above Hinton and Radford, were irregular and sporadic and constituted no appreciable part of the commerce of the region (R. 114, 115; 2903). This petitioner asserts was error.

It is, of course, true that, where the evidence as a whole establishes a real capacity for practical usefulness, the mere fact that any past use has been sporadic, or has formed no appreciable part of the commerce of the region, would not negative navigability. Where such circumstances are explained by factors unrelated to the impracticability of use, such as was the case in *United States* v. *Utah*, 283 U. S. 64, they may not even be evidence tending to show non-navigability.

However, under the undisputed facts in this record the situation is quite the reverse. It is uncontroverted that the only alternative means of transportation was wagoning over bad roads at prohibitive cost so as to compel the use of any practical water transportation, no matter how difficult. The undisputed evidence established that, from the settlement of New River Valley in 1744, New River, had it been navigable, was a natural route for large part of the trade and commerce for the region and that the imperative need for some practical route down the New and Kanawha Valleys was continuously recognized, as is abundantly shown by the efforts of the State of Virginia to establish such a route.

Under these circumstances, the fact that even any alleged movement of small boats outside of the lower parts of the improved sections, above Hinton and Radford, was sporadic, and constituted no appreciable part of commerce of the region, manifestly bore upon the weight to be given this nebulous and uncertain testimony, whether considered alone or in connection with the other evidence in the case. Under the undisputed facts, it would be unbelievable either that any use would be sporadic or an inappreciable part of the commerce of the region if in fact the stream had been susceptible of practical use. Thus these circumstances strongly tend, first, to show that such movements, if they occurred, were under unusual and temporary conditions or involved such difficulties as to be impracticable and, second, to deny practical usefulness in interstate commerce.

(3) *Abandonment and unprofitableness.*

Finally, in commenting on this testimony the lower court said:

> "but there was also testimony of non expert witnesses submitted by the defendant to the effect that the attempt to commercially use keel boats was unsuccessful and unprofitable, and in the Radford-Allisonia District was substantially abandoned before the railroad came to Allisonia in 1886" (R. 2903).

Where abandonment or unprofitableness of use is explained by circumstances other than the impracticability of navigation (such as absence of need for water transportation or competition with highly efficient means of land transportation), neither fact establishes non-navigability and under such circumstances may not even constitute evidence of non-navigability. There is nothing in the opinion of either court below to suggest the adoption of any other rule in this respect. However, where, as in the instant case generally —and particularly in the instance to which the lower court referred, the abandonment and unprofitableness of use were explicable only by New River's lack of practical usefulness for navigation, such circumstances had a proper bearing upon the weight to be attributed to the testimony, whether considered separately or in connection with the definite evidence strongly negativing navigability. Indeed, under the circumstances such testimony was compelling evidence of non-navigability.

Theoretical navigability or attempted use without utility is not sufficient. In the case of charcoal and iron boating above Radford, to which the lower court specifically referred, the evidence established that such experimental boating (even though not attempted until after federal work had been done) proved so impracticable that it was soon abandoned, and that the furnaces were compelled to resume the costly wagoning of their iron to market (Resp. App. A. 48-53, 68-75). This was compelling evidence of lack of practical utility.

(4) *Petitioner's contentions erroneous in law.*

As above shown, petitioner's criticisms are unjustifiably directed to perfectly proper comments upon the nature and weight of certain items of testimony urged by petitioner. However, petitioner specifically concedes (Pet. Reply Br. 27) that all of these factors making against navigability were established by the evidence. There is, we submit, no decision of this Court in which a stream has been held navigable where all of these conceded indicia of non-navigability existed. Indeed, there is none where it has been held that any one of these indicia of non-navigability could not properly be weighed and considered in connection with the other evidence upon the issue unless the evidence in the case established that such indicia of non-navigability were explicable by factors unrelated to the impracticability of navigation. In the instant case the record is not merely barren of any such explanation but affirmatively establishes that such indicia are explicable upon no other basis than New River's lack of practical utility for purposes of navigation.

V.

Petitioner's comparison with the Desplaines River.

On oral argument and in its reply brief (6-7), petitioner purports to describe the physical characteristics of the Desplaines River and at least implies that such were its physical characteristics in a state of nature when it bore the extensive and valuable commerce upon the basis of which the Courts found it to have been navigable. (*Economy Light & Power Co.* v. *United States*, 256 U. S. 113.) The courts did not and could not base their determination upon the physical characteristics of the river in a state of nature —the only condition in which it had borne useful commerce.

Long before the hearing the water shed of the Desplaines had been radically changed from its condition in the state of nature. For instance, the drainage area had been reduced from 1428 square miles to 250 square miles, due to the construction of the Illinois & Michigan Canal in 1848 and other radical changes in the congested Chicago area (256 Fed. 792, 797). Its natural flow and even its natural low water profile were unknown. (*Economy* case, Trans. 585.) All of the testimony with regard to flow related to data privately collected during a 20-year period commencing in 1886, long after these radical changes had occurred. Even so U. S. Geological Survey figures (quoted by petitioner in its brief, p. 55, in *Appalachian Electric Power Co.* v. *Smith*) shows that the mean flow of the Desplaines at Joliet from 1922 to 1929 was 650 second feet. It is of course plain that the flow, after the river's drainage area had been reduced from 1428 to less than 250 square miles, was only a fraction of the flow which had prevailed under natural conditions.

Another and most extraordinary change was the actual diversion and shifting of the river itself from its natural channel "to the west and north side of the Valley", in order to "leave a site between the river as thus changed and the Illinois and Michigan Canal for the construction of the drainage canal itself" (id. 797). Petitioner's statement (Pet. Reply Br. 6), that the controlling depths over the rapids and shallows of the Desplaines River were never more than 15 inches, refers to estimated depths (at a few points along the river) which were based on a gauge record kept at Riverside, Illinois, for the same 20-year period (256 Fed. 792, 795) and which of course do not show the condition of the river in its natural location and state during the century and a half of practical use.

The average slope of the Desplaines River is about 2½ feet per mile (256 Fed. 794), which compares with an average slope of 7.1 feet per mile on the New between Wilson Creek and its mouth and 5.5 feet per mile in the 40-mile stretch above Round Bottom, West Virginia. (See Resp. Br., Plate III). The bed and banks of the Desplaines River are soft and quite devoid of rocks and boulders. (*Economy* case, Trans. 639), while the bed and banks of New River consist almost uniformly of series of rock ledges strewn with huge boulders.

Contrary to petitioner's assumption, there was always (with the rare exception of a great Desplaines flood) necessary a portage over the low divide between the Chicago River and the Desplaines River, varying in length due in large part to the condition of the south fork of the Chicago River and of the west branch thereof.

Whatever may have been the natural condition of the Desplaines—which the courts did not know—, the facts were, as this Court found, that that condition had been sufficient to bring into being and sustain substantial commerce for more than 150 years. Petitioner's statement that the Circuit Court of Appeals "found only 14 specific instances of the use of the Desplaines for commercial navigation" (Pet. Reply Br. 7) must be read in connection with the court's statement that, in addition to the specific instances of use, there was evidence of "*very many other* trips" (256 Fed. 797), and that there were

> "*numerous historical references* to the Chicago-Illinois route * * * the fur trade was a *leading*

> *branch* of commerce in the *western world,* and *this trade* was one of the characteristics of the Desplaines River. *Large quantities* of supplies of various kinds needed by the settlers in a new country were also *transported over the Desplaines* during the same period in boats of the size and character then commonly used in river commerce." (id. 798).

Indeed this Court in *The Montello* case, 20 Wall. 430, 440, made reference to this use, stating:

> "Smith, in his history of Wisconsin, says: 'At this time (1718) the three *great avenues from the St. Lawrence to the Mississippi* were, one by the way of the Fox and Wisconsin Rivers, *one by way of Chicago* [which was the Chicago-Desplaines-Illinois River route], and one by the way of the Miami of the lakes * * *'."

And this Court itself noted the fact that the Desplaines had been "of practical service as *a highway of commerce* for a *century and a half.*" (256 U. S. 113, 124).

This extensive use was made of the Desplaines even though it flowed through an open prairie where even in a state of nature land travel, not only by foot and pack train but even by ox cart and wagon, was entirely practicable and indeed easy. In contrast, as regards the New River, the evidence conclusively shows that, although the difficulties of land travel down the New and Kanawha Valleys were of the most severe character, no use whatever was made of the New. The Lake Michigan-Desplaines-Illinois route, on the other hand, had been in practical use from the days of the earliest settlement of the continent.

VI.

Petitioner's criticism of respondent's revision of petitioner's chart is unfounded.

Before replying to petitioner's attempted criticism of respondent's revision of petitioner's chart (Pet. Reply Br., pp. 20-26), we again emphasize that respondent's egregious and indefensible method of purporting to weigh selected items of recollection testimony disregards all conflicting evidence of like character and of a higher order, the concurred in finding of the lower courts that the reports of the Army Engineers are the most reliable evidence upon the subject in the record, the fact that the circumstances of many such alleged trips make them evidence of non-navigability and the concurred in finding of the lower courts on the issue. Moreover, the question is not whether petitioner can find any evidence from which a contra-inference, in its opinion, could be drawn, but whether the concurred in finding of the lower courts is supported by substantial evidence. From that standpoint it is idle to discuss the details of items selected out of one of the numerous lines of testimony touching the issue which are found in the record. Nevertheless we briefly comment upon petitioner's criticism.

(a) *Incorrect use of testimony as actually recorded* (Pet. Reply Br., p. 21). Petitioner's line 2B, based upon the testimony of the witness Calloway, purports to represent the transportation of railroad construction materials from Hinton upstream to Glen Lyn. Contrary to petitioner's assertion (Pet. Reply Br., p. 21), respondent has not eliminated this line but has reduced it to show an indefinite movement from Hinton, first, to reflect the extent of any alleged knowledge of the witness according to his testimony, and, second, to reflect the fact that his testimony is inconsistent with well-known facts. It would also seem that the line might well have been entirely eliminated as hearsay (R. 484). In any event it is quite clear that, assuming the materials were ever loaded on a boat, the witness did not have actual knowledge as to what upstream point or points the alleged transportation actually reached (R. 484-5). Petitioner's witness, A. G. Flannagan, whose assistant this witness (M. V. Calloway) was, made no mention of any such boating (R. 466-70). Calloway testified that these supplies were for the Norfolk and Western Railway and were checked out to its order and delivered in Hinton to a representative of that company (R. 483). Therefore, in view of the testimony of respondent's witness, Osborne (R. 1649 et seq.), it would appear that, if such supplies were taken by river from Hinton at all, they must have been taken to the railroad grading work in West Virginia below Round Bottom. Osborne, who occupied a responsible position with the railroad in connection with all of this construction (see p. 24 *infra*), testified that he neither knew nor heard of anything carried by boat to the railroad work at Glen Lyn (R. 1650-2; 1654-5). It seems quite clear that Calloway knew nothing of the alleged trip except that he claimed to have delivered supplies upon the order of a man who "came there with his auto" in 1883. This 91-year old witness was in fact testifying to a happening some fifty odd years after it was supposed to have occurred; and we think that his testimony indicates that this was not the only "slip of the tongue" made by him.

(b) *Duplication.* (Pet. Reply Br. p. 22) Petitioner's line 3B was eliminated because it plainly duplicated the similar part of petitioner's line 3A. The witness' testimony is more than "arguable justification" for the elimination of this obvious duplication. (R. 218-219, 223). While petitioner's argument, that its witness erroneously testified to having seen sluices, wing walls and artificial channels merely because he was asked a leading question, hardly adds to the weight or credibility of his testimony, the contention is in fact erroneous. Without any suggestion, the witness voluntarily testified, in respect of the whole stretch covered by his testimony and particularly in respect to the falls between Radford and Hinton (R. 220), that there "was a sluice through there"; and when interrogated about the falls of the Narrows subsequently this occurred:

> "Q. You say this sluice is in the middle of that falls?
>
> A. I think so.
>
> Q. Is it pretty well marked?
>
> A. It is supposed to be, there is wing dams on each side of the sluices." (R. 221).

Petitioner's suggestion, that perhaps some works had been placed in the river by the Confederacy and that it might have been these to which the witness referred, is completely refuted by the reports of the Army Engineers. Major Craighill, reporting to the Chief of Engineers in 1872, would have described the existing works, had there been any, rather than to have said:

> "But little has been done by way of improving the river since the time of Moore & Briggs, though an effort is *said* to have been made in that direction by the confederate government during the late war." (R. 2279).

(c) ***Hearsay.*** (Pet. Reply Br. p. 23) Line 2A (also being based upon the testimony of the 91-year old witness Calloway) purports to show a movement of lumber, staves, and tobacco to Hinton from True, West Virginia, located about four miles above Hinton. Contrary to petitioner's assertion, this line has not been eliminated in respondent's revision but merely a symbol has been added to make clear an indefinite movement to Hinton. It could, of course, justifiably have been eliminated as pure hearsay. Petitioner does not deny the testimony was hearsay but contends that the witness' hearsay knowledge of the intended route was the full equivalent of actual observation, *non constat* the movement may never have been started, been diverted, interrupted, or an utter failure. Such testimony is, we submit, clearly inadmissible. (*Ellicott* v. *Pearl,* 10 Pet. 412; 5 *Wigmore,* 3rd Edition, Section 1585). These authorities plainly show that the ruling of the District Court is inapplicable here. The testimony of this witness came in by deposition, it being understood it was objected to (R. 427-8; 482-3); and no specific ruling was made with respect to it. Since there was no jury the trial court allowed "much latitude in the introduction of evidence" (R. 106), rightly judging that it could later determine whether the evidence was entitled to any weight. Even if the testimony had been admissible (which we deny), its hearsay character would obviously have deprived it of any substantial weight.

(d) *Non-commercial items* (Pet. Reply Br. p. 23). Line 4C, as petitioner well knows, was not eliminated because the Government was the owner of the work boats taken from the section above Radford to Hinton for sale upon abandonment of the Government work, but because this movement was a construction maneuver involving physical possibility and not practicability and was not commerce carried on by the customary modes of trade and travel by water. Indeed the record plainly establishes that this movement, apart from its non-commercial character, was in fact evidence of non-navigability. The report of the Resident Army Engineer, praising the man in charge of this maneuver "for the energy and ability displayed in this movement", discloses that "after much difficulty" he, with a force of men, succeeded in floating these boats downstream in twenty-nine days—reflecting a progress of less than 2.7 miles per day (Ex. 39; R. 2401). The movement was in the spring (March and April) and petitioner's witness Owen testified that "the water was high" and "there was a right smart tide" (R. 249; Pet. Br. 51-2). The necessity of engaging in this difficult and laborious maneuver demonstrated that the boats were concededly useless anywhere except immediately at Hinton. The sale of all the Government property realized only $415.26 (R. 2397).

(e) *Testimony inconsistent with other evidence in the case* (Pet. Reply Br. p. 24). Line 6C purported to show boating of railroad supplies for the Norfolk & Western to Shumate's Falls. This testimony was plainly inconsistent with the testimony of Capt. Osborne, a division engineer supervising construction on the New River Railroad Division (of the Norfolk & Western) until the tracks were laid from Radford to a point down near Glen Lyn, at which time he took charge of laying the tracks, building stations and tanks and the like for the company, which work was finally completed on March 10, 1883 (R. 1650-1). Capt. Osborne testified that nothing was shipped up the river to Glen Lyn for the company, and he was in a position to know this. Nor did he observe any such use for the contractors. This is borne out by the testimony of Gerald (R. 1547 et seq.), Hundley (R. 1647-8), and the testimony of the following witnesses who were engaged in wagoning supplies to the contractors: Rufe Spangler (R. 1498); W. H. Spangler (R. 1503); S. L. Buckland (R. 1509-10); H. S. Skeen (R. 341-2). This is all fully shown in respondent's Appendix A, 100-7, with which petitioner does not attempt to deal except to say that it need not be analyzed. Petitioner's assertion that Capt. Osborne's testimony, given with reference to the division extending from Radford to Glen Lyn, dealt with the construction of another railroad, is entirely erroneous. Respondent's reference to R. 1652 is to the grading done by the company below Round Bottom in West Virginia to which some supplies probably were boated from Hinton, W. Va. (See Appendix A, supra) and not to the boating of stone from Pepper's Ferry as petitioner unjustifiably seeks to imply (Pet. Reply Br. 24). The latter was a ferrying operation which, although plainly evidence of non-navigability (Resp. Br. pp. 54-5), had nothing to do with the alleged boating to which line 6C referred.

(f) *Testimony inconsistent with well-known facts* (Pet. Reply Br. p. 25). Line 1A represented an alleged night trip of a family consisting of the witness (then seven or eight years old), two brothers, a sister, the mother and father, from Eggleston Springs, Va., to True, West Va. (R. 458, 459). This alleged night trip would have involved negotiating, among others, The Falls of the Narrows, Shumate's Falls, Wiley's Falls, McDaniel's Falls and Bull Falls, at night by a family with small children. The Court has only to look at the photographs of the first three of these falls in Respondent's Appendix B to judge of the likelihood of such a happening. As to the witness' alleged spontaneous correction of his statement that the trip was made in 1870 (before the witness was born), reference to the reporter's transcript (1079-80) shows that there were six intervening questions and answers before Government counsel led as follows:

> "Q. That was in the year 1879?
> A. Yes sir, spring of the year."

As to the alleged corroboration of this singular testimony, the question is not whether any such extraneous statement can be found in the record but whether the testimony is negatived by facts established by substantial evidence. Moreover, it is strange that the single statement of witness Talbot should be the only such corroboration out of all of the maze of testimony in this case and even that affords no corroboration for the night trip described by the foregoing witness. Talbot testified concerning a boat in an entirely different stretch of the river, about a mile below Radford and 20 miles above Eggleston Springs—the upper or beginning point of the alleged Anderson nocturnal voyage (R. 458; 1541-2).

VII.

Contrary to petitioner's assertion on oral argument, the early engineering reports are consistent with later reports as to non-navigability of New River.

Petitioner's statement in oral argument, that prior to 1925 the War Department was of the opinion that New River was navigable and that not until that year did it hold the view that New River is non-navigable, is clearly contrary to the fact.

First, the various reports of the Chief of Engineers from 1873 to 1882 (Resp. App. A. 57-63) negative petitioner's statement. Those reports show, not that the stream was navigable in its natural condition but, that artificial improvements were necessary if outlets by river were to be provided, that is, that navigability could only be created artificially. Indeed, those reports plainly show that any precarious navigability which may have been temporarily attained, in any parts of the stretches in which federal work was done, depended upon, and was confined within the limits of, the small artificial channel created by the federal work (Resp. Br., pp. 45-6).

Second, various other reports of the War Department, all prior to 1925, likewise belie petitioner's statement. Thus the Report of the Chief of Engineers of 1887 states:

> "As *Congress has never given such a sum of money* as would justify the *proper beginning* of a *connected* project for a *continuous* navigation from the North Carolina border to Hinton, the effort has been to apply such funds as were supplied in *ameliorating* the condition of the river * * *" (Ex. 560, R. 2826).

* * * * * * * *

> "For reasons often mentioned in annual and special reports, *no attempt has been made to give a continuous navigation* of the New River * * *" (Ex. 560, R. 2826).

In a report to the Secretary of War dated July 13, 1911, General W. H. Bixby, Chief of Engineers, stated:

> "*There has been no useful navigation on New River at any time, and none is possible under existing natural conditions, nor without the expenditure of vast* and *prohibitive* sums in improvement work" (Ex. 566, R. 2844).

and General W. W. Black, Chief of Engineers, included the same statement in his report to the Secretary of War of May 19, 1916 (Ex. 566, R. 2844).

Furthermore the Board of Engineers for Rivers and Harbors in 1912 reported:

> "Physical conditions are such that it *could not be improved for useful navigation except at prohibitive cost.* The board, therefore, reports, concurcurring with the views of the district officer and the division engineer, that *it is not advisable for the United States to undertake the improvement of New River from Radford, Va., to Hinton, W. Va.*" (House Doc. 1410, 62nd Cong., 3rd Sess., Ex. 46; R. 2420.)

Thus, contrary to petitioner's statement, there is evidence, in abundance, which shows that the War Department, not merely since 1925 but prior to that time as well, has been of the view that New River is non-navigable.

Respectfully submitted,

Raymond T. Jackson,
M. F. Millikan,
A. Henry Mosle,
Creswell M. Micou,
Fraser M. Horn,
Wendell W. Forbes,
M. W. Belcher, Jr.,
John L. Abbot,
Counsel for Respondent.

October 19, 1940.

FILE COPY

Office - Supreme Court, U. S.
FILED
OCT 7 1940
CHARLES ELMORE CROPLEY
CLERK

In the

Supreme Court of the United States

OCTOBER TERM 1940

NO. 12

UNITED STATES OF AMERICA - - - Petitioner
v.
APPALACHIAN ELECTRIC POWER
COMPANY - - - - - - - - - - Respondent

BRIEF ON BEHALF OF THE COMMONWEALTH OF KENTUCKY, AS AMICUS CURIAE

HUBERT MEREDITH,
Attorney General,
M. B. HOLIFIELD,
Assistant Attorney General.

INDEX.

SUBJECT INDEX.

Page

STATEMENT 1–2

INTEREST OF KENTUCKY 2

THE CONTENTION OF KENTUCKY 3–18

(a) Strained Construction of Commerce Clause Includes Objectives Undreamed of by Constitutional Fathers 3

(b) Those Strained Constructions Are Not Reflected in Early Decisions of the Courts and Contemporary Early History of the Nation 3–5

(c) Justice Marshall Recognized in the Reserved Rights of the States Limitations Antagonistic to Modern Strained Construction of the Commerce Clause 5–8

(d) Madison's Papers Demonstrate the Correctness of Marshall's Contention that Reserved Rights of the States Impose a Limitation on the Commerce Clause 8–11

(e) Madison's Veto of March 3, 1817, Was an Emphatic Recognition of the Absence of Federal Legislative Jurisdiction of Canals, Turnpike Roads, and Internal Improvements of State Waterways 11–13

(f) President Monroe Supported Madison's Construction in a Veto Message and State Paper 13

(g) Even Alexander Hamilton Agreed to Madison's Construction as to Canals 14

Page

(h) Federal Control of Power Dams in Navigable Streams Is Permissible Primarily to Protect Navigation, and Secondarily to Dispose of Surplus Power Necessarily Developed 14–15

(i) Federal License to Create Obstructions Even in Navigable Streams Can Impose Conditions Only That Affect Navigability 16

(j) Excerpts from Speech of Senator Black in the Congressional Record to Protest against Further Encroachment on "the Rapidly Disappearing Rights of the Sovereign States of America." 17–18

CASES CITED.

Frost Trucking Co. v. R. R. Commission, 271 U. S. 583, 593, 90 L. Ed. 1101, 1104 15

Gibbons v. Ogden, 9 Wheat. 1, 6 L. Ed. 23 4

Gibbons v. Ogden, supra, 195, p. 70 L. Ed.; 203, p. 72 L. Ed. 5

Gilman v. Philadelphia, 10 U. S. (3 Wall.) 713, 18 L. Ed. 96 7

Port of Seattle v. Oregon & Washington R. R. Co., 255 U. S. 56, 63, 65 L. Ed. 500, 506 16

Union Bridge Co. v. United States, 204 U. S. 364, 51 L. Ed. 523 15

United States v. Chandler-Dunbar Co., 229 U. S. 53, 57 L. Ed. 1063 15

United States v. Rio Grande Dam & Irrigation Co., 174 U. S. 690, 709, 43 L. Ed. 1136, 1143 16

United States v. River Rouge Improvement Co., 269 U. S. 411, 419, 70 L. Ed. 339, 346 16

Veazie et al. v. Moor, 55 U. S. (14 How.) 568, 574, 14 L. Ed. 545, 548 3

STATUTES CITED

	Page
Acts of Legislature of Virginia, Section 11	4
Constitution (Federal), Clause 17, Section 8, Article I	8

GENERAL PUBLICATIONS CITED.

Address of Senator Black of Alabama, in Congressional Record of 70th Congress, 1st Session, pp. 4536-4538 of Part 4, Volume 69	17
Messages and Papers of the Presidents, Volume 1, page 584—by James D. Richardson	12–13
Papers of James Madison (See House Document 398, 69th Congress, 1st Session, pp. 724-725	9–10
Works of Alexander Hamilton, Volume 3, p. 196, by Henry Cabct Lodge	14

IN THE

Supreme Court of the United States

OCTOBER TERM 1940

NO. 12

UNITED STATES OF AMERICA..*Petitioner*

v.

APPALACHIAN ELECTRIC POWER COMPANY......................*Respondent*

BRIEF ON BEHALF OF THE COMMONWEALTH OF KENTUCKY, AS AMICUS CURIAE

MAY IT PLEASE THE COURT:

Notwithstanding we have joined in the brief filed on behalf of the State of North Carolina, we have decided to file this additional brief on behalf of Kentucky to emphasize a point we deem to be of much importance.

We will not undertake to restate this case—that has been done in a manner so complete by General McMullan of North Carolina that an additional statement by us would constitute an unnecessary repetition. As to the factual aspects of the case, all the facts were before the Federal

District Court and its decision was adverse to the contention of petitioners; and the Circuit Court of Appeals, Fourth Circuit, has reviewed the evidence before the lower court and by a majority opinion sustains the findings of that court. Therefore we are assuming that New River is not a navigable stream in fact, and that the construction of the project proposed will not affect adversely the navigability of the Kanawha River into which New River flows.

INTEREST OF KENTUCKY

The purpose of this brief is to protest against the assumption by the Federal Power Commission of jurisdiction over non-navigable streams and its attempt, upon the pretext that the interests of interstate commerce are affected, to bar persons from developing water power in and upon such streams without first procuring licenses so to do from said Commission and against the imposing of conditions in said licenses. All of such assumed jurisdiction and powers are in conflict with the reserved powers of the states that are specifically protected by Amendments 9 and 10 to the Federal Constitution. We think the assumption of such jurisdiction and powers by the Federal Congress and its Commissions have been encouraged (a) by an influence that seeks to abolish all the rights of the states, and (b) failure of the states to resist the usurpation by Federal Bureaus and Commissions of the reserved rights of the states. Such failure of the individual states, to resist the encroachment upon their powers, has resulted in the bench and bar losing sight of the fundamental principles upon which our Federal Constitution rests and has encouraged a torturing from clause three, section eight, of Article one of the Federal Constitution, a construction that was not intended by the 1787 Convention which promulgated that instrument or the conventions of the different states that ratified it.

THE CONTENTION OF KENTUCKY

(a) Strained Construction of Commerce Clause Includes Objectives Undreamed of by Constitutional Fathers.

The State of Kentucky contends that the Commerce Clause of the Constitution already has been strained and stretched to such an extent as to make it cover numerous matters not contemplated by its framers and which, had they been expressly included, would have been insurmountable barriers to its ratification by the States; also that the further stretching here being attempted by the Government, in its endeavor to make that clause the vehicle for giving it jurisdiction over water power projects on non-navigable streams, is even more unreasonable and involves distorting beyond recognition both the language and the intent of the Commerce Clause.

(b) Those Strained Constructions Are Not Reflected in Early Decisions of the Courts and Contemporary Early History of the Nation.

Contemporary history and the early decisions of this Court make it clear that, at the time of the adoption of the Constitution, there was little or no thought that, under its power to regulate *commerce,* Congress would have power to regulate *transportation* (whether on water or on land), as distinguished from the regulation of, or removal of barriers to, the doing of business; and definitely there was no thought that Congress would have the power to construct or provide *means of transportation.* In fact, Mr. Justice Daniel in the case of *Veazie et al.* v. *Moor,* 55 U. S. (14 How.) 568, 574, 14 L. Ed. 545, 548, in speaking for the Supreme Court of the United States, and in discussing the Commerce Clause, said:

> "*The design and object of that power, as evinced* in the history of the Constitution, *was to establish a perfect equality amongst the several States as to commercial rights, and to prevent unjust and invidious dis-*

tinctions, which local jealousies or local and partial interests might be disposed to introduce and maintain." (Emphasis ours)

As is well pointed out in the brief (page 8) submitted herein on behalf of the States of North Carolina et al., *amici curiae,* it was not until 1824, in *Gibbons* v. *Ogden,* 9 Wheat. 1,—6 L. Ed. 23—that this Court first held to the effect that the power of Congress to regulate commerce includes the power to regulate transportation by water; That at the time of the adoption of the Constitution, and in particular the Commerce Clause, it was not assumed that the Federal power under that clause reached out to include navigation, or at least did not reach out to include Federal authority with respect to interstate transportation on streams admittedly navigable in intrastate commerce, is shown by the terms of the so-called Virginia compact, whereby the Legislature of Virginia consented that the district of Kentucky, lying within the boundaries of Virginia, should be admitted as a state of the Federal Union.

Section 11 of the relevant Acts of the Legislature of Virginia prescribes as follows:

> ". . . that the use and navigation of the river Ohio, so far as the territory of the proposed State, or the territory which shall remain within the limits of this Commonwealth lies thereon, shall be free and common to the citizens of the United States, and the respective jurisdictions of this Commonwealth, and of the proposed State, on the river as aforesaid, shall be concurrent only with the States which may possess the opposite shores of the said river." Kentucky Statutes Carroll's 1903 Edition, page 44.

This Act was adopted December 18, 1789, and when it was received by the Federal Congress the latter passed an Act admitting Kentucky as a State on February 4, 1791, which

Act became effective June 1, 1792. The Constitution of the United States had been promulgated September 17, 1787, and had been ratified by the Commonwealth of Virginia June 6, 1788. Thus, the Virginia compact was adopted in less than seven months after that State had ratified the Constitution of the United States. Every provision of the Constitution, and especially the Commerce Clause, had been discussed in every county of Virginia. No one can read Section 11 of the compact without reaching the conclusion that Virginia did not consider it wise to agree to Kentucky's becoming a sovereign State until she had secured an agreement binding on Kentucky that the navigation of the Ohio River, lying within northern boundary of Kentucky, should be free to the citizens of Virginia and to all the citizens of the United States. Surely Virginia would not have considered such an agreement necessary if it had been understood at that time that the Federal Government under the Commerce Clause was entrusted with the control, regulation, and protection of all of the navigation of the Ohio River.

(c) Justice Marshall Recognized in the Reserved Rights of the States Limitations Antagonistic to Modern Strained Construction of the Commerce Clause.

Chief Justice Marshall, the ablest contender for increased powers by the Federal Government that ever was a member of the Supreme Court, in *Gibbons* v. *Ogden*, supra, 195, on page 70 of the Law Edition, stated in terms consistent with the foregoing the intent and purpose of the Commerce Clause and gave an illustration which, so we think, indicated what in his view was the furthest limit of the powers of Congress embraced in the commerce clause, when he said:

> *"The completely internal commerce of a state, then, may be considered as reserved for the state itself.*

> "But, in regulating commerce with foreign nations, the power of Congress does not stop at the jurisdictional lines of the several states. It would be a very useless power if it could not pass those lines. The commerce of the United States with foreign nations, is that of the whole United States. Every district has a right to participate in it. *The deep streams which penetrate our country in every direction, pass through the interior of almost every state in the Union, and furnish the means of exercising this right.* If Congress has the power to regulate it, that power must be exercised whenever the subject exists. If it exists within the states, *if a foreign voyage may commence or terminate at a port within a state, then the power of Congress may be exercised within a state.*" (Emphasis ours)

and further on in the opinion (203, on page 72 of the Law Edition) he said:

> *"The objects of inspection laws, is to improve the quality of articles produced by the labor of the country; to fit them for exportation; or, it may be, for domestic use. They act upon the subject before it becomes an article of foreign commerce, or of commerce among the states, and prepare it for that purpose.* They form a portion of that immense mass of legislation *which embraces everything within the territory of a state not surrendered to the general government;* all which can be most advantageously exercised by the states themselves. *Inspection laws, quarantine laws, health laws of every description, as well as laws for regulating the internal commerce of a state, and those which respect turnpike-roads, ferries, &c., are components parts of this mass.*
>
> *"No direct general power over these objects is granted to Congress; and, consequently, they remain subject to state legislation."* (Emphasis ours)

To be sure, later in *Gilman* v. *Philadelphia*, 10 U. S. (3 Wall.) 713, 18 L. Ed. 96, it was held by this Court that under the commerce clause Congress has the power to protect the waters over which interstate navigation takes place. But certainly Chief Justice Marshall, who was never known to yield a power granted to the Federal Government or to cast a shadow upon its legal right to exercise any power granted, did not contend that under the Commerce Clause there was granted to the Federal Government any power to itself provide methods of transportation, e.g., to purchase lands for or to construct turnpike roads or canals. Justice Marshall, of course, knew the history of the convention that promulgated our Constitution and of the conventions of the different states that ratified that instrument. He was raised on an adjoining plantation to that of General George Washington, and he and his father, Thomas Marshall, were members of the Convention of Virginia called to ratify or reject that Constitution, and as an active member of that convention was a valuable aid to the Honorable James Madison who led the delegates who favored and secured its ratification. But the fact that he was an ardent federalist and a fervent nationalist did not deter him from frankly and clearly stating the limitations on the commerce clause embraced in the reserved rights of the states. It is refreshing to read in this opinion (*Gibbons* v. *Ogden*, one of our legal classics) the concession that the states retained and could exercise powers for "regulating the internal commerce," such as "those laws which respect turnpike-roads, ferries &c. . . ." (*supra*, 203 L. Ed. 72).

He did not strain the Commerce Clause even in the matters of navigation. He only gave the Federal Congress power to regulate transportation on "deep streams" "if a foreign voyage may commence or terminate within a state."

One cannot read Section 8 of Article I of the Federal Constitution without realizing the difference between the viewpoint and conclusions of the great Chief Justice and the contentions made by the Government in the present case.

It is clear that the Federal power, to regulate interstate commerce, is implemented in the Constitution with all authority necessary to enable Congress to accomplish that purpose, but it is equally clear from both the language of the Constitution and also contemporary history that it was intended to exclude any power even to purchase of lands for constructing or providing means of transportation, such as turnpikes or canals, let alone any power actually to construct such roads or canals. To be sure, these powers, both as regards acquisition of the requisite lands and the construction of roads or canals by the Federal Government, appear in later years to have been sanctioned in practice and in the decisions of this Court. However, the point we wish to make here is that such sanctioning is despite, and not because of, the original intention as to the scope of the commerce clause, and that because of this fact it is in our view appropriate to pause carefully before sanctioning further claimed extensions of Federal authority under the commerce clause.

(d) Madison's Papers Demonstrate the Correctness of Marshall's Contention that Reserved Rights of the States Impose a Limitation on the Commerce Clause.

To illustrate what we say concerning the original intention, that there should be no Federal right to construct turnpikes or canals, let us note that clause 17, Section 8, Article I, of the Constitution reads:

> "To exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular States and the acceptance of Congress, become the seat of the Government of the United States, and to exercise like authority over all places *purchased by the consent of the legis-*

> *lature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings;"* (Emphasis ours)

It is impressive that power to purchase land "by the consent of the legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings" is expressly included but that there is no similar inclusion of power to purchase land for turnpike-roads or canals.

An illuminating bit of history in this connection is found in Volume III, page 1576, of "The Papers of James Madison", by Henry D. Gilpin, published at Mobile by Allston Mygatt in 1842, (See House Doc. 398, 69th Congress, 1st Session, pp. 724-5), where it is stated that the following proceedings occurred on Friday, September 14, 1787, in the Federal Constitutional Convention:

> "DOCTOR FRANKLIN moved to add, after the words, 'postroads,' Article 1, Sect. 8, a power '*to* provide for cutting canals where deemed necessary.'
>
> "MR. WILSON seconded the motion.
>
> "MR. SHERMAN objected. *The expense* in such cases will fall *on the United States,* and *the benefit accrue to the places where the canals may be cut.*
>
> "MR. WILSON. Instead of being an expense to the United States, *they may be made a source of revenue.*
>
> "MR. MADISON suggested an enlargement of the motion, into a power '*to grant charters of incorporation where the interest of the United States might require,* and *the legislative provisions of individual states may be incompetent.* His primary object was, however, *to secure an easy communication between the States, which the free intercourse now to be opened seemed to call for. The political obstacles being removed, a removal of the natural ones as far as possible ought to follow.*

"MR. RANDOLPH seconded the proposition.

"MR. KING thought the power unnecessary.

"MR. WILSON. *It is necessary to prevent a State from obstructing the general welfare.*

"MR. KING. The States will be prejudiced and divided into parties by it. In Philadelphia and New York, it will be referred to the establishment of a bank, which has been a subject of contention in those cities. In other places it will be referred to mercantile monopolies.

"MR. WILSON mentioned *the importance of facilitating by canals the communication with the Western settlements.* As to banks, he did not think with Mr. King, that the power in that point of view would excite the prejudices and parties apprehended. *As to mercantile monopolies, they are already included in the power to regulate trade.*

"COLONEL MASON *was for limiting the power to the single case of canals.* He was afraid of monopolies of every sort, which he did not think were by any means already implied by the Constitution, as supposed by Mr. Wilson.

"*The motion being so modified as to admit a distinct question specifying and limited to the case of canals.*

"Pennsylvania, Virginia, Georgia, aye,—3; New Hampshire, Massachusetts, Connecticut, New Jersey, Delaware, Maryland, North Carolina, South Carolina, no,—8.

"*The other part fell of course, as including the power rejected.*"

(Emphasis ours)

The Honorable James Madison being an ardent Nationalist recognized that in the adoption of the Commerce Clause "the political obstacles being removed, a removal of the natural ones as far as possible was in order." It was his opinion and evidently the opinion of the convention, because no one challenged his statement, that in adopting the Commerce Clause the convention had only removed the political obstruction that barred the free flow of commerce between the several States and between each of them and foreign nations and Indian tribes. No steam railroad existed in the world at that time. They were an undreamed-of possibility. Madison regarded waterways as the main arteries of commerce. He was endeavoring to remove physical obstructions to commerce in the same way that they had removed political obstructions by increasing the powers of Congress. *But the convention was not of his mind.* Its members were willing to remove political obstructions to commerce but by *an overwhelming majority refused to give the Federal Government the power to construct canals and thus remove physical barriers.* (Of course, the refusal to grant the power to construct canals generally includes the refusal to permit Congress to "canalize" non-navigable streams.)

(e) Madison's Veto of March 3, 1817, Was an Emphatic Recognition of the Absence of Federal Legislative Jurisdiction of Canals, Turnpike Roads, and Internal Improvements of State Waterways.

When we review the repeated rejection by the Constitutional Convention of a grant of power to Congress to construct roads and canals, a sample of which we have above quoted from "Madison's Papers," we begin to understand the last official act of this great President: A bill was presented to him entitled—"An Act to set apart and pledge certain funds for internal improvement," which bill specifically provided "for constructing roads and canals and improving the navigation of water courses in order to facilitate, promote and give security to internal commerce among the several States, and to render more easy and less expensive the means and provisions for the common defense." Madison, as a member of the Constitutional Convention, had repeatedly advocated the granting to Congress of the power to do each and every thing this bill undertook to accomplish. More than any other member of the convention he set forth reasons why thes powers should be granted.

But he could not forget that in each instance his plea had been denied. He was in favor of the democratic principle of permitting the majority to rule. He did not believe in that fine art generally described as "writing around the Constitution." Hence on March 3, 1817, as his last official act he vetoed this bill and in doing so, wrote:

> " '*The power to regulate commerce among the several States' can not include a power to construct roads and canals, and to improve the navigation of water courses in order to facilitate, promote, and secure such a commerce without a latitude of construction departing from the ordinary import of the terms strengthened by the known inconveniences which doubtless led to the grant of this remedial power to Congress.*
>
> "To refer the power in question to the clause 'to provide for the common defense and general welfare' would be contrary to the established and consistent rules of interpretation, as rendering the special and careful enumeration of powers which follow the clause nugatory and improper. Such a view of the Constitution would have the effect of giving to Congress a general power of legislation instead of the defined and limited one hitherto understood to belong to them, the terms 'common defense and general welfare' embracing every object and act within the purview of a legislative trust. It would have the effect of subjecting both the Constitution and laws of the several States in all cases not specifically exempted to be superseded by laws of Congress, it being expressly declared 'that the Constitution of the United States and laws made in pursuance thereof shall be the supreme law of the land, and the judges of every State shall be bound thereby, anything in the Constitution

or laws of any State to the contrary notwithstanding.' *Such a view of the Constitution, finally, would have the effect of excluding the judicial authority of the United States from its participation in guarding the boundary between the legislative powers of the General and the State Governments, inasmuch as questions relating to the general welfare, being questions of policy and expediency, are unsusceptible of judicial cognizance and decision.*"

Messages and Papers of the Presidents, Volume 1, page 584—by James D. Richardson.

From further reading of this message one will observe that President Madison was still of the opinion that power should be given Congress to make the improvements provided in the bill. However, consistent with his strong conviction that what he considered to be a worthy object should not be accomplished by stretching of the commerce clause, he closed his veto message with a suggestion that those powers should be granted by *Constitutional Amendment.*

(f) President Monroe Supported Madison's Construction in a Veto Message and State Paper.

By examining Volume II, page 142, of Messages and Papers of the Presidents, one will discover that President James Monroe vetoed a bill similar to the one above set forth. He too was of the opinion that Congress should be granted the power to enact such legislation and wrote a state paper (Vol. II, page 144) *advocating such an amendment to the Constitution.* While President Monroe was not a member of the Constitutional Convention at Philadelphia, it should be remembered that he was a member of the session of Congress, under the Articles of Confederation, that sat at the city of New York at the same time the Constitutional Convention was in session and during the time was in constant correspondence with Mr. Madison concerning the provisions embodied in the Constitution.

(g) Even Alexander Hamilton Agreed to Madison's Construction as to Canals.

Even Alexander Hamilton had a like point of view. No delegate that attended the Constitutional Convention labored more earnestly to create a strong national government for the United States than did he. There was a great difference between him and James Madison: Hamilton had no faith in the vox populi—he even had a contempt for majorities when they opposed the objectives he sought to accomplish. Madison was equally anxious to establish a strong national government, but had a profound respect for the rule of the majority; he would present every argument within his power to secure the granting of what he believed to be a necessary power, but when a majority of the convention rejected his argument and withheld from the Federal Government the power he wished to grant, he respected and stood by the decision of the majority. Hamilton was the most artful and successful liberal constructionist of the Federal Constitution of his day and age, and his constructon always enlarged the powers granted and often added powers withheld. However, in his famous opinion as to the constitutionality of the Bank of the United States of date February 23, 1791, he admitted that there is:

> *". . . nothing in any part of the Constitution respecting the regulation of canals."*
>
> Works of Alexander Hamilton, Volume 3, page 196, by Henry Cabot Lodge.

Of course Hamilton and Madison actually *knew* the intent and purposes of the Constitutional Convention.

(h) Federal Control of Power Dams in Navigable Streams Is Permissible Primarily to Protect Navigation, and Secondarily to Dispose of Surplus Power Necessarily Developed.

We trust that in the foregoing we have made clear that whatever may be the present status in practice or in law, the intention of those who wrote the commerce clause into the Constitution and of the early interpreters of that clause was that the Federal Government should have no right to provide or construct transportation facilities such as turnpikes or canals. And, of course, they had not the remotest intention of granting to the Federal Government directly or by implication any authority to construct dams, or to regulate the dams of the States or their citizens, on non-navigable streams. We submit that there was no such conception even as regards navigable streams. We, of course, today do not contend that the Federal Government has no control over dams on navigable streams, but recognize that under the holdings of this Court dams in navigable streams may be regulated for the protection of navigation, and to that end may even be absolutely prohibited (*Union Bridge Co.* v. *United States*, 204 U.S. 364, 51 L. Ed. 523; *United States* v. *Chandler-Dunbar Co.*, 229 U.S. 53, 57 L. Ed. 1063).

(i) Federal License to Create Obstructions Even in Navigable Streams Can Impose Conditions Only that Affect Navigability.

However, we disagree with the Government's contention as to the powers which it claims accrue to it by reason of its right to prohibit obstructions to navigable streams. It is our view that the federal right to prohibit an obstruction to a navigable stream does not carry with it the right to permit the obstruction on such conditions (unrelated to the protection of navigation—as is true of many of the license conditions required by the Power Commission) as the Federal Government may choose to impose (*Frost Trucking Co.* v. *R. R. Commission*, 271 U.S. 583, 593, 70 L. Ed. 1101, 1104). Instead, it is our view that the only conditions that the Federal Government may lawfully impose, in the case of a structure erected in a navigable stream, are those which relate to the protection of navigation. (*Port of Seattle* v. *Oregon & Washington R.R. Co.*, 255 U.S. 56, 63, 65 L. Ed. 500, 506; *United States* v. *River Rouge Improvement Co.*, 269 U.S. 411, 419, 70 L. Ed. 339, 346.)

As regards regulation of dams on non-navigable streams, it is clear that the right of the Federal Government is limited to restraining acts on the non-navigable streams which substantially interfere with navigation on waters navigable in interstate commerce. (*United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 709, 43 L. Ed 1136, 1143.)

In the present case, however, the Government is asking this Court to stretch the Commerce Clause beyond established limits, whether for non-navigable or navigable streams. We submit that such a process of stretching the Commerce Clause further and further beyond the intention at the time the Constitution was written and adopted can lead only to nullification of the States' rights which were so clearly reserved. And in our view, respectfully submitted, *the time to stop* such further attempts to stretch *is now.*

We are not opposed to progress. We are in hearty agreement with the opinion of this Court in the case of *United States* v. *Chandler-Dunbar Co.*, *supra,* holding that, where a river is navigable in fact and where it is necessary to construct a dam therein to maintain or improve that existing navigability, it has a perfect right to sell the surplus power or energy. But we are opposed to the Federal Government, or any of its Commissions, directly or indirectly, through a license system or otherwise, confiscating the rights and property owned by the several states, or their riparian owners, on either navigable or non-navigable streams within the states.

(j) **Excerpts from Speech of Senator Black in the Congressional Record in Protest Against further Encroachment on "the Rapidly Disappearing Rights of the Sovereign States of America."**

In the preparation of this brief we have reviewed much that is contained on the subject in the Congressional Record but have found nothing which impresses us as being more apt on the subject than an address delivered by Senator Black of Alabama. Said address, which can be found on pages 4536–4538 of Part 4, Volume 69, Congressional Record of 70th Congress, 1st Session, could be read with much interest in connection with our brief, but the following excerpt on page 4537 of the Record so accurately represents the attitude of Kentucky that we take the liberty of quoting it with emphasis as follows:

> "The basic proposition is that since the days of the early settlement of this country, when a man went to the banks of a running stream *and established a little mill run by water power that power was his.* He could not be disturbed by judicial or legislative decree to extend that power over certain territory where commerce did not naturally carry it. The waters of the Tennessee at Muscle Shoals is a part of the interior of the State of Alabama, as the waters of any stream which flows through any of the Western States is a part of one of those states. When an attempt is made to take the power which flows through any stream, *when the Government never has had any right to manufacture power, a right which is subservient to the State under the Supreme Court opinion, and say, 'We will distribute it to the various States by legislative mandate,' we are doing exactly what the Senator from Mississippi (Mr. Harrison) said he did not believe in. We are invading the rights of the State and making of it a conquered province, the like of which has not been seen since the days of slavery in the provinces that were under the subjection of the Roman yoke.*

What is the State? Has it no right at all? *It can not get any taxes under this plan. Somebody has to pay the taxes. Where should the taxes come from? If they do not come from industry, where will they come from?* They will have to come from the poor, hard-working, overburdened farmer. Yet we are told that any person or corporation or government that is big enough may come into the State of Alabama and put its hands on what is justly ours and take from us the right to collect taxes and rob the State of Alabama of the last right *which has been left it under the rapidly disappearing rights of the sovereign States of America.*" (Emphasis ours)

We believe that this Court will preserve to the states their reserved rights, and, believing this, we file this brief as amicus curiae.

Respectfully submitted,

COMMONWEALTH OF KENTUCKY

HUBERT MEREDITH
Attorney General

By ______________________
M. B. HOLIFIELD
Assistant Attorney General

FILE COPY

Office - Supreme Court, U. S.
FILED
OCT 10 1940
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

October Term, 1940

No. 12

UNITED STATES OF AMERICA, *Petitioner*,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

BRIEF OF THE STATE OF WEST VIRGINIA, AMICUS CURIAE

Clarence W. Meadows,
Attorney General of West Virginia.

JARRETT PRINTING COMPANY, CHARLESTON, W. VA.

SUBJECT INDEX

PAGE

Preliminary Statement ---------------------------- 1

The Contentions of Petitioner -------------------- 6

The Interests of West Virginia -------------------- 6

The Findings and Opinions of the Courts Below ---- 7

Non-Navigability of New River -------------------- 9

Definition of Navigable Waters -------------- 10

The Actual Condition ------------------------ 12

Actions of the State of West Virginia ------------ 13

West Virginia's Position Regarding Federal Jurisdiction Under Power Act ---------------------- 15

Extent of Federal Jurisdiction Over Projects on Navigable Streams ---------------------- 16

Extent of Federal Jurisdiction Over Projects on Non-Navigable Streams ------------------ 19

Conditions of Standard Form License -------- 23

Profound Importance of the Questions in this Case with Respect to the States' Control and Management of Their Own Internal Affairs -- 29

Conclusion ------------------------------------ 31

CASES CITED

Page

Alabama Power Co. *v.* Gulf Power Co., 283 Fed. 606, 613 19

Alabama Power Co. *v.* V. Ickes, 302 U. S. 464, 477 9

Ashwander *v.* Tennessee Valley Authority, 297 U. S. 288, 340 19

Brewer-Elliott Oil and Gas Co. *v.* United States, 260 U. S. 77 8

Daniel Ball, The, 10 Wall. 557 9, 10

First Employers Liability Cases, 207 U. S. 463, 502 19

Frost Trucking Co. *v.* Railroad Commission, 271 U. S. 583, 593 19

General Pictures Co. *v.* Electric Co., 304 U. S. 175, 178 8

Head *v.* Amoskeag Co., 113 U. S. 9 22

Huston Oil Co. *v.* Goodrich, 245 U. S. 440, 441 8

Kansas *v.* Colorado, 206 U. S. 46, 94 21

Leovy *v.* United States, 177 U. S. 621, 633; 44 L. Ed. 914, 920 10

Linder *v.* United States, 268 U. S. 5, 17 19

Luxton *v.* North River Bridge Co., 153 U. S. 525 26

Martin *v.* Waddell, 16 Peters 410 16

Missouri *v.* Union Electric Light & Power Co., 42 F. (2d) 692, 53 F. (2d) 1080 26

National Labor Relations Board *v.* Jones & Laughlin Steel Corp., 301 U. S. 1, 31-32 9

pp. 36-37 26

PAGE

Oklahoma *v.* Texas, 258 U. S. 574 ---- 10

Pollard, Lessee, *v.* Hagan, 3 How. 212, 229 ---- 16

Port of Seattle *v.* Oregon etc. Co., 255 U. S. 56 ---- 17

Schechter Corp. *v.* United States, 295 U. S. 495, 546 ---- 26

Texas *v.* White, 7 Wall. 700, 725 ---- 31

United States *v.* Appalachian Electric Power Co., 23 Fed. Supp. 83, 98-99 ---- 9

United States *v.* Appalachian Electric Power Co., 107 Fed. (2d) 769, 793 ---- 15
  at 780 ---- 9

United States *v.* Butler, 297 U. S. 1 ---- 19

United States *v.* Chicago etc., Railroad Co., 282 U. S. 311, 324 ---- 19

United States *v.* Commercial Credit Co., 286 U. S. 63, 67 ---- 8

United States *v.* Cress, 243 U. S. 316, 322; 61 L. Ed. 746, 751 ---- 11, 20

United States *v.* Doughton, 62 F. (2d) 936, 940 ---- 10

United States *v.* Electro-Metallurgical Co., et al., (In Equity No. 3398) ---- 14

United States *v.* Rio Grande Dam & Irrigation Co., 174 U. S. 690 ---- 20, 21
  at 703 ---- 22

United States *v.* River Rouge Co., 269 U. S. 411, 419 ---- 19

United States *v.* Utah, 283 U. S. 64 ---- 11

United States *v.* West Virginia et al., 295 U. S. 463, 469 ---- 3

Wisconsin *v.* Illinois, 278 U. S. 367, 415 ---- 19

WEST VIRGINIA STATUTES CITED

Page

Acts of the Legislature, 1913, Chapter 11 ---------- 4

Acts of the Legislature, 1915, Chapter 17 ---------- 4, 5

Acts of the Legislature, 1933, Chapter 115 ---------- 3

FEDERAL STATUTES CITED

Federal Water Power Act and as amended by Federal Power Act of 1935 ---------- 6, 10, 15, 19, 23

  Sec. 3 ---------- 10, 25

  Secs. 4 (e) and 23 (b) ---------- 28

  Sec. 7 (a) ---------- 28

  Sec. 10 (a) ---------- 23

  Sec. 10 (c), (d), (e) and (f) ---------- 24

  Secs. 14, 15 ---------- 24

  Sec. 14 ---------- 25, 28

  Secs. 19-21 ---------- 25

REPORTS CITED

10 Annual Report, Federal Power Commission 153 2

11 Annual Report, Federal Power Commission 124 2

Public Utility Reports, 1929-B, pp. 215, 218 ---------- 3

IN THE

Supreme Court of the United States

October Term, 1940

No. 12

UNITED STATES OF AMERICA, *Petitioner*,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

BRIEF OF THE STATE OF WEST VIRGINIA, AMICUS CURIAE

PRELIMINARY STATEMENT

This suit involves specifically the question whether jurisdiction over the development of the water power (and perhaps other) resources of New River shall remain with the States in which that stream is situated or shall, against the will of those States, be transferred to the Federal Government. Nevertheless there is at stake the broad principle of whether States shall continue to exercise jurisdiction to determine when, how, and by what means all their natural internal resources shall be developed for their own best interests and for the best interests of their people. New River is in part situated within the boundaries of West Virginia and the vital interest of this State, both in the specific question involved and in the broad principle at issue, is hardly subject to exaggeration.

It had never occurred to the State of West Virginia and its officials that there ever could be challenge of the full and complete sovereign power to regulate the development of the water power resources of New River and other State waters in such manner, short of interference with interstate navigable waters, as it deems for the best interests of the State and its people. However, in 1931 it came to the attention of the State that the Federal Power Commission was asserting jurisdiction to determine whether, and if so on what conditions, the water power resources inherent in New River could be developed and was asserting that such water power resources could not be developed under the license and jurisdiction of the States within which the river is situated but only under a license issued by the Commission in complete disregard of State power and State policy. From the time when this controversy was created by such contention of the Federal Power Commission up to the present, the position of the State of West Virginia has been clear and unwavering, both upon questions of jurisdiction and upon the factual issues which underlie them. For example, the State, through its Governor, protested against the Federal Power Commission taking jurisdiction of the Radford project (10 Annual Report F. P. C. 153) and, by the attorney for the West Virginia Public Service Commission, appeared in opposition to that jurisdiction at the public hearing held by the Federal Power Commission on February 16-17, 1931 (11 Annual Report F. P. C. 124).

By reason of the State's asserting

> "a right superior to that of the United States to license the use of the New and Kanawha Rivers for the production and sale of hydroelectric power."

and denying

> "the right of the Federal Power Commission to require a license for the construction and operation of the Hawks Nest Project [located on the river below Hinton] by the corporate defendants"

and asserting

> "that in so far as the Federal Water Power Act purports to confer upon the Federal Power Commission authority to license the project or to control the use of the river by the corporate defendants, the act is an invasion of the sovereign rights of the state and a violation of the Constitution of the United States."

the United States, by an original bill filed January 14, 1935, sought (albeit unsuccessully) to bring suit against the State of West Virginia in this Court. *United States v. West Virginia et al.,* 295 U. S. 463, 469.

The State of West Virginia has, through its legislature and Public Service Commission, exercised jurisdiction over water power development on the New River and has done so to the exclusion of the Federal Government (Chapter 115, Acts 1933, Reg. Sess.; P. U. R. 1929-B, pp. 215-18).

The State of West Virginia appeared as *amicus curiae* in this suit in the District Court of the United States for the Western District of Virginia and similarly appeared in the Circuit Court of Appeals for the Fourth Circuit when the appeal was before that Court.

The course of this controversy and the facts involved are fully detailed in the opinion of the District Court and have been dealt with at length by the majority opinion of the Circuit Court of Appeals, so that here only some of the pertinent matters which demonstrate how vital the outcome of this litigation is to the interests of the State of West Virginia will be referred to and discussed.

The State of West Virginia includes within its boundaries a large area in the higher altitudes of the Alleghany Mountains which is the source of numerous non-navigable streams flowing into the Kanawha, Ohio, Monongahela and Potomac Rivers, and because of the precipitous nature of the country which they traverse many of such streams have a rapid fall capable of producing extensive water power. Accordingly there are within the boundaries of the State water powers in numerous streams including the New River which are largely undeveloped at this time and are of great value to the State and its citizens.

The State of West Virginia has fostered a policy promoting and encouraging the development of the hydroelectric energy latent in its streams. As far back as February 21, 1913, an Act was passed by the Legislature of West Virginia, for the purpose of providing for the development of water power, which declared that:

> "All water streams within the state capable of generating electrical or other energy or power shall be under the control and supervision of the state",

subject only to the rights of the riparian owners (Acts 1913, Chapter 11). This Act was amended and reenacted by the Water Power Act of 1915 (Acts 1915, Chapter 17). A subsequent water power act enacted by the Legislature of West Virginia in 1929, although declared constitutionally void by reason of a technical defect in the prescribed administrative procedure, nevertheless set forth the same policies on the part of the State.

The West Virginia Power Act of 1915 above referred to authorized the production and sale of hydroelectric or other power by domestic corporations only; defined and regulated the powers, rights, duties and obligations of such companies under permits to be issued by the State for a period not to exceed fifty years; provided for the reversion after such period to the State and the people thereof of all rights and powers under such permits; provided for the purchase of the project by the State on the payment of the value of the improvements; and provided for the payment of certain annual royalties to the State. The Act further provided for the regulation by the State of the building, maintenance and operation of dams across its [water] streams and of all structures, works and property used in connection therewith and the regulation of accounting practices, of rates charged for electricity and of security issues. This Act expressly asserted the sovereign authority of the State over all such streams.

The New River rises in the mountains of northwestern North Carolina and enters Virginia at her southern boundary. It then flows through the State of Virginia, a distance of approximately 125 miles, pursuing first an easterly or northeasterly direction and then turning abruptly it follows a northwesterly course into the State of West Virginia. In the State of West Virginia it continues in a northwesterly direction for some 90 miles until it unites with the Gauley River to form the Kanawha which continues in the same direction for about 90 miles until it flows into the Ohio River at Point Pleasant, West Virginia.

Respondent's project consisting of a dam and generating plant, the subject of this litigation, is located several miles above Radford, Virginia, and some 60 miles above the State of West Virginia.

THE CONTENTIONS OF PETITIONER

The contentions of the petitioner are *first*, that respondent's project is located in navigable waters of the United States; *second*, that, if not so located, its construction and operation would impair the navigable capacity of navigable waters of the United States; and *third*, that, in either situation, it could not be constructed and operated without a *standard* license under the Federal Power Act.

THE INTERESTS OF WEST VIRGINIA

The interests of the State are involved both directly, and indirectly. It is apparent not only that it is the policy of the State of West Virginia to foster and protect the development of its rivers similar to New River, but that it has been vigilant to protect its interest in New River itself against any encroachment by the Federal Government, and that it has asserted its plenary jurisdiction over that part of the New River within its borders which is involved in this litigation. Moreover, development of the power resources of the river in accordance with the terms of the Federal Water Power Act not only would deprive the State of its jurisdiction in the premises but would as well threaten, if not actually result in, the loss of very valuable subjects of taxation and revenue.

The application of the provisions of the Federal Water Power Act to projects like this Radford project on New River would retard, if not prevent, developments of that kind in West Virginia, with the consequent loss of revenue, employment and other benefits; it would also serve as a dangerous precedent for thwarting the policy of the State and infringing its sovereignty.

In the latter connection the State of West Virginia is vitally interested in retaining the rights reserved to her by the Tenth Amendment of the Constitution of the United States and in opposing unconstitutional encroachments of Federal authority in general, the complete substitution of Federal bureaucratic control and the unlawful whittling away of the powers of the States. These disturbing tendencies have been growing during recent decades and have now reached an alarming stage. Actually, *despite its steadily increasing exercise of power* during the past quarter of a century, it is significant to note that the Federal Government, during that entire period, ***has obtained from the States an additional grant of power on one occasion only.***

In exercising authority steadily extending in scope it apparently has chosen to usurp the reserve powers of the States rather than to seek additional grants of power through Constitutional amendment. The State of West Virginia firmly believes that the point has been reached where the preservation of American Constitutional government makes it imperative that usurpation be abruptly halted.

THE FINDINGS AND OPINIONS OF THE COURTS BELOW

Not only are the findings of the District Court based upon substantial evidence, but contrary findings, with respect to the navigability of the river and the effect of the construction and operation of respondent's project (as to all of which petitioner had the burden of proof), could find no substantial basis in the record. Moreover, the Circuit Court of Appeals carefully reviewed and independently weighed the evidence and reached the same conclusions of fact as did the District Court, and thereupon affirmed the findings made by the District Court. These findings of the lower courts are in strict conformity with official findings of the Engineers of the United States Army, who, in the discharge of their official duties, have repeatedly reported that New River is not navigable in fact at any point in its course.

Indeed, as to these issues, petitioner, in the Circuit Court of Appeals, in its own appraisal of the factual situation, conceded in effect that there could result no showing *clearly* to the contrary of the Court's findings. Thus, at page 268 of petitioner's supplemental brief in the Circuit Court of Appeals, it is said:

> "It cannot be said that the New River presents a '*clear* case' of navigability or non-navigability or that there is a '*clear* case' of absence of any effect on the interests of interstate or foreign commerce."

It is obvious, therefore, from the foregoing discussion that the findings, made by the District Court and affirmed by the Circuit Court of Appeals after an independent review of the evidence, cannot be said to be "*clearly* erroneous" (*United States* v. *Commercial Credit Co.*, 286 U. S. 63, 67) or "*plainly* without support" (*General Pictures Co.* v. *Electric Co.*, 304 U. S. 175, 178); and that there is an abundance of substantial evidence which supports them.

Inasmuch as these findings, concurred in by both lower courts, are supported by substantial evidence, they are not open to question in this Court.

Huston Oil Co. v. *Goodrich*, 245 U. S. 440, 441;

Brewer-Elliott Oil & Gas Co. v. *United States*, 260 U. S. 77;

Alabama Power Co. v. *Ickes*, 302 U. S. 464, 477.

Petitioner's statements, that the courts below, in reaching the conclusion that New River is non-navigable, "revised long settled rules as to the test of navigability" (Petition for a writ of certiorari, p. 16) and that "they introduced novel qualifications to the test of navigable waters" (Petitioner's Brief, p. 21), are squarely contrary to the fact. Actually both courts below followed the long settled test of navigability, which was laid down in the *Daniel Ball* case, 10 Wall. 557, and which has been consistently adhered to since that time. (23 F. Supp. 83, 98-99; 107 F. (2d) 769, 780).

Similarly petitioner's assertion that effect upon interstate commerce with reference to a project in non-navigable waters embraces beneficial effect upon navigable waters elsewhere (Petitioner's Brief pp. 100, 123) is without support in law. *National Labor Relations Board* v. *Jones & Laughlin Steel Corp.*, 301 U. S. 1, 31-32.

NON-NAVIGABILITY OF NEW RIVER

In the District Court petitioner contended that New River is a navigable water of the United States from its mouth, i.e., from its confluence with the Gauley River, up to the mouth of Wilson Creek near the Virginia-North Carolina line. The State of West Virginia is, of course, concerned with the question as to whether that portion of New River which lies within the boundaries of West Virginia is navigable or non-navigable. On this point the position of the State is clear. It insists that no part of the 90 mile long section of New River which is within the confines of West Virginia is navigable in fact, let alone being a navigable water of the United States.

Definition of Navigable Waters

We do not take space to discuss the rules for testing navigibility, which obviously have been correctly applied by both the District Court and the Circuit Court. However, we have noted that various of the reports of Government engineers, made upon or in connection with the respondent's declaration of intention, refer to the definition of "navigable waters" as contained in the Federal Water Power Act. It must be remembered that the decisions of the Supreme Court of the United States, defining navigable waters of the United States, such as *The Daniel Ball,* 10 Wall. 557, are interpretations, not of a statute, but of the commerce clause of the Federal Constitution, and, in this respect, merely an implied provision thereof (see *Leovy* v. *United States,* 177 U. S. 621, 633; 44 L. Ed. 914, 920; *United States* v. *Doughton,* 62 F. (2d) 936, 940).

That which is not navigable waters of the United States as defined by the Supreme Court of the United States cannot be made such by a statutory definition. This applies to the definition of "navigable waters" under Section 3 of the Federal Water Power Act, which definition embraces "such other parts of streams as shall have been authorized by Congress for improvement by the United States or shall have been recommended to Congress for such improvement". Apropos this portion of the definition, it is noted that in *Oklahoma* v. *Texas,* 258 U. S. 574, this Court pointed out that the *failure of the attempted improvement* spoke louder than the attempted improvement in showing that the waters there under consideration were not navigable waters of the United States. No more then can Congress convert non-navigable sections of a river into navigable waters of the United States merely by calling such non-navigable sections "interrupting falls, shallows, or rapids." The holding in *United States* v. *Utah*, 283 U. S. 64, shows that certain sections of a river may be navigable and others non-navigable, also that a section non-navigable in fact and in law and as short as 36 miles may intervene between sections which are navigable in fact and in law.

See *United States* v. *Cress*, 243 U. S. 316, 322; 61 L. Ed. 746, 751, wherein this Court states:

> "Many state courts, including the Court of Appeals of Kentucky, have held, also, that the legislature cannot, by simple declaration that a stream shall be a public highway, if in fact it be not navigable in its natural state, appropriate to public use the private rights therein without compensation. * * *
>
> "This court has followed the same line of distinction. * * *"

Apparently realizing the insuperable difficulty of demonstrating navigability in interstate commerce, the petitioner seeks without basis in fact, so we think, to impute navigability to limited intrastate stretches of the river and then, suggests (Petitioner's Brief, pp. 74-76) that, in case of a short intrastate portion of the stream, where some artificial improvement had locally been attempted, a short-lived, experimental use thereof, long since abandoned for transporting products which were subsequently carted from the river to the railroad, there to be reshipped to points outside the State, converts at least that portion of the river into a navigable water of the United States. We pause only to point out, *first*, that the rules determinative of navigable waters of the United States and used by the lower courts have already extended to the limit the implications of the commerce clause of the Constitution, without leaving room for such a conception as the petitioner here offers, and, *secondly*, that, although the petitioner makes this suggestion with regard to the situation immediately above Radford, Virginia, yet the result of the validation in law of any such conception would be to plant isolated fragments of "navigable waters of the United States" all over West Virginia and the other States of the Union wherever a railroad is accessible for the shipment of products which have been transported by canoe or batteau or mountain-stream ferry-boat over intrastate stretches, however short. If such a conception were to receive serious consideration, we could envisage no limitation upon the commerce clause of the Constitution and no residue of power in West Virginia or any other State over any aspect of intrastate commerce.

The Actual Condition

The physical condition of the 90-mile long section of New River in West Virginia is fully described by the evidence in the record and may be characterized as a steep, bold, rough, mountainous stream forbidding any substantial or useful commerce, although, for a short distance above Hinton, West Virginia, a part of the West Virginia portion of the river was used to some extent after a considerable expenditure of money by the Federal Government in an effort to create navigability. There is not now, nor has there for many years been, any local or intrastate commercial use of New River in West Virginia, let alone any interstate use. Aware of the absurdity of its claim that New River is navigable from its mouth to Wilson Creek, near the North Carolina-Virginia line, the petitioner, in the Circuit Court of Appeals and here has limited its claim of navigability to the portion of New River between Allisonia, Virginia, and Hinton, West Virginia. In connection with that part of the river above Hinton, petitioner endeavors to create the impression that this constitutes navigable waters of the United

States by attempting to demonstrate that, once upon a time, there was a substantial use of the river across the Virginia-West Virginia state line. Incidentally, any contention of the petitioner that the state line crosses the New River at the upper end of Round Bottom is not conceded by the State of West Virginia, nor is it conceded that the state line either touches or enters New River at any point below Wiley Falls.

However, with regard to the main consideration, the record demonstrates that there were few, if any, trips across the state line and such trips, if they occurred at all, took place during temporary high-water and were insubstantial in character, and the testimony of such use is either hearsay or very unconvincing because of faulty recollection, inaccuracies and inconsistencies. Indeed to us of West Virginia any claim that any part of New River in West Virginia is navigable is little short of being ridiculous.

That the *petitioner itself does not take seriously its claim, that New River above Hinton is navigable,* is evidenced by the simple fact that Congress has authorized and the War Department is preparing to construct across New River, three or four miles above Hinton, West Virginia, the huge Bluestone Dam, without providing it with any locks or navigation facilities whatsoever.

ACTIONS OF THE STATE OF WEST VIRGINIA

In the Bill of Complaint it was averred that New River was recommended to Congress for improvement. Also, and without basis in fact, it was averred that New River has always been recognized and treated by the United States and the States of Virginia and West Virginia as navigable and that the State of West Virginia has always recognized the navigability of New River throughout its course in that State (par. 11 of bill of complaint, Record page 8).

To substantiate these claims with respect to West Virginia, petitioner at the trial of this action introduced in evidence the Joint Resolution adopted by the West Virginia Legislature on September 21, 1872. This resolution was the reincarnation of the idea of the Central Water Line Improvement which had died in its infancy years before. This resolution no more constituted recognition, legislative or otherwise, of the navigable capacity of the New and the Greenbrier Rivers than it did of the area of mountain-land over which the proposed canal, of this Central Water Line Improvement, would have extended.

However, it is deemed appropriate to bring to this Court's attention the fact that in a memorandum to the Federal Power Commission dated January 23, 1929, the Public Service Commission of West Virginia stated:

> "* * *
>
> "II. That said Public Service Commission has * * * fully investigated among other things the following subjects * * *
>
> "(1) Whether or not the said New River is a navigable stream, and, if so, in what respect the construction of the proposed works would affect the navigability of said river * * *.
>
> "III. That such investigation resulted substantially in the following findings of fact:
>
> "(1) That said New River *is not a navigable stream.*" (P. U. R., Vol. 1929-B, pp. 215-218.)

Moreover, the State of West Virginia, defendant by intervention in the case of *United States* v. *Electro-Metallurgical Co. et al.*, instituted in the District Court of the United States for the Southern District of West Virginia (In Equity No. 3398), in paragraph 6 of its answer filed therein

> "denies that New River from Wilson Creek, Virginia, to the Kanawha River in West Virginia, and particularly that part thereof embraced within the Hawk's Nest project, was in its natural condition or now is, either in fact or in law, navigable waters of the United States."

To summarize: Because of the physical facts patent alike upon the face of the record in this case and to the traveler passing along New River; in the light of the history of non-use of the river; and in view of the attitude and actions of the State of West Virginia, this State adheres firmly to its position that no part of New River within the boundaries of West Virginia is a navigable water of the United States. That position is supported by the findings of both lower courts. These findings are supported by substantial evidence and may not be disturbed.

WEST VIRGINIA'S POSITION REGARDING FEDERAL JURISDICTION UNDER POWER ACT

Whether the purpose of the relevant portions of the Power Act be to regulate and control water power developments, as petitioner in the Circuit Court admitted in the following language:

> "Thus the primary purpose of the legislation was the control of water power development, not of navigation" (Appellant's Supplemental Brief in C. C. A., p. 148),

or whether the purpose was to assert control only where (no Federal property being concerned) the interests of navigation are adversely affected, as was in effect held by the Circuit Court (107 F. [2d] 769, 793), seems to us, so far as the present case is concerned, to be immaterial.

Certainly under the admitted facts of this case we are dealing with a stream where no public land or other Federal property is involved and where the Federal Power Commission is seeking to exercise jurisdiction over a project which does not have the function of developing or improving navigation and which will not adversely affect the navigable capacity of any navigable waters of the United States.

Extent of Federal Jurisdiction Over Projects on Navigable Streams

West Virginia is of the view that, even if, contrary to the obvious facts, New River were a navigable water of the United States, then, subject to the Federal Government's right to protect its waters for the purposes of navigation, the States (not the Federal Government) would be absolute owners of the waters and the soil under them. This has been the law since the earliest days of this government. In *Martin* v. *Waddell*, 16 Peters 410, Chief Justice Taney said:

> "When the revolution took place the people of each State became themselves sovereign, and in that character held absolute right to all their navigable waters and the soils under them for their common use, subject only to the right since surrendered by the Constitution to the general government."

and in the case of *Pollard. Lessee* v. *Hagan*, 3 How. 212, 229, this Court, after quoting the above statement, said:

> "Then to Alabama belong the navigable waters and soils under them in controversy in this case, subject to the right surrendered by the Constitution to the United States, and no compact that might be made could diminish or enlarge these rights."

Hence, it is plain that, even if New River were navigable, the jurisdiction over it on the part of the Federal Government would be limited to the control thereof for the purposes of navigation. *Port of Seattle* v. *Oregon, etc., Company,* 255 U. S. 56.

West Virginia is also of the view that, even on interstate navigable streams, the State has the jurisdiction over the development of water power, except as to any power which may be incidentally created by *bona fide* navigation works of the Federal Government, and that the State may subject such development to such conditions and regulations as it may choose to prescribe, in so far as there is no interference with the control of the navigable waters, for purposes of protecting and fostering the navigation on, and navigable capacity of, such waters.

As stated by Senator Shields of Tennessee in the debates on this subject in the Senate:

> "The United States having no property in navigable streams, the Congress, as its agent, cannot constitutionally sell or lease the beds and waters of those streams for any purpose, its power being confined to the control of them for the purposes of navigation. When it attempts to do more, either directly or by coercion of the riparian owner, it is guilty of confiscation of private property." Congressional Record Vol. 53, Part 3, p. 2641.

and further:

> "These contentions are now conceded by some of the advocates of these Federal rents and royalties who are familiar with the authorities, and they have been driven to rest the power of Congress to compel the payment of them upon the proposition, as I understand it, that the United

> States, through Congress, has the power to grant to the States and their grantees, permits necessary to authorize them to construct dams in navigable streams, and in exercising this power may impose such conditions as Congress deems proper.
>
> "This must carry with it the assertion that this can be done, although the proposed structure will not obstruct but improve navigation, and the purpose of it be lawful and laudable, and the terms or conditions imposed are beyond the affirmative powers of Congress, and in direct violation of the express provisions of the Constitution.
>
> "Mr. President, these are most astounding propositions of constitutional law and public policy, difficult to reconcile with the spirit and genius of constitutional government and the guaranties which it affords to the personal and property rights of a free people. Is it possible that Congress can by constructive force and duress usurp the sovereign powers of the States and confiscate the property held in trust for their citizens? Can the fundamental law be thus evaded and violated to force the States and their citizens to yield to an unlawful and unjust exaction under the penalty of being arbitrarily prohibited from the use and enjoyment of their property? The premises of this proposition are fallacious. The United States has no general police power over or proprietary rights in navigable waters to grant." Congressional Record, Vol. 54, Part 1, pp. 1007-8.

And as stated by Senator Nelson:

> "If any compensation is to be made for the use of the water, it belongs to the states or to the riparian owners." Congressional Record, Vol. 58, Part 3, pp. 1040-1.

True, as petitioner states (Petitioner's Brief, p. 131), the Federal Government has the authority to forbid the construction of a project on a navigable stream—although, contrary to petitioner's assertion, it has no such authority with respect to a project on a non-navigable stream (see page 17, 18 hereof)—nevertheless, the exercise of the power to regulate commerce by prohibiting structures in navigable streams may not be made the basis of exercising a non-federal power, i.e., of exacting, as a price of Federal consent for such structures, conditions unrelated to the protection of navigation. *First Employers Liability Cases*, 207 U. S. 463, 502; *Linder* v. *United States*, 268 U. S. 5, 17; *Frost Trucking Co.* v. *Railroad Commission*, 271 U. S. 583, 593; *United States* v. *Chicago, etc., Railroad Co.*, 282 U. S. 311, 324; *United States* v. *Butler*, 297 U. S. 1. The only conditions that lawfully may be exacted are those related to the protection of navigation. *United States* v. *River Rouge Co.*, 269 U. S. 411, 419; *Wisconsin* v. *Illinois*, 278 U. S. 367, 415; *Ashwander* v. *Tennessee Valley Authority*, 297 U. S. 288, 340; *Alabama Power Co.* v. *Gulf Power Co.*, 283 Fed. 606, 613.

However, it is believed that the somewhat more detailed statement of the position of West Virginia in regard to the Power Act may more pertinently be directed to the question of Federal jurisdiction over a power project located on a non-navigable stream, such as New River actually is.

Extent of Federal Jurisdiction Over Projects on Non-Navigable Streams

In the present case the petitioner is attempting to go much further than was contemplated when the law was enacted, as is shown by such debates as that from which the immediate foregoing quotations are taken. The petitioner is here trying to establish a jurisdiction over *non-navigable waters* where no Federal property at all is involved. It is thereby seeking to deprive the States and their citizens of the right to develop those waters under such rules and regulations as the States may choose to prescribe. The Federal Government possesses no jurisdiction or control within the State of West Virginia and her sister States over their respective non-navigable waters as such. The jurisdiction of the Federal Government under the commerce clause extends no further with respect to non-navigable waters than it does with respect to dry land or any other thing, substance, or subject (other than to commerce itself or to navigable waters). That is, in this respect the constitutional authority of the Federal Government is limited to prohibiting substantial interference with navigation on, or the navigable capacity of, navigable waters of the United States. *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690; *United States* v. *Cress,* 243 U. S. 316. The State of West Virginia denies that the United States has any constitutional power to make water power developments upon the non-navigable streams of West Virginia illegal *per se* without a Federal license.

Petitioner's argument that it might have delegated its authority to build this project, located on a non-navigable stream, to an agent, viz., its licensee, and that consequently it could have exacted from that licensee such terms and conditions as it saw fit to impose, is predicated upon the false hypothesis that the Federal Government itself might have constructed "this very project" (Petioner's Brief, pp. 119-120).

The Federal Government has no authority whatsoever to build a power development (the Radford project is nothing other than a power development) on a navigable stream, let alone on a non-navigable stream such as New River.

Again Petitioner argues (Petitioner's Brief, pp. 130-131) that, because as it erroneously contends, it could forbid altogether the construction of a project on a non-navigable stream, the Federal Government has authority to impose such license conditions as it sees fit for such a project. However, the Federal Government has neither licensing authority nor authority to forbid the construction of a project located on a non-navigable stream, its only authority on a non-navigable stream being to restrain such acts as impair the navigable capacity of a navigable stream. *United States* v. *Rio Grande Dam & Irrigation Co.*, supra. But, even if the Federal Government had licensing authority over projects on a non-navigable stream and authority to prohibit the construction of such projects, nevertheless, it would have no authority to impose for such projects license conditions which are unrelated to the protection of navigation, just as it may not do so even in the case of projects located on navigable streams (See p. 19 herein).

Petitioner's statement that Respondent's riparian rights go no further than the enjoyment of the natural flow of the stream and that the natural flow of a non-navigable stream may not be altered except on conditions specified by the Federal Government (Petitioner's Brief, p. 124, 136) presents a picture of relative State and Federal power that is decidedly out of focus. Whereas, on the one hand, the Federal power on a non-navigable stream is a limited power, that is, limited to restraining such acts as impair the navigable capacity of a navigable stream, on the other hand, the State's power is plenary.

So long as the State does not impair navigation and does not confiscate vested rights it has the full and complete sovereign power to adopt any law or orders which it deems best adapted to the development of its water resources and to the promotion of the welfare and prosperity of its people. *Kansas* v. *Colorado*, 206 U. S. 46, 94; *United States* v. *Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, 703; *Head* v. *Amoskeag Co.*, 113 U. S. 9.

Petitioner, entirely overlooking cases dealing squarely with the subject of interstate non-navigable waters, supports its view that the Federal Government has control over non-navigable waters merely because they may cross State lines, with cases on other subjects involving the admitted right of the Federal Government to regulate commerce and the channels of commerce (Petitioner's Brief, p. 126). However, these cases are not apropos of Petitioner's suggestion. Non-navigable waters are neither commerce nor channels of commerce and moreover this Court long ago squarely stated in connection with such view (viz., as contained in a Trial Court's instructions* to a Jury):

> "Such a view would extend the paramount jurisdiction of the United States over all the flowing waters in the States, and would subject the officers and agents of a State, engaged in constructing levees, to restrain overflowing rivers within their banks, or in regulating the channels of small streams for the purposes of internal commerce, to fine and imprisonment, unless permission be first obtained from the Secretary of War. If such were the necessary construction of the statutes here involved, their validity might well be questioned. But we do not so understand the legislation of Congress. When it is remembered that

---

* Concerning the Trial Court's instructions this Court said: "If these instructions were correct, then there is scarcely a creek or stream in the entire country which is not a navigable water of the United States. Nearly all the streams on which a skiff or small lugger can float discharge themselves into other streams or waters flowing into a river which traverses more than one State, and the mere capacity to pass in a boat of any size, however small, from one stream or rivulet to another, the jury is informed, is sufficient to constitute a navigable water of the United States. * * *"

> the source of the power of the general government to act at all in this matter arises out of its power to regulate commerce with foreign countries and among the States, it is obvious that what the Constitution and the acts of Congress have in view is the promotion of commerce in its international and interstate aspect, and a practical construction must be put on these enactments as intended for such large and important purposes."

Petitioner's argument that it should be made a "central authority" (Petitioner's Brief, p. 116) having control of all uses of all streams and that the various uses of streams should not be left to the control of the "individual states" (Petitioner's Brief, p. 127) is a matter which, if it needs determination at all, should be submitted to the States, for constitutional amendment. It is not an issue appropriate for submission to a Court.

Conditions of Standard Form License

If and to the extent that the Federal Power Act is to be construed to require any conditions other than those which have a substantial relationship to the protection of navigation on navigable waters of the United States, the act is beyond the powers of the Federal Government.

The sovereign powers of the State are infringed by the conditions of the standard form of license which attempt to give the Federal Power Commission control over the plan for the improvement and development of a waterway, for the improvement and utilization of water power development, and for other beneficial uses including recreational purposes, particularly so when applied to non-navigable waters (Sec. 10-a). In the same category are those license conditions which specify: That the licensee shall maintain the project works in condition of repair adequate for efficient operation in the development and transmission of power; that the licensee shall make necessary renewals and replacements, establish and maintain adequate depreciation reserves (determined by the Commission, not the State) for such purposes, and conform to such rules and regulations as the Commission (not the State) may prescribe for the protection of life, health and property (10-c); that the licensee shall, after the first twenty years, establish and maintain amortization reserves out of surplus earned in excess of a specified rate of return, such reserves to be, in the discretion of the Commission, held until the termination of the license or applied from time to time in reduction of the net investment, the rate of return and proportion of surplus earnings to be paid into such reserves being set forth in the license (10-d) i.e. to be determined by the Commission not by the State; that the licensee pay the United States an annual charge fixed by the Commission to reimburse the United States for the costs of administration, and that the licensee expropriate to the United States excess profits until the respective States shall make provision to prevent excess profits or for the expropriation thereof to themselves, or until the period of amortization is reached (10-e); that any licensee or any other project owner benefited by any licensee of a head-water improvement shall reimburse the latter for such part of the annual charges (for interest, maintenance and depreciation thereon) as the Commission concludes to be equitable, pay the United States the costs—as fixed by the Commission—of reaching such conclusion, and pay the United States similar charges when it makes any head-water improvement (10-f).

Section 14 provides for the so-called recapture or taking over of the project by the Federal Government at the end of the license, to be paid for at either the net investment, or fair value, whichever happens to be the lower, plus reasonable severance damages if any, and Section 15 permits the United States to issue a license which will enable another licensee to exercise its rights under Section 14. This net investment is defined in Section 3. It may be generally characterized as the actual legitimate original costs, plus additions and betterments, less certain unappropriated surpluses, balances of current depreciation of accounts, and aggregate appropriations of surplus or income held in amortization, sinking fund or similar reserves, or expended for additions or betterments, or used for the purposes for which such reserves were created where they were accumulated during the period of the license from earnings in excess of a fair return.

Such method of taking over amounts to the taking of property without just compensation. Not only is the sovereign power of the state usurped, but local enterprises may well be wrecked by such taking by the Federal Government and the consequent competition, and every water power in the State may well be found under the jurisdiction of the Power Commission and operated in a manner entirely subversive of the regulation by, and plan of, the State.

The imposition of such confiscatory conditions upon the development of water powers in West Virginia will necessarily defeat and nullify the policy of this State, which policy is to bring about such a development of its water resources as will promote its prosperity and increase its tax resources.

Section 19 permits regulation by the Federal Power Commission, in case the State has no such commission, of services, rates and security issues, regardless of whether the services, rates and security issues relate only to intrastate transactions.

Section 21 of the Act confers on the licensee the power of eminent domain to acquire what is necessary for the construction, maintenance or operation of any project, or works appurtenant or accessory thereto, in conjunction "with an improvement which in the judgment of the Commission is desirable or justified in the public interest for the purpose of improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce," and under this provision, regardless of the policy, plan or will of the State, public highways, schools, county seats and other public property can be acquired. (See what was done in *Missouri* v. *Union Electric Light & Power Company,* 42 F. [2d] 692, appeal dismissed on stipulation 53 F. [2d] 1080). Although the Federal Government's power of eminent domain is limited to what is necessary in the exercise of the granted powers, *Luxton* v. *North River Bridge Co.,* 153 U. S. 525, nevertheless there is here attempted to be conferred through a bureau the *power to authorize the condemnation of anything whatsoever, provided only it is in conjunction with an improvement which the bureau regards as desirable or justified in the public interest.*

That these exercises of assumed power on the part of the Federal Government constitute a gross invasion of the rights of the State is borne out by the rule that the Commerce Clause, from which the power to improve navigable streams is implied, may not, upon the basis of indirect, remote or insubstantial relationships between the things sought to be controlled and interstate commerce, be extended to control matters within the State's jurisdiction. *Schechter Corp.* v. *United States,* 295 U. S. 495, 546; *National Labor Relations Board* v. *Jones and Laughlin Steel Corp.,* 301 U. S. 1, 36-37.

In connection with this consideration of the license conditions sought to be imposed under the Federal Power Act, it is desired to point out that, whereas the discussion has been directed to the instant case where a water power project is located on a non-navigable stream, yet it is the view of West Virginia that the United States is equally impotent to impose upon a project in *navigable* waters of the United States license conditions such as that providing for the taking over of the project by the United States and other conditions which have no relationship to the protection of navigation. So long as no public land of the United States is involved, it seems clear that, whether a project be in navigable or in non-navigable waters, all pertinent Federal power stems from the same source, the Commerce Clause (involving as it does the protection of navigation), and that the limitations upon Federal control are fundamentally the same in both cases. Thus the resultant Constitutional limitations upon Federal authority in the premises differ only in the respect that, whereas the Federal Government has no constitutional authority to require a Federal license at all for a project located on a non-navigable stream and duly authorized by State law, the Federal Government does have constitutional authority to require a license for a project on a navigable water of the United States so long as the conditions sought to be imposed by that license have a real and *bona fide* relation to the protection* of navigable capacity.

*** In fact, with respect to projects on non-navigable streams the Federal Power Commission itself, at one stage of its history, seemed to recognize a principle definitely at variance with that of petitioner at the present time, for, in connection with its explanatory statement concerning the obtaining of an opinion of the Attorney General of the United States with regard to eliminating certain license conditions (by means of a so-called minor-part license), there appears the following:**

> **"It is possible that licenses restricted to the terms essential for safeguarding the navigation interests will serve the essential Federal interests and at the same time overcome the objections advanced by the States. The control over projects of this class is fundamentally a function of the States, and it seems appropriate that the Federal relationship should be conformably subordinated to an extent consistent with the protection of recognized Federal interests." 10th Annual Report of the Federal Power Commission, 1930, p. 8, 9.**

The fact that the standard form license contains various conditions which have no relation to the protection of navigation need not be stressed. *It is frankly conceded by petitioner* (see petitioner's brief, p. 128).

In the foregoing, the license conditions sought to be imposed under the Federal Power Act have been considered from the standpoint of their imposition upon a private citizen or private corporation. The utter invalidity, not to say iniquity, of many of those conditions stands out the more clearly when considered in view of the fact that they would apply also in the cases of any water power development made by West Virginia itself. It appears from Sections 4 (e) and 23 (b) of the Act that States and municipalities, like private citizens and corporations, are purportedly subject to the necessity of obtaining licenses. Purportedly a State too must come to the Federal Power Commission as a suppliant.

Under Section 7 (a) an application by a State or municipality has priority over an application by a private party; but, once a license has been issued, there appears to be no difference in the obligations of, or conditions imposed upon, a State or municipality as a licensee as compared with the obligations and conditions resting or imposed upon private licensees, excepting apparently only as regards the payment of annual charges under certain conditions. Under Section 14 the alleged right of petitioner to take over the entire project would apply equally if the licensee were a State.

It is not suggested that in principle the invasion of the rights of the State is any greater if the State be a licensee than if the licensee be one of its citizens and the property rights involved be those granted by the State instead of property rights still retained by the State. Nevertheless the extent to which the Power Act, or at least petitioner's interpretation thereof, conflicts with the fundamental law of the land, as set forth in the Constitution, is the more glaringly revealed when one considers that under the provisions of the Act such claims as those which petitioner makes would apply as well if the project were that of a State.

Thus it is claimed (petitioner's brief, pages 128-131), first, that *even on a non-navigable stream* the Federal government "has power to forbid the construction or operation of a project" (p. 129; cf. p. 131) and, secondly, that therefore petitioner may impose conditions "which do not relate to the protection of navigation, but instead seek to assure conservation and regulation of the use of water resources and to permit ultimate recapture of the project by the United States." (p. 128; cf. p. 131). Clearly petitioner claims the right to regulate water resources for all kinds of uses, including power, irrigation, etc.; and the language used contains the implication that the United States would merely be taking back the project.

The State of West Virginia insists that such claims of petitioner are completely outside Federal authority under the Constitution.

Profound Importance of the Questions in This Case With Respect to the States' Control and Management of Their Own Internal Affairs

The principle of States' rights lies at the very foundation of our Federal system of Government. Despite the fact that expediency has tended to overshadow the principle of federalism, nevertheless the latter principle is as important today as at any stage in our history. Consequently, the situation which exists today is one to occasion grave concern to those who believe in the continuance of our Constitutional division of Government between State and Nation and who believe that the maintenance of the authority of the States over their internal affairs is as necessary to the preservation of our system of Government as is the maintenance of the authority of the National Government over the matters entrusted to the Nation by the Federal Constitution.

If the Federal Government may, particularly on non-navigable streams, prohibit water power developments except on condition that the developer submit to a Federal license containing the conditions, unnecessary for the protection of navigation, which petitioner herein is seeking to impose, then there is no reason why the same Federal license conditions may not be imposed in practically every other field of business.

Stated differently, if these license conditions, unnecessary for the protection of navigation, may be imposed upon water power projects and the generation of electricity, neither of which is commerce between the States, then there is established a principle that would make all manufacturing industries — indeed every conceivable business and undertaking which is a producer of goods— subject to the imposition of a Federal license containing like conditions (for the taking over of the business by the Federal Government) for the mere reason that its produce might enter into commerce between the States. Surely that would be an astounding principle of Constitutional law. Indeed, such a principle would make available to the National Government the power to control the States and their citizens to an undreamed-of extent. Surely the preservation of powers reserved to the States is vital to the continued existence of our dual form of Government—a form of Government so well adapted to conditions and political ideas at the time it was established that it won the admiration and emulation of statesmen everywhere, and one which, we submit, is so well adapted to present-day needs that any change from it is beyond serious thought. If, then, our form of Government—

> "an indestructible Union, composed of *indestructible States*", (*Texas* v. *White,* 7 Wall. 700, 725)—

is not to be supplanted by some form of totalitarian state, the rights of the States, not only deserve but, must receive a better fate than merely lip service.

CONCLUSION

Unless the decree of the District Court is affirmed, the established policy of the State of West Virginia for the development of her water resources will be seriously threatened, if not completely thwarted. The full preservation of the constitutional power of the State to adopt such policy as it may from time to time see fit for the development of its water resources, and for the interests, health and general welfare of her people, is of the greatest importance and one of its sovereign prerogatives; and, unless this Federal effort to control the development of internal resources is resisted and denied, the State will be deprived of vital power in regulating matters of domestic concern having no real and substantial relation to commerce.

For the foregoing reasons, resting upon fundamental principles underlying our dual system of Government, the decree below should be affirmed.

Respectfully submitted.

—Clarence W. Meadows,
Attorney General of West Virginia.

FILE COPY

Office - Supreme Court, U. S.
FILED
MAR 23 1940
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1939

No. [redacted] 12

UNITED STATES OF AMERICA, *Petitioner*

vs.

APPALACHIAN ELECTRIC POWER COMPANY, *Respondent*

MOTION OF COMMONWEALTH OF VIRGINIA FOR LEAVE TO INTERVENE AS PARTY DEFENDANT

ABRAM P. STAPLES,
Attorney General of Virginia.

Richmond, Virginia.
March, 1940.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1939

No. 674

UNITED STATES OF AMERICA, *Petitioner*

vs.

APPALACHIAN ELECTRIC POWER COMPANY, *Respondent*

MOTION OF COMMONWEALTH OF VIRGINIA FOR LEAVE TO INTERVENE AS PARTY DEFENDANT

To the Honorable, The Chief Justice and Associate Justices of said Court:

COMES NOW the Commonwealth of Virginia, by its Attorney General, and moves this Court for leave to intervene as a party defendant or respondent in the above entitled cause, with full right to participate as a party in the hearing and disposition of said cause in this Court, but in subordination to all of the proceedings hereinbefore had in said cause and upon the record as made and filed in this Court.

The grounds upon which this motion is based are:

1. The Commonwealth of Virginia is one of the States of the United States of America and as such pos-

sesses all of the powers of sovereignty over the territory within her domain, including all natural resources situated within her boundaries, except in so far and to the extent that any of her sovereign powers have been surrendered to the United States of America under and by virtue of the Federal Constitution.

2. Virginia desires to emphatically disclaim any hostility toward the Federal Power Commission with respect to its actions in relation to the New River development, or toward the Federal Government in its efforts to institute the regulations here involved. On the other hand, the Commonwealth welcomes and appreciates Federal aid and assistance in appropriate cases. She realizes that the attempted Federal control of the generation of hydro-electric power in New River is intended to be helpful, but she feels that such efforts have had, and will continue to have, results extremely injurious and harmful to the development of her water power and to the best interests of the State. The repeated insistence of the Federal Power Commission upon exercising control over the New River project involved in this case in spite of Virginia's continued protest, Virginia believes has been ill advised and most unfortunate.

3. Virginia has adopted a comprehensive statutory scheme for the conservation, control, regulation, and development of the waters of the State, in accordance with a policy deliberately and advisedly adopted by the State as best adapted to promote the best interests of the State and her people (Michie's 1936 Virginia Code, sections 3581(1)-3581(16)). Among other things, a declared purpose of the State, in enacting and adopting this statutory scheme and policy, is to encourage and pro-

mote the development and utilization of the water power inherent in the waters of the State in order to conserve the coal deposits of the State, to increase her tax resources, to promote her industrial development, to increase the supply of electricity available to the people of the State and reduce the charges therefor, and generally to promote the welfare and prosperity of the State and her people. The Virginia State Corporation Commission is fully empowered to fix rates for electric energy charged by public utilities (Michie's 1936 Virginia Code, sections 4065a, 4066).

4. In execution of the foregoing statutory policy, in the year 1932 Virginia granted a license to the respondent, Appalachian Electric Power Company, for the construction and operation of the hydroelectric development in New River, near Radford, Virginia. New River, Virginia considers a non-navigable stream, and, in so far as it is situated within Virginia, constitutes one of her valuable natural resources by reason of its suitability and adaptability to the development of water power. The construction and operation of said project for which Virginia issued said license will conserve coal deposits, contribute substantially to the tax resources of the State, increase the supply of electric energy available to the people of the State for domestic and industrial use, decrease rates for electric energy, and in these and other ways will substantially contribute to the welfare and prosperity of the State and her people. Under the provisions of the aforesaid license and State statutes, Virginia has the right to acquire such project when, as, and if she deems its acquisition for the best interests of the State and her people.

5. For many years the efforts of the United States, through its agency, the Federal Power Commission, to control the water power developments in Virginia prevented the construction of the New River project. This was due chiefly to the restrictions upon the development of said water power which are contrary to the declared policy of Virginia, but which said Commission sought to impose on said development. The utilization of the water resources of the State have been thereby burdened, retarded, and largely nullified. However, after several unsuccessful attempts to have the validity of the powers attempted to be exercised by the Federal Power Commission tested in the courts, the respondent Virginia licensee began the construction of the project here involved. Soon thereafter, the petitioner brought this suit in the United States District Court for the Western District of Virginia to restrain the said respondent licensee from constructing said project, and to require said licensee to remove any part of said project theretofore constructed under the authority of Virginia's license. The United States District Court for the Western District of Virginia and the Fourth Circuit Court of Appeals have severally held that New River is not a navigable water of the United States, that the construction and operation of the project will not impair the navigable capacity of any navigable waters of the United States, and that the Federal Power Act, nor the Rivers and Harbors Act of March 3, 1899, nor any other Federal statute, purports to condition the development of this water resource of the State upon the consent or regulation of the United States.

6. In its petition for certiorari in this cause, the petitioner has requested this Court to reverse the decree of the Circuit Court of Appeals and to find in substance that New River is a navigable water of the United States, subject to the jurisdiction of the United States and not to the jurisdiction of Virginia, and that (whether said New River be navigable or non-navigable) the power resources of this Virginia stream may not be developed and utilized under the license authority and in accordance with the statutory policy of Virginia, but only under the authority of the Federal Power Commission and the conflicting statutory policy of the United States. Among other things, petitioner asks this Court to hold that this water resource of Virginia may be developed, if at all, only under a Federal license which would vest in the United States, rather than in the State of Virginia, the exercise of all police powers over and in connection with said project and its operation, and in particular would require the respondent Virginia licensee to accept a Federal license providing that the United States may take over the project at the end of the license period for the "net investment" (as determined by said Power Commission and subject to numerous deductions) or its then fair value, whichever is the less. Virginia is advised that her licensee, the respondent, has invested in this development in the belief that the Virginia statutes and license afford to it adequate protection, and that, if said respondent licensee had believed that the project would be controlled by the Federal Power Commission and its burdensome license requirements, the investment would not have been made. Virginia believes that other developments of her water powers have been retarded by doubts as to which regulatory authority would control same.

7. Adjudication of a right in the petitioner to take over said project would nullify and destroy the reserved right of the State of Virginia to acquire the project when and if it should be deemed in the best interests of the State and her people to have the project owned by the State rather than by private enterprise, or, if not so acquired by the State, would subject the State to the risk that the project may be entirely removed from her taxable property as well as from all governmental regulation by the State. The effect of this and other conditions which the petitioner requests this Court to sustain and apply to said development would be to destroy the recapture rights of the State reserved under its license, and to invade the quasi-sovereign rights of the State over and in relation to said project. In addition, the insistence of the petitioner upon the right to prohibit the development of the water resources of the non-navigable waters of Virginia, except with the consent and in accordance with numerous burdensome regulations and restrictions imposed by said petitioner, will, if sustained, effectually nullify and destroy the statutory policy of the State in the conservation, development, and utilization of her water resources, and, apart from the invasion of the sovereign rights of the State, will make the development of her water resources so difficult and burdensome that their development will continue to be seriously curtailed and retarded, greatly to the injury of the welfare and prosperity of the State and her people.

8. Unless this motion is granted and the State of Virginia is permitted to intervene as a party defendant, her jurisdiction to control New River and to regulate the development of the resources of New River, and her

rights under the State license, would be finally adjudicated and destroyed without opportunity to be effectually heard should an adverse decision be rendered. The petition for certiorari was granted on March 4, 1940, and on March 5, the Virginia Legislature adopted unanimously a resolution, a copy of which is annexed hereto and marked Exhibit A, directing her Attorney General to petition this Court on behalf of said State for leave to intervene as a party defendant, and thus participate in the hearing and disposition of this cause.

9. The granting of this motion for leave to intervene is necessary in order to afford the State of Virginia due process of law. Mere participation as *amicus curiae,* without any standing as a party in the proceeding, and without the right to be heard other than by brief, or to make any appropriate motion or take any other appropriate action in the cause necessary to protect the quasi-governmental, as well as property, interests of the State, would be a most inadequate remedy. No remedy short of intervention would afford the State proper opportunity to protect her rights.

10. The property rights of Virginia in the bed of the stream, and the waters flowing over same, are likewise directly involved. The petitioner claims not only the right to exercise general governmental regulatory jurisdiction and police powers over these waters and stream beds for all purposes, but the right to recapture and become the owner of same (Federal Water Power Act, section 14. Appendix to petition for certiorari, pp. 34-6.).

While the question of the ownership of the bed of the stream was not made an issue in the pleadings, nevertheless, the District Court found that "ownership of the bed is recognized as being in the State" (23 F. Supp., 83, 101).

11. The Federal Water Power Act also makes it unlawful for Virginia herself, or any of her municipalities to develop the water power of the State without securing the required license from the Federal Power Commission (Section 23, Appendix to petition for certiorari, pp. 36-7).

12. While Virginia is unable to point out to the Court any precedent for the granting of this motion, it may be said also that she has been unable to find any similar case in which leave to intervene has been petitioned by a State and denied. In this connection, the attention of the Court is respectfully directed to a bill introduced in the House of Representatives January 8, 1940, by Representative Satterfield of Virginia (H. R. 7737), which, with certain amendments not here material, was reported favorably by the House Judiciary Committee, without objection from the Attorney General of the United States, and was passed unanimously by the House on March 18, 1940. It has not yet been acted on in the Senate. The bill contains these provisions:

> "SEC. 266a. (1) Whenever the validity of the exercise of any power by the United States, or any agency thereof, or any officer or employee thereof, is drawn in question in any court of the United States, and the determination of such question involves any conflict with the exercise by any State of any governmental power of such State, or whenever the exercise of such Federal power would result in any impairment or abridgment of any governmental power asserted by or exercised by such State,

> or any agency thereof, or any officer or employee thereof, not already a party, the court having jurisdiction of the suit or proceeding shall certify such fact to the attorney general of such State. In any such case, the court shall permit such State to intervene and become a party for the presentation of evidence (if evidence is otherwise receivable in such suit or proceeding) and argument upon the question of the validity of the exercise of such power. * * *
>
> * * * * *
>
> "(3) As used in this section, the term 'court of the United States' means any district court of the United States, any circuit court of appeals, and the Supreme Court of the United States; * * *."

Obviously, this pending legislation gives Virginia no legal right to intervene in this case, yet its passage by the House, without objection by the Attorney General, is believed worthy of consideration by the Court in determining the reasonableness of the motion, which, of course, is addressed to the Court's discretion.

13. In moving for leave to intervene the State of Virginia expressly consents that the cause may be disposed of by this Court upon the record as made and filed in this Court. The State of Virginia does not tender a separate answer to the complaint of the United States, but requests leave to adopt for the purpose of this suit the answer filed by the respondent, and the amendment thereto, as her answer in this proceeding. Virginia also expressly states that she does not desire to introduce any additional testimony or other evidence in this case. Consequently, the granting of such intervention will not disturb the state of the record or of the proceedings.

14. WHEREFORE, the Commonwealth of Virginia prays that leave to intervene as a party defendant in the above entitled cause in this Court be granted under the terms and conditions stated in the foregoing motion.

Respectfully submitted,

ABRAM P. STAPLES,
Attorney General of Virginia.

Richmond, Virginia.
March, 1940.

EXHIBIT A.

SENATE JOINT RESOLUTION NO. 33

Whereas, the Federal Power Commission, a regulatory agency of the United States, has asserted in the Federal Courts, in a suit instituted by the United States against the Appalachian Electric Power Company, that it is possessed of plenary jurisdiction and powers to regulate the construction and operation of, and ultimately to recapture the ownership of, an electric water power plant of said company on New River, near Radford, Virginia; and,

Whereas, said plant was constructed pursuant to authority conferred on said Company by a license issued to it by the Virginia State Corporation Commission in conformity with Virginia statutes relating to and regulating the construction and operation of such power plants; and,

Whereas, the conditions sought to be imposed by the Federal Power Commission on Virginia's said licensee are so burdensome that, if generally applied to Virginia waters, they will completely annul the legislative policy of this Commonwealth to encourage the development of her water powers; and,

Whereas, the United States District Court for the Western District of Virginia and the United States Circuit Court of Appeals for the Fourth Circuit (by a two to one decision) have both sustained the jurisdiction and power of Virginia to regulate said plant on New River, but the United States has decided to carry said case to the United States Supreme Court;

Now, therefore, Be it resolved by the Senate of Virginia (the House of Delegates concurring) as follows:

1. That the Commonwealth of Virginia considers the development of her water powers a matter of State concern only and one within her exclusive jurisdiction to regulate.

2. That the regulation by Virginia of her water powers, free from burdensome restrictions having no substantial relation to navigation in interstate commerce, is of vital importance to the interests of the Commonwealth.

3. That the General Assembly of Virginia is of opinion that the jurisdiction to exercise the said powers asserted by the United States over Virginia's streams was not conferred on the United States by the United States Constitution and can be conferred only by an act of the General Assembly of Virginia, ceding such jurisdiction to the United States.

4. That the Commonwealth of Virginia has not only not ceded such jurisdiction or consented to the exercise by the United States of such jurisdiction, but has protested against same before the Federal Power Commission from the beginning, and also in the courts at all times, and does now still further protest against same.

5. That the development of Virginia's water powers is not a matter of national concern, but a problem of the State which this Commonwealth is fully competent and able to administer and regulate and is properly administering and regulating through her State Corporation Commission, and no facts exist which provide any basis, reason or necessity for Federal intervention in relation to same, except to the extent such development may affect interstate navigation.

6. That the Attorney General of Virginia, Honorable Abram P. Staples, be, and he hereby is, requested to file a petition for leave to intervene in said suit in the Supreme Court of the United States as a party defendant, and, if such leave be not granted, then to take all possible action in said suit, as *amicus curiae,* to sustain the exclusive jurisdiction of the Commonwealth of Virginia over her streams in all matters not substantially related to navigation in interstate commerce.

FILE COPY

Office - Supreme Court, U. S.
FILED
MAR 23 1940
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1939

No. [redacted] 12

UNITED STATES OF AMERICA, *Petitioner*

vs.

APPALACHIAN ELECTRIC POWER COMPANY, *Respondent*

MOTION FOR LEAVE TO FILE A MEMORANDUM IN SUPPORT OF VIRGINIA'S MOTION TO INTERVENE

ABRAM P. STAPLES,
Attorney General of Virginia.

Richmond, Virginia.
March, 1940.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1939

No. 674

UNITED STATES OF AMERICA, *Petitioner*

vs.

APPALACHIAN ELECTRIC POWER COMPANY, *Respondent*

MOTION FOR LEAVE TO FILE A MEMORANDUM IN SUPPORT OF VIRGINIA'S MOTION TO INTERVENE

To the Honorable, The Chief Justice and Associate Justices of said Court:

NOW COMES the Commonwealth of Virginia, by her Attorney General, Abram P. Staples, and prays leave to file the subjoined memorandum in support of her motion for leave to intervene as a party defendant or respondent in this cause.

The interest of Virginia is fully set forth in her said motion, and in said memorandum.

WHEREFORE, the Commonwealth of Virginia prays that this Honorable Court will accept the following memorandum for consideration.

Respectfully submitted,

ABRAM P. STAPLES,
Attorney General of Virginia.

Richmond, Virginia.
March, 1940.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1939

No. 674

UNITED STATES OF AMERICA, *Petitioner*

vs.

APPALACHIAN ELECTRIC POWER COMPANY, *Respondent*

MEMORANDUM IN SUPPORT OF VIRGINIA'S MOTION FOR LEAVE TO INTERVENE

Virginia respectfully submits the following propositions and authorities in support of her motion to intervene as a party defendant or respondent in this case:.

1. States have property rights in the waters of interstate streams, the apportionment of which is a proper subject for compacts between them.

> *Hinderlider* v. *LaPlatta, etc., Company,* 304 U. S. 92.

2. Virginia owns the bed of the New River involved in this case. See the finding in this case in the District

Court, *United States* v. *Appalachian Electric Power Company,* 23 Fed. Sup. 83, 101.

3. In the absence of cession to the United States by Virginia of jurisdiction, such ownership, even in waters navigable in interstate commerce, is subject only to a servitude under which Congress may "use the lands under the streams 'for any structure which the interest of navigation in its judgment may require'."

> *James* v. *Dravo Contracting Company,* 302 U. S. 134, 140.

4. Virginia possesses rights as a sovereign or quasi-sovereign which are justiciable and entitled to the protection of the courts.

> *Hopkins, etc., Association* v. *Cleary,* 296 U. S. 315;
> *Colorado* v. *Toll,* 268 U. S. 228-230;
> *Missouri* v. *Holland,* 252 U. S. 416, 431.

There is doubt as to the standing of the respondent corporation to raise the question of violation of the Tenth Amendment in the absence of objection by Virginia.

> *Tennessee Electric Power Company* v. *Tennessee Valley Authority,* 306 U. S. 118, 143-4.

Respectfully submitted,

ABRAM P. STAPLES,
Attorney General of Virginia.

Richmond, Virginia.
March, 1940.

FILE COPY

Office - Supreme Court, U. S.
FILED
[illegible]
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

UNITED STATES OF AMERICA, PETITIONER,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
RESPONDENT.

BRIEF OF THE COMMONWEALTH OF VIRGINIA AMICUS CURIAE

ABRAM P. STAPLES,
Attorney General of Virginia,
Richmond, Virginia.

September, 1940.

TABLE OF CONTENTS

Page

Preliminary Statement 1

Scope of this Brief 1

Statement 2

The Broad Constitutional Questions Presented 6

The Attitude of Virginia 7

The Interests of Virginia in This Case 11

A. Property Interests 11

Effect of Petitioner's Contentions on Virginia's Property Rights 16

B. Removal of Sources of Taxation 20

C. Effect on Virginia's Sovereign Powers 23

The Questions Presented 24

Summary of Argument 27

Argument 40

I. Virginia and the United States each enjoys in this Court an equal status, and there is no presumption that the attempted exercise by either Government of a power conflicting with one attempted to be exercised by the other, is constitutional or proper.......... 40

II. Though the evidence does not support the petitioner's claim that New River was navigable in interstate commerce a half century or more ago, even if it did, this fact alone would not confer perpetual jurisdiction on the Federal Government to regulate interstate navigation in the stream where there is no such navigation now in said stream and no reasonable possibility that there ever will be any such navigation therein to regulate 43

Page

III. The Federal Government's power to protect navigable waters in interstate navigable streams is itself implied from the power to regulate interstate commerce, and it cannot be made the basis of inferring any additional regulatory power, the exercise of which does not constitute a regulation of interstate commerce 51

IV. Regulation of the manufacture of electric energy in the manner provided for by the Federal Power Act is not a regulation of interstate commerce, and the exercise of any such power by the Federal Government, over the protest of the State in which the plant is located, if sustained under the commerce clause, would amount to a destruction of the dual system of American Government as established by, and in violation of, the United States Constitution 52

V. The provisions of the Federal Power Act which authorize the Federal Government to take over the property of Virginia, consisting of the bed of the river and the usufruct of the stream flow, without compensation to the State, violate Article 4, Section 3, Clause 2, as well as the Fifth Amendment of the Constitution 68

VI. Even if the Federal Government had the power to regulate the manufacture of electrical energy, the proposed Federal regulation of the construction and operation of hydro-electric generating plants, where there is no such regulation of plants operated by steam, is arbitrary and unreasonable, is not based on any proper classification, and would result in needlessly confusing the efforts of Virginia to regulate the industry as a whole 70

VII. Virginia is entitled to a decision now on the constitutionality of the capture clause, as well as the other license provisions of the Act, so as to enable her to proceed with the development of her many valuable streams 73

Conclusion 77

TABLE OF CASES

Page

Ashwander v. *Tennessee Valley Authority,* 297 U. S. 288, 36, 60, 62, 68

Chisholm v. *Georgia,* 2 Dallas 419 43

Consolidated Edison Company v. *National Labor Relations Board,* 305 U. S. 197 .... 8, 56

Coverdale v. *Arkansas–Louisiana Pipe Line Company,* 303 U. S. 604 .... 31, 53

Cornell v. *Coyne,* 192 U. S. 418 53

Economy Light and Power Company v. *United States,* 256 U. S. 113 .... 29, 44-48

Id., 256 Fed. 792 .... 46, 47

Florida v. *United States,* 282 U. S. 211 55

Graves v. *New York,* 306 U. S. 466 20

Hammer v. *Dagenhart,* 247 U. S. 251 .... 32, 60

Hinderlider v. *La Plata Company,* 304 U. S. 92 .... 34, 62

Howard v. *Illinois Central Railroad,* 207 U. S. 463 (Employer's Liability Cases) 61, 62

James v. *Dravo Contracting Company,* 302 U. S. 134 .... 33, 58

Kansas v. *Colorado,* 206 U. S. 45 63

Montello Case, 20 Wall. 430 45

McCullough v. *Maryland,* 4th Wheat. 316 .... 56, 57, 60

National Labor Relations Board v. *Jones & Laughlin Steel Corp.,* 301 U. S. 1 .... 8, 55, 56, 59

New Jersey v. *Sargent,* 269 U. S. 328 .... 39, 74

Pittman v. *Home Owners' Loan Corporation,* 308 U. S. 21 20

Schecter case, 295 U. S. 495 54

TABLE OF CASES—*Continued*

Page

State of South Carolina v. *United States*, 199 U. S. 437..........21, 23

State of Ohio v. *Helvering*, 292 U. S. 360 23

Texas v. *Florida*, 306 U. S. 398 52

Town of Bedford v. *United States* (C.C.A. Mass.), 23 Fed. (2d) 453 69

United States v. *Carolene Products Company*, 304 U. S. 144.... 70

United States v. *Coombs*, 12 Peters (U. S.) 72, 9 L. ed. 1004 ....34, 67

United States v. *Jacobs*, 306 U. S. 363 51

United States v. *E. C. Knight Company*, 156 U. S. 1................. 53

United States v. *Wayne County, Kentucky*, 252 U. S. 574...... 69

Id., 53 Ct. Cl. 417 68

United States v. *Wheeler Township* (C.C.A. Minn.), 66 Fed. (2d) 977 69

Utah Power & Light Co. v. *Pfost*, 286 U. S. 165.................31, 53

Wayne County v. *United States*, 252 U. S. 574....................... 36

Wyoming v. *Colorado*, 259 U. S. 419 63

CONSTITUTION, STATUTES AND MISCELLANEOUS CITATIONS

	Page
Constitution of the United States, Article IV, Section 3	26, 36, 69
Id., Amendment V	26, 69
Id., Article V	28, 42
Id., Article III, Sections 1 and 2	41
Id., Amendment XI	42
16 USCA 803(a)	18
Id., 803(c)	18
Id., 803(d), (e)	18
Id., 800	19
Id., 797(d)	19
Id., 817	19
Id., 803	19
Rivers and Harbors Act of March 3, 1899	44
Federal Water Power Act, Section 10(c)	63, 64
Act of Congress of May 18, 1796	45, 46, 49
Act of Congress of March 26, 1804	46, 49
Ordinance of 1787	47
Acts of General Assembly of Virginia of 1928, p. 1099	12
Id., of 1932, p. 684	12
Code of Virginia (Michie 1936) Sections 3581(1)-3581(16)	12
Id., Sections 4065(a), 4066	13
Cong. Rec. Vol. 9, pt. 8, p. 8222	11
Cong. Rec. Vol. 70, pt. 1, p. 996 (Dec. 21, 1928)	76
The Public Papers and Addresses of Franklin D. Roosevelt, Vol. 1, p. 98	10
Id., pp. 171-2	14
Id., pp. 82, 91, 163, 164, 167-170, 176, 178, 181, 186, 204	15
Id., Vol. 3, p. 40; Vol. 5, p. 123	16

Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

UNITED STATES OF AMERICA, PETITIONER,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
RESPONDENT.

BRIEF OF THE COMMONWEALTH OF VIRGINIA AMICUS CURIAE

PRELIMINARY STATEMENT

SCOPE OF THIS BRIEF

Virginia has joined with North Carolina and thirty-seven other States, *amici curiae,* in a brief in which is discussed those questions more or less common to all of said States. It is not intended here to repeat the arguments made in that brief, but to discuss principally certain questions more peculiarly applicable to Virginia in which the project under consideration is located, and a few additional questions not therein touched on.

The respondent, Appalachian Electric Power Company, has also filed an elaborate brief in which the decisions of this Court pertaining to the questions of navigability and the jurisdiction of the United States over streams, navigable and non-navigable, are so exhaustively reviewed that it would but impose an undue burden on the Court to undertake here a similar general discussion of these cases. Respondent's brief also contains an analysis, in complete detail, of the evidence respecting the factual questions of navigability of New River and the effect of the hydro-electric project on navigation in the Kanawha River. Virginia respectfully asks leave to adopt these portions of respondent's brief, in order to avoid a repetition of the arguments there made.

STATEMENT

This suit is the outgrowth of a Declaration of Intention to construct, operate and maintain the Radford project, a hydro-electric generating plant located in New River, a Virginia mountain stream, which was filed by a predecessor and assignor of respondent with the Federal Power Commission on June 26, 1925. From the very beginning Virginia has protested against the assumption of jurisdiction over the project by said Commission. At the only public hearing on the declaration ever held by the Commission, on March 2, 1926, the late John R. Saunders, then Attorney General of Virginia, filed a written protest and also appeared in person. He called attention to the fact that "Virginia, unlike many other States in this Union, has still maintained and reserved to itself, for the benefit of all citizens of that Commonwealth, the beds and shoals of the rivers and streams which go through that State." (Gov. Ex. 100, R. pp. 2584, 2600-2602.)

The position there taken has been consistently maintained in all court proceedings involving the Commission's jurisdiction, Virginia having appeared in all of them as *amicus curiae.*

On March 5, 1940, the day following the granting of this certiorari, the General Assembly of Virginia unanimously adopted a resolution as follows:

SENATE JOINT RESOLUTION NO. 33

Whereas, the Federal Power Commission, a regulatory agency of the United States, has asserted in the Federal Courts, in a suit instituted by the United States against the Appalachian Electric Power Company, that it is possessed of plenary jurisdiction and powers to regulate the construction and operation of, and ultimately to recapture the ownership of, an electric water power plant of said company on New River, near Radford, Virginia; and,

Whereas, said plant was constructed pursuant to authority conferred on said Company by a license issued to it by the Virginia State Corporation Commission in conformity with Virginia statutes relating to and regulating the construction and operation of such power plants; and,

Whereas, the conditions sought to be imposed by the Federal Power Commission on Virginia's said licensee are so burdensome that, if generally applied to Virginia waters, they will completely annul the legislative policy of this Commonwealth to encourage the development of her water powers; and,

Whereas, the United States District Court for the Western District of Virginia and the United States Circuit Court of Appeals for the Fourth Circuit (by a two to one decision) have both sustained the jurisdiction and power of Virginia to regulate said plant on New River, but the United States has decided to carry said case to the United States Supreme Court;

Now, therefore, Be it resolved by the Senate of Virginia (the House of Delegates concurring) as follows:

1. That the Commonwealth of Virginia considers the development of her water powers a matter of State concern only and one within her exclusive jurisdiction to regulate.

2. That the regulation by Virginia of her water powers, free from burdensome restrictions having no substantial relation to navigation in interstate commerce, is of vital importance to the interests of the Commonwealth.

3. That the General Assembly of Virginia is of opinion that the jurisdiction to exercise the said powers asserted by the United States over Virginia's

streams was not conferred on the United States by the United States Constitution and can be conferred only by an act of the General Assembly of Virginia ceding such jurisdiction to the United States.

4. That the Commonwealth of Virginia has not only not ceded such jurisdiction or consented to the exercise by the United States of such jurisdiction, but has protested against same before the Federal Power Commission from the beginning, and also in the courts at all times, and does now still further protest against same.

5. That the development of Virginia's water powers is not a matter of national concern, but a problem of the State which this Commonwealth is fully competent and able to administer and regulate and is properly administering and regulating through her State Corporation Commission, and no facts exist which provide any basis, reason or necessity for Federal intervention in relation to same, except to the extent such development may affect interstate navigation.

6. That the Attorney General of Virginia, Honorable Abram P. Staples, be, and he hereby is, requested to file a petition for leave to intervene in said suit in the Supreme Court of the United States as a party defendant, and, if such leave be not granted, then to take all possible action in said suit, as *amicus curiae,* to sustain the exclusive jurisdiction of the Commonwealth of Virginia over her streams in all matters not substantially related to navigation in interstate commerce."

Pursuant to that resolution a motion to intervene as a party was made in this Court by the Attorney General of Virginia. This motion was denied on April 1, 1940, but "with permission to file a brief and participate in oral argument as *amicus curiae.*" Thereupon the States of Virginia and West Virginia (through which New River also runs) made a motion for the continuance of the cause, which was granted on April 8, 1940, and the case assigned for argument on Monday, October 14, next.

THE BROAD CONSTITUTIONAL QUESTIONS PRESENTED

The broad constitutional questions presented, in so far as the Commonwealth of Virginia is concerned, are:

1. Does the Congress possess the exclusive constitutional power to regulate through a commission the construction and operation of a hydro-electric generating plant in respect to matters having no relation to navigation, (a) when constructed in Virginia waters navigable in interstate commerce, and (b) when constructed in such waters not so navigable.

2. Does the Congress possess the constitutional power to take, without compensation, Virginia's property rights in the bed of such a stream and the usufruct of the stream flow?

3. Does the State of Virginia possess the exclusive power to regulate the construction and operation of such plants, except to the extent that they affect navigation in interstate commerce?

Virginia's protest against the Federal Power Commission's jurisdiction over her streams is not motivated by any desire to hamper or restrict the activities of the Federal Power Commission within its proper sphere, nor is there any intention on the part of the State to free the respondent company from proper governmental supervision and regulation. On the other hand, the State has provided its own agency, the State Corporation Commission, and vested it with ample powers and imposed on it the duty to regulate the respondent's activities, both in the manufacture of electric energy, and in its distribution and sale. This regulation Virginia intends shall be efficiently and effectually conducted. The respondent's manufacture of electric energy in Virginia is by no means confined to the project here involved. On the contrary, the respondent possesses other plants operated by both steam and water power. The electrical energy generated in these various plants is fed into the respondent's single distribution system, and all is blended and integrated into one general activity. To segregate one part of this whole for Federal regulation, while the remainder is regulated by the State must necessarily result in a confused, if not a chaotic condition. It would seem to be very difficult, if not impossible, for the Federal Commission to ascertain the profits derived from the New River project under such circumstances, or for the State Commission to find a suitable basis for regulation of the other plants, or the distribution system or the business as a whole, including rates.

Furthermore, the generation of electrical energy constitutes, in itself, an independent field of governmental regulation. The manufacture of such energy has been clearly established by the unvarying decisions of this Court to lie within the sphere of State control, just as other manufacturing enterprises. Federal regulatory jurisdiction in this field has been expressly limited by the Constitution, as construed by this Court, to regulatory measures, *negative in character,* deemed necessary to *protect from injury* other transactions which are themselves interstate in character. This was the basis of the decisions in the National Labor Relations Board cases. *National Labor Relations Board* v. *Jones & Laughlin Steel Corp.,* 301 U. S. 1, *Consolidated Edison Company* v. *National Labor Relations Board,* 305 U. S. 197. In this last named case the company did not sell any electricity at all in interstate commerce, but Federal jurisdiction to prevent a shutdown because of threatened labor disputes was sustained because of the effect such an interruption of service would have on railroads and other interstate activities dependent upon the Edison Company for power in order to operate.

Virginia, therefore, regards with genuine apprehension the persistent efforts of the Federal Power Commission to invade this manufacturing field and to draw such an activity into its affirmative regulatory jurisdiction. While the supremacy of the Federal Government in its own proper sphere, as delineated in the Constitution, is cheerfully conceded, yet just as earnestly does Virginia insist upon the supremacy of her own government in its proper field as established by that instrument. Since the foundation of our Government, the regulation of manufacture has been considered by all to be within the exclusive jurisdiction of the States, and has been regarded as solely within their police powers.

Naturally, the mere advocacy by the Solicitor General before this Court of such a radical departure from established beliefs and principles has caused consternation among the Attorneys General of *five-sixths* of the States and they have filed briefs in opposition thereto. If manufacturing and everything "affecting" interstate commerce is to be drawn within the orbit of Federal power to the exclusion of any State voice therein, there will no longer remain any useful civil function which the State Governments can perform.

It is Virginia's view that it was the intention of the Constitution that the State and Federal Governments together should occupy the entire field of government, that each should have its respective sphere therein and be complementary of the other. That after all, they are partners in government with a single end and common purpose, and there should exist between them a cheerful and cordial spirit of cooperation to the accomplishment of the greatest good. That changing conditions make necessary, from time to time, readjustments of their spheres of activity. But, that the Commerce Clause of the Constitution should be used as an instrument of destruction, of all State regulatory powers over domestic business, was never intended by the framers of the Constitution and is not justified by existing conditions.

Such a result is appalling to contemplate, yet the Solicitor General's arguments necessarily lead to that result.

The exercise by Virginia and the other States of their police powers and other reserved powers has universally been regarded as a right retained under the Constitution and never surrendered. The Solicitor General's argument leads to the conclusion that these powers may be exercised by the States, not as a matter of right, but only by Congressional grace, in any matters "affecting" interstate commerce, which means all business matters of any importance, because all such do "affect" interstate commerce.

The attitude and position of Virginia in this case is, therefore, that, while she is anxious to cooperate with the Federal Government to the end that her people, as well as those of other States, may be well governed jointly by both governments, she does not feel that this end will be served by such a revolutionary and chaotic change in their basic structures as is here advocated by the Federal Power Commission. She is constrained, therefore, to file this brief in protest against any such expansion of Federal jurisdiction and the consequent diminution of that of the States. This Virginia conceives to be her duty and she is not unmindful of the fact expressed by the then Governor of New York, Honorable Franklin D. Roosevelt, in his second inaugural address, in these words:[1]

> "When States become indifferent to their

---

[1] The Public Papers and Addresses of Franklin D. Roosevelt, Vol. 1, p. 98.

> duties, the natural tendency is for the National Government to grasp for more power."

Pertinent also is a statement made on May 9, 1928, in a House debate by Honorable Cordell Hull, then representative from Tennessee. In discussing certain unauthorized powers attempted to be exercised by Congress over State streams, based solely on the right to regulate navigation, Mr. Hull said:[2]

> "Under this naked right, *with no power given to use the water for any other purpose than navigation,* Congress has drifted along without any challenge by the States, *they being asleep,* and has naturally gone a little too far in some of the special acts that have been passed." (Italics supplied.)

THE INTERESTS OF VIRGINIA IN THIS CASE

A. *Property Interests*

The fourth finding of fact made by the District Court is as follows:

> "The bed of New River at the site of the project is owned by the State of Virginia and all lands adjacent to the river which will be affected by the project have been acquired by and are now owned by the defendant." (R. p. 154.)

---

[2] Cong. Rec. Vol. 9, pt. 8, p. 8222.

Virginia's ownership of the bed of the stream is not challenged by the petitioner, and it is, therefore, unnecessary to refer to the various statutes and decisions applicable. In view of such ownership, no riparian owner may lawfully construct a dam on such property of the State without permission of its legislature. But the vast water powers of State streams, having been going to waste from time immemorial, and being readily susceptible of useful development, in 1928 the Virginia legislature took cognizance of the deplorable situation, and gave careful consideration to the adoption of measures to encourage the utilization of these water powers for the benefit of the people of the State. It seemed almost a crime that these natural resources of the Commonwealth should be permitted to lie dormant if it were possible for the State to do something to utilize them. It was realized that, unless the State was to depart from her established policy of refraining from engaging in competition with private industry by developing these water powers as governmental activities, inducements must be held out to encourage their development by private capital. It was further found that fear of being harassed by future legislation and of undue governmental interference in the operation of water power projects operated as a strong deterrent to private developers. In order to correct this situation, the 1928 Virginia Water Power Act was passed and later amended in 1932 [Acts 1928, p. 1099; Acts 1932, p. 684; sections 3581(1)-3581(16) Michie's 1936 Code.] The purposes of the statute are therein declared to be "to encourage the utilization of the water resources in the

State to the greatest practicable extent and to control the waters of the State, as herein defined, and also the construction or reconstruction of a dam in any rivers or streams within the State for the generation of hydro-electric energy * * *."

The inducements offered by the statute to private investors include a fifty-year license, and thereafter an indeterminate license to continue only until the property is purchased or acquired by the State. The license confers the right to use "the natural resources owned by the State," such as the stream flow and beds of streams. While the State reserves the right to acquire the property by condemnation at any time, the methods prescribed for ascertaining the value and amount to be paid the prospective investor are fair and reasonable.

On the other hand, the statute vests in the State Corporation Commission appropriate powers to regulate the types of dams and other improvements and the methods of their operation, and to require that the stream flow be not injuriously interferred with by the construction or operation of the property. Under other statutes, the State Corporation Commission is empowered to regulate rates for electric power, as well as other matters relating to the conduct of the business. [Michie's 1936 Code Sections 4065(a), 4066.]

The Commonwealth of Virginia considers her laws, with respect to the control of her water powers, both fair to the prospective investor and at the same time adequate to protect the public interests.

After proper investigation, the State Corporation

Commission granted the respondent Appalachian Electric Power Company's application for a license to construct the dam and power plant here in controversy, and but for the assertion by the Federal Power Commission of its control over the project, the plant would no doubt have been in operation many years ago.

Although Virginia has granted a license to the respondent company to operate its project under proper State regulation and control, nevertheless the State continued to own the stream and its bed, which includes, of course, the latent, as well as utilized, water power therein. This was the view repeatedly expressed by Governor Franklin D. Roosevelt, of New York. In a message to the legislature on March 12, 1929, he said:[8]

> "For a generation the need for power for industrial and domestic purposes has been steadily increasing, and during this period *the ownership by the people of the State of New York* of a vast potential source of energy in their portion of the waters of the St. Lawrence River has received increasing public attention.
>
> "In the past the actual necessity for the development of this potential energy has not been wholly clear but in more recent times the great preponderance of informed opinion recognizes the immediate need for action.

---

[8] The Public Papers and Addresses of Franklin D. Roosevelt, Vol. 1, pp. 171-2.

"The State owns or controls other much smaller water-power rights but it seems to me best at this time to focus recommendations and public attention on the development of the St. Lawrence River.

"In making use of this potential energy on the St. Lawrence *owned by the people of the State,* the objective of the problem is essentially this:

"1. The physical transforming of falling water into electrical current.

"2. The transmission and distribution of this current from the plant where it is developed to the industries and homes of the people of the State.

"As this St. Lawrence power source *is the property of the people of the State,* we can, I think, all agree to the principle that the actual energy therefrom should be, for all time, under the immediate control of the people of the State and should be transmitted and distributed to the people of the State at the lowest practical cost." (Italics supplied.)

Similar assertions of State ownership occur repeatedly in Governor Roosevelt's public statements.[4]

Subsequent statements of President Roosevelt, as late as December, 1936, show that in discussing the proposed St. Lawrence treaty with Canada it was contemplated that the power should be developed by the Power Authorty of the State of New York.[5] But the position taken by the petitioner here not only ignores but would completely nullify these valuable property rights of Virginia. Virginia also has valuable property rights in other streams, the development of which is being obstructed by the cloud cast by the Federal Power Act over her jurisdiction with respect to their development. Among these is the James River above Richmond, which, though not as wild a stream as New River, is utterly useless for navigation. It is believed that these streams will be devoted to useful development if Virginia is left free to encourage same.

---

[4] Id. pp. 82, 91, 163, 164, 167-170, 176, 178, 181, 186, 204.

Effect of Petitioner's Contentions on Virginia's Property Rights

An examination of the petition for certiorari and of petitioner's brief filed in the above entitled cause discloses that this Court is asked, with regard to waters where there is involved no public land nor any other Federal property:

(1) To hold in practical effect that Virginia's water powers, whether on navigable or non-navigable streams, may not be developed or utilized by the State, or under her jurisdiction and authority, but instead may be developed only if such development meets the approval of the Federal Power Commission and, if so, then only pursuant to the acceptance of a Fed-

---

[5] Id. Vol. 3, p. 40; Vol. 5, p. 123.

eral license containing numerous burdensome restrictions upon the utilization of such water powers, which restrictions are in conflict with the policies adopted by the State of Virginia for the conservation, regulation and development of her water resources.

(2) To hold that the water powers of Virginia may be developed only, if at all, under a Federal license which would have the effect of vesting in the United States, rather than in the State, ultimate reversionary or residual proprietary rights therein and the exercise of local police powers over and in connection with such projects and their operation, and even of providing for the regulation of intrastate rates for electricity, developed and sold from such water resources within the State, in the absence of State regulation.

(3) To hold that the United States may, as a condition to permitting the development of Virginia's water power resources, whether on navigable or non-navigable streams, compel the developers (duly authorized by the State) to accept a Federal license which would give the United States a contractual right to take over the power development at the end of the Federal license period upon payment to the developer of the "net investment" (as determined by the Federal Power Commission and subject to numerous Federal statutory deductions) or its then fair value, whichever is the less, with the consequent appropriation of Virginia's property rights in the streams.

(4) To hold that Virginia's water power resources

may be developed only under plans and conditions which "in the judgment of the (Federal Power) Commission will be best adapted to a comprehensive scheme * * * of water power development and of other beneficial public uses" [16 USCA 803(a)], in complete derogation of the sovereign right of the State to authorize, regulate and control the development of her streams for water power, recreational and other purposes as she deems for her best interests (subject only to the admittedly constitutional requirement that there be no interference with interstate or foreign commerce).

(5) To hold that the development of Virginia's water powers, even on non-navigable streams, may be made only in accordance with the regulations of the Federal Power Commission with reference to renewals, replacements and depreciation reserves and under "such rules and regulations as the (Federal Power) Commission may from time to time prescribe for the protection of life, health and property" [16 USCA 803(c)], all in complete disregard of the rights of the State in her streams.

(6) To hold that Virginia's water power resources may be developed only subject to the regulation of amortization reserves, determination of net investment, payment of fees to the United States and expropriation of excess profits by the United States, as determined by the Federal Power Commission, all in disregard of the rights of the State [16 USCA 803(d), (e)].

(7) To hold that the United States may prohibit the development of Virginia's water power resources, whether on navigable or non-navigable streams, unless the developer enters into a contract to permit the United States to "take over" such water power development for less than the fair value at the time of taking, with the result of greatly impeding, or even nullifying, the development of said water resources and, in practical effect, permitting the Federal Government to enter the domain of the State for the purpose of engaging in a business or industry, in excess of the constitutional authority of the United States and in violation of the sovereign rights of the State.

(8) To hold that, in complete disregard of Virginia's rights and policies, her water power resources may be developed only after receiving the approval of the Federal Power Commission and only upon plans which that Commission deems best adapted to develop, serve and utilize in the public interests the water resources of the region (16 USCA 800).

Furthermore, subsection (d) of section 797 makes it clear that any State or municipality which might desire to develop the water powers of the State is subject to the same license requirements and burdens (except, under section 803, as to annual charges for power not sold at a profit and except as to certain projects designed to improve navigation) as are imposed upon private licensees, while section 817 makes it unlawful for a State or municipality to build a power dam, in any waters subject to the jurisdiction of the Commission, without procuring the required permit or license from the Power Commission. *Thus, Virginia herself is prohibited by this statute from developing her own water powers as a governmental undertaking except with the consent and under the directions of the Federal Commission.*

It is clear from the foregoing summary of the burdensome provisions of the Federal Water Power Act that, if valid and if construed as petitioner contends, the Act amounts to a virtual prohibition of the development of Virginia's own property interests in her streams, either by the State herself, by her municipalities or by private investors licensed by the State to develop her said property interests.

B. *Removal of Sources of Taxation*

If the Federal Government should be held to possess the constitutional power to acquire and operate the hydro-electric plant here involved, disassociated from the function of regulating navigation, it would be predicated upon the further holding that such an activity is a *governmental function,* in which case the Congress is empowered to exempt from State taxation the governmetal agency through which the function is performed. *Graves* v. *New York,* 306 U. S. 466, 477; *Pittman* v. *Home Owners' Loan Corporation,* 308 U. S. 21. If the Federal Government may operate industrial plants of this type as an essentially governmental function, there is no reason why it may not extend the field indefinitely. The disastrous results to the State's revenues which would follow from such tax exemptions is obvious. It was vividly pictured by this Court when considering the effect on Federal revenues of exempting State proprietary activities from Federal taxation in the case of *State of South Carolina* v. *United States,* 199 U. S. 437. In holding that the operations by a State of a liquor dispensary was the exercise of a proprietary and *not a governmetal function,* this Court said:

> "The right of South Carolina to control the sale of liquor by the dispensary system has been sustained. *Vance* v. *W. A. Vandercook Co.* 170 U. S. 438. The profits from the business in the year 1901, as appears from the findings of fact were over half a million of dollars. Mingling the thought of profit with the necessity of regulation may induce the state to take possession, in like manner, of tobacco, oleomargarine, and all other objects of internal revenue tax. If one state finds it thus profitable, other states may follow, and the whole body of internal revenue tax be thus stricken down.
>
> "More than this. There is a large and growing movement in the country in favor of the acquisition and management by the public of what are termed 'public utilities,' including not merely therein the supply of gas and water, but also the entire railroad system. Would the state, by taking into possession these public utilities, lose its republican form of government?
>
> "We may go even a step further. There are

some insisting that the state shall become the owner of all property and the manager of all business. Of course, this is an extreme view, but its advocates are earnestly contending that thereby the best interests of all citizens will be subserved. If this change should be made in any state, how much would that state contribute to the revenue of the nation? If this extreme action is not to be counted among the probabilities, consider the result of one much less so. Suppose a state assumes, under its police power, the control of all those matters subject to the internal revenue tax, and also engages in the business of importing all foreign goods. The same argument which would exempt the sale by a state of liquor, tobacco, etc., from a license tax, would exempt the importation of merchandise by a state from import duty. While the state might not prohibit importations, as it can the sale of liquor, by private individuals, yet, paying no import duty, it could undersell all individuals, and so monopolize the importation and sale of foreign goods.

"Obviously, if the power of the state is carried to the extent suggested, and with it is relief from all Federal taxation, the national government would be largely crippled in its revenues. Indeed, if all the states should concur in exercising their powers to the full extent, it would be almost impossible for the nation to collect any revenues. In other words, in

> this indirect way it would be within the competency of the states to practically destroy the efficiency of the national government. * * *" (199 U. S. 437, 454-5.)

This reasoning applies equally to the condition the States may be confronted with if proprietary activities of the Federal Government are held to be essentially governmental. The above case was recently reaffirmed in *State of Ohio* v. *Helvering,* 292 U. S. 360.

It cannot be doubted, therefore, that the principles advocated by petitioner in this case constitute a real threat to the independent existence of the State governments.

C. *Effect on Virginia's Sovereign Powers*

Manufacturing activities have heretofore been uniformly regarded as local or internal affairs of the State, subject to exclusive regulation under the State's police powers. This power of regulation and control of such industries is indispensable to the proper functioning of efficient local government. The principles advocated by petitioner would expand the application of the Commerce Clause so as to bring the regulation of all industries "affecting" interstate commerce within the exclusive Federal jurisdiction. The obvious effect would be the substantial destruction of nearly all useful civil functions now performed by Virginia under her police powers. Every business activity of any importance necessarily "affects" interstate commerce in some degree.

Virginia is vitally interested, therefore, in preserving the integrity of her sovereignty.

THE QUESTIONS PRESENTED

Petitioner's brief (p. 2) states the questions presented briefly, as follows:

1. Is New River, at the site of the project, navigable in interstate commerce?

2. If not, (a) will the project obstruct navigation in other navigable waters, or (b) will it affect the interests of interstate commerce within the meaning of section 23 of the Federal Power Act?

3. Are the licensing provisions of said Act, which have no relation to regulation of stream flow or navigation, constitutional under the Commerce Clause, (a) if the project is located in waters navigable in interstate commerce, or (b) if located in waters not so navigable?

As stated at the outset, the facts involving navigability and the effect of the project on navigation in other waters so clearly appear in the concurring findings of both lower Courts, and are so fully discussed in respondent's brief, that they will not be again argued here. Most of the constitutional and other legal questions, and the relevant authorities have been discussed at length in the brief, *amici curiae,* of North Carolina, Virginia and thirty-seven other States. What is said here on these questions is intended to be supplemental to that discussion, as well as to the argument contained in respondent's brief, ~~and will avoid~~, so far as possible, any repetition of the matter contained in that brief or in the brief of respondent. This brief will undertake to maintain the following propositions:

I.

Virginia and the United States each enjoys in this Court an equal status, and there is no presumption that the attempted exercise by either government of a power conflicting with one attempted to be exercised by the other, is constitutional or proper.

II.

Though the evidence does not support the petitioner's claim that New River was navigable in interstate commerce a half century or more ago, yet, even if it did, such fact alone would not confer perpetual jurisdiction on the Federal Government to regulate interstate navigation in the stream where there is no such navigation now in said stream and no reasonable possibility that there ever will be any such navigation therein to regulate.

III.

The Federal Government's power to protect navigable waters in interstate navigable streams is itself implied from the power to regulate interstate commerce, and it cannot be made the basis of inferring any additional regulatory power the exercise of which does not constitute a regulation of interstate commerce.

IV.

Regulation of the manufacture of electric energy in the manner provided for by the Federal Power Act is not a regulation of interstate commerce, and the exercise of any such power by the Federal Government, over the protest of the State in which the plant is located, if sustained under the Commerce Clause, would amount to a destruction of the dual system of American Government as established by, and in violation of, the United States Constitution.

V.

The provisions of the Federal Power Act which authorize the Federal Government to take over the property of Virginia, consisting of the bed of the river and the usufruct of the stream flow, without compensation to the State, violate Article 4, Section 3, Clause 2, as well as the Fifth Amendment of the Constitution.

VI.

Even if the Federal Government had the power to regulate the manufacture of electrical energy, the proposed Federal regulation of the construction and operation of *hydro-electric* generating plants, where there is no such regulation of plants operated by steam, is arbitrary and unreasonable, is not based on any proper classification, and would result in needlessly confusing the efforts of Virginia to regulate the industry as a whole.

VII.

Virginia is entitled to a decision now on the constitutionality of the capture clause, as well as the other license provisions of the Act so as to enable her to proceed with the development of her many valuable streams.

SUMMARY OF ARGUMENT

I.

In determining the constitutional validity of Federal statutes which involve a conflict in the exercise of State and Federal jurisdiction or powers, the general rules of law to be applied must necessarily be essentially different *in cases where the State appears and asserts the possession of the disputed jurisdiction* from cases where a *private litigant alone* undertakes to claim that such jurisdiction resides in the State. In the case at bar, it appears that both the Congress and the Virginia legislature have enacted statutes each asserting jurisdiction in their respective governments to regulate the generation of electricity in waters navigable in interstate commerce. The petitioner relies on the Federal statutes while the respondent relies on those of the State. Under the rule ordinarily applicable to a private litigant attacking them, there is a strong presumption in favor of the constitutionality of both statutes. The obvious result must be that the respective presumptions offset and nullify each other, as between the two governments themselves.

While the Federal Government enjoys supremacy in the field of the powers delegated to it by the Constitution, the States enjoy a like supremacy within the field of their reserved powers, including the police power. In cases where there is disagreement between a State Government and the Federal Government respecting jurisdiction to exercise their respective powers in a particular field, it is the high function of this Court to determine the question. The argument which has been recently advanced by some that this Court should decide such a question in favor of Federal jurisdiction unless it is plain that such jurisdiction has been, or is sought to be, exceeded is unsound in principle. Any such rule would produce a succession of precedents sustaining diminutions of State jurisdiction and power which would gradually result in a complete destruction of the dual form of government. Furthermore, it would amount to a practical abdication by this Court of its most important function, *i.e.*, to preserve the continued existence of the form of government created by the Constitution.

While it is true that Article V of the Constitution empowers the legislatures of two-thirds of the States, on their own initiative, to require the calling of a convention to propose amendments to the Constitution, and thus preserve their powers and jurisdiction, this should not be considered as relieving this Court of the responsibility to avoid the necessity for resort to any such extreme measure, with the attendant possibility of serious curtailment of needful existing Federal powers.* However, the fact that this power of amendment was conferred on the States is evidence of the scrupulous care exercised by the framers of the

Constitution to insure the continued existence of the dual form of government.

II.

Even if the evidence established (which Virginia denies) that New River a half century or more ago was a stream navigable in interstate commerce, this fact alone would not have the legal effect of bringing the stream within the *perpetual jurisdiction* of Congress to regulate navigation therein, where it now appears that there is no reasonable possibility that this mountain stream will ever be useful or used as a highway in interstate commerce, and is not susceptible of such use. The rule stated in *Economy Light and Power Company* v. *United States,* 256 U. S. 113, relied on by petitioner, had reference to a river which, by Federal statute, had been perpetually preserved as a public highway. To apply such a rule to all State rivers as to which persons could be found to testify that some interstate use had been made thereof by generations long passed, would create an intolerable state of doubt and uncertainty as to the status of every State stream of any importance. While, under the evidence and findings below, this legal question may be regarded as unimportant in this case as to New River, yet Virginia's interests in the James River above Richmond, which by means of dams and locks was used in navigation in the early days, and other similarly situated streams, render this question of great importance in the development of these other streams. Even petitioner does not contend that under modern conditions, with improved highways, motor vehicles and railroads, there is any possibility that New River will or can ever be utilized as a highway of commerce. It is but employing a needless and useless, as well as a harmful, *fiction* to preserve Federal jurisdiction to regulate navigation in a stream where there is not, cannot and will not be, in fact, any navigation to regulate. Particularly is this true when the effect of the *fiction* is to hinder, delay and obstruct the States in the development of their water resources, and create doubt and uncertainty as to the status of streams. Legal fictions are invoked only to accomplish a worthy purpose, not to create harm, uncertainty, doubt and confusion. Therefore, even if the stream had been used in interstate commerce fifty or more years ago, this fact would not give Federal jurisdiction over the stream after possibility of such use has long since vanished.

III.

The Federal Government's power to protect waters navigable in interstate commerce is itself an implied power, inferred from the power to regulate interstate commerce. Obviously a new power cannot be implied from that to protect navigable waters where the new power is not included in the power from which the first implied power is inferred. To imply any such new and different power would be to violate the ancient truism that "A stream cannot rise higher than its source." If the new power is not within the Commerce Clause itself, obviously it may not be inferred from a power which itself is inferred from the Commerce Clause. The ultimate result of such a rule would necessarily be unlimited Federal power over every conceivable subject. The power to prohibit obstructions to navigable waters cannot, therefore, be made the basis for a regulatory power over electric generating plants, since this regulatory power is itself not within the Commerce Clause.

IV.

The generation of electrical energy is not interstate commerce, and the Federal Government is not empowered by the Commerce Clause to regulate its manufacture. Commerce does not begin until the manufacture ends, and the exclusive control of the manufacture resides in the State. *Utah Power & Light Company* v. *Pfost,* 286 U. S. 165, 181. The generation of power, even though closely connected with interstate commerce, is distinct therefrom and not a part thereof. It is in legal contemplation, as well as in fact, a local activity. *Coverdale* v. *Arkansas-Louisana Pipe Line Company,* 303 U. S. 604, 611.

But petitioner urges this Court to break down the dividing line between manufacture and commerce as established by past decisions. To do so, however, would be to so extend the Commerce Clause as to destroy substantially all the regulatory police powers of the States and render their governments capable of rendering little service or contribution to the dual system in the sphere of regulation. In fact, it would practically destroy our existing system of government.

The regulatory measures which the Federal Power Commission seeks to exercise over the New River plant, which Virginia objects to, have no relation to navigation in any waters anywhere. They embrace every detail of construction, maintenance and operation of the plant, and their exercise by thise Federal agency would necessarily supersede and exclude State regulation. The Solicitor General's assumption (p. 141) that the Federal Government may *arbitrarily* forbid the movement of the electric energy in interstate commerce is not only not sustained by reason or by the decisions of this Court, but a contrary principle has been established. Such a prohibition must be predicated on a reasonable and constitutional basis. *Hammer* v. *Dagenhart,* 247 U. S. 251, and cases cited therein. Furthermore, the Federal Power Act is not restricted in its application to plants sending the electric energy produced into interstate commerce. If this were the asserted basis of Federal jurisdiction and, if it were sustained as valid, the respondent would, no doubt, confine its distribution to Virginia. Or Virginia might so limit the use by her licensees of the power produced from her properties.

But even if the Federal Government did possess the power to arbitarily prohibit the distribution of the energy in interstate commerce, and if the Act based Federal jurisdiction on the power to prohibit such distribution, it is undoubtedly true that Virginia possesses the absolute power to prohibit the construction of the plant on her river beds. Therefore, aside from Virginia's police power, her property interests entitle her to control the project except in so far as same might interfere with interstate commerce. And this principle likewise applies to petitioner's argument that the Federal power *to prohibit the construction of such a plant in navigable waters* carries with it the power to impose, upon constructions permitted therein, arbitrary conditions unrelated to navigation. Virginia also owns the beds of *navigable* streams and may prohibit such constructions, except those related to navigation. *James* v. *Dravo Contracting Company,* 302 U. S. 134, 147.

But the Federal power to prohibit constructions in navigable waters is merely the power to protect such waters from obstructions. It would be an abuse of that power to refuse consent to the use by the State or her licensees of such waters in such a manner as not to obstruct or interfere with navigation. Concededly, to be sure, the Federal Government has exclusive jurisdiction to *determine* whether a structure is harmful to navigation. But, once it is decided that it is *not* harmful, it is difficult to perceive any principle which would sustain that Government's power to forbid the structure. The real power is to prevent *obstructions* to navigation, *not* harmless or beneficial improvements in the stream. Petitioner's position, in its final analysis, is that *the power to decide what is harmful,* which is in the nature of a judicial power, may be availed of to take away from the States their jurisdiction over the harmless or beneficial structures. It is apparent that such an abuse of a mere power to decide a question would constitute a palpable invasion of State sovereignty and a violation of the reserved powers of the States.

The only power which the Federal Government possesses over *waters* navigable in interstate commerce, which it does not possess over *all the lands* of a State, is the power to regulate, protect and control navigation in said waters. Other actions in these waters, which have no substantial relation to navigation, are internal concerns of the State. In fact, the Federal Government has the identical jurisdiction and power *to prevent acts on land, as well as on water,* where such acts obstruct or interfere with navigation or interstate commerce. *United States* v. *Coombs*, 12 Peters (U. S.) 72, 78, 9 L. ed. 1004, 1007. It would seem that the Federal Government possesses the like power to decide whether any structure *on land* obstructs navigation or commerce, and, if so, to prohibit same. It might be contended with equal plausibility that it can annex similar conditions to a decision not to prohibit a structure on land, even though not located anywhere near a stream of any kind.

The mere fact that rivers which cross State lines may present problems involving the interests of two or three States, does not bring the regulation of hydroelectric plants within the Commerce Clause. The Constitution provides two methods for solving such problems, first, by compacts entered into with the consent of Congress between the States interested; and, second, where the States are unable to reach an agreement, this Court alone has jurisdiction to decide as to their respective rights and interests. *Hinderlider* v. *La Plata Company,* 304 U. S. 92. Certainly it has never been contended that, because there may be disagreement between two or three States as to their respective rights in a stream, this entitles the Federal Government, through a commission, to take over control of it. The proper and only function of the Federal Government in such a case is to settle the dispute through its judiciary department as has always been the practice. Nor can a possible dispute between a few States convert the problem into a national one, as petitioner contends, so as to entitle the Representatives in Congress from forty-eight States to participate in its solution. Nor does petitioner suggest the particular provisions of the Constitution which, it claims, confers on Congress the power or jurisdiction over every so-called "National Problem." But, be that as it may, a specific problem of this nature, involving only a few States, is not a "National Problem."

Furthermore, it is significant that all the States interested in the New River and Kanawha River, beginning with North Carolina, in which the stream rises, have filed briefs, *amici curiae,* protesting against extending Federal jurisdiction over the stream.

Petitioner's atteempt to justify the licensing and capture provisions of the Power Act on the ground that it might have some relation to flood control is not supported by any provisions of the Act.

V.

The scheme of the Federal Power Act is obviously to compel the setting aside, by the lessee, during the fifty year term of the lease, of amortization reserves sufficient to retire the investment of the lessee; that is, to empower the Federal Power Commission to make the project a self-liquidating one. Thus, under the terms of the Act, if administered in this manner, the Federal Government would be empowered to take over the ownership and operation of the project, plant, and the bed and usufruct of the stream without any outlay or payment to the lessee or to Virginia. This procedure for acquiring Virginia's property rights clearly amounts to an absolute confiscation and taking of property without any color of authority therefor. This constitutes a clear violation of the Fifth Amendment. *Wayne County* v. *U. S.*, 252 U. S. 574.

Furthermore, the generation of electrical energy is a proprietary, not a governmental function, unless the energy is generated as a mere incident to the exercise of a governmental function and is in the nature of a by-product resulting from such exercise. *Ashwander* v. *Tennessee Valley Authority*, 297 U. S. 288. The Federal Government is without power to engage in a proprietary activity, yet the Federal Power Act does not restrict its application to cases where the hydroelectric plant is but an incident to the exercise of an essentially governmental function.

The capture provisions of the Act, therefore, not only provide for the taking of Virginia's property without condemnation proceedings in a court of competent jurisdiction and without compensation, but authorize the Federal Government to engage in the proprietary business of generating and distributing electrical energy. Such provisions of the Act are clearly in violation of the property clause of the Constitution. Article IV, Section 3, Clause 2.

VI.

Even if the Federal Government had the power to regulate the generation of electrical energy, Virginia's system of regulating the operation of electric power utilities recognizes no distinction between hydro-electric and carbo-electric generating plants, or as to the principles governing rate charges.

The Federal Act, however, arbitrarily imposes enormous burdens on hydro-electric activities which place them at a distinct disadvantage in contrast with steam plants, which are not under Federal regulation at all. The effect has been to seriously obstruct the development of Virginia's water powers, and completely reverse the policy of encouraging same which Virginia's legislature adopted many years ago.

The regulation of *part* of an electric power company's activities, including rates and other matters, by the Federal Commission and *part* by the State Corporation Commission where their several products are blended into one distribution system obviously complicates and confuses the efforts of the State agency to fix fair and just rates for the whole system or otherwise regulate same. Many questions arise which are most perplexing. Is a different rule of valuation to be applied to the two types of plants, and, if not, is the State Commission to follow the Federal or vice versa? How is the distribution cost to be allocated as between the two types, when the time of day the power is supplied by each greatly effects the value of such power? May the Federal Commission, by the rule it applies for amortization reserves, lay an undue burden on the other plants and as well on the distribution system of the licensee? These are but illustrations of the many problems needlessly created by the regulatory jurisdiction and powers asserted by the Federal Commission.

The only alleged basis for any such radical classification of these two types of generating plants is that the water power plant is claimed to have some relation to interstate navigation. Of course, if the Federal Commission's regulatory activities were confined to those features of the hydro-electric plant which have any reasonable relation to navigation, such as regulation of stream flow, Virginia would cheerfully concede the Federal jurisdiction in that respect. But the mere fact that the method of regulating stream flow might affect navigation furnishes absolutely no basis for applying to other features of water power development not affecting stream flow a different type of regulation from that controlling plants operated by steam. This classification is utterly arbitrary and unreasonable and without any rational basis.

VII.

An immediate decision of the constitutional questions here involved is imperative. The uncertainty of the status of the jurisdiction of the States over their rivers, both navigable and non-navigable, renders it so. These constitutional questions are directly raised by the pleadings in this case and are squarely presented on the record. While the purpose of the Water Power Act was allegedly to protect and conserve the States' water powers, exactly the opposite has been the effect. The development of the latent power in the streams has been retarded and obstructed by reason of burdensome requirements and much of this natural resource has been going to waste for over twenty years as a result of this Federal legislation. Virginia, as well as the other States desiring same, should be free to encourage the utilization of this waste and thereby conserve their coal deposits which are being needlessly exhausted to generate electrical energy.

Immediately after the passage of the Federal Water Power Act there was a prompt protest from New Jersey that its provisions exceeded the Federal powers, and suit was instituted to have the Act declared unconstitutional. This Court held, however, that no justiciable controversy was presented, and declined to decide the question. *New Jersey* v. *Sargent,* 269 U. S. 328. The question is properly presented on this record, however, and the urgent public interest requires its decision.

ARGUMENT

I.

VIRGINIA AND THE UNITED STATES EACH ENJOYS IN THIS COURT AN EQUAL STATUS, AND THERE IS NO PRESUMPTION THAT THE ATTEMPTED EXERCISE BY EITHER GOVERNMENT OF A POWER CONFLICTING WITH ONE ATTEMPTED TO BE EXERCISED BY THE OTHER, IS CONSTITUTIONAL OR PROPER.

It is a very remarkable fact, in the development of the interpretation of the Constitution of the United States, that the great body of the decisions of this Court adjudicating the respective jurisdictions and powers of the State and Federal governments have been rendered in cases in most of which the States were not parties and did not even participate as *amici curiae*. The so-called "states' rights" have been in most instances sought to be interposed by private litigants as a shield to avoid the effect of what to them were undesirable Federal statutes, or have been attacked to avoid State statutes. The validity of many statutes has turned on the facts adduced in the records, but the States had no part in furnishing the evidence. This Court, therefore, in reaching its decisions on these most fundamental of all judical questions, has not had the benefit of the views and arguments of the States themselves. Furthermore, there have developed rules of presumptions of constitutionality, both of State and Federal enactments, which, while appropriate as between either government and a private litigant, cannot be justly or logically applied in a case where there is disagreement or conflict between the State and Federal governments themselves, concerning their respective powers and jurisdictions.

Then, also, there has grown up in the course of this litigation, conducted by private litigants, a doctrine that when acting within its delegated powers the Federal Government is supreme. This is not objectionable, because the same rule applies to the supremacy of the States in the exercise of their reserved powers over internal concerns. But efforts to extend this doctrine to the point where Congress is given the dominant right to determine and decide whether it or a State is possessed of jurisdiction to exercise a power in a particular field are obviously highly objectionable to the States. Virginia feels that she is entitled to, and will receive at the bar of this Court, equal consideration with the Federal Government, and free from any presumptions in favor of the latter's legislative enactments in conflict with hers. While this Court is itself technically a branch of the Federal Government, it was created by the States in Article III (Section 1) of the Constitution, and the jurisdiction conferred thereby (Section 2) contemplates that controversies between a State and the United States shall be decided by this Court. Certainly the States would not have committed their interests to this high tribunal if there had been any thought that the interests of the United States would be deemed paramount to theirs, or that there would be any presumption in favor of the validity of the exercise of a Federal power over that of a State. The application of any such presumption to cases like this would result in a series of decisions, each extending the power beyond the former, which was itself based on a presumption of the validity of the exercise of the Federal power. The ultimate end would be a destruction of State powers *as a matter of right,* with the States exercising their powers *as a matter of grace* and only with the consent of Congress. This, of course, would be a complete reversal of the fundamental concept of the dual system, under which the States reserved their powers as a matter of right and themselves conferred on the Federal Government all the powers it possesses.

And the Constitution bears on its face conclusive evidence that the supremacy and independence of the States was intended to be perpetual. While Congress may propose, only the States may adopt amendments to the Constitution. Furthermore, if a situation should arise in which the States believe their rights have been invaded, they may initiate the calling of a constitutional convention to bring about any necessary amendments (Article V). Such a convention, held under circumstances involving resentment and bitterness at supposed Federal encroachments, would be most unfortunate, and might result in serious curtailment of Federal powers. But the vesting of this ultimate residual power in the States was obviously intended both as a warning against undue Federal encroachments, and as a final protection should the warning be ignored. It is interesting to note that the only curtailment of Federal power, since the foundation of the government,—the adoption of the Eleventh Amendment,—was brought about by the States as a result of the statement in the opinion of

Mr. Justice Wilson, who wrote one of the opinions in the case, that "Georgia is not a sovereign state." *Chisholm* v. *Georgia,* 2 Dallas 419, 457.

Virginia believes it to be the high function and duty of this Honorable Court to preserve the respective present existing fields of State and Federal powers and jurisdiction.

II.

THOUGH THE EVIDENCE DOES NOT SUPPORT THE PETITIONER'S CLAIM THAT NEW RIVER WAS NAVIGABLE IN INTERSTATE COMMERCE A HALF CENTURY OR MORE AGO, YET EVEN IF IT DID, SUCH FACT ALONE WOULD NOT CONFER PERPETUAL JURISDICTION ON THE FEDERAL GOVERNMENT TO REGULATE INTERSTATE NAVIGATION IN THE STREAM WHERE THERE IS NO SUCH NAVIGATION NOW IN SAID STREAM AND NO REASONABLE POSSIBILITY THAT THERE EVER WILL BE ANY SUCH NAVIGATION THEREIN TO REGULATE.

Petitioner's main claim to jurisdiction over the New River project is based on a contention that about sixty or more years ago a few adventurous mountaineers occasionally manoeuvered small flat boats up and down the stream to such an extent as to establish as a fact that at that time, at least, it was a stream navigable in interstate commerce, and that having once acquired that status it retains same until there has been specific action by Congress abandoning it as such. The concurrent findings by the two lower courts, that the facts shown by the evidence do not sustain the petitioner's contention, would, under the rule here applicable, seem to render this question of the legal effect of such ancient navigation, if it had existed, unimportant in this particular case. But there are many other valuable mountain streams in Virginia (as well, perhaps, as in other states) which, unlike New River, were actually used in navigation, with the artificial aid of locks and dams, and which might be considered now as navigable waters of the United States, if the Federal Power Commission's position should be sustained. Navigation in such other streams was practicable in those early days only because there were no highways or other available means of transportation. With the advent of the railroads and the construction and improvement of highways, navigation in these rivers ceased, even long before the coming of motor vehicles. It is quite certain that these other rivers will never be used again for navigation purposes, and cannot possibly be used in the accustomed mode of transportation by water. Yet the Power Commission contends that it possesses plenary jurisdiction over all power projects which Virginia may desire to build, or license the building of, in these streams.

In support of this contention petitioner relies on the decision of this Court in *Economy Light and Power Company* v. *United States,* 256 U. S. 113. An analysis of the case, however, and of the questions actually involved therein, clearly shows that it does not support petitioner's position, though it is true that certain expressions in the opinion, lifted from their setting and context, lend color to petitioner's contentions. It was a suit instituted by the United States under the Rivers and Harbors Act of March 3, 1899, to restrain the construction of a dam, not authorized by the State of Illinois, or by the War Department, in the Desplaines River. The case turned upon the question whether the river was a "navigable water of the United States," within the meaning of said act. There was no contention that there had been any actual navigation in the river since about 1820, or a period of about a hundred years. The issue of fact was whether in its natural state the stream was navigable in interstate commerce during the years 1787 to 1804. The reason the inquiry related to those long past years was because it was found by the lower courts that, due to artificial diversions of water from the stream and artificial obstructions, such as dams and bridges, the river was not navigable in its condition existing at the time of the suit, but that, if it was navigable in its natural state during the years 1787 to 1804, the river acquired then a status as a "navigable water of the United States," and *this status was preserved by special acts of Congress* relating to the then territories in the Northwest, from which the States of Indiana, Illinois and others were carved. The opinion of the Circuit Court of Appeals points out that it had been previously held in the *Montello Case*, 20 Wall. 430, 444, that to preserve the natural character of all these rivers leading into the Mississippi and St. Lawrence was the purpose of the Ordinance of 1787 declaring them to be free to the public. That opinion also quotes section 9 of the Act of Congress of May 18, 1796, as follows: "And be it further enacted that all navigable rivers within the territory to be disposed of by this Act shall be deemed to be and remain public highways," and also section 6 of the Act of Congress of March 26, 1804: "That all navigable rivers, creeks and waters, within the Indiana Territory, shall be deemed to be and remain public highways." And the Circuit Court further said:

> "The trial judge found, as the record shows, that there is no evidence of actual navigation within the memory of living men, and therefore there would be no present interference with navigation by the building of the proposed dam. But it was held that the evidence shows the Desplaines *a navigable water of the United States, preserved as such by the legislation of Congress.*" (Italics supplied. 256 Fed. 798.)

And the Circuit Court of Appeals, after discussing the legal tests of navigability to be applied to determine whether the Des Plaines was a navigable water of the United States in the period 1787-1804, stated its conclusions as follows:

> "Under these authorities it seems clear that the Desplaines river, having been used as an interstate highway of commerce from 1673 to 1825 in the only kind of commerce then existing, is to be deemed of navigable capacity and *a navigable stream within the Ordinance of* 1787 *and the acts of Congress of May* 18, 1796, *and March* 26, 1804, by which Congress specifically took jurisdiction over navigable streams and *declared that they should forever remain public highways.*

> * * *" (Italics supplied. *Economy Light and Power Company,* 256 Fed. 792, 804.)

On the appeal to this Court, the opinion of Mr. Justice Pitney reviewed these acts of Congress and said:

> "There can be no doubt that the waters of the Chicago-Des Plaines-Illinois route 'and the carrying places between the same' constituted one of the routes of commerce intended by the ordinance, and the subsequent acts referred to, to be maintained as common highways. It did not make them navigable in law unless they were navigable in fact, but declared the public rights therein so far as they were navigable in fact; * * *" (256 U. S. at p. 120.)

And the opinion further points out (p. 123) "that the Ordinance of 1787 recognized 'carrying places' as a part of a navigable waterway."

The opinion then states the Court's conclusion:

> "We concur in the opinion of the circuit court of appeals that a river having actual navigable capacity in its natural state, and capable of carrying commerce among the states, is *within the power of Congress to preserve for purposes of future transportation,* even though it be not at present used for such commerce, and be incapable of such use according to present methods, either by reason of changed conditions or because of

artificial obstructions. * * *" (Italics supplied. 256 U. S. at p. 123.)

Petitioner evidently relies on what is said later in the same paragraph of the opinion:

> "The Des Plaines river, after being of practical service as a highway of commerce for a century and a half, fell into disuse, partly through changes in the course of trade or methods of navigation, or changes in its own condition partly as the result of artificial obstructions. In consequence, it has been out of use for a hundred years; but a hundred years is a brief space in the life of a nation; improvements in the methods of water transportation, or increased cost in other methods of transportation, may restore the usefulness of this stream; since it is a natural interstate waterway, it is within the power of Congress to improve it at the public expense; and it is not difficult to believe that many other streams are in like condition, and require only the exertion of Federal control to make them again important avenues of commerce among the states. *If they are to be abandoned, it is for Congress, not the courts, so to declare.* The policy of Congress is clearly evidenced in the Act of 1899, and, in the present case at least, nothing remains but to give effect to it." (Italics supplied: 256 U. S. at p. 124.)

This Court concurred in the opinion of the Circuit

Court of Appeals, which held, as above quoted, that the Desplaines River's status as a navigable water of the United States *was preserved by the provisions of the Acts of* 1796 *and* 1804, which Acts related only to the Northwest territory. The portion of the opinion of this Court last quoted, petitioner contends was meant to apply, not specifically to the Desplaines River, and "many other streams in like condition" in the Northwest territory covered by the 1796 and 1804 Acts, which were the only streams under consideration by this Court, but that this Court intended to hold that every stream in every State in which interstate navigation ever was conducted, is perpetually within the jurisdiction of Congress to regulate navigation, though all navigation has been abandoned for generations.

But if it had been the intention of this Court to hold that a stream's navigable status was preserved under the common law, there would have been no reason to refer to or adjudicate the effect of the 1796 and 1804 Acts at all. Such Acts would have been wholly unnecessary to preserve the navigable status of the Desplaines River. The statement in the opinion with reference to the rivers under consideration that "If they are to be abandoned, it is for Congress, not the Courts so to declare," obviously was intended to apply only to those streams the status of which had been *preserved by Congress.* This Court was merely saying, in effect, "Congress has preserved the status of these rivers; if that status is to be abandoned, it is for Congress not the Courts so to declare."

It is inconceivable that this Court could have intended to hold that it lay within the power of a few adventurous mountaineer boatmen, by manipulating their crude craft in New River, to impose upon that turbulent stream a paramount servitude in favor of interstate navigation, for which it was never suitable, and deprive the States of the power to use the stream for generating electrical energy, to which it is ideally adapted.

Nor does the opinion in this case furnish any basis for the Power Commission's contention as to rivers like the James in Virginia, which has not been navigable above tidewater at Richmond for over half a century, that the Rivers and Harbors Act and the Federal Power Act are to be given retroactive effect so as to perpetually preserve said rivers as subject to the jurisdiction of the Federal Government to regulate navigation, when there is not, will not and cannot be any navigation therein to regulate. Such a jurisdiction over imaginary but non-existent and impossible navigation can be but a legal fiction, and, where it serves no useful purpose, but operates only to throttle the States in the development of their water powers, it is a most harmful fiction, and one which, Virginia earnestly submits, this Court will not invoke. It could just as logically be applied to every mountain path or old mud road over which interstate transportation of persons or commodities ever was carried on.

Obviously fictions should not be made the basis of determining the constitutionality of the exercise of governmental powers. As said by Mr. Justice Black, in referring to the feudal fiction of complete ownership of the whole by each of two tenants by the entirety:

> "The constitutionality of an exercise of the taxing power of Congress is not to be determined by such shadowy and intricate distinctions of common law property concepts and ancient fictions." (*United States* v. *Jacobs,* 306 U. S. 363, 369.)

III.

THE FEDERAL GOVERNMENT'S POWER TO PROTECT NAVIGABLE WATERS IN INTERSTATE NAVIGABLE STREAMS IS ITSELF IMPLIED FROM THE POWER TO REGULATE INTERSTATE COMMERCE, AND IT CANNOT BE MADE THE BASIS OF INFERRING ANY ADDITIONAL REGULATORY POWER, THE EXERCISE OF WHICH DOES NOT CONSTITUTE A REGULATION OF INTERSTATE COMMERCE.

Petitioner argues that because the Federal Government has the implied power to protect navigable waters from harmful obstructions, and to prohibit the erection of such structures in such waters, it has the further power to attach to its consent not to prohibit a harmless structure from being built, license conditions that amount to a regulation of intrastate business. The obvious result of the argument is the implication of a power, not within the Commerce Clause, from said power to prohibit, which itself is inferred from the Commerce Clause.

It is an accepted maxim of the law, with respect to the implication of powers, that "a stream cannot rise higher than its source." The source of the power is the Commerce Clause, which is restricted to interstate commerce, but petitioner would have the "stream" of inferred powers rise so high as to embrace intrastate matters not within the Commerce Clause. Petitioner's contention that inferences may be built on inferences in this manner furnishes an ideal illustration of the evil cautioned against by Mr. Justice Frankfurter in his dissenting opinion in *Texas* v. *Florida,* 306 U. S. 398, 434, when he said:

> "But legal doctrines have, in an odd kind of way, the faculty of self generating extension."

It is quite obvious that a continued application of the principle of inferring new powers from powers themselves inferred would lead to ultimate powers having no more connection with the power to regulate interstate commerce than the "cow with the crumpled horn" of Mother Goose fables had with the "house that Jack built."

IV.

REGULATION OF THE MANUFACTURE OF ELECTRIC ENERGY IN THE MANNER PROVIDED FOR BY THE FEDERAL POWER ACT IS NOT A REGULATION OF INTERSTATE COMMERCE, AND THE EXERCISE OF ANY SUCH POWER BY THE FEDERAL GOVERNMENT, OVER THE PROTEST OF THE STATE IN WHICH THE PLANT IS LOCATED, IF SUSTAINED UNDER THE COMMERCE CLAUSE, WOULD AMOUNT TO A DESTRUCTION OF THE DUAL SYSTEM OF AMERICAN GOVERNMENT AS ESTABLISHED BY, AND IN VIOLATION OF, THE UNITED STATES CONSTITUTION.

The Federal Power Commission asserts its jurisdiction to control and regulate, not only the construction of a waterpower project affecting interstate navigation in so far as it affects stream flow (which Virginia concedes), but all other details of the project, even though having no possible relation to navigation. One of the grounds it relies on is that every plant which sends its products into interstate commerce is a business "affecting interstate commerce" and for that reason the Federal Government has jurisdiction to regulate it down to the smallest details of plant construction and operation. Petitioner does not dispute the fact that the decisions of this Court have uniformly established that the business of manufacturing lies within the field of exclusive State regulatory power; *Cornell* v. *Coyne,* 192 U. S. 418; that the mere fact that the product moves in interstate commerce is immaterial, since "commerce succeeds to manufacture and is not a part of it," *United States* v. *E. C. Knight Company,* 156 U. S. 1, 12; and that the generation of electrical energy is manufacturing within this principle and is not a part of interstate commerce, *Utah Power & Light Co.* v. *Pfost,* 286 U. S. 165, 181; *Coverdale* v. *Arkansas-Louisiana Pipe Line Co.,* 303 U. S. 604, 611. But petitioner, in effect, requests this Court to overrule these decisions and so readjust the fields of Federal and State regulatory jurisdiction as to transfer to the Federal field plenary power to completely regulate any manufacturing business the products of which, in whole or in part, move in interstate commerce. The manufacture of any such product, petitioner, in effect argues, *affects* interstate commerce, and the Federal Government may fully regulate anything *affecting* same.

The far-reaching effect of transferring to the federal field of regulatory jurisdiction every business, manufacturing or otherwise, which remotely affects interstate commerce is obvious. The owner of a vegetable garden or a person raising domestic fowls this principle would bring within the federal jurisdiction because the effect of raising these products for the owner's consumption would be, to that extent, to lessen the demand for such commodities brought into the State, or increase the quantities sent out into other states. If the jurisdiction of the Federal Government under the Commerce Clause is to be determined and tested purely on theory, there is no limitation to the extent to which it may be carried by extending it to every act *affecting* interstate commerce, and the obvious result would be the destruction of the functions of the states in the regulatory field. That any such result as this is clearly in violation of the fundamental principles of our dual system of government is recognized in all of the decisions of this Court. See the recent *Schecter case,* 295 U. S. 495, 546. The rule is clearly established that the affirmative, direct and positive regulatory powers of the Federal Government are confined to those acts, matters and transactions which actually constitute a part of the stream and flow of interstate commerce and do not embrace matters merely *affecting* such commerce. In addition to this direct, positive regulatory power over interstate commerce itself, however, this Court has recognized the power of Congress to *Protect* interstate commerce when there is a direct and substantial *threat of injury* to it by exercising a *negative* *protective regulatory power* over matters which are themselves wholly intrastate. In order to justify the exercise of this protective power, however, this Court has emphasized that "the justification for the exercise of federal power should clearly appear". *Florida* v. *United States,* 282 U. S. 211; *National Labor Relations Board* v. *Jones & Laughlin Steel Corp.,* 301 U. S. 1. In the latter case, this Court said:

> "* * * Although activities may be intrastate in character when separately considered, if they have such a close and substantial relation to interstate commerce that their control is essential or appropriate to protect that commerce from burdens and obstructions, Congress cannot be denied the power to exercise that control. *A. L. A. Schecter Poultry Corp.* v. *United States, supra.* Undoubtedly the scope of this power must be considered in the light of our dual system of government and may not be extended so as to embrace effects upon interstate commerce so indirect and remote that to embrace them, in view of our complex society, would effectually obliterate the distinction between what is national and what is local and create a completely centralized government. *Id.* The question is necessarily one of degree. As the Court said in *Board of Trade* v. *Olsen, supra* (262 U. S. p. 37, 67 L. ed. 850), repeating what had been said in *Stafford* v. *Wallace,* 258 U. S. 495, 66 L. ed. 735, *supra:* 'Whatever amounts to more

> or less constant practice, and threatens to obstruct or unduly to burden the freedom of interstate commerce is within the regulatory power of Congress under the commerce clause and it is primarily for Congress to consider and decide the fact of the danger and meet it.' ". (81 L. ed. 893, 911-2.)

The case of *Consolidated Edison Co.* v. *National Labor Relations Board,* 305 U. S. 197, involved the question of the regulatory power of the National Labor Relations Board over the business of the Consolidated Edison Company and its relations to its employees. The Edison Company did exclusively an intrastate business, but the jurisdicton of the Labor Relatons Board was sustained as the exercise of a federal power to *protect* interstate railroads and other large interstate businesses *from the injury* which would follow should the operations of the Edison Company be interrupted by threatened labor difficulties or strikes. The character of the regulatory power which was being exercised is shown from the following statement of Mr. Justice Reed, concurring in part:

> "It is agreed that the 'fundamental purpose of the Act is to protect interstate and foreign commerce from interruptions and obstructions caused by industrial strife.' * * *" (305 U. S. 197, 245, 83 L. ed. 148.)

Even so ardent an advocate of the centralization of federal power as Chief Justice Marshall said in *McCullough* v. *Maryland,* 4th Wheat. 316, 403:

> "No political dreamer was ever wild enough to think of breaking down the lines which separate the States, and of compounding the American people into one mass."

The principles contended for by petitioner would sustain the exercise of the direct regulatory power over intrastate business and obviously would produce this disasterous result. Petitioner does not even contend that the power it seeks to exercise is for the purpose of protecting interstate commerce from threatened injury. In fact, it is impossible to conceive of any greater threat to interstate commerce from the generation of electricity in a hydro-electric plant than in a steam plant except, of course, regulation of stream flow.

Aside from the power conferred by the Act upon the Federal Commission to exercise regulatory control over the stream flow in order to protect navigation or navigable waters from obstruction or injury, it is not contended by petitioner that the other regulatory powers embraced within the terms of the Federal license have any relation to navigation or the protection of navigable waters. The petitioner argues, however, that the Federal Government possesses the power to arbitrarily forbid the construction of any plant in navigable waters, and the failure to exercise this protective power, or the decision of the Federal Government not to exercise same, operates as a legal permit or license that same may be constructed. The further argument is then advanced that from this power to prevent the construction is implied the further power to embrace in the so-called license or permit any and every regulatory provision which the Federal Government may desire to exercise over the project, its construction and operation, even though same has no relation to stream flow or to the protection of navigation or navigable waters.

It is clear, however, that the decisions of this Court have established the principle that the Federal Government's jurisdiction and powers over navigable waters are restricted entirely to the regulation of navigation and the protection of such waters from harmful obstructions, and that, while the stream is subject to the servitude in favor of navigation and interstate commerce, the states themselves possess all other governmental jurisdiction over said streams. Thus, in the case of *James* v. *Dravo Contracting Company*, 302 U. S. 134, 140, this Court held West Virginia's ownership of the bed of the Kanawha and Ohio Rivers, *which are navigable waters of the United States*, "was subject to the power of Congress to use the lands under the streams 'for any structure which the *interest of navigation* in its judgment may require'." (Italics supplied.) And the court further held that the actual occupancy of the bed of the stream by the United States for the construction of a dam *in the interest of navigation* did not operate to vest title to the lands in the United States, "But as the occupation was simply the exercise of the dominant right of the Federal Government (*Gibson* v. *United States, supra*, 276) the servient title continued as before. * * * The Solicitor General conceded in his argument at bar that *the State of West Virginia retained its territorial* *jurisdiction over the river beds* and we are of the opinion that this is the correct view." (Italics supplied.)

The exercise of the Federal Government's protective power, under the decisions of this Court, may not be used in such a manner as to invade the general field of the reserve powers of the states. To extend this protective negative power to the extent of the positive affirmative regulation of an intrastate activity would be in clear violation of the principles established in the case of *National Labor Relations Board v. Jones & Laughlin Steel Corporation,* above quoted from.

This Court has never held that the Federal Government possesses the power to prohibit structures in navigable waters of the United States *which are not hurtful or harmful to the navigable capacity of such waters, or to navigation therein.* The only power of the Federal Government over such harmless structures is that of deciding whether they are in fact harmless. Once it has been decided that they are not hurtful or harmful to navigation or the capacity of navigable waters, there is no legitimate power in the Federal Government to prevent the construction of same. It would be an obvious abuse of the Federal Government's power to decide this question, to exact, as a condition to a favorable decision, *the additional power to regulate matters in no way related to navigation or the protection of such waters.*

What has been said above with respect to the use of the power to decide whether a proposed structure is harmful to navigation or navigable waters applies equally to petitioner's argument that the alleged power of the Federal Government to prohibit the sending of the electrical energy into other States justifies exacting, as the price of permitting same, the right to exercise powers over intrastate commerce and other matters local to Virginia. It is clear that the employment of the power to exclude matter from interstate commerce, such as lottery tickets and harmful commodities, is an exercise of *protective* regulatory powers of Congress, and cannot be applied arbitrarily, and, while there may be differences of opinion whether the exclusion is in reality a bona fide exercise of the power to regulate commerce, as was held not to be the case in *Hammer* v. *Dagenhart,* 247 U. S. 261, yet the principle itself is well established, as stated in *Ashwander* v. *Tennessee Valley Authority,* 297 U. S. 288, that "The Congress may not 'under the pretext of executing its powers, pass laws for the accomplishment of objects not entrusted to the government.' Chief Justice Marshall in *McCulloch* v. *Maryland,* 4 Wheat. 316, 423. The Government's argument recognizes this essential limitation." (297 U. S. 326.)

Petitioner has not pointed out anything in interstate commerce which needs protection from, or would be protected by, the excluding of this electrical energy from such commerce.

But this Court has expressly and emphatically decided against petitioner's contentions that Congress may impose conditions on the right to engage in interstate commerce and has stated the reasons therefor so logically and convincingly that there can be no doubt as to the correctness of the conclusion reached. In *Howard* v. *Illinois Central Railroad,* 207 U. S. 463, 502 (*Employer's Liability* Cases), Mr. Chief Justice White said:

> "3. It remains only to consider the contention which we have previously quoted, that the act is constitutional although it embraces subjects not within the power of Congress to regulate commerce, because one who engages in interstate commerce thereby submits all his business concerns to the regulating power of Congress. To state the proposition is to refute it. It assumes that, because one engages in interstate commerce, he thereby endows Congress with power not delegated to it by the Constitution; in other words, with the right to legislate concerning matters of purely state concern. It rests upon the conception that the Constitution destroyed that freedom of commerce which it was its purpose to preserve, since it treats the right to engage in interstate commerce as a privilege which cannot be availed of except upon such conditions as Congress may prescribe, even although the conditions would be otherwise beyond the power of Congress. It is apparent that if the contention were well founded it would extend the power of Congress to every conceivable subject, however inherently local, would obliter-

> ate all the limitations of power imposed by the Constitution, and would destroy the authority of the states as to all conceivable matters which, from the beginning, have been, and must continue to be, under their control so long as the Constitution endues." (207 U. S. at p. 502.)

It is further worthy of note that the powers exercised by the Federal Government in the *Ashwander* case, *supra,* related to properties over which the government had acquired full title to the dam site with all riparian rights. Respondent seeks to sustain the validity of the regulatory provisions of the Federal license, and their application to Virginia owned properties, upon the ground that rivers running through two or more states constitute *"National Resources,"* and that the license provisions which extend beyond the protection of navigation are intended to assure conservation and regulation of such *"National Resources."* No authority whatever is cited to sustain the proposition that the properties in streams of this type are national resources, nor is any notice taken by petitioner of the many decisions of this Court to the contrary. In the recent case of *Hinderlider* v. *LaPlata River Company,* 304 U. S. 92, this Court clearly held, in an opinion delivered by Mr. Justice Brandeis, that the property rights in such streams belong exclusively to the States through which they run, and that the several States interested may by compact entered into, with the consent of Congress, settle and determine between themselves the nature and extent of their respective rights therein. In the event that the States interested in the LaPlata River involved in that suit had not been able to agree upon their respective rights, the opinion points out that, "The extent of the existing equitable right of Colorado and of New Mexico in the LaPlata River could obviously have been determined by a suit in this Court, as was done in *Kansas* v. *Colorado,* 206 U. S. 45, 51, in respect to the rights in the Arkansas River and in *Wyoming* v. *Colorado,* 259 U. S. 419, in respect to the Laramie." (304 U. S. 104-5.) And this Court further held that the fact that such a compact is assented to by Congress does not render the same a "treaty or statute of the United States." *Id.* page 109.

It is clear, therefore, that the property rights and governmental control over streams, except in so far as such control relates to navigation and the protection of navigable waters, reside in the States, and these property rights can be converted into so-called "National Resources" only by the granting by the States of the said property rights so held, or by constitutional amendment.

The petitioner seeks to link the regulatory powers vested in the Federal Commission with possible future flood control activities of the Federal Government. However, the Federal Water Power Act contains not a word of flood control, and the regulatory powers conferred on the Commission, except in so far as they relate to the control of stream flow for the protection of navigation, *have no more relation to flood control than they do to navigation.* Furthermore, while Section 10(c) of the act empowers the Power Commission to regulate the operation of the plant so "as not to impair navigation," there is no word authorizing regulation of the operation so as to avoid floods. If there were such provisions, they would constitute an obviously unconstitutional appropriation of the State's properties for a purpose not within the commerce clause or any other delegated power. The petitioner's argument in its final analysis is that these streams flowing through two or more States have by some magical development of the Constitution become burdened with a federal servitude to flood control in addition to the servitude for navigation. The argument would seem to be that States must refrain from any development of the latent water powers in their rivers, should the Federal Commission so decide, on the chance that Congress might see fit at some distant date to inaugurate a program of flood control, and that such developments as are made must be operated not primarily to develop electrical energy, but that this purpose must be subordinated to flood control. There would be few, if any, developments of these streams under such imposed conditions, and in the meantime this latent water power must be allowed to go to waste and the States are powerless to prevent it, so petitioner claims. This plan advocated by the Federal Commission, it characterizes as a program of *conservation of resources.* On the contrary, it is in reality a program for the *wasting* of the water resources of the States because nothing is truer than the old maxim, "The mill will never grind again with water that is passed."

It is utterly inconsistent with the petitioner's argument that the regulatory powers sought to be exercised by the Power Commission in this case, which have no relation to controlling the flow of a stream, could possibly affect flood control. Said Commission has already approved the project, and has tendered a license with the objectionable regulatory provisions in addition to retaining the power to regulate the stream flow for the protection of navigation. This latter power neither Virginia nor the respondent has objected to.

The petitioner argues that streams of this nature constitute national problems and that it is necessary for the Federal Government to preempt the property rights and governmental regulatory powers of the States over their streams in order to protect other States from flood damage. In view of this contention, it is quite remarkable that forty-one of the forty-eight States of the Union have joined in filing briefs in this Court protesting against the taking of their jurisdiction and property rights to provide this Federal "protection". In fact, there is no more desire manifested on the part of the States for this "protection" than was indicated by the governments of Belgium, Norway and Denmark for their "protection" by Hitler from the government of the British Empire.

It is further true that many rivers which would come within the Power Commission's views as to what are navigable streams, such as the James River in Virginia, flow directly into the sea and do not traverse any other State. Nevertheless, if they were navigable waters, they would be within the jurisdiction of the Federal Power Commission and no element of "protecting" other States from flood damage could possibly enter into the control which said commission would seek to exercise over a stream of this type. It is clear, therefore, that the Act itself does not contemplate any such flood control activity as the basis for the exercise of the regulatory powers here objected to.

Petitioner argues that the Federal Government could itself construct a project in aid of navigation and flood control, and, therefore, it may properly regulate any structure erected by private individuals which could possibly be utilized for that purpose by the Federal Government. However, if the Federal Government erected such a structure, it would be necessary to acquire the property rights involved and erect thereon a structure, at its own expense. This is an essentially different activity from undertaking to dedicate and, in effect to confiscate, the properties of the States, without their consent, to such a purpose. It is equally true that the Federal Government may acquire lands for the purpose of constructing forts, arsenals, post offices, and other needful Federal buildings within the States, but this certainly cannot be construed as empowering the Federal Government to regulate any structure whatsoever, erected on any lands which might be suitable for any one of those purposes. In so far as the regulation of navigation, and other activities in interstate commerce is involved, the Federal Government possesses exactly the same power on land as on water. In the case of *United States* v. *Coombs,* 12 Peters (U. S.) 72, 78, 9 L. ed. 1004, 1007, referring to the jurisdiction of Congress to exercise the power to regulate navigation and commerce, this Court said:

> "It does not stop at the mere boundary line of a State; nor is it confined to acts done on the water, or in the necessary course of the navigation thereof. It extends to such acts done on land which interfere with, obstruct, or prevent the due exercise of the power to regulate commerce and navigation with foreign nations, and among the States.'"

It is clear, therefore, that the fact that the project here involved has been constructed in a river in no way increases the regulatory jurisdication of the Federal Government with respect to same.

Furthermore, the mere fact that the stream may traverse two or more States does not convert the problem into a national one. It is on the contrary one which the States can, and here evidence a desire to, control through compacts in cases where an agreement can be reached, or have their rights adjudicated by this Court where same is necessary.

V.

THE PROVISIONS OF THE FEDERAL POWER ACT WHICH AUTHORIZE THE FEDERAL GOVERNMENT TO TAKE OVER THE PROPERTY OF VIRGINIA, CONSISTING OF THE BED OF THE RIVER AND THE USUFRUCT OF THE STREAM FLOW, WITHOUT COMPENSATION TO THE STATE, VIOLATE ATRICLE 4, SECTION 3, CLAUSE 2, AS WELL AS THE FIFTH AMENDMENT OF THE CONSTITUTION.

The Federal Power Commission is empowered by the Act to exercise such complete control over a water power project as to bring about, through compelling the setting aside of amortization reserves, the absolute ownership of same by the Federal Government at the expiration of the term of the Commission's lease, without any cost whatever or any payment therefor. The Act, therefore, obviously contemplates that the Federal Government will "capture" the bed of the stream and usufruct of the stream flow, which are the property of Virginia, without any compensation to Virginia therefor, and without condemnation or other legal proceedings therefor. "* * * The water power, the right to convert it into the electrical energy thus produced, constitute property * * *." *Ashwander* v. *United States*, 297 U. S. 288, 330.

Property of a State or its political subdivisions already devoted to a public use, *i.e.,* highway purposes, was held by the Court of Claims to constitute "private property" within the meaning of the Fifth Amendment and when taken by the United States compensation must be made therefor. 53 Ct. Cl. 417. This decision was affirmed in a *per curiam* memorandum by this Court. *United States* v. *Wayne County, Kentucky,* 252 U. S. 574. See also to the same effect, *Town of Bedford* v. *United States* (C. C. A. Mass.), 23 Fed. (2d) 453; *United States* v. *Wheeler Township* (C. C. A. Minn.), 66 Fed. (2d) 977.

The taking of Virginia's property, without compensation, as the Federal Power Commission insists here it is empowered by the Act to do and intends to do, would be a clear violation of the compensation clause of the Fifth Amendment.

The said taking would also violate the property clause (Article 4, Section 3, Clause 2); the last sentence of which provides that "nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or any particular state." Petitioner's contention that the Commerce Clause should be so construed as not only to prejudice, but to completely extinguish, Virginia's claims to ownership of the bed of the stream and the usufruct of the stream flow, clearly violates the above quoted provision of the Constitution.

But, aside from these *prohibitions* against the taking of Virginia's property, there is no *affirmative* grant in the Constitution to the Federal Government of any *power* to take same. Neither the Commerce Clause, nor any newly conceived source of Federal power, such as is advanced by petitioner, that interstate rivers are a "National Problem," can possibly be held to justify any such taking.

VI.

EVEN IF THE FEDERAL GOVERNMENT HAD THE POWER TO REGULATE THE MANUFACTURE OF ELECTRICAL ENERGY, THE PROPOSED FEDERAL REGULATION OF THE CONSTRUCTION AND OPERATION OF HYDRO-ELECTRIC GENERATING PLANTS, WHERE THERE IS NO SUCH REGULATION OF PLANTS OPERATED BY STEAM, IS ARBITRARY AND UNREASONABLE, IS NOT BASED ON ANY PROPER CLASSIFICATION, AND WOULD RESULT IN NEEDLESSLY CONFUSING THE EFFORTS OF VIRGINIA TO REGULATE THE INDUSTRY AS A WHOLE.

Regulatory legislation of Congress, under the Commerce Clause, must not be arbitrary or unreasonable in imposing burdensome requirements or it will be lacking in due process; although, when the State does not appear to protest against same, the existence of facts affording a rational basis for the regulation is to be presumed, unless facts proven or known to exist preclude such presumption. ***United States* v. *Carolene Products Company,*** 304 U. S. 144, 152-4. But, where the State does appear to protest against such legislation as an invasion of its field of domestic regulation, such a presumption will not be raised, as Virginia has endeavored to show in the discussion of Point I, ***supra.***

The complete regulation of hydro-electric plants, which the Federal Power Commission seeks to establish here as within its jurisdiction, while the regulation of carbo-electric plants is left to the States, furnishes an excellent example of the confusion which must result in attempts to impose complete uniform Federal regulation of any type of manufacturing activity within the several States, and proves the wisdom of the framers of the Constitution in preserving local control over these local matters. If the asserted jurisdiction of the Power Commission were sustained, we would have in Virginia a situation in which the Virginia Commission would be charged with the responsibility of fixing intrastate rates for the licensee's entire output of electrical energy, including that of its steam plants, all of which would be fed into one distribution system. The Federal Commission would be engaged at the same time in regulating the type of construction and maintenance, the setting aside of amortization reserves and various other features relating to the generation of part of the power. It is obvious that the Virginia Commission would be confronted with many perplexing problems, such as the basis of valuation for rate making purposes to be applied to the two types of plants, the weight to be given the Federal Commission's valuations, if any are made, the allocations to the respective plants of the distribution costs and of the value of the energy supplied by them at different times of the year and at different hours of the day or night, with correspondingly different effects, because of daily peak loads, seasonal demands, etc., upon the prices realized by the licensee therefor; the burdensome effect, if any, which the Federal Commission's regulatory actions may have on other units of the licensee's system; the disparity between values assessed for purposes of local taxation and those fixed by the Federal Commission. These and many other problems would seriously hamper and obstruct, if not completely nullify, Virginia's efforts at intelligent and reasonable regulation of her electric power utilities. Obviously, too, these problems present a most discouraging picture to prospective developers of Virginia's streams.

It seems manifest that any *uniform* licensing system which would apply alike to such projects in every navigable stream must be arbitrary on its face. Some sites in some streams, by virtue of the volume of flow and the extent of the fall, may be sufficiently valuable to carry the burdens imposed by the Federal Power Act, while others obviously are not. These latter, if the petitioner's contentions are sustained, must remain undeveloped, and their latent powers the State will be compelled to permit to go to waste. It is difficult to perceive how, upon analysis, the Federal Power Act can be termed a "conservation" measure, when the real effect is to compel *the consumption of coal,* a nonperishable natural resource, and the *wasting of water* power, which cannot be preserved after the water has passed over the power site.

It is earnestly submitted, therefore, that, even if the Federal Government had the power to regulate the generation of electrical energy, the mere fact that some hydro-electric plants are constructed in navigable waters, where the operation of the plant will not injuriously affect navigation or the navigable capacity of said waters, furnishes no rational basis for imposing thereon burdensome regulatory requirements which have no relation to navigation or said navigable capacity, but which serve only to place such plant at a distinct competitive disadvantage in contrast with carbo-electric plants.

VII.

VIRGINIA IS ENTITLED TO A DECISION NOW ON THE CONSTITUTIONALITY OF THE CAPTURE CLAUSE, AS WELL AS THE OTHER LICENSE PROVISIONS OF THE ACT, SO AS TO ENABLE HER TO PROCEED WITH THE DEVELOPMENT OF HER MANY VALUABLE STREAMS.

In addition to New River, Virginia owns many streams which are susceptible of valuable water power development, but neither the State herself, nor private investors would be likely to embark upon such an enterprise in view of the doubts and uncertainties which flow from the Federal Water Power Act. Doubtless a similar situation exists in all of the States having similar streams.

While the cloud cast by the Water Power Act and the assertions of jurisdiction thereunder made by the Federal Power Commission would doubtless not be sufficient alone to constitute a justiciable controversy, nevertheless, the constitutional validity of the objectionable regulatory provisions contained in said act are directly raised by the pleadings in this case and are squarely presented to the Court for decision. The Federal Commission itself is being greatly embarrassed by the uncertainties of the present situation, as appears from the statement of the Solicitor General filed April 5, 1940, in opposition to the continuance of this case, where it is said:

> "The Commission informs us that something over half of the 200 largest hydroelectric plants are now operated without a license from the Commission."

As heretofore pointed out, the obstruction of the development of water power is not only not a conservation of natural resources, but results in a needless waste of valuable energies which are daily being dissipated with the passage of the waters over desirable dam sites. Virginia should be free to encourage the utilization of the energies latent in these waters, and thereby conserve valuable coal deposits which are being inexcusably exhausted to generate the electrical energy which could readily be secured from these streams.

An effort was made by the State of New Jersey within a brief time after the passage of the Federal Power Act, to have same declared unconstitutional by this Court on the ground that its provisions constituted an obstruction of the development by the State of its water power, but this Court held that there was no allegation or fact that the State was about to engage in the development of such power, or that the Federal Power Commission intended to apply the Act in such a way as to encroach upon the State's property rights, and, therefore, that the question was a moot one and this Court was without jurisdiction to entertain the bill. (*New Jersey* v. *Sargent,* 269 U. S. 328.) Since that time a number of attempts have been made to secure a final determination of the status of the various streams in the respective States, but without success. That this confusion exists and has existed for many years is attested by the remarks of Representative Cordell Hull of Tennessee, with reference to his bill to amend the Federal Water Power Act, in which he said:

> "It was in these circumstances that an earnest and hurried effort was put forth with the object of bringing about an improved and more desirable power policy on the part of the Federal Government. The Federal water power act of 1920 was the outcome. The States having defaulted for generations, and most of them having no laws or agencies for carrying out their functions and preserving their rights, the natural result was that most of the laws, regulations, and practises relating to water power and its development were inserted indiscriminately and in mass in the Federal water power act. No serious attempt was made to classify and set forth the respective rights, functions, and duties of the Federal Government and the States. The assumption seemed to be that since the States were wholly inactive, and since water power development should not be longer delayed, the Federal Government, willingly in some instances and unwillingly in others, felt justified in assuming *at least for the time being* the authority to perform all needful functions —*both State and Federal*—pertaining to the supervision and control of water power development.
>
> "During the years that have followed *a few of the States have awakened and endeavored to assert some of their responsibilities and*

> *rights.* The fact that the Federal power act, as stated, *blended and confused State and Federal functions and rights,* has greatly complicated the general movement of water power development. Misunderstanding and controversy relating to the construction of Federal water power law, and especially to the problem of just what constitutes the responsibilities and functions of the States, *has tended to slow down and handicap* the most important steps and efforts to carry forward our system of power development." (Cong. Rec. Vol. 70, Pt. 1, p. 996) (Dec. 21, 1928). (Italics supplied.)

The petitioner has, for some reason not understandable to Virginia, requested this Court to defer decision upon the question of the constitutionality of the capture clause which would authorize the taking over by the Federal Government, without compensation, of the property rights of the several States in their respective streams. It is obvious that, if this question is allowed to remain undecided *until the expiration of the fifty year license period,* as petitioner requests, the result will be a most serious and utterly unnecessary obstruction to the development of the water power, not only of Virginia, but of the other States as well.

For these and other obvious reasons, therefore, Virginia earnestly asks and insists that all these constitutional questions which are obstructing the development of her natural water power resources may be decided by this Honorable Court in this case.

CONCLUSION

It is submitted that the concurrent decisions of the courts below should be affirmed upon the ground that the regulatory provisions having no relation to controlling the flow of the stream so as not to impair navigation, are unconstitutional as constituting an invasion of the regulatory field reserved to the States.

In the event, however, that the Court should determine that said provisions are within the regulatory field of the Federal Government, the decisions below should nevertheless be affirmed, upon the grounds stated in the opinions of said courts, that the project is not constructed in waters navigable in interstate commerce, and that the operation of same will not have any substantial effect upon any such waters or upon interstate commerce.

Respectfully submitted,

ABRAM P. STAPLES,
Attorney General of Virginia.

FILE COPY

Office - Supreme Court, U. S.
FILED
OCT 12 1940
CHARLES ELMORE CROPLEY
CLERK

No. 12

In the Supreme Court of the United States

October Term, 1940

United States of America, petitioner
v.
Appalachian Electric Power Company, respondent

BRIEF ON BEHALF OF STATES OF:

ALABAMA
ARIZONA
CALIFORNIA
COLORADO
CONNECTICUT
DELAWARE
FLORIDA
IDAHO
ILLINOIS
IOWA
KANSAS
KENTUCKY
LOUISIANA
MAINE
MARYLAND
MASSACHUSETTS
MICHIGAN
MINNESOTA
MISSOURI
MISSISSIPPI
NEBRASKA
NEVADA
NEW HAMPSHIRE
NEW JERSEY
NEW MEXICO
NEW YORK
NORTH CAROLINA
NORTH DAKOTA
OHIO
OREGON
PENNSYLVANIA
RHODE ISLAND
SOUTH DAKOTA
TENNESSEE
UTAH
VERMONT
VIRGINIA
WASHINGTON
WYOMING

AS AMICI CURIAE.

TABLE OF CONTENTS

PAGE
I. STATEMENT 2
II. QUESTIONS OF LAW INVOLVED 3
III. INTERESTS OF THE STATES 4
IV. THE FACTUAL ISSUES AND THEIR LEGAL ASPECTS 5
  (a) The Issues 5
  (b) Criteria of Navigable Waters 6
V. LIMITATIONS ON FEDERAL CONTROL OF POWER DEVELOPMENTS LOCATED IN NON-NAVIGABLE STREAMS 8
  A. Source and Extent of Federal Power in Respect of Navigability in Interstate Commerce 8
  B. Federal Government Has No Jurisdiction Over Non-Navigable Waters Per Se 10
  C. Beneficial Effect on Navigable Capacity of No Significance 13
  D. Limitations on Federal Control Where a Project on a Non-Navigable Stream Adversely Affects a Navigable Water of the United States 14
  E. License Conditions 15
VI. LIMITATIONS ON FEDERAL CONTROL OF POWER DEVELOPMENTS LOCATED IN NAVIGABLE STREAMS 21
  A. Federal Power to Protect Navigable Streams by Prohibiting Erection of Structures Therein Does Not Include Power to Exact Extraneous Conditions as a Consideration for Permitting the Erection of Such Structures 21
  B. License Conditions 24
VII. PETITIONER ATTEMPTS TO ACCOMPLISH THROUGH THE COURTS WHAT SHOULD BE ACCOMPLISHED ONLY BY AMENDMENT OF THE FEDERAL CONSTITUTION 25
VIII. SIGNIFICANCE OF THE LEGAL ISSUES IN THE NEW RIVER CASE IN RELATION TO THE POWERS OF THE STATES AND THEIR CONTROL OVER THEIR INTERNAL RESOURCES IN GENERAL 28

TABLE OF CASES

PAGE

Brewer-Elliott Oil & Gas Co. v. *United States*, 260 U. S. 77 7

California Oregon Power Co. v. *Beaver Portland Cement Co.*, 295 U. S. 142 13

Daniel Ball, The, 10 Wall. 557 .... 6, 7

Electric Bond & Share Co. v. *Commission*, 303 U. S. 419 19

Frost Trucking Co. v. *R. R. Commission*, 271 U. S. 583 22

First Employer's Liability Case, 207 U. S. 463 22

Gibbons v. *Ogden*, 9 Wheaton 1 9

Gilman v. *Philadelphia*, 3 Wall. 713 9

Helvering v. *Davis*, 301 U. S. 619 25

Kansas v. *Colorado*, 206 U. S. 46 24

Labor Board v. *Jones & Laughlin*, 301 U. S. 1 14

Leovy v. *United States*, 177 U. S. 621 .... 7, 8

Linder v. *United States*, 268 U. S. 5 23

McGuinn v. *High Point*, 217 N. C. 449 .... 5, 20

Montello, The, 20 Wall. 430 6

Port of Seattle v. *Oregon & Washington R. Co.*, 255 U. S. 56 .... 14, 24

The Daniel Ball, 10 Wall. 557 .... 6, 7

The Montello, 20 Wall. 430 6

United States v. *Appalachian Electric Power Co.*, 23 F. Supp. 83; 107 F. (2d) 769 .... 5, 21

United States v. *Coombs*, 12 Pet. 72 9

United States v. *Cress*, 243 U. S. 316 6

United States v. *Holt State Bank*, 270 U. S. 49 7

United States v. *Lowden*, 308 U. S. 225 23

United States v. *Oregon*, 295 U. S. 1 7

United States v. *Rio Grande D. & I. Co.*, 174 U. S. 690 .... 6, 9, 10, 11, 12, 13

United States v. *River Rouge Improvement Co.*, 269 U. S. 411 .... 14, 24

United States v. *Utah*, 283 U. S. 64 7

Wisconsin v. Illinois, 278 U. S. 367 24

Yadkin County v. *High Point*, 217 N. C. 462 5

CONSTITUTION AND STATUTES

PAGE

Constitution of the United States 20, 25, 27
  Art. I, Sec. 8, cl. 3 .... 7, 8, 9, 23, 28
  10th Amendment 4

Public Utility Act of 1935—
  Sec. 4a 19
  Sec. 5 19

Rivers and Harbors Act of 1899 .... 2, 4, 27
  Sec. 9 .... 2, 21
  Sec. 10 2

United States Code—
  Title 16, Sec. 803(a) 16
  Title 16, Sec. 803(c) 16
  Title 16, Sec. 803(d) 16
  Title 16, Sec. 803(e) 16
  Title 16, Sec. 803(f) 17
  Title 16, Sec. 807 17
  Title 16, Sec. 812 17

Water Power Act 2, 4, 14, 20, 21, 24
  Sec. 14 .... 17, 18
  Sec. 19 17

In the Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

UNITED STATES OF AMERICA, PETITIONER

v.

APPALACHIAN ELECTRIC POWER COMPANY, RESPONDENT

BRIEF ON BEHALF OF STATES OF:

ALABAMA
ARIZONA
CALIFORNIA
COLORADO
CONNECTICUT
DELAWARE
FLORIDA
IDAHO
ILLINOIS
IOWA
KANSAS
KENTUCKY
LOUISIANA
MAINE
MARYLAND
MASSACHUSETTS
MICHIGAN
MINNESOTA
MISSOURI
MISSISSIPPI
NEBRASKA
NEVADA
NEW HAMPSHIRE
NEW JERSEY
NEW MEXICO
NEW YORK
NORTH CAROLINA
NORTH DAKOTA
OHIO
OREGON
PENNSYLVANIA
RHODE ISLAND
SOUTH DAKOTA
TENNESSEE
UTAH
VERMONT
VIRGINIA
WASHINGTON
WYOMING

AS AMICI CURIAE.

I

STATEMENT

The Federal Government, the petitioner, instituted this suit in the District Court of the United States for the Western District of Virginia in May, 1935, to enjoin Appalachian Electric Power Company, the respondent, from constructing and maintaining a water power project in the New River near Radford, Virginia, unless it procures a full-condition license from the Federal Power Commission under the Federal Water Power Act, or, in the alternative, to require the removal of the project as violative of the Rivers and Harbors Act of March 3, 1899, and the Federal Water Power Act.

The petitioner contended that the construction and operation of this project without such a Federal license was unlawful under Section 9 of the Rivers and Harbors Act of 1899, because allegedly New River was navigable in fact in interstate commerce or, if it were not navigable in fact in interstate commerce, then the construction and operation of the project was nevertheless unlawful under Section 10 of the Rivers and Harbors Act of 1899 because allegedly the construction and operation of the project would impair the navigable capacity of the Kanawha River into which New River flows, the head of navigation on the Kanawha being approximately 160 miles downstream from the project in question. It similarly contended that the construction and operation of the project without such a license violated the Federal Water Power Act because allegedly New River was navigable in fact in interstate commerce, and if not so navigable, then because allegedly the construction and operation of the project would impair the navigable capacity of the Kanawha River and thereby affect the interests of interstate commerce.

The District Court found:

(a) That New River is not a navigable water of the United States either at the site of the project or elsewhere in its course, and

(b) That the construction of the project will not obstruct the navigable capacity of the Kanawha River or any navigable waters of the United States and that the operation of the project in any normal, rational or probable method of operation will not obstruct or impair the navigable capacity of the Kanawha River or any navigable water of the United States and will not affect the interests of interstate commerce.

It entered a final decree dismissing the bill.

The Circuit Court of Appeals, 4th Circuit, after a reexamination of the evidence concurred in the findings of the District Court and affirmed the decree.

II

QUESTIONS OF LAW INVOLVED

The broad questions of law sought to be presented by petitioner have to do fundamentally with the extent of Federal jurisdiction in relation to that of the respective States. Specifically they are (1) whether the Federal Government has authority to impose any license whatsoever with respect to a water power project located on a non-navigable stream in one of the several States (and, if so, under what circumstances and how conditioned), and (2) whether, even in the case of a project located on a navigable stream, the Federal Government would have any authority to require a license containing conditions beyond those reasonably related to the protection of navigation.

There are involved further the questions as to whether (and, if so, to what extent) under the facts of this case there are applicable either the Rivers and Harbors Act of 1899 or the Federal Water Power Act of 1920 (as amended in 1935).

III

INTERESTS OF THE STATES

It is submitted that it is a well-settled principle that, where no public land or other Federal property is involved and where the interests of navigation are not involved, the control of the use of flowing water and the rights therein of riparian owners are subject only to the laws of the several States. However, the assertion of jurisdiction by the Federal Power Commission over non-navigable streams and its attempt to impose a license and certain license conditions for water power developments thereon, and indeed its like requirements as to water power developments of navigable streams, directly challenge both that long-established principle and the rights of the States as guaranteed by the Tenth Amendment of the Constitution of the United States.

Thus, the position of the petitioner in this case is in complete and irreconcilable conflict with the constitutional powers and proprietary rights of the States in relation to the development of their own natural resources and particularly in relation to the development of their water power resources.* The States assert the full and complete right to provide, if they choose, for private development of their water power re-

---

*In fact the courts of the State of North Carolina have found that there is an "incompatibility between the *obligations assumed*" by a municipality (a subdivision of the state) as licensee, "in agreeing to abide by all of the conditions imposed in the license issued by the Federal Power Commission and its *duties* as a municipality." *Yadkin County* v. *High Point*, (April 17, 1940) 217 N. C. 462, 465; and that a municipality exceeds "its authority in applying for and accepting the license from the Federal Power Commission." *McGuinn* v. *High Point*, 217 N. C. 449, 455.

sources and to secure for themselves the benefit of the resulting tax resources. On the other hand, they assert the right, if they so elect, to take over or make such developments themselves and to secure for themselves the profits or other benefits of public development.

The position of the United States in the instant case would strike down both the right of the States to determine whether their water power resources shall be publicly or privately developed and also the right of the States to take for themselves the benefits of whichever form of development they elect to adopt.

However, it is plain that the profound significance and implications of the instant case are not limited to the relationship of the States to the control of water power development, important as that aspect is to many States, but rather may extend to the control by the States over other of their internal affairs.

IV

THE FACTUAL ISSUES AND THEIR LEGAL ASPECTS

(a) The Issues

The factual issues sought to be raised by petitioner are

(1) Whether New River is navigable in fact in interstate commerce; /and

(2) Whether, if it is not navigable in fact in interstate commerce, the construction and operation of this water power project will substantially impair the navigable capacity of any navigable water of the United States.

In view of the fact that the evidence in the record, as referred to in the opinions of both courts below (23 F. Supp. 83, 89-98, 101-104; 107 F. (2d) 769, 780-789), shows that the findings of the lower court were supported by substantial evidence, we take for granted that the findings of fact of the United States District Court, concurred in by the Circuit Court of Appeals, will not be disturbed by this Court.

(b) Criteria of Navigable Waters

Contrary to petitioner's suggestion (Petition for Writ of Certiorari, p. 16), that the courts below revised long-settled rules as to the test of navigability, it seems clear that both courts below followed the long-settled Federal test of navigability (23 F. Supp. 83, 98-100; 107 F. (2d) 769, 780).

In this connection any suggestion that the Federal Power Act definition of navigable waters could be effective to enlarge or broaden the scope of the judicial definition, prescribed by this Court, may be summarily dismissed, for Congress cannot by statutory definition or legislative fiat make navigable waters of the United States of any streams which are not actually navigable in interstate commerce in their natural state. In point is the statement of this Court in *United States* v. *Cress,* 243 U. S. 316, 322, that:

> "Many state courts, including the Court of Appeals of Kentucky, have held, also, that the legislature cannot, by simple declaration that a stream shall be a public highway, if in fact it be not navigable in its natural state, appropriate to public use the private rights therein without compensation. * * *
>
> "This Court has followed the same line of distinction."

Indeed, it is our very earnest contention that the Federal test as to what are navigable waters of the United States, as set forth in decisions of this Court in such cases as *The Daniel Ball,* 10 Wall. 557, 563; *The Montello,* 20 Wall. 430, 442; *United States* v. *Rio Grande D. & I. Co.,* 174 U. S.

690; *Leovy v. United States,* 177 U. S. 621; *Brewer-Elliott Oil & Gas Co.* v. *United States,* 260 U. S. 77; *United States* v. *Holt State Bank,* 270 U. S. 49; *United States* v. *Utah,* 283 U. S. 64; and *United States v. Oregon,* 295 U. S. 1, is at least broad enough for the protection of any navigable capacity that is real or is useful for the purposes of interstate commerce.

Any broadening of the definition and any taking in of waters not clearly navigable according to that test can, in our view, result only in an unwarranted extension of Federal jurisdiction into what was intended to be the domain of the several States. We bear in mind that, after all, under the Commerce Clause it is only interstate and foreign *commerce* which is to be regulated by the Federal Government.

Thus, the petitioner's contention (Pet. Brief, pp. 73-76) in the instant case that an intrastate stream or lake is a navigable water of the United States merely because it has been used in carrying for a short distance by boat a commodity which was subsequently shipped over an interstate railroad, is plainly untenable. That theory would in practical effect convert every intrastate navigable water into a navigable water of the United States. The very case, viz., *The Daniel Ball,* which petitioner cites and from which it quotes in support of its contention, squarely refutes that contention. Thus waters which are capable of navigation on intrastate reaches only are at most navigable waters of a State. In order to constitute navigable waters of the United States, they must, in addition to the other requirements of the Federal test of navigability-in-fact,

> "form * * * by themselves, or by uniting with other waters, a continued highway over which commerce * * * with other States * * * is conducted by water." (10 Wall. 557, 563.)

That waters which fail to comply with the foregoing prescription are at most navigable waters of the State is made unequivocably clear by the more complete definition from which the foregoing excerpt is taken:

> "And they constitute navigable waters of the United States within the meaning of the acts of Congress, in contradistinction from the navigable waters of the States, when they form in their ordinary condition by themselves, or by uniting with other waters, a continued highway over which commerce is or may be carried on with other States or foreign countries in the customary modes in which such commerce is conducted by water." (10 Wall. 557, 563.)

The position of the States with regard to Federal jurisdiction over water power developments will be discussed, first, in relation to projects on non-navigable streams such as the case at bar, and, secondly, in relation to projects on navigable streams.

Our discussion hereinbelow proceeds on the premise that no Federal land or other Federal property is involved.

V.

LIMITATIONS ON FEDERAL CONTROL OF POWER DEVELOPMENTS LOCATED IN NON-NAVIGABLE STREAMS.

A. Source and Extent of Federal Power in Respect of Navigability in Interstate Commerce

Clearly the sole source of Federal authority over navigable waters is in the Commerce Clause of the Constitution. Thus, in referring to "navigable waters of the United States," this Court in 1900 in *Leovy* v. *United States,* 177 U. S. 621, stated at page 632:

> "The power of Congress to regulate such waters is *not expressly granted* in the Constitution, but is a power *incidental* to the express 'power to *regulate commerce with* foreign nations, and among the several States and with the Indian tribes.'" (Italics supplied.)

In this connection it is pertinent to note the several steps taken by this Court in deducing from the Commerce Clause the nature and extent of the Federal power in respect of waters navigable in interstate commerce. When this Court in 1824 in *Gibbons* v. *Ogden,* 9 Wheaton 1, held in effect that the power of Congress over *commerce* includes like power over *navigation,* it was merely giving expression to the fact that the part was comprehended within the whole. In that same case, however, Chief Justice John Marshall defined the power "to regulate" as meaning the power "to prescribe the rule by which commerce is to be governed" (p. 196). But, when in 1836 in *United States* v. *Coombs,* 12 Pet. 72, this Court held in effect that the power to *regulate* navigation (commerce) includes the power to *protect* navigation (p. 78), it did so and could do so only, we submit, by drawing an *inference.*

Again, when in 1865 in *Gilman* v. *Philadelphia,* 3 Wall. 713, this Court in effect held that Federal power under the Commerce Clause includes not merely protection of *navigation* (*commerce*) but also protection of *navigable waters* and furthermore of the *navigable capacity* of navigable waters, there were involved *further inferences.*

The need for recognizing the facts concerning, and the reasonable limits of extension of, Federal power by *inference* is even greater in the cases of *non-navigable* streams. This is the more apparent when one bears in mind, as above shown, that any Federal power over navigable streams *per se* (as distinguished from *commerce* upon such streams) exists merely by *inference.* Apparently these considerations were fully in mind when this Court in 1899 rendered its decision in *United States* v. *Rio Grande Dam & Irrigation Company,* 174 U. S. 690, and in its opinion, as pointed out hereinbelow, expressed the limitations upon Federal authority in respect of non-navigable streams.

We are prompted to suggest that, if it should be held that the Federal power in respect of navigation goes *beyond* protection of the navigable capacity of navigable waters, such a holding will have extended *beyond* the limits of reasonable inference. Obviously, each step in that direction involves corresponding curtailment of the rights, responsibilities and power of the States.

B. FEDERAL GOVERNMENT HAS NO JURISDICTION OVER NON-NAVIGABLE WATERS PER SE.

There is a real and definite difference between the limitations on Federal control over projects located in navigable waters and the limitations on Federal control over projects in non-navigable waters.

Control by the Federal Government over the erection of structures outside the physical limits of navigable waters is restricted to the prevention of any impairment of the navigable capacity of a navigable water of the United States by acts done outside of those waters. Such control includes no power to prevent or regulate the erection of structures in non-navigable streams, but merely the incidental power to prevent any substantial interference with navigable capacity elsewhere.

In short, the Federal Government has no plenary power to decide whether structures in non-navigable waters may or may not be erected. *United States* v. *Rio Grande Dam & Irrigation Co.,* 174 U. S. 690. Therefore the Federal Government has no power to make such a structure unlawful by reason of the fact merely that it has no Federal license or permit.

Therefore, such incidental power as the Federal Government possesses cannot be the basis of any right to require a Federal license, for the mere erection of a structure in a non-navigable stream. Instead, the Federal Government's power with regard to such structures is limited to the right to restrain any substantial impairment of the navigable capacity of navigable waters through acts performed in the non-navigable waters.

The nature and scope of Federal power in the forgoing respects were fully discussed and the limitations thereon were clearly set forth by this Court in the *Rio Grande* case, *supra:*

> "Of course, when such proceedings are instituted it becomes a question of *fact* whether the act sought to be enjoined is one which fairly and *directly tends to obstruct (*that is, *interfere* with or *diminish)* the navigable capacity of a stream. It does not follow that the courts would be justified in sustaining *any* proceeding by the Attorney General to restrain *any* appropriation of the upper waters of a navigable stream. The question *always* is one of *fact,* whether such appropriation *substantially interferes* with the navigable capacity *within the limits* where *navigation* is a *recognized fact."* (P. 709.) (Italics supplied.)

In the course of the opinion in that case this Court, for purpose of illustrating its thought in this connection, said:

> "The Hudson River runs within the limits of the State of New York. It is a navigable stream and a part of the navigable waters of the United States, so far at least as from Albany southward. One of the streams which flows into it and contributes to the volume of its waters is the *Croton River,* a *non-navigable stream.* Its waters are taken by the State of New York for domestic uses in the city of New York. *Unquestionably* the State of New York has a *right to appropriate* its waters, and the United States *may not question* such appropriation, unless thereby the navigability of

> the *Hudson* be disturbed. On the other hand, if the State of New York should, even at a place above the limits of navigability, by appropriation for any domestic purposes, diminish the volume of waters, which, flowing into the Hudson, make it a navigable stream, to *such an extent* as to *destroy its navigability,* undoubtedly the jurisdiction of the National Government *would arise* and its power to restrain such appropriation be unquestioned; and within the purview of this section it would become the right of the Attorney General to institute proceedings to restrain such appropriation." (P. 709.) (Italics supplied.)

The opinion shows that the inquiry of this Court in that case was addressed to the question of the extent of the Federal Government's right to interfere (p. 701). The limitation which this Court held to exist upon the Federal power to protect navigable waters from injury, by reason of acts done in non-navigable tributaries, was concisely stated in its decree. That decree did not grant an injunction against the allegedly unauthorized construction of the dam but ordered an inquiry as to

> " * * * whether the *intended acts* of the defendants in the construction of a dam and in appropriating the waters of the Rio Grande will *substantially diminish* the navigability of that stream within the *limits of present navigability,* and if so, to enter a decree restraining those acts to the extent that they will so diminish." (P. 710.) (Italics supplied.)

From the foregoing it is clear that, in the case of a project situated in a non-navigable stream, there is no power in the Federal Government to prohibit its construction merely by reason of its being so situated and that likewise there is no power to impose any license. Furthermore, it is clear that, where there exists or will certainly exist interference with the navigable capacity of some water of the United States, the control by the Federal Government is limited to the prohibition of that actual or intended use of the project which

> "*substantially* interferes with the navigable capacity *within the limits* where navigation is a recognized fact." (Italics supplied.) (174 U. S. at 709.)

Of course, it necessarily follows that, if the foregoing be specifically applied to the instant case on the basis of the facts as found by the courts below, viz., that the project will not interfere with navigation anywhere, there is no power in the Federal Government to require a license and hence no question as to the validity of license conditions.

C. Beneficial Effect On Navigable Capacity of No Significance

The petitioner's suggestion (Pet. Brief, p. 100, 123) that even a *beneficial* effect on the navigable capacity of a navigable water of the United States, by reason of a project located on a non-navigable stream, affords a basis for Federal jurisdiction, is untenable.

Contrary to petitioner's assertion (Pet. Brief, p. 123), the *Rio Grande* decision above quoted is plainly to the effect that such control as the Federal Government has in the premises is predicated upon proof that the project will "substantially interfere with the navigable capacity" of any downstream water where navigation is a recognized fact, and is further to the effect that even in such case jurisdiction may be asserted only to the extent of the threatened diminution or interference. Thus it is clear from that case that the only effect over which the Federal Government has any control is one which is *adverse*. See also *California, Oregon Power Co. v. Beaver Portland Cement Co.*, 295 U. S. 142, 158-9, which reviews the scope and effect of the *Rio Grande* decision, and *Labor Board* v. *Jones & Laughlin,* 301 U. S. 1, 31-32.

From the foregoing it seems clear that any benefit or possibility of benefit to a navigable water of the United States by reason of a water power project located on a non-navigable stream would not afford any basis for the exercise of any Federal control in connection with such project.

D. LIMITATIONS ON FEDERAL CONTROL WHERE A PROJECT ON A NON-NAVIGABLE STREAM ADVERSELY AFFECTS A NAVIGABLE WATER OF THE UNITED STATES.

Although the facts of the instant case apparently do not bring into the foreground the limitations on Federal control where a project on a non-navigable stream adversely affects a navigable water of the United States, yet, in order to make our position clear, we consider that subject.

We believe it has been demonstrated in the foregoing that, even in such a hypothetical case of adverse effect by reason of a project in a non-navigable water, there is no power in the Federal Government to require a license for the project, but rather only a continuing right to do whatever is necessary, but only whatever is necessary, to prevent that adverse effect. Moreover, it seems manifest that, even if, contrary to our view, the Federal Government might require some license for such a project on a non-navigable stream (where there is some adverse effect upon a navigable water), the license conditions would be limited to such as are necessary to prevent interference with navigation. In other words, the conditions must have a real and substantial relation to the protection of navigation. *U. S.* v. *River Rouge Improvement Co.,* 269 U. S. 411, 419; *Port of Seattle* v. *Oregon and Washington R. Co.,* 255 U. S. 56, 63.

Any contention that the imposition of license conditions not related to the protection of navigation may be imposed by reason merely of a right to require some sort of license or consent or, as petitioner suggests (Pet. Brief, pp. 129-131), that the power to refuse to consent carries with it the power to consent upon any condition whatsoever, is utterly without foundation. Of course, such a contention would hinge first of all upon the existence of a right which we deny, viz., a right in the Federal Government to require a license for a project in non-navigable waters. But, even if that right did exist, it would not serve to justify the attaching of conditions not relevant to the protection of navigation. Indeed, even in the case of navigable waters the admitted power of the Federal Government to require consent for the erection of structures therein affords no warrant for the imposition of irrelevant license conditions. (See pp. 21-24, *infra.*)

Under the Federal Power Act many, indeed most, of the license conditions provided for therein are mandatory (at least so far as concerns projects located in navigable waters of the United States). Such a license contains all of the conditions which the Federal Power Commission is required or considers itself authorized to impose (excepting license conditions, not here involved, relating solely to the use of public or Indian lands or dams or other Federal property). Therefore, we refer to such a license as a full-condition license. It is such a license which was tendered the respondent by the Federal Power Commission and the imposition of which is prayed for by petitioner in its bill of complaint. (See Exhibit 131, R. 2663.)

With the foregoing in mind, we examine some of those license conditions for the purpose of ascertaining whether or not they really are related to the protection of navigation.

E. License Conditions

The conditions of the full-condition license purport to give the Federal Power Commission authority of such scope that the plan of improving and developing a waterway may be *controlled for the development and utilization of water power* and for other beneficial uses, *including recreational purposes* (16 U. S. C. 803—(a)). Other conditions require the licensee to maintain the project works in a condition adequate for its efficient operation in the development and transmission of power, to make necessary renewals and replacements and to establish and maintain adequate depreciation reserves for such purpose, which reserves are to be determined by the Federal Power Commission, not by the State concerned. Also the licensee is required to conform to such rules and regulations as the Commission may prescribe for the *protection of life, health and property* (16 U. S. C. 803—(c)). Can such conditions properly be said really to relate to the protection of navigation? Are they not rather invasions of the reserved power of the States?

Again, the licensee is required to establish and maintain amortization reserves out of surplus earned after the first twenty years and accumulated in excess of a specified rate of return, such reserves, in the discretion of the Commission, to be held until the termination of the license or applied from time to time in reducing the net investment. The rate of return and portion of surplus earnings to be paid into the reserves are required to be set forth in the license (16 U. S. C. 803-(d)). Thus they are determined by the Federal Power Commission, not by the respective States. Other conditions require the licensee to pay fees to the United States and provide for the expropriation to the United States of excess profits (to be determined by the Federal Power Commission, not by the States) until the respective States shall see fit to make provision to prevent excess profits or to expropriate the same to themselves (16 U. S. C. 803-(e)). Do any of these provisions really relate to the protection of navigation?

Still another condition requires a downstream licensee or any unlicensed owner benefiting by any headwater improvement to reimburse a licensee of a headwater improvement for such part of the annual charges, including interest, maintenance and depreciation thereon, as the Federal Power Commission may deem equitable and to pay the Federal Government the costs, as may be determined by the Federal Power Commission, of making such determination, and to pay the United States similar charges when the latter makes any like headwater improvement (16 U. S. C. 803-(f)).

Section 19 (16 U. S. C. 812) provides for Federal Power Commission regulation of even intrastate services and rates in the immaterial event a given State has not seen fit to provide for such regulation.

Section 14 of the Act (16 U. S. C. 807) permits the Federal Government to take over the project property at the expiration of the license period upon the payment of the lesser of two amounts, the fair value or the net investment. Thus the Federal Government would by contract obtain the right to take over a power project which it does not have the constitutional authority to condemn or even to acquire or itself to construct. In effect, the Federal Government would be implemented to engage within a State in a business in excess of the Federal Government's constitutional authority.

Thus, quite aside from what appears to amount to the taking of property without just compensation, it is clear that there would be encroachment upon the sovereign power of the State. Water power development within the borders of the State would come under the jurisdiction of the Federal Power Commission or even be owned by the Federal Government. In any case such power developments would be regulated and controlled by the Federal Power Commission or the Federal Government regardless of whether the policy and plan of regulation and control were in harmony with those of the State in point.

Another outcome of the provision for the taking over of the power project property by the Federal Government affects vitally the tax resources of the several States. In private hands, the property is subject to the full extent of the taxing power of the State, whereas when taken over by the Federal Government the property would be removed from the tax rolls of the local communities and the State, with resultant hardship upon the remaining property owners.

It is with regard to this provision of Section 14 of the Act, for the taking over of the project property by the Federal Government, that petitioner in effect proposes that this Court shall defer decision (Pet. Brief, pp. 135, 137-9). However, it is not clear why the petitioner should prefer to have decision reserved with regard to this particular license provision and not with regard to the others. Certainly it is a provision in which the States, in some cases as to the fact itself and in all cases as to the principle involved, are vitally interested and as to which they are strongly of the view that the question should be settled now.

Looking at the matter from the standpoint of the pleadings, it is patent that the petitioner is moving this Court to compel the respondent to accept a full-condition license, including this very condition regarding the right of the Federal Government to take over the property. Indeed, one of the three "Questions Presented" in the petition for the writ of certiorari is

> "Whether the licensing provisions of the Federal Power Act are constitutional * * * " (Petition, p. 2).

And petitioner makes no suggestion that the license provision regarding the taking over of the property should be treated any differently than the other license conditions. Further, in its "Reasons for Granting the Writ," petitioner stresses the questions involved in this very license condition (Petition, p. 17).

Thus, provided any license at all be necessary, the very bill of complaint and the "Questions Presented" to this Court place this license provision, like the remaining license conditions, squarely before this Court at the present time. Indeed, to defer decision upon this very important license condition would appear to be contrary to the policy of this Court to decide all of the material issues properly before it.

Electric Bond & Share Company v. *Commission*, 303 U. S. 419, cited by petitioner (Pet. Brief, p. 138), contains nothing to the contrary of that for which we here contend. In that case there was no endeavor on the part of petitioner, through its Securities and Exchange Commission, to compel more than the filing of a mere statement of registration under the Public Utility Act of 1935 (Sections 4 (a) and 5). To be sure, it was conceivable that in due course, following the registration, that Commission might endeavor to impose conditions of that Act other than the one requiring registration. But that was purely speculative. In the present case, on the contrary, the Federal Power Commission is seeking to compel the acceptance of a license containing all of the terms and conditions of the Federal Power Act. There is nothing speculative or uncertain on that point and, we submit, the issue is properly raised as to the validity of each and every condition which petitioner now seeks to compel the respondent to accept.

It seems too obvious for argument that such conditions and provisions for acquisition of the project by the Federal Government have no relation to the protection of navigation or to any regulation of any interstate commerce conducted on navigable waters. Rather they unmistakably and egregiously encroach upon the power reserved to the States. Indeed, they point the way to further encroachments, in respect of other industries or business activities, with increasingly serious repercussions and disadvantageous effects upon the powers and the tax resources of the States. This provision, contractual in form, whereby the Federal Government is sought to be empowered to acquire a business, is plainly outside of Federal power under the Constitution, and is equally contrary to the fundamental policy of maintaining the sovereignty of the individual States and preserving their control over their natural resources.

The conditions cited in the foregoing by no means exhaust those to which States may properly object as involving attempted aggrandizement of Federal power and corresponding encroachment upon the reserved powers and domain of the States*—all, it is submitted, without sanction in the Constitution which binds the States into a Union.

In short, it is obvious that many of the provisions contained in the full-condition license, which, under the terms of the Federal Power Act must be imposed (at least in the case of a power project located in a navigable stream), have no such relationship to the protection of the commerce on the navigable waters of the United States as would bring them within the scope of the constitutional power of the Federal Government.

Petitioner's contention (Pet. Brief, pp. 120-121) that the Government may license a private person "as an agent for the federal purposes," to build the project upon such terms and conditions as in the opinion of Congress the public interests may require, is unsound because it is predicated upon an erroneous premise. The erroneous premise is that the Government itself could build "this very project" (Pet. Brief, pp. 120, 135). The Federal Government itself has no right to build this project which is solely a water power project, located on a non-navigable stream. Contrary to petitioner's assertion (Pet. Brief, p. 135), the Court below did not recognize any such right in the Federal Government. It was only for a *proper* Federal purpose that the Court below recognized the right of the Federal Government to acquire the project upon payment of just compensation.**

---

* With reference to the encroaching effect of certain of the license conditions see the recent case of *McGuinn* v. *High Point*, 217 N. C., 449, paragraph 5 on 453, 457.

VI

LIMITATIONS ON FEDERAL CONTROL OF POWER DEVELOPMENTS LOCATED IN NAVIGABLE STREAMS.

It is of course settled that, in the exercise of its power to protect navigation, Congress may prohibit the erection in navigable waters of the United States of any structure which it holds to constitute an obstacle to navigation. However, contrary to petitioner's assertion (Pet. Brief, p. 129, 131), the existence of such authority in Congress does not constitute or carry with it power to couple, with its needed consent, conditions which are unrelated to the protection of navigation.

A. Federal Power to Protect Navigable Streams by Prohibiting Erection of Structures Therein Does Not Include Power to Exact Extraneous Conditions as a Consideration for Permitting the Erection of Such Structures.

It is true that the Rivers and Harbors Act of 1899, Section 9 thereof, requires the consent of Congress for the placing of any structure in navigable waters, and it also seems clear that the Federal Water Power Act was intended to be the vehicle for the giving of this congressional consent. Nevertheless, and contrary to petitioner's contention, it does not follow that, as a condition of congressional consent, the Federal Government may impose a kind of a license and exact conditions which extend its powers beyond those delegated to it.

** The pertinent portion of the Court's opinion is as follows:

"If the United States wishes to acquire the property for a *proper* Federal purpose, it must pay just compensation therefor." (107 F. (2d) 769, 798.) (Italics supplied.)

To state the matter somewhat differently, neither the Federal nor a State Government may, by exacting conditions for its consent, thereby obtain for itself additional and non-constitutional powers. This principle has been recognized in various cases decided by this Court. In *Frost Trucking Co.* v. *R. R. Commission,* 271 U. S. 583, 593-4, this Court said:

> "It is not necessary to challenge the proposition that, as a general rule, the state, having power to deny a privilege altogether, may grant it upon such conditions as it sees fit to impose. But the power of the state in that respect is not unlimited; and one of the limitations is that *it may not impose conditions which require the relinquishment of constitutional rights.*" (Italics supplied.)

And similarly in the *First Employers' Liability case,* 207 U. S. 463, 502-3:

> "3. It remains only to consider the contention which we have previously quoted, that the act is constitutional, although it embraces subjects not within the power of Congress to regulate commerce, because one who engages in interstate commerce thereby submits all his business concerns to the regulating power of Congress. To state the proposition is to refute it. It assumes that because one engages in interstate commerce he thereby endows Congress with power not delegated to it by the Constitution, in other words, with the right to legislate concerning matters of purely state concern. It rests upon the conception that the Constitution destroyed that freedom of commerce which it was its purpose to preserve, since it treats the right to engage in interstate commerce as a privilege which cannot be availed of except upon such conditions as Congress may prescribe, even although the conditions would be otherwise beyond

> the power of Congress. It is apparent that if the contention were well founded it would extend the power of Congress to every conceivable subject, however inherently local, would obliterate all the limitations of power imposed by the Constitution, and would destroy the authority of the States as to all conceivable matters which from the beginning have been, and must continue to be, under their control so long as the Constitution endures."

No principle contrary to the foregoing is to be found in the case of *United States* v. *Lowden,* 308 U. S. 225, (cited by petitioner at page 131 of its brief). In that case, involving a railroad seeking an approval from the Interstate Commerce Commission of a proposed lease of one railroad by another company, this Court did not hold, as petitioner infers, that a condition unrelated to the protection of interstate commerce could be imposed. Rather the Court held in effect that the condition which the Interstate Commerce Commission imposed, viz., that of retirement pay to employees, did have a relation to the protection of interstate commerce, by preventing interruptions thereof through labor disputes growing out of labor grievances and by promoting "that efficiency of service which common experience teaches is advanced by the just and reasonable treatment of those who serve."

A principle equally applicable with that stated in the subcaption hereof (p. 21, *supra*) is the principle stated in *Linder* v. *United States,* 268 U. S. 5, that the exercise of one of the delegated powers of the Federal Government cannot be made the basis of clothing the Federal Government with powers reserved to the States. This Court stated that principle as follows:

> "Congress cannot, under the pretext of executing delegated power, pass laws for the accomplishment of objects not intrusted to the Federal Government. And

> we accept as established doctrine that *any provision* of an act of Congress *ostensibly enacted under power granted* by the Constitution, *not naturally* and *reasonably adapted* to the *effective exercise* of *such power* but solely to the *achievement* of *something plainly within power reserved to the States,* is invalid and cannot be enforced." (P. 17.) (Italics supplied.)

It is clear then that the only justification for the requirement of a license on a navigable stream lies in the fact that the Federal Government has the responsibility and power of regulating interstate and foreign commerce, which language of the Commerce Clause has in turn been held to include the protection of the navigable capacity of navigable waters of the United States. This being true, it necessarily follows that the conditions which may be imposed in the license may lawfully include only those which have "a *positive* relation to the control of navigation." *United States* v. *River Rouge Improvement Co.,* 269 U. S. 411, 419. Thus any license condition, in order to be justifiable, must have a "real" and "substantial" relation to the protection of navigation or navigable capacity. *Wisconsin* v. *Illinois,* 278 U. S. 367; *Port of Seattle* v. *Oregon & Washington R. R. Co.,* 255 U. S. 56, 63; *Kansas* v. *Colorado,* 206 U. S. 46.

B. LICENSE CONDITIONS

Our analysis of various though not all of the conditions contained in a full-condition license under the Federal Power Act has been set forth at pages 15-20, *supra,* in connection with our discussion of projects on non-navigable streams. Necessarily there is no justification for including any of those conditions in a license even for a project in navigable waters.

In order that there may be no misunderstanding, we repeat that all of our discussions under Points V and VI hereof have been predicated upon the assumption that there is involved no Federal land or any other Federal property.

VII

PETITIONER ATTEMPTS TO ACCOMPLISH THROUGH THE COURTS WHAT SHOULD BE ACCOMPLISHED ONLY BY AMENDMENT OF THE FEDERAL CONSTITUTION.

Petitioner's statements that the water power resources of the country are a "national heritage" * and that there is urgent necessity for Federal control (Pet. Brief, pp. 115-116) amount to a concession that what the Federal Power Commission desires is Federal control of *all* water power generating stations and sites. Indeed, petitioner asks boldly for control not only of navigation (to which it is entitled) and water power (to which it is not entitled, except where purely incidental), but control of all other uses of streams, including use of water for irrigation and water supply (Pet. Brief, pp. 115, 133-4).

The argument for Federal control and for central authority (Pet. Brief, pp. 116, 134) is one that should be addressed to Congress with the objective of obtaining, by amendment of the Constitution, additional grants of power from the States, not an argument that should be urged upon a court. It is elementary that no necessity can *per se* be the source of Federal power. Rather the Constitution is the source of Federal power and any additional grants of power must be obtained from the States via the route of constitutional amendment.†

Petitioner's argument (Pet. Brief, p. 134), based on the case of *Helvering v. Davis,* 301 U. S., 619, is not in point. That case involved the validity of old age pensions, the money for which was raised pursuant to the taxing power. Petitioner seeks to construe the quoted language** in that case as being applicable to the commerce power. However, there is no such applicability. This Court was merely pointing out that the problem of providing for elderly persons is national in area, doing so for the purpose of showing that this particular application of the congressional power to tax and spend is for the *general* welfare, as distinguished from local or special welfare. There is no indication in the opinion that, merely because a problem is national in area, Federal power springs perforce from the existence of that fact. In short, what the Federal Government may do under one delegated power, viz., the power to tax and spend for the general welfare, is no criterion whatsoever as to what it may do under another delegated power, e.g., the commerce power.

---

* Apparently by "national heritage" petitioner means *Federal* heritage, although why, under our dual form of government, water power sites located in the respective States should be a Federal heritage, as petitioner implies, rather than a heritage of the States, is by no means clear and certainly not conceded by us.

But petitioner is not content with the seeking of control of all uses of the waters of streams. Indeed it contends (Pet. Brief, pp. 126-27) that Congress has jurisdiction over *every stream, no matter how non-navigable, so long as that stream flows across a State line.* Of course it is well recognized that Congress may not only regulate interstate commerce, but also the use of the channels of interstate commerce. It may prohibit these channels from being used for purposes that contravene the public health, morals, safety, etc. Thus, as petitioner states (Pet. Brief, pp. 126-27), Congress may prohibit interstate movement of stolen automobiles, impure foods, kidnapped persons, convict-made goods, or women for immoral purposes, or even the move-

---

† Thus, petitioner's claim (Pet. Brief, p. 116) of need for "central" i.e. Federal control of the generation of electric energy (as distinguished from its transmission in interstate commerce) is one which, in order to be validated, would require a constitutional amendment plus a congressional enabling act.

** "The problem is plainly national in area and dimensions. Moreover, laws of the separate states cannot deal with it effectively." (Pet. Brief, p. 134, from 301 U. S. 619, 644.)

ment from quarantined areas of cattle which have not been dipped. And Congress may protect the channels of interstate commerce themselves, as it has done, by the Rivers and Harbors Act of 1899, in the case of the channels of waterborne interstate commerce.*

However, contrary to petitioner's assertion, it does not follow from the foregoing that a non-navigable stream becomes subject to Federal control by reason merely of the fact that it flows across a State line. True, as petitioner states, there is in such instance an "interstate movement of waters" (Pet. Brief, p. 126), but an interstate movement of water is not commerce *per se.* Such merely interstate movement can no more be considered commerce than can the movement of a rainstorm from one State to another. Like the drops of rain, the drops of water which make up such non-navigable stream will be capable of assisting in the carriage of commerce if and when they enter a navigable stream. But, of course, the waters themselves are not commerce.

Moreover, in the case of a mere interstate movement of water, there is not involved any question of protecting interstate commerce or regulating the use of the channels of interstate commerce so as to prohibit them from serving purposes that contravene public health, morals, safety, etc. Hence there is no basis in law whatsoever for Federal control over the interstate movement of water *per se,* nor any logic in petitioner's argument (Pet. Brief, pp. 126-27).

We leave this subject with the statement that under the Constitution of the United States the only way to accomplish the things here sought to be accomplished by the petitioner is by *amendment of the Constitution.*

---

* See p. 21, *supra.*

VIII.

SIGNIFICANCE OF THE LEGAL ISSUES IN THE NEW RIVER CASE IN RELATION TO THE POWERS OF THE STATES AND THEIR CONTROL OVER THEIR INTERNAL RESOURCES IN GENERAL.

While the foregoing consideration of the scope of Federal power in relation to the reserved powers of the States has concerned itself primarily with water power development, as here involved, nevertheless we believe that the determination of the issues of law in the instant case will have a far broader significance than the determination of the relative spheres of Federal and State jurisdiction with respect merely to water power projects. We apprehend that, if what we consider as a serious encroachment upon the clearly reserved sovereignty and authority of the States be permitted with regard to the subject-matter of this case, similar encroachments upon the powers of the States and with respect to other internal resources of the States may be expected to follow.

Thus, if, where no public land of the United States is involved, the Federal Government is to be permitted under the aegis of the Commerce Clause to impose upon water power projects, especially on non-navigable streams, licenses involving conditions, such as the Federal acquisition clause, having no relation to the protection of navigation, there would seem to be no barrier in law to imposition by the Federal Government of similar licensing requirements, with like acquisition clauses, as regards other natural resources situated upon private or State lands. For example, in cases in which the product or output enters or might enter into interstate commerce, there could be validated a Federal prohibition against the operation of a private or State-owned coal mine except on condition that the owner submit to a Federal license containing a similar provision with regard to the acquisition of the mine by the Federal Government; a Federal prohibition against the production of petroleum and natural gas, unless the owner of the oil well or gas well submit to a Federal license containing a similar provision with regard to the acquisition of the well by the Federal Government; or, indeed, a Federal prohibition of the operation of farm lands, except on condition that the owners of the farms submit to Federal licenses containing a similar provision with regard to the acquisition of the farms by the Federal Government.

In short, the same provision for Federal acquisition would be applicable to the production of minerals, phosphates for agricultural fertilizer or, indeed, any other natural resources upon private or State-owned lands. If this claimed power of acquisition of water power developments were exercised, the States and municipalities thereby manifestly would lose large tax revenues. Once taken over by the Federal Government the property would become immune from all State and local taxation. We do not suggest that these are the only implications which might reasonably follow if the Court were to acquiesce in the petitioner's contentions, but we do submit that such implications alone are sufficient to warrant the most serious reflection before this Court places its imprimatur of approval upon what we insist are fundamental and far-reaching invasions of the powers reserved to the States.

Respectfully submitted,

Thomas S. Lawson,
Attorney General of Alabama,
Montgomery, Alabama.

Joe Conway,
Attorney General of Arizona,
Phoenix, Arizona.

Earl Warren,
Attorney General of California,
San Francisco, California.

Byron G. Rogers,
Attorney General of Colorado,
Denver, Colorado.

Francis A. Pallotti,
Attorney General of Connecticut.
Hartford, Connecticut.

James R. Morford,
Attorney General of Delaware.
Wilmington, Delaware.

George Couper Gibbs,
Attorney General of Florida,
Tallahassee, Florida.

J. W. Taylor,
Attorney General of Idaho,
Boise, Idaho.

John E. Cassidy,
Attorney General of Illinois,
Springfield, Illinois.

John M. Rankin,
Attorney General of Iowa,
Des Moines, Iowa.

Jay S. Parker,
Attorney General of Kansas,
Topeka, Kansas.

Hubert Meredith,
Attorney General of Kentucky;
M. B. Holifield,
Asst. Attorney General of Kentucky,
Frankfort, Kentucky.

EUGENE STANLEY,
Attorney General of Louisiana,
Baton Rouge, Louisiana.

FRANZ E. BURKETT,
Attorney General of Maine,
Augusta, Maine.

WILLIAM C. WALSH,
Attorney General of Maryland,
Baltimore, Maryland.

PAUL A. DEVER,
Attorney General of Massachusetts,
Boston, Massachusetts.

THOMAS READ,
Attorney General of Michigan,
Lansing, Michigan.

J. A. A. BURNQUIST,
Attorney General of Minnesota,
St. Paul, Minnesota.

ROY MCKITTRICK,
Attorney General of Missouri,
Jefferson City, Missouri.

GREEK L. RICE,
Attorney General of Mississippi,
Jackson, Mississippi.

WALTER R. JOHNSON,
Attorney General of Nebraska,
Lincoln, Nebraska.

GRAY MASHBURN,
Attorney General of Nevada,
Carson City, Nevada.

Thomas P. Cheney,
Attorney General of New Hampshire,
Concord, New Hampshire.

David T. Wilentz,
Attorney General of New Jersey,
Trenton, New Jersey.

Filo M. Sedillo,
Attorney General of New Mexico,
Santa Fe, New Mexico.

John J. Bennett, Jr.,
Attorney General of New York;
Henry Epstein,
Solicitor General of New York,
Albany, New York.

Harry McMullan,
Attorney General of North Carolina.
Raleigh, North Carolina.

Alvin C. Strutz,
Attorney General of North Dakota,
Bismarck, North Dakota.

Thomas J. Herbert,
Attorney General of Ohio,
Columbus, Ohio.

I. H. Van Winkle,
Attorney General of Oregon,
Salem, Oregon.

Claude T. Reno,
Attorney General of Pennsylvania,
Harrisburg, Pennsylvania.

Louis V. Jackvony,
Attorney General of Rhode Island,
Providence, Rhode Island.

Leo A. Temmey,
Attorney General of South Dakota,
Pierre, South Dakota.

Roy H. Beeler,
Attorney General of Tennessee,
Nashville, Tennessee.

Joseph Chez,
Attorney General of Utah,
Salt Lake City, Utah.

Lawrence C. Jones,
Attorney General of Vermont,
Montpelier, Vermont.

Abram P. Staples,
Attorney General of Virginia,
Richmond, Virginia.

Smith Troy,
Attorney General of Washington,
Olympia, Washington.

Ewing T. Kerr,
Attorney General of Wyoming,
Cheyenne, Wyoming.

For the Respective Amici Curiae.

Printed By Mitchell Printing Co., Raleigh, N. C.

FILE COPY

Office - Supreme Court, U. S.
FILED
OCT 12 1940
CHARLES ELMORE CROPLEY
CLERK

In the Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

BRIEF AMICUS CURIAE FILED ON BEHALF OF THE STATE OF WISCONSIN

JOHN E. MARTIN,
Attorney General,

ADOLPH KANNEBERG,
Counsel for the Public Service Commission,

NEWELL S. BOARDMAN,
Assistant Attorney General.

Moore Printing Company—Madison, Wis.

Page

I. STATEMENT 1

II. POSITION OF THE STATE OF WISCONSIN AND SCOPE OF THIS BRIEF 3

III. ARGUMENT 4

(1) The Extent of State Power and Jurisdiction Over Navigable Waters of the United States and the Plenary Power of the State's Jurisdiction with Respect to Non-navigable Waters 4

(2) Amplification of the Importance of the Case to the State of Wisconsin 10

(3) The Conflict in Policy and Sovereignty Between the Federal Power Act and Our Own State Statutes Pertaining to Waters, Their Development, Protection, and Preservation.. 14

IV. CONCLUSION 24

APPENDIX 26

CASES CITED

Angelo v. Railroad Commission, 194 Wis. 543.......... 5

Barney v. Keokuk, 94 U. S. 324.......................... 7

County of St. Clair v. Lovingston, 23 Wall. 46.......... 9

Fox River Paper Company et al. v. Railroad Commission, 274 U. S. 651 15

Hardin v. Jordan, 140 U. S. 371.......................... 6

PAGE

Hudson County Water Co. v. McCarter, 209 U. S. 349 .... 7-8, 17

Kansas v. Colorado, 206 U. S. 46 9

Knight v. United States Land Association, 142 U. S. 161 . 9

Leovy v. United States, 177 U. S. 621 9

Martin v. Waddell, (1842) 16 Peters 366 5-6

McCready v. Virginia, 94 U. S. 391 9

Mumford v. Wardwell, 6 Wall. 423 9

Pollard's, Lessee, v. Hagan, (1845) 3 Howard (U. S.) 212 .... 6, 9

Port of Seattle v. Oregon & Washington Railroad Co., et al., (1921) 255 U. S. 56 .... 7, 9

St. Anthony Falls Water Power Co. v. St. Paul Water Commissioners, 168 U. S. 349 9

Scott v. Lattig, 227 U. S. 229 9

Shively v. Bowlby, 152 U. S. 1 6

United States v. Rio Grande Dam and Irrigation Company, 174 U. S. 690 .... 9, 14

United States v. River Rouge Improvement Co., 269 U. S. 411 9

Weber v. Harbor Commissioners, 18 Wall. 57 7

STATUTES AND CONSTITUTIONAL PROVISIONS, AND SESSION LAWS REFERRED TO AND CONSTRUED

	Page
Federal Constitution, Amendment XIV	18
Wisconsin Constitution, Art. IX, Sec. 3	5
Wisconsin Statutes, Ch. 31 1939	11-12
Wis. Stats., Sec. 31.02	22-23
Wisconsin Statutes, Sec. 31.06	16-17
Wis. Stats., Sec. 31.08	17
Wisconsin Statutes, 1939, Sec. 31.09	12, 15
Wisconsin Statutes, Sec. 31.12	22
Wis. Stats., Sec. 31.18 (4)	23
Wis. Stats., Sec. 31.21	17, 23
Wisconsin Laws, 1907, Chap. 335	12-13, 19, 20, 21
Wisconsin Laws, 1911, Chap. 640	12, 19, 20
Wisconsin Laws, 1939, Chap. 441	12, 13, 19, 20
Laws of New Jersey, 1905, Ch. 238	7

OTHER AUTHORITIES CITED

Federal Power Act	1, 4, 24, 25

	Page
Federal Power Act. Sec. 9 (b)	18
Federal Power Act, Sec. 10 (f)	19
Federal Power Act, Section 14	15
Federal Power Act, Sec. 23 (b)	1, 14, 24

In the
Supreme Court of the United States

OCTOBER TERM, 1940

No. 12

THE UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

BRIEF AMICUS CURIAE FILED ON BEHALF OF THE STATE OF WISCONSIN

I.

STATEMENT

The State of Wisconsin is vitally concerned with the extreme interpretation which the petitioner takes in this case with respect to purported federal authority under the Federal Power Act and particularly the second paragraph of sec. 23 (b) of said Act.[1]

---

[1] "* * * Any person, association, corporation, state, or municipality intending to construct a dam or other project works across, along, over, or in any stream or part thereof, other than those defined herein as navigable waters, and over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several states shall before such construction file declaration of such intention with the Commission, whereupon the Commission shall cause immediate investigation of such proposed construction to be made, and if

The position taken by the petitioner (petitioner's brief, pp. 89 to end), it seems to us, completely sets at naught accepted concepts of the limitation of federal authority over non-navigable streams and the recognized and accepted concepts of the plenary power of the state with respect thereto.

The argument of the petitioner, indeed, is grounded upon the fundamental theory that the water-power resources of the states are the "heritage" of the federal government rather than of the states. This concept, so it seems to us, is so far reaching as to completely reverse accepted and well-recognized constitutional concepts.

The position of the petitioner would enable the government to take over water powers on non-navigable streams which the federal government clearly has no constitutional authority to acquire or operate and thereby, among other things, deprive the state of its constitutional right to stimulate private development of water-power resources in the state with consequent increase in tax revenues or to develop or acquire the projects for itself or the various municipalities of the state so as to obtain the profits or benefits of public operation.

The extreme position asserted by the petitioner would severely burden and impede the development of the water resources of Wisconsin for power, recreational, and other public purposes in contravention of the state's declared

---

upon investigation it shall find that the interests of interstate or foreign commerce would be affected by such proposed construction such person, association, corporation, state, or municipality shall not construct, maintain, or operate such dam or other project works until it shall have applied for and shall have received a license under the provisions of this Act. If the Commission shall not so find, and if no public lands or reservations are affected, permission is hereby granted to construct such dam or other project works in such stream upon compliance with state laws."

public policy. It invades the sovereignty of the State of Wisconsin acting within its constitutional sphere.

Indeed, the Federal Power Commission is at present asserting within the State of Wisconsin the exact position asserted by the petitioner in the instant case and is attempting to invade the sovereignty of the State of Wisconsin by attempting to impose a full conditioned license on a power dam in a non-navigable stream in Docket DI-134, Wisconsin, now pending before the Federal Power Commission. The construction of the dam was authorized by the legislature of this state in 1887 (prior to the enactment of the Rivers and Harbors Act). It is locaed near Tomahawk, Wisconsin, upon a non-navigable reach of the Wisconsin River (even conceding that the Wisconsin River is navigable as far as Portage, which we deny) and cannot possibly substantially affect adversely any commerce or the navigable capacity of any navigable reaches of the Wisconsin River (if there are any such reaches, which we deny).

II.

POSITION OF THE STATE OF WISCONSIN AND SCOPE OF THIS BRIEF

It has been our privilege to read and study the very able brief submitted amici curiae on behalf of the States of North Carolina, et al. We fully agree with all positions taken in that brief and the arguments made in relation thereto. For the sake of brevity we shall not repeat in this brief either the positions taken in that brief or the arguments made in support thereof. The brief referred to presents ably and comprehensively the scope of federal power and jurisdiction and the limitations with respect thereto over navigable waters of the United States as well

---

[1] When the term "commerce" is used in this brief, it refers to interstate commerce.

as the extremely limited scope of federal jurisdiction over non-navigable waters. In this brief we shall present

(1) The corollary to said concept, namely, the extent of state power and jurisdiction over navigable waters of the United States and the plenary power of the state's jurisdiction with respect to non-navigable waters (non-navigable in the federal sense).

(2) We shall then amplify somewhat more than is done in the preliminary statement the importance of the case to the State of Wisconsin, and then show

(3) The conflict in policy and sovereignty between the Federal Power Act and our own state statutes pertaining to waters, their development, protection, and preservation.

III.

ARGUMENT

(1) *The Extent of State Power and Jurisdiction Over Navigable Waters of the United States And the Plenary Power of the State's Jurisdiction with Respect to Non-navigable Waters*

As has been heretofore stated, the brief filed amici curiae by the States of North Carolina, et al., develops very fully the scope of federal power and jurisdiction and the limitations with respect thereto over navigable waters of the United States as well as the very limited constitutional scope of federal jurisdiction over non-navigable waters (non-navigable in the federal sense). It probably follows as a matter of course that that jurisdiction which is not lodged with the federal government necessarily is lodged with the states. However, it may not be amiss and may be of some help to cite briefly some of the cases which deal with the scope of state power as distinct from those cases which deal with the extent and limitations of federal power.

Section 3 of Article IX of the Constitution of the State of Wisconsin provides as follows:

> "The people of the state, in their right of sovereignty, are declared to possess the ultimate property, in and to all lands within the jurisdiction of the state; and all lands the title to which shall fail from a defect of heirs shall revert or escheat to the people."

The Supreme Court in *Angelo v. Railroad Commission,* 194 Wis. 543, at page 550, commenting on this provision, states:

> "This provision 'is an explicit assertion of a fundamental attribute of state sovereignty. Under such power as sovereign the state had, at the moment of its creation, the right to determine all matters concerning the title to lands covered by navigable waters, subject only to the paramount authority of the federal government, in matters concerning navigation as a part or means of interstate commerce and of its proper disposal by the United States prior to statehood.' "

Justice Taney in *Martin v. Waddell,* (1842) 16 Peters 366, says:

> "'When the American Revolution took place, the people of each state became themselves sovereign; and in that character, held the absolute right to all

> their navigable waters, and the soils under them, for their own common use, subject only to the rights since surrendered by the constitution to the general government."

And again:

> "* * * when the people of New Jersey took possession of the reins of government, and took into their own hands the power of sovereignty, the prerogatives and regalities which before belonged either to the crown or the parliament, became immediately and rightfully vested in the state."

In *Shively v. Bowlby,* 152 U. S. 1, 14-15, the court said in part:

> "And upon the American Revolution, all the rights of the Crown and of Parliament vested in the several states, subject to the rights surrendered to the national government by the Constitution of the United States."

New states admitted to the Union after the adoption of the Constitution of the United States entered the Union on the same basis as the original states.

In *Pollard's, Lessee, v. Hagan,* (1845) 3 Howard (U. S.) 212, the court cited the oft-quoted phrase (p. 229):

> "When the Revolution took place, the people of each state became themselves sovereign; and in that character hold the absolute right to all their navigable waters, and the soils under them for their own common use, subject only to the rights since surrendered by the Constitution."

In *Hardin v. Jordan,* 140 U. S. 371, it was held that the title to the shore and land under water was incidental to the sovereignty of the state and such lands are subject to state regulation and control subject to the control by Congress with respect to navigation.

Again in *Port of Seattle v. Oregon & Washington Rail-Road Co., et al.*, (1921) 255 U. S. 56, Justice Brandeis said (p. 63):

> "The right of the United States in the navigable waters within the several states is limited to the control thereof for purposes of navigation."

No general rule was laid down by the federal government to guide the states in their control over such waters and lands under such waters, but on the contrary it has been held that it was for the several states themselves to determine in what waters and to what extent the prerogatives of the state should be exercised in the regulation and control of such waters and the beds thereunder. *Weber v. Harbor Commissioners*, 18 Wall. 57.

In *Barney v. Keokuk*, 94 U. S. 324, 338, the court says:

> "If they choose to resign to the riparian proprietor rights which properly belong to them in their sovereign capacity, it is not for others to raise objections."

Thus each state in its sovereign capacity establishes its own law governing the respective rights of the public and of the riparian owners with respect to the waters and their soils.

In *Hudson County Water Co. v. McCarter*, 209 U. S. 349, 356, the court held Chapter 238, Laws of New Jersey, 1905, prohibiting the transportation of water of the state into another state to be constitutional. The court said in part as follows:

> "* * * But we agree with the New Jersey courts, and think it quite beyond any rational view of riparian rights that an agreement, of no matter what private owners, could sanction the diversion of an important stream outside the boundaries of the State in which it flows. The private right to appropriate is subject not only to the rights of lower owners but to the initial limitation that it may not substantially diminish one of the great foundations of public welfare and health.
>
> "We are of opinion, further, that the constitutional power of the State to insist that its natural advantages shall remain unimpaired by its citizens is not dependent upon any nice estimate of the extent of present use or speculation as to future needs. The legal conception of the necessary is apt to be confined to somewhat rudimentary wants, and there are benefits from a great river that might escape a lawyer's view. But the State is not required to submit even to an aesthetic analysis. Any analysis may be inadequate. It finds itself in possession of what all admit to be a great public good, and what it has it may keep and give no one a reason for its will."

Congress has no power to impair the natural advantages which a state possesses in its waters, except as an incident to its legitimate power to improve a navigable stream of the United States for navigation. It must necessarily follow that Congress has no power to impair, regulate, control or take over the natural advantages which a state possesses in its waters, except as state sovereignty may be incidentally affected by the Congress exercising its constitutional power of improving navigable waters of the United States for navigation (navigation used in the sense of improving for interstate commerce). It would seem to follow that the federal government may not enter upon a non-navigable stream and construct and operate a water storage reservoir for the improvement of navigation in navigable waters of the United States unless permitted by state law and upon compliance with all state requirements, as the authority of the federal government and the extent of its jurisdiction and sovereignty over non-navigable streams is that of enjoining a use thereof which will substantially adversely affect the navigable capacity of navigable waters of the United States where navigation is a recognized fact.

Thus, in *United States v. Rio Grande Dam and Irrigation Company,* 174 U. S. 690, the court says at page 709:

> "Of course, when such proceedings are instituted it becomes a question of fact whether the act sought to be enjoined is one which fairly and directly tends to obstruct (that is, interfere with or diminish) the navigable capacity of a stream. It does not follow that the courts would be justified in sustaining any proceeding by the Attorney General to restrain any appropriation of the upper waters of a navigable stream. The question always is one of fact, whether such appropriation substantially interferes with the navigable capacity within the limits where navigation is a recognized fact."[1]

---

[1] See also:

St. Anthony Falls Water Co. v. St. Paul Water Commissioners, 168 U. S. 349.
Pollard v. Hagan, 3 How. 212, 230.
Mumford v. Wardwell, 6 Wall. 423, 436.
Weber v. Board of Harbor Commissioners, 18 Wall. 57, 65.
County of St. Clair v. Lovingston, 23 Wall. 46, 68.
McCready v. Virginia, 94 U. S. 391, 394.
Knight v. United States Land Association, 142 U. S. 161, 183.
Leovy v. United States, 177 U. S. 621, 633.
Kansas v. Colorado, 206 U. S. 46, 93.
Scott v. Lattig, 227 U. S. 229, 242.
Port of Seattle v. Oregon & Washington R. R. Co., 255 U. S. 56, 63.
United States v. River Rouge Improvement Co., 269 U. S. 411, 419.

It would seem to follow from the foregoing cases and those cited in the footnote that the state as sovereign has the exclusive and unrestricted right to determine riparian rights in navigable waters and the exclusive and unrestricted right to use and dispose of navigable waters and the land under them, and to authorize the use by others, and to regulate and control them in whatever manner it sees fit, subject only to the power of Congress in respect to navigation (commerce).

(2) *Amplification of the Importance of the Case to the State of Wisconsin*

The number of power dams in Wisconsin having an installed capacity of 100 horse power or more in 1938 was 184 or more.[1] Many water power sites in the state are underdeveloped. The above number would be greatly augmented if power dams with an installed capacity of less than 100 horse power, but capable of developing more than 100 horse power, were included.

There are 151 public utility dams in the state, 240 private power dams, 243 dams creating artificial ponds or lakes for recreation, cranberry culture, and other purposes. There are approximately 168 dams for the control and regulation of natural lakes. The total number of dams in the state is approximately 805.[2] The number of dams in the state capable of developing 50 theoretical horse power for 50 per cent of the time is approximately

---

[1] Letter from the Power Commission to the United States Senate, Document 125, 76th Congress, 1st Session.

[2] All of the foregoing figures are taken from the records of the Public Service Commission of the State of Wisconsin.

450.[1] Of this number the following are located in navigable waters of the United States:

Fox River—9 government dams (federal)
  3 private power dams
  1 municipally owned dam

Rock River—1 privately owned dam at Beloit

Wisconsin River—1 privately owned dam at Prairie du Sac (if the Wisconsin River as far as Portage is a navigable stream of the United States, which the state denies)

All other dams are located in streams which are non-navigable (in the federal sense).

Wisconsin has adopted a comprehensive statutory scheme for the conservation, development, and regulation of its water resources, particularly for the development of hydraulic and electric power and for extending, developing, and protecting the abundant water areas for recreational uses. Manufacturing and the recreation industries are the leading industries of the state. The center or hub of this statutory scheme is the policy of the state to encourage the private development of dams in the waters of the state for power and other purposes and for creating water storage reservoirs for stream regulation under statutory permits, whereby the dams and appurtenant project works may be recaptured by the state or a municipality thereof. If the dam is constructed under the so-called Water Power Law, Chapter 31, Wisconsin Statutes, the project may be recaptured after 30 years and upon one year's notice.[1]

---

[1] All of the foregoing figures are taken from the records of the Public Service Commission of the State of Wisconsin.

Reservoirs, dams, and other works and property for stream regulation constructed by any of the three reservoir companies in Wisconsin may be acquired by the state at any time for the compensation provided for in the statute if it shall have the constitutional power to do so.[2]

---

[1] "31.09 **Proposals to accompany applications.** Each applicant for a permit to construct, operate and maintain a dam for the purpose of developing power or for the purpose of aiding in the development of power by other dams through the creation of reservoirs or otherwise, and each applicant for a permit to construct, operate and maintain a dam for any other purpose whatsoever, which is capable of developing fifty theoretical horse power or more available for fifty percent of the time throughout the year, shall file with his application for a permit, in addition to the requirements of section 31.05 or section 31.07, as the case may be, the following proposals:

(1) That the commission prior to the time the permit is granted shall value the dam site and all flowage rights and other property necessary for the purposes set forth in the application for the permit, whether the same or any part thereof are owned by the applicant or not.

(2) That the commission shall audit all outlays for property and for the construction of the dam, buildings, and other structures and works constructed, maintained, and operated and used and useful under the permit.

(3) That the permit, if granted, shall be granted and accepted subject to the express condition that the state of Wisconsin, if it shall have the constitutional power, or any municipality, on not less than one year's notice, at any time after the expiration of thirty years after the permit becomes effective, may acquire all of the property of the grantee, used and useful under the permit, by paying therefor, the cost of reproduction in their then existing condition of all dams, works, buildings, or other structures or equipment, used and useful under the permit, as determined by the commission, and by paying in addition thereto the value of the dam site and all flowage rights and other property as determined by the commission prior to the time the permit was granted, as provided in subsection (1), plus the amounts paid out for additional flowage rights, if any, acquired after the valuation made by the commission as provided in subsection (1); and that the applicant waives all right to any further compensation." Wisconsin Statutes, 1939.

[2] Wisconsin Valley Improvement Company Reservoir Act, Chapter 335, Laws of 1907; Chippewa and Flambeau Improvement Company Reservoir Act, Chapter 640, Laws of 1911; and Wolf River Reservoir Company Act, Chapter 441, Laws of 1939.

The Wisconsin Valley Improvement Company Act, Chapter 335, Laws of 1907, states the purposes of the act to be: "To create, construct, acquire, Under the three public acts (see footnote 2, p. 12), as amended,[1] water storage reservoirs for stream regulation have been constructed in the headwaters of the principal rivers of the state, namely, the Wisconsin, Tomahawk, Chippewa, and Flambeau. The reservoirs, 25 in number, have a total storage capacity of 32,533 million cubic feet of water.[2] The reservoirs are constructed and operated at the cost of the water powers benefited, each paying in proportion to the benefits conferred upon it by the reservoir system, the Public Service Commission of Wisconsin being the state agency authorized to determine the amount of tolls to be paid by each toll payer. The Wisconsin Legislature of 1939 enacted Chapter 441, laws of that year, authorizing the Wolf River Reservoir Company to construct water storage reservoirs in the headwaters of the Wolf River and to collect tolls in proportion to the benefits conferred on the water powers in the Wolf and Fox Rivers.

The Northern States Power Company operates four reservoir dams for stream regulation and one dam for power and storage in the headwaters of the Chippewa River in Wisconsin. The combined storage capacities of these five projects is 6,082 million cubic feet.[2]

---

maintain, and operate a system of water reservoirs located in and along the Wisconsin River and certain of its tributaries for the purpose of impounding surplus waters in times of great supply and releasing the same in times of drought and scarcity of water for the purpose of improving the navigation of the Wisconsin and Tomahawk Rivers and improving the usefulness of said streams for all public purposes and of diminishing the damage and injury by floods and freshets to property, both public and private, along said rivers."

[1] Amendments are not material as they do not change policy.

[2] Records of the Public Service Commission of Wisconsin.

(3) *The Conflict In Policy and Sovereignty Between the Federal Power Act and Our Own State Statutes Pertaining to Waters, Their Development, Protection, and Preservation*

The license provisions or conditions contained in a full conditioned license under the Federal Power Act and which have no relation to the protection of navigation are in excess of federal constitutional power and are objectionable whether the dam is located upon navigable waters of the United States or located upon non-navigable waters (non-navigable in the federal sense). However, in the instant case the petitioner seeks to impose these license provisions with respect to a dam which is located in non-navigable waters (findings of two federal courts) and which does not adversely affect other commerce or navigable capacity of navigable waters of the United States (findings of two federal courts). The petitioner contends that a dam so located and so operated is subject to the provisions of section 23 (b) of the Federal Power Act. It is our position that section 23 (b) does not apply to any such project. The scope, purpose and intent of section 23 (b) is admirably analyzed in the brief for the respondent, pp. 95-103. We agree with the position taken by the respondent. We adopt this argument as it impresses us as logical and essentially sound.[1]

---

[1] Furthermore, even assuming that section 23 (b) of the Federal Power Act has any application at all to non-navigable streams, which we deny, said section does not deal with navigability or navigable capacity but with the effect upon interstate commerce and by the express language of said section. Where there is no commerce that can be affected, the section obviously can have no application. *United States v. Rio Grande Dam and Irrigation Company*, 174 U. S. 690.

Section 14 of the Federal Power Act authorizes the United States to take over the licensed property at the expiration of the license, which may be for a period of 50 years or less. Under the Wisconsin law the state, if it shall have the constitutional power, or a municipality may recapture the permitted project after 30 years from the date of issuing the permit.[1]

The conflict in sovereignty is obvious. The right of the State acting in its sovereign capacity to impose this condition was established in *Fox River Paper Company et al. v. Railroad Commission,* 274 U. S. 651.[2] This case illustrates the fundamental difference between federal and state authority in that the State has authority to define the nature and scope of property rights, an authority which does not rest in the federal government in any degree.

---

[1] Section 31.09, Wisconsin Statutes set forth in footnote 1 of this brief on page 12.

[2] Petitioner's arguments that the validity of the recapture clause of the Federal Power Act is conclusively established by *Fox River Paper Co. v. Railroad Commission,* 274 U. S. 651, is wholly without foundation. That case involved the right of the State of Wisconsin to recapture a project under Section 31.09 (Wisconsin Statutes) and there are, of course, wide differences between the power of the federal government on the one hand and the power of the State on the other, for the State, unlike the federal government, may establish its own law of riparian property rights which, of course, includes the right to prohibit the project entirely. If the State may prohibit entirely, it may impose such conditions as it deems consonant with its public policy with respect to developing its water resources and may impose as a condition of the permit the right of the State to recapture when it shall have the constitutional power or permit a municipality to recapture under the same terms.

This court held in that case that the decision of the highest court of Wisconsin as to the nature and extent of riparian rights in that state was binding upon it. The Wisconsin Supreme Court had held that the riparian owners had no vested rights because (1) riparian rights on navigable waters of the state are subordinate to the plenary power of the state to regulate such waters, (2) the State may forbid all obstruction by the dam, (3) thus the riparian rights are inchoate until the State has given its consent, and (4) if the State can refuse permission, it may impose conditions which it thinks necessary such as that the project should be removed after 30 years.

This court then held that those were all matters arising under state laws which "this Court on writ of error must accept as final." (p. 655) "We are not concerned with the correctness of the rule adopted by the state court, its conformity to authority or its consistency with related legal doctrine." (p. 657)

The so-called federal recapture clause strikes at the heart of state sovereignty. In the first place it would permit the federal government to engage in unconstitutional activities within the state and thus invade the sovereign rights of the state. In the second place, it obviously burdens, if it does not prevent, the development of state water-power resources in accordance with state policy. In the third place, it defeats the rights of the state to encourage and stimulate private development with consequent increase in tax resources or, on the other hand, to encourage public development with consequent public benefit from the public operation.

If the United States claims the right to recapture a project in a stream navigable or non-navigable where the owner has accepted a license providing for recapture (as provided in the license tendered by the petitioner to the respondent) such right is based solely on contract. It is elementary in the law of contracts that insofar as it relates to the transfer of property rights, the grantee can get no more by a contract of conveyance than the grantor had, and hence the federal government's right to recapture a project is subject to all of the conditions of the state permit for developing the site, including the state's right of recapture.

In this connection we wish to point out that the Wisconsin law provides that no transfer or assignment of a permit for a dam granted under section 31.06 or section

31.08, Statutes, shall be valid or of any effect whatsoever unless it is in writing and a certified copy thereof filed with the Public Service Commission of Wisconsin within ten days after the execution thereof and unless such transfer or assignment is approved in writing by the Commission.

The section also prohibits the transfer or assignment of a permit to a foreign corporation.[1]

Thus the permittee under Wisconsin law has no power to enter into a contract with the United States wherein he agrees to allow the United States to recapture the project.

In *Hudson County Water Co. v. McCarter*, 209 U. S. 349, 356, the court held that "one whose rights, such as they are, are subject to state restriction cannot remove them from the power of the state by making a contract about them," and that the contract will carry with it the infirmity of the subject matter. The court further found that the contract involved in that case was not within the protection of the 14th amendment to the Federal Constitution.

---

[1] "31.21 **Transfer of permit.** (1) No transfer of assignment of any permit granted under section 31.06 or section 31.08 shall be valid or of any effect whatsoever unless the same shall be in writing and a certified copy thereof shall, within ten days after the execution thereof, be filed with the commission and unless such transfer or assignment is approved in writing by the commission; and no such transfer or assignment shall be approved by the commission except after an investigation and a finding that the transfer or assignment is not made or intended to be made for a purpose or to create a condition prohibited by section 31.22. No permit shall be transferred or assigned to a foreign corporation, nor shall any permit granted to a municipality be assigned or transferred to any person, firm, or corporation, otherwise than as security for a loan made in good faith and concurrently with and as consideration for such transfer or assignment, and no foreign corporation shall have power to acquire title to any such permit, nor shall any person, firm or corporation have power to acquire title to a permit granted to or acquired by a municipality, otherwise than in the enforcement of such security, and in no case shall any such foreign corporation hold title to or operate under any such permit for a period longer than three years.

(2) No municipality shall make or execute any lease or other contract with any person, firm, or corporation for the sale or use of hydraulic or hydroelectric power developed or generated by such municipality under a permit granted under section 31.06 or section 31.08, for a period longer than ten years, unless the same shall be first approved by the commission, after investigation and upon a finding that such lease or contract will not impair or interfere with the purpose or uses for which such dam was acquired or constructed by the municipality.

The United States is likewise powerless to enter into such a contract because the state forbids it and because section 9 (b) of the Federal Power Act provides that before a license may issue satisfactory evidence shall be furnished to the Commission "that the applicant has complied with the requirements of the laws of the State, or States, within which the proposed project is to be located with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes and with respect to the right to engage in the business of developing, transmitting, and distributing power, and in any other business necessary to effect the purposes of a license under this act."

Among other contract provisions in the license tendered by the Federal Power Commission to the respondent (Record, pp. 2665-2675) or which under the act (construed as petitioner contends for) could have been imposed and which are in conflict with the Wisconsin Statutes and are particularly objectionable are the following:

Article XVIII (Record, p. 2671) requires the licensee benefited by the construction work of another licensee, a permittee, or the United States of a storage reservoir or other headwater improvements to reimburse the owner of such reservoir or other improvements for such part of the annual charges "for interest, maintenance, and depreciation" thereon as the Commission may deem equitable.

The last paragraph of section 10 (f) of the Federal Power Act goes so far as to provide that any unlicensed project (which includes projects authorized by state law) in the stream which is benefited by the construction work of a licensee or permittee, the United States, or any agency thereof shall pay annual toll in such amount as the Commission shall determine and fix as reasonable and equitable. This provision conflicts with the policy of Wisconsin to equalize stream flow in its principal rivers through the agency of quasi-public corporations operating pursuant to Chapters 335, Laws of Wisconsin for 1907, and 640, Laws of Wisconsin for 1911 as amended.[1] As has already been pointed out, page 13 of this brief, under these public acts, water storage reservoirs for stream regulation have been constructed in the headwaters of the principal rivers of the state, namely, the Wisconsin, Tomahawk, Chippewa, and Flambeau. The reservoirs, 25 in number, have a total storage capacity of 32,533 million cubic feet of water.[2] The reservoirs are constructed and operated at the cost of the water powers benefited, each paying in proportion to the benefits conferred upon it by the reservoir system, the Public Service Commission of Wisconsin being the state agency authorized to determine the amount of tolls to be paid by each toll payer. The Wisconsin Legislature of 1939 enacted chapter 441 of the laws of that year authorizing the Wolf River Reservoir Company to construct water storage reservoirs in the headwaters of the Wolf River and to collect tolls in proportion to the benefits conferred on the water powers in the Wolf and Fox Rivers. If the state has power to authorize, regulate, fix and determine the tolls to be paid by water powers benefited by these projects, as it clearly has, it would seem apparent that the federal government is wholly without power to do so.

---

[1] Amendments are not material as they do not change policy.

[2] Records of the Public Service Commission of Wisconsin.

The policy of how a stream, which is not navigable under federal law, shall be developed in the interest of navigation ~~or~~ power or recreation or whatnot is purely a state function. The requirement in the federal license that the lower water power pay to an upper water power for incidental benefits which may result from the operation of a mill pond cannot be implied from the jurisdiction of the United States to regulate commerce or from the power of the United States to restrain a dam owner from so operating his dam as to substantially impair the navigable capacity of navigable waters of the United States. It attempts to invade the state's reserved power to determine the law and policy under which the state's water resources shall be developed.

The only provision in the Wisconsin laws permitting the collection of tolls from lower water powers benefited by the upper developments on a stream are those authorized and sanctioned under the three acts above referred to, namely, Chapter 335, Wisconsin Laws for 1907, Chapter 640, Wisconsin Laws of 1911, and Chapter 441, Wisconsin Laws for 1939 (Session Laws) which acts permit only the storage of surplus water for release during low stream flow (reservoir developments). Corporations authorized to charge tolls under these acts are public or quasi public in nature and have specific legislative authority to collect such tolls subject to regulation and approval by the Public Service Commission of the state.[1]

It is the policy of Wisconsin not to require a lower water power to pay to an upper private owner of a dam having a large millpond or a water storage reservoir for incidental benefits due to the storing of flood waters which, except for the storage capacity of the millpond or reservoir, would be wasted. Permitting a private water power to collect tolls from a lower water power discourages (so the legislature assumes) the development of the streams for power.

Thus the Northern States Power Company operates four reservoir dams for stream regulation and one dam for power and storage in the headwaters of the Chippewa River in Wisconsin. The combined storage capacities of these five projects is 6,082 million cubic feet.[2] This private corporation is without power to collect tolls from water powers benefited by the operation of said dams.

---

[1] The provision of Chapter 335, Laws of 1907, providing for collection of tolls is section 4, and provides as follows: "When said Wisconsin Valley Improvement company shall have created or acquired and maintained in successful operation water reservoirs in accordance with this act * * * it shall, subject to the supervision and control hereinafter provided for, be entitled to charge, collect and receive reasonable and uniform tolls from the owner or owners or lessee or lessees of each and every improved and operated water power located upon the Wisconsin river, or any tributaries thereof, below any said reservoirs and benefited thereby, but not exceeding in the aggregate of all its revenues sufficient to pay all reasonable costs of operation and maintenance and a net annual return of six per cent on the cash capital actually paid in on stock subscriptions to the grantee. Said tolls shall be semi-annually fixed, ascertained and determined by the railroad commission of Wisconsin (now Public Service Commission of Wisconsin) on or about the first day of July and the first day of January of each year, for the six months' period preceeding each of said dates. Said tolls shall be fixed in proportion to the benefits conferred by the reservoir system upon each of the improved and operated waters aforesaid. * * *" The provisions of the other two acts providing for tolls are similar.

[2] Records of the Public Service Commission of Wisconsin.

Under Article XVIII of the license tendered by the Federal Power Commission to the respondent in this case, all lower water powers would be required to pay if the foregoing projects were licensed by the Federal Power Commission or permitted by the War Department.

Article IV of the license tendered the respondent requires the project works to be constructed in conformity with plans approved by the Federal Power Commission. This provision conflicts with section 31.12,[1] Wisconsin Statutes, which requires the approval of plans by the Public Service Commission of Wisconsin.

Article V of the license tendered the respondent requires that the construction be subject to the approval of the United States Engineers Office. This provision also conflicts with section 31.12, Wisconsin Statutes.

Article XIII of the license tendered the respondent subjects the operation of the project and the control of the level of the pool to the Secretary of War, which is in conflict with section 31.02, Wisconsin Statutes,[2] under which the Public Service Commission of Wisconsin has power to regulate the level and flow of waters.

---

[1] Section 31.12 is printed as an appendix.

[2] "31.02 **Powers of commission.** (1) The commission, in the interest of public rights in navigable waters or to promote safety and protect life, health and property is empowered to regulate and control the level and flow of water in all navigable waters and may erect, or may order and require bench marks to be erected, upon which shall be designated the maximum level of water that may be impounded and the lowest level of water that may be maintained by any dam heretofore or hereafter constructed and maintained in navigable waters; and shall establish and maintain gauging stations upon the various navigable waters of the state and shall take other steps necessary to determine and record the characteristics of such waters.

(2) The commission is vested with authority and power to investigate and determine all reasonable methods of construction, operation, maintenance, and equipment for any dam so as to conserve and protect all public rights in navigable waters and so as to protect life, health and property; and the construction, operation, maintenance and equipment, or any or all thereof, of dams in navigable waters shall be subject to the supervision of the commission and to the orders and regulations of the commission made or promulgated under the provisions of this chapter of the statutes."

Article XIV of the license tendered the respondent provides that the project shall be operated in the interest of flood control. This provision conflicts with section 31.02, Wisconsin Statutes.

Article XVII of the license tendered the respondent directs the licensee to remove and destroy brush and timber. This provision conflicts with section 31.18 (4),[1] Wisconsin Statutes, which authorizes the Public Service Commission of Wisconsin in its discretion to determine whether any or all of the brush and timber shall be removed.

Article XIX of the license tendered the respondent requires the licensee to pay tolls to a licensed owner or a reservoir or other improvement, from the operation of which the licensee receives benefits. For reasons heretofore set forth, pages 19-22 of this brief, this provision conflicts with Wisconsin policy.

Article XXIII of the license tendered the respondent requires permission of the Federal Power Commission before an owner may voluntarily sell his property, which conflicts with section 31.21, Wisconsin Statutes.[2]

---

[1] "31.18 (4) The public service commission shall in the interest of public rights in navigable waters, or to promote safety and protect life, health and property, require the grantee of any permit, under this chapter, or of any permit or authorization heretofore provided for by legislative enactment, prior to flowing any lands by the construction of a dam thereunder, to remove from such lands all or any portion of the standing and fallen timber and all or any portion of the brush."

[2] Printed footnote page 17 of this brief.

IV.

CONCLUSION

It is unnecessary to repeat the importance to this state (and to all states) of many of the petitioner's contentions as to the scope, purpose and intent of the Federal Power Act, and particularly Section 23 (b) thereof, and the attempt to assert federal jurisdiction over power structures erected in non-navigable streams (in a federal sense) where those structures in no sense substantially affect adversely either commerce or the navigable capacity of any navigable waters of the United States.

For reasons set forth herein it is submitted that the Act was never intended to so extend federal jurisdiction, and if so intended and construed, it is unconstitutional as a plain usurpation of the rights reserved to the states under the Tenth Amendment to the Constitution of the United States. It is inconceivable that the interstate commerce clause of the Federal Constitution could have been intended to be so far reaching in consequences as to wrest from the states control over waters upon which there is no commerce at all. To so extend federal power and jurisdiction under the commerce clause is to destroy the federal system. The states would no longer have any sovereign rights over any waters.

Many of the provisions of the licensing sections of the Federal Power Act are in excess of federal power under the Constitution even when applied to structures erected in navigable waters of the United States as, for instance, the so-called recapture clause and other provisions not related to navigation (commerce). Most (we submit all) of the licensing provisions are in excess of federal power when it is attempted to apply them to a project located in non-navigable waters and the operation of which does not substantially affect adversely either commerce or the navigable capacity of navigable waters of the United States.

The clash and conflict between the water power act of the State of Wisconsin and the various reservoir acts of the State and the Federal Power Act, construed as the petitioner contends it must and should be construed, is clear and irreconcilable. The Wisconsin legislation is within the field of state sovereignty and jurisdiction over navigable and non-navigable waters. When the petitioner attempts to assert power and rights in conflict therewith, as it does in the instant case, it acts in excess of constitutional power and invades the sovereignty of the states.

Respectfully submitted,

JOHN E. MARTIN,
Attorney General,

ADOLPH KANNEBERG,
Counsel for the Public Service Commission,

NEWELL S. BOARDMAN,
Assistant Attorney General.

APPENDIX.

"31.12 **Map, profile and plans.** (1) The grantee of a permit under section 31.06, to construct, maintain and operate a dam, before commencing any work of construction authorized by the permit, shall submit to the commission a complete map and profile on the scale of not less than one inch per thousand feet showing the land that may be affected by the construction and maintenance of the dam, or by any flowage that may be caused thereby, and the outline of the flowage, and such other hydrographic and topographic data as the commission may prescribe, and shall also file complete detailed plans and specifications for the proposed dam, including all booms, piers, or other protection works.

(2) The commission shall examine the map, profile, plans and specifications; shall hear the grantee thereon and may reject the same or any part thereof, if unsatisfactory or incomplete, or may suggest and require modifications thereof. If the map, profile and plans and specifications are satisfactory and complete, or, if the same shall be modified as suggested and required, the commission shall so find and approve the same, and thereupon the grantee shall have authority to construct the proposed dam in accordance therewith, but the commission may, at any time during the construction of any dam and in the interest of the public safety, or of any public rights in navigable waters, authorize, order or require such changes in the plans and specifications and the construction of the dam as shall be necessary.

(3) If the commission, in the case of an application for a permit to construct a dam with a capacity of less than two hundred fifty hydraulic horse power at ordinary stage of water, shall find that the information and data furnished in the original or amended application is sufficient, the applicant shall not be required to furnish the additional or more detailed information or data specified in subsections (1) and (2) of this section. The commission may, however, at any time during the construction of any such dam authorize, order or require changes in the construction or the method or plan of construction thereof, as provided in subsection (2) of this section.

(4) Within ten days after the completion of any dam the grantee shall file with the commission a verified statement that the same was constructed in accordance with the plans and specifications approved by the commission; or in case no plans and specifications were required to be filed, then that the dam was constructed in accordance with the description contained in the application.

FILE COPY

Office - Supreme Court, U. S.
FILED
APR 4 1940
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM 1939

No. [redacted] 12

UNITED STATES OF AMERICA, *Petitioner*

vs.

APPALACHIAN ELECTRIC POWER COMPANY, *Respondent*

MOTION OF THE STATES OF VIRGINIA AND WEST VIRGINIA FOR CONTINUANCE OF CAUSE

ABRAM P. STAPLES,
Attorney General of Virginia.
CLARENCE W. MEADOWS,
Attorney General of West Virginia.

Richmond, Virginia.
April, 1940.

IN THE

Supreme Court of the United States

OCTOBER TERM 1939

No. 674

UNITED STATES OF AMERICA, *Petitioner*

vs.

APPALACHIAN ELECTRIC POWER COMPANY, *Respondent*

MOTION OF THE STATES OF VIRGINIA AND WEST VIRGINIA FOR CONTINUANCE OF CAUSE

TO THE HONORABLE CHIEF JUSTICE AND
ASSOCIATE JUSTICES OF SAID COURT:

Now come the States of Virginia and West Virginia by their respective Attorneys General and jointly move this Court for a continuance of the above-entitled cause to the October Term 1940, or, in the alternative, for the postponement of hearing of this cause to the latest day certain on which said cause can be heard during the October Term 1939, but not earlier than May 15, 1940. The grounds upon which this motion is based are:

1. The questions sought to be presented by the United States in this cause vitally involve the soverign

and proprietary rights of the States of Virginia and West Virginia; and if such questions be held properly determinable herein, the importance of their determination to the said States can hardly be overstated. Among the most important and valuable natural resources of the States of Virginia and West Virginia are New River and various other rivers and streams within their domain which are valueless for purposes of navigation or commerce but are of incalculable value to the said States and their people for water power, recreational and other uses.

2. The Sates of Virginia and West Virginia have each adopted a policy aimed to promote and encourage the development and utilization of water power of the streams within their respective borders and thereby to increase their tax resources and to promote industrial development and the welfare and prosperity of the States and the peoples thereof. Furthermore, these States have adopted statutory schemes in pursuance of said policies, providing for the conservation, development and regulation of the waters within their respective borders and for the regulation of the output and distribution of, and the prices charged for, the electricity resulting from such development of those waters.

3. An examination of the petition in certiorari filed by the United States in the above-entitled cause discloses that this Court will be asked, with regard to waters where there is involved no public land nor any other Federal property:

a) To hold in practical effect that water powers within the several States, whether on navigable or non-navigable streams, may not be developed or utilized by the several States, or under their jurisdiction and authority, but instead may be developed only if such development meets the approval of the Federal Power Commission and, if so, then only pursuant to the acceptance of a Federal license containing numerous burdensome (and, as these States believe, unconstitutional) restrictions upon the utilization of such water powers, which restrictions are in conflict with the policies adopted by the States of Virginia and West Virginia for the conservation, regulation and development of their water resources.

b) To hold that the water powers of the several States may be developed only, if at all, under a Federal license which would have the effect of vesting in the United States, rather than in the several States ultimate reversionary or residual proprietary rights therein and the exercise of local police powers over and in connection with such projects and their operation, and even of providing for the regulation of intrastate rates for electricity developed and sold from such water resources within the various States.

c) To hold that the United States may, as a condition to permitting the development of water power resources within the several States, whether on navigable or non-navigable streams, compel the respective States or municipalities or developers (duly authorized by the States) to accept a Federal license which would give the United States a contractual right to take over the power development at the end of the Federal license period upon payment of the "net investment" (as determined by the Federal Power Commission and subject to numerous Federal statutory deductions) or its then fair value, whichever is the less, with the consequent destruction of the tax resources of the several States and of their sovereign and proprietary rights to acquire such projects for themselves when and as they deem such acquisition in the best interests of themselves and their peoples.

d) To hold that water power resources within the several States may be developed only under plans and conditions which "in the judgment of the (Federal Power) Commission will be best adapted to a comprehensive scheme * * * of water power development and of other beneficial public uses" (16 USC 803 (a)), in complete derogation of the sovereign rights of the several States to authorize, regulate and control the development of their streams for water power, recreational and other purposes as such States deem for the best interests of themselves and their people, subject only to the admittedly constitutional requirement that there be no interference with interstate or foreign commerce.

e) To hold that the development of water powers within the several States, even on non-navigable streams, may be made only in accordance with the regulations of the Federal Power Commission with reference to renewals, replacements and depreciation reserves and under "such rules and regulations as the (Federal Power) Commission may from time to time prescribe for the protection of life, health and property" (16 USC 803(c)), all in complete disregard of the sovereign rights of the several States.

f) To hold that the water power resources of the several States may be developed only subject to the regulation of amortization reserves, determination of net investment, payment of fees to the United States and expropriation of excess profits by the United States, as determined by the Federal Power Commission, all in disregard of the sovereign rights of the various States (16 USC 803(d), (e)).

g) To hold that the United States may prohibit the development of water power resources within the several States, whether on navigable or non-navigable streams, unless the developer enters into a contract to permit the United States to "take over" such water power development for less than the fair value at the time of taking, with the result of greatly impeding, or even nullifying, the development of the water resources of the several States, depriving the several States of tax resources and, in practical effect, permitting the Federal Government to enter the domain of the several States for the purpose of engaging in a business or industry, in excess of the constitutional authority of the United States and in violation of the sovereign rights of the States.

h) To hold that, in complete disregard of the sovereign rights of the several States and their respective policies, the water power resources of the several States may be developed only by applicants receiving the approval of the Federal Power Commission upon plans which that Commission deems best adapted to develop, serve and utilize in the public interests the water resources of the region (16 USC 800).

i) To revise the long-established definition of navigable waters of the United States in such a way as to deprive the several States of much, if not all, of the jurisdiction which they have exercised over the development of their natural resources since this Government was founded.

j) To revise the long-established rules of law with reference to the circumstances in which, and extent to which, the Federal Government may prevent development upon non-navigable streams under State authority and may so prevent in such a way as virtually to nullify the sovereign power of the several States to develop, conserve and utilize their natural resources at the times, in the manner, and by the means which they deem for the best interests of themselves and their peoples.

4. It is obvious that these powers sought to be exercised by the Federal Power Commission have no relation to the regulation or protection of navigation, but constitute an invasion of the field of State police powers. There can be no doubt that the decisions of this Court deny the possession by Congress of any unusual or peculiar jurisdiction over such navigable waters except to protect and regulate navigation. But this Court is asked by the government to overrule this long line of decisions and ordain new principles which would greatly enlarge the now established jurisdiction of the Congress, and would correspondingly curtail, reduce and impair the jurisdiction which the States have exercised since the adoption of the Constitution. The far-reaching effect of such a change in constitutional concepts is obvious. This proposed extension of congressional jurisdiction under the commerce clause and the application of like principles in other general fields of State and Federal activities

would result in confusion and chaos as to their respective jurisdictions, if not in a virtual paralysis of state governments in the exercise of their police powers.

5. If said contentions of the Federal Government were to be upheld, the adopted policies of the States of Virginia and West Virginia with reference to the conserving, development and utilization of their water resources will be largely, if not wholly, nullified and destroyed. The consequences to the sovereign rights of the States in this and other respects and to the welfare of their people would be of grave import. Moreover, if the questions sought to be raised by the Federal Government are deemed appropriate for decision in the above-entitled cause, the sovereign and proprietary rights of the States of Virginia and West Virginia in and over these and other natural resources may be effectually foreclosed and concluded without any opportunity on the part of said States adequately to present their contentions and views to this Court and with possibly irreparable prejudice to the interests and welfare of the said States.

6. For a further statement of the respects in which the State of Virginia considers its interests and its sovereign and proprietary rights to be affected, the Court is respectfully referred to the grounds upon which the State of Virginia based its motion for leave to intervene as party defendant, which grounds are set forth at pp. 1-9 of the "Motion of Commonwealth of Virginia for Leave to Intervene as Party Defendant," filed in this Court March 26, 1940. The attention of the Court is invited also to the Joint Resolution adopted March 5, 1940, by the Senate and House of Delegates of Virginia with reference specifically to the above-entitled cause, a copy of which resolution is appended as Exhibit A to the aforesaid motion for leave to intervene.

7. For the protection of their vital interests and those of their peoples, the States of Virginia and West Virginia each desire to file an adequate brief in this cause as *amicus curiae,* as authorized and permitted under the rules of this Court. But, unless adequate time is given for the preparation of such a brief, the right granted by the rules of this Court will be illusory and of little or no value to the said States and their peoples. Inasmuch as the States of Virginia and West Virginia each have vital interests, not merely in the broader issues of law, as in part set forth in paragraph 3 hereof, but also in the factual aspects of the case, a prerequisite to the preparation of such briefs will be adequate opportunity to examine the printed record, which is not yet available. The record was not printed in either of the courts below. Instead, the record filed in the Circuit Court of Appeals consisted of a typewritten copy of several thousand pages, which fact, aggravated by reason of several hundred riders attached to the record and of numerous longhand corrections, made its physical condition such that it has been impossible to examine or to work with the record. To make matters worse, of such typewritten record there exists but a single copy.

Furthermore in the usual case the record would have been printed and available before the petition for certiorari was heard, thereby enabling all the original parties, and states desiring to be heard as *amici,* to have a copy thereof and to have had opportunity for study of the same long in advance of the time that would have been necessary to write the respective briefs, yet in this case the record was not printed in the court below and this Court, for the purpose of considering the petition for certiorari, dispensed with the necessity for the printing of the record. Consequently there has not been opportunity for any advance study of the printed record which it is understood will approximate 3,000 pages in length. Moreover, the preparation of adequate briefs cannot reasonably be initiated until there has been opportunity to examine the brief which is to be filed on behalf of the Federal Government and to determine the bases of the various claims apparently advanced by the Government in its petition for certiorari.

8. The undersigned have been informed by the Clerk of this Court that this cause is subject to call for argument during the week of April 22, 1940. Hearing at that time would not afford reasonable opportunity for the preparation of adequate briefs in behalf of the States of Virginia and West Virginia, respectively, in support of their vital interests in this litigation. In view of the foregoing facts, unless the hearing in this cause shall be continued until the October Term 1940, the States of Virginia and West Virginia will be greatly handicapped in such presentation of their respective views; and, if the hearing is not deferred until at earliest May 15, 1940, these States will, for all practical purposes, be deprived of the benefit of the right extended by this Court to the several States of the United States by rule No. 27, paragraph 9, to file, in causes such as this, adequate briefs covering the questions which affect their sovereign and proprietary rights.

The undersigned feel it their duty to apprise the Court of the fact that they severally or jointly have received letters from Attorneys General of 25 other States who consider their interests may be vitally affected by this cause, and who desire to consider the advisability of submitting their views as *amici curiae*. The Court is advised of this fact for such consideration as it may deem appropriate in view of the Rule of Court above referred to conferring upon all these States the right to file briefs *amicus curiae*. While thoroughly in sympathy with the attainment of all reasonable speed in passage of causes through the Courts, the undersigned submit, however, that, in view of the facts that it is nearly five years since the bill of complaint in this cause was filed and that the project on New River has already been constructed and is in operation, there is no justification for such haste as would result if the cause were called for argument at this term, nor indeed for such handicapping of the efforts of the various interested States, properly to prepare and present their views to this Honorable Court, or as would result if the cause were heard before the October Term 1940.

WHEREFORE, the States of Virginia and West Virginia pray that the hearing of the above cause be continued to the October Term 1940 of this Court, or, if this prayer be denied, then in the alternative, for the postponement of hearing to the latest day certain on which said cause can be heard during the October Term 1939, but not earlier than May 15, 1940.

Respectfully submitted,

ABRAM P. STAPLES,
Attorney General of Virginia.
CLARENCE W. MEADOWS,
Attorney General of West Virginia.

Richmond, Virginia.
April, 1940.

FILE COPY

Office - Supreme Court, U. S.
~~FILED~~
JAN 10 1941
CHARLES ELMORE CROPLEY
CLERK

IN THE

Supreme Court of the United States

OCTOBER TERM, 1940.

No. 12.

THE UNITED STATES OF AMERICA,
Petitioner,

v.

APPALACHIAN ELECTRIC POWER COMPANY,
Respondent.

PETITION FOR REHEARING.

RAYMOND T. JACKSON,
Cleveland, Ohio,
A. HENRY MOSLE,
CRESWELL M. MICOU,
FRASER M. HORN,
WENDELL W. FORBES,
M. W. BELCHER, JR.,
New York, N. Y.,
JOHN L. ABBOT,
Lynchburg, Va.,
Counsel for Respondent.

January 10, 1941.

Pandick Press, Inc., 22 Thames St., New York, U. S. A.

INDEX.

Petition for Rehearing.

PAGE

Summary of Grounds of Petition........................ 1

Specific Grounds Urged in Support of Petition, With Supporting Reasons........................ 2

I. Navigability Vel Non of New River........................ 2

II. License Conditions........................ 32

Table of Cases.

Alabama Power Co. *v.* Ickes, 302 U. S. 464........................ 27
Appalachian Electric Power Co. *v.* Smith, 67 F. (2d) 451, cert. denied, 291 U. S. 674........................ 15
Arizona *v.* California, 283 U. S. 423........................6, 10, 27
Ashwander *v.* T. V. A., 297 U. S. 288, 340........................ 34

Barnes *v.* United States, 46 Ct. Cl. 7........................ 6
Boyer, *Ex Parte*, 109 U. S. 629........................ 8
Brewer-Elliott Oil Co. *v.* United States, 270 Fed. 100; 260 U. S. 77........................ 5, 28

California *v.* Pacific R. R. Co., 127 U. S. 1........................ 7
Crowell *v.* Benson, 285 U. S. 22........................ 7, 27

Daniel Ball, The, 10 Wall. 557........................3, 4, 26

Economy Light & Power Co. *v.* United States, 256 U. S. 113........................5, 15, 23, 26

Leovy *v.* United States, 177 U. S. 621........................ 26, 28

PAGE
Marine Transit Co. *v.* Dreyfus, 285 U. S. 263 8
Montello, The, 20 Wall. 430 .... 3, 4, 6, 23, 26
Oklahoma *v.* Texas, 258 U. S. 574 27
Roberts W. Parsons, The, 191 U. S. 17 8
Shively *v.* Bowlby, 152 U. S. 1 26
United States *v.* Chemical Foundation, 272 U. S. 1 27
United States *v.* Commercial Credit Co., 286 U. S. 63 27
United States *v.* Cress, 243 U. S. 316 .... 4, 7, 26
United States *v.* Doughton, 62 F. (2d) 936 (C. C. A. 4th) 26
United States *v.* Holt State Bank, 270 U. S. 49 .... 5, 23, 27, 28
United States *v.* O'Donnell, 303 U. S. 501 27
United States *v.* Rio Grande D. & I. Co., 174 U. S. 690 26
United States *v.* Utah, 283 U. S. 64 .... 23, 27

IN THE

Supreme Court of the United States

OCTOBER TERM—1940.

No. 12.

THE UNITED STATES OF AMERICA,
Petitioner,
v.
APPALACHIAN ELECTRIC POWER
COMPANY,
Respondent.

PETITION FOR REHEARING.

TO THE CHIEF JUSTICE AND THE ASSOCIATE JUSTICES OF THE SUPREME COURT:

Comes now the above-named Respondent, Appalachian Electric Power Company, and presents this its petition for rehearing of the above entitled cause and, in support thereof, respectfully shows:

Summary of Grounds of Petition.

FIRST: As Respondent understands the petition, briefs and oral argument in this Court, *the reversal* of the concurrent finding that New River is not navigable in fact in interstate commerce *rests upon propositions of law which were not presented to this Court by petition, brief or oral argument;* and therefore *neither Respondent nor the States* appearing as *amici curiae* herein *have been heard thereon.*

SECOND: The definition of navigable waters of the United States now enunciated by this Court for the first time is squarely in conflict with all relevant prior decisions of this Court and with well-settled Constitutional principles.

THIRD: Even under the definition of navigable waters so enunciated, New River, upon the facts established by the record, is not a navigable water of the United States.

FOURTH: The definition of navigable waters announced herein is in fact unworkable, transfers to Congress the power and duty vested by the Constitution in the Federal courts to determine the Constitutional facts as to navigable waters of the United States, destroys the valuable rights of States and their citizens in waters plainly non-navigable under the long established law and destroys our dual system of government in a wide field.

Fifth: The principles announced also extend the Constitutional authority of the United States in relation to navigable waters far beyond the limits previously set by the decisions of this Court, destroy the rights of the States and their citizens in such waters and set aside the principle, which has prevailed since the foundation of our Government, that the Federal Government may not exercise authority not granted to it. If the announced principles be applied, as logically they must be, to all other natural resources of the States, they will destroy our dual constitutional system in a far wider field.

8

Specific Grounds Urged in Support of Petition, with Supporting Reasons.

I.

Navigability Vel Non of New River.

The Court erred in reversing the concurrent finding of the lower courts that New River is not navigable in fact in interstate commerce and their concurrent holding that consequently New River is not a navigable water of the United States.

The reversal of this concurrent finding and holding rests upon several fundamental errors, the public importance of some of which can not be overstated if our Constitutional system is to be preserved and the basic law upheld unless and until changed by orderly processes of amendment.

A.

The Court erred in holding that a stream not navigable in fact in its natural and ordinary condition is nevertheless a navigable water of the United States provided that the stream can be made navigable by artificial means at a cost which balances the "need at a time when the improvement would be useful" (p. 8).[1]

1. The opinion cites no decision of this Court which supports the foregoing proposition; and we know of none. On the contrary, all decisions of this Court upon the subject impliedly, and many of them expressly, deny its validity. The Court accepts the decision in *The Daniel Ball,* 10 Wall. 557, as stating the "basic concept of navigability." In that case this Court, in considering the navigability of Grand River, Michigan, said that streams to be navigable in law must be navigable in fact "in their ordinary condition" (l.c. 563). The Grand River, which empties into Lake Michigan, had not been artificially improved but was navigable in fact and actually navigated by steam-boats for 40 miles above its mouth. The opinion plainly referred to use or susceptibility for practical use under natural and ordinary conditions; and it has ever since been so construed by this Court.

Thus in *The Montello,* 20 Wall. 430, although the Fox River had been artificially improved by locks and dams, this Court applied the test of navigability in fact under natural and ordinary conditions. This Court, construing and applying the definition of navigability enunciated in *The Daniel Ball,* said:

> "If it be capable *in its natural state*[2] of being used for purposes of commerce, no matter in what mode the commerce may be conducted, it is navigable in fact, * * *" (l.c. 441).

---

[1] Numbers in parenthesis, accompanying references to this Court's opinion or to quotations therefrom, are those of pages of the opinion as printed and sent to counsel for Respondent.

[2] All italics are supplied unless otherwise specifically indicated.

And, after pointing out that a large and extensive commerce had been carried over the river "in its natural state" (l. c. 442), the Court further said:

> "* * * but the vital and essential point is whether the *natural navigation* of the river is such that it affords a channel for useful commerce" (l. c. 443).

In *United States* v. *Cress*, 243 U. S. 316, this Court, after an exhaustive review of the cases, said:

> "Many state courts, including the Court of Appeals of Kentucky, have held, also, that the legislature can not, by simple declaration that a stream shall be a public highway, if in fact it be not navigable *in its natural state*, appropriate to public use the private rights therein without compensation. (Citing numerous cases)
>
> "This Court has followed the same line of distinction. That the test of navigability in fact should be applied to streams *in their natural condition* was in effect held in *The Daniel Ball*, 10 Wall. 557 * * *.
>
> * * * * * *
>
> The point was set forth more clearly in *The Montello*, 20 Wall. 430, * * *. It was argued (p. 440) that although the river might now be considered a highway for commerce conducted in the ordinary modes, it was not so in its natural state, and therefore was not navigable water of the United States within the purview of *The Daniel Ball* decision. The Court, accepting navigability *in the natural state* of the river as the proper test, proceeded to show that, even before the improvements resulting in an unbroken navigation were undertaken, a large and successful commerce had been carried on through this river * * *" (l. c. 322-3).

And further:

> "It follows from what we have said that the servitude of privately-owned lands forming the banks and bed of a stream to the interests of navigation is a natural servitude confined to such streams

> as *in their ordinary and natural condition are navigable in fact* and confined to the natural condition of the stream" (l. c. 325-26).

In *Economy Light & Power Co.* v. *United States,* 256 U. S. 113, this Court again reviewed the authorities and stated the test to be "whether the river, *in its natural state,* is used, or capable of being used as a highway for commerce over which trade and travel is or may be conducted in the customary modes of trade and travel on water" (l. c. 121-2).

The proposition now enunciated by this Court was specifically rejected by the Circuit Court of Appeals in *Brewer Oil Co.* v. *United States,* 270 Fed. 100, 102-3. In this Court, Oklahoma (intervenor) urged that the evidence established that "the Arkansas River by proper improvements, could be made navigable by vessels of light draft" and "that the testimony shows that the river may be made navigable at the place in controversy." Oklahoma Brief, 81, 129. In affirming the decree, this Court said that navigability depends "upon the fact whether the river *in its natural state* is such that it affords a channel for useful commerce" and that "Neither the argument nor the record discloses any ground which can overcome the weight which the finding of two courts must have with us". *Brewer-Elliott Oil Company* v. *United States,* 260 U. S. 77, 86.

Again, in *United States* v. *Holt Bank,* 270 U. S. 49, this Court said:

> "The rule long since approved by this Court *in applying the Constitution* and laws of the United States is that streams or lakes which are navigable in fact must be regarded as navigable in law; that they are navigable in fact when they are used, or are susceptible of being used, *in their natural and ordinary condition,* as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water; * * *" (l. c. 56).

Finally, in *Arizona* v. *California*, 283 U. S. 423, 452, (an original suit) this Court stated

> "whether a stream is navigable in law depends upon whether it is navigable *in fact.*" (l. c. 452)

It is hardly to be supposed that Mr. Justice Brandeis would have engaged in the burdensome labor of examining all of the numerous documents cited in the foot-notes to his opinion for the purpose of determining the extent of actual navigation on the river, or would have relied upon historical navigability in fact if, as the present decision announces, his inquiry should really have been directed to the question of whether the river could be made navigable by expenditure of a sufficient amount of money and, if so, whether in his opinion the cost would have been commensurate with the need.

Stated in other words, the unbroken line of decisions of this Court has up to this time held that navigability-in-fact is *essential to navigability-in-law.* Yet the Court now says in effect that, to be navigable-in-law, a stream need not in fact be navigable and that a mere possibility that the stream may artificially be made navigable at some future time at reasonable cost is sufficient.

We have not overlooked the fact that the opinion (p. 9) directs the reader to compare *Barnes* v. *United States,* 46 Ct. Cl. 7, 28. The case was never cited in any of the Government briefs; and it seems that it has never before been cited by any court on this point, not even by the Court of Claims. The statement in the *Barnes* case is based upon an obvious misinterpretation of both the facts and the decision in *The Montello* case, as abundantly appears not only from a reading of *The Montello* case but also from the subsequent expositions of *The Montello* case by this Court in the decisions hereinabove cited.

2. As legislative support for its new pronouncement, the Court cites (p. 8) the definition of navigable waters contained in Section 3(8) of the Water Power Act. The instant decision reaffirms the well-established principle that Federal navigability is a Constitutional fact. It follows that, if this statutory definition is construed to include waters not navigable in interstate commerce, it is manifestly unconstitutional. *United States* v. *Cress,* 243 U. S. 316, 322; *Crowell* v. *Benson,* 285 U. S. 22, 55. The Court appears to construe the phrase in the aforesaid definition, "which either in their natural or *improved* condition * * * *are* used or suitable for use for the transportation of persons or property in interstate or foreign commerce", as a declaration that there shall be regarded as navigable any waters which, though non-navigable, can be made navigable by artificial means. This, we respectfully submit, is a clear misconstruction of the definition.

This part of the definition plainly applies only to waters which either *are* naturally navigable in fact or *have been* made navigable interstate by artificial means, i. e., are (already) in an improved condition. It does not apply to non-navigable waters which *could be* made artificially navigable.

Of course, no one questions the Constitutional authority of the United States to construct an interstate navigable waterway as an instrumentality of interstate commerce, either by means of a canal entirely over dry land or by utilizing the bed of a non-navigable stream, just as the Federal Government could construct a transcontinental railroad as an instrumentality of interstate commerce. *California* v. *Pacific R. R. Co.,* 127 U. S. 1. But in either case compensation would have to be paid for property taken. *United States* v. *Cress, supra* (l.c. 326). Such an artificial interstate waterway would of course be a navigable water of the United States.

3. The opinion states:

> "It cannot properly be said that the federal power over navigation is enlarged by the improvements to the waterways. It is merely that improvements make applicable to certain waterways the existing power over commerce" (p. 9).

We understand these statements to be advanced as a foundation for the proposition under discussion, i. e., that a stream not navigable in fact in its natural condition is nevertheless navigable in law if it can be made actually navigable at a reasonable expense. So understood, the statements seem plainly to confuse the circumstance that Federal power extends over interstate navigation upon all interstate navigable waters, whether naturally or artificially navigable, and the fact that Federal authority over navigation does not extend to non-navigable waters merely because therein, by lawful procedure and payment of compensation for property and rights taken, there may be created an artificial interstate navigable waterway which would thereupon come under the jurisdiction of Congress. Where an artificial interstate waterway has actually been created, there has been no increase of Federal power over navigation in the abstract sense but there has been brought into being a new subject upon which the Federal power over navigation may operate.

4. In support of the definition now enunciated, the Court states:

> "An analogy is found in admiralty jurisdiction, which may be extended over places formerly non-navigable" (p. 9).

The cases[1] cited by the Court merely hold that the old Illinois and Michigan Canal and the Erie Canal, waters admittedly navigable in fact in interstate commerce, are subject to the admiralty jurisdiction of the United States courts. This, we submit, furnishes not the slightest support for the proposition that admiralty jurisdiction, or any Federal jurisdiction dependent upon the existence of navigable waters, extends to non-navigable waters merely because they could be made artificially navigable at some unknown expense, assumed to be reasonable.

---

[1] *The Robert W. Parsons,* 191 U. S. 17; *Ex Parte Boyer,* 109 U. S. 629; *Marine Transit Co.* v. *Dreyfus,* 284 U. S. 263.

5. The extent to which this proposition departs not only from long and unbroken lines of decisions of this Court, and from Constitutional principles accepted ever since the foundation of our Government, can not, in our opinion, be overstated. Federal authority over interstate navigable streams has rested upon the fact that they are natural highways of interstate commerce and has been limited to the control of such waters for purposes of navigation. Property rights remained in the States and their people even on navigable streams, and the foregoing has been the Constitutional line of demarcation between the rights of the States and the Federal Government even in navigable waters (Resp. Br. 109-112). All rights in non-navigable waters were vested in the States and their citizens. It is, we submit, perfectly obvious that the proposition now enunciated by the Court for the first time and in conflict with all relevant prior decisions of this Court deprives the States and their people of all governmental and proprietary rights in the valuable water powers and other resources of that great mass of streams which have been known as non-navigable under the established law of the land.

There is scarcely a stream with any appreciable flow, no matter how impossible of use in its natural state, which could not at some cost, however great, be canalized for some kind of navigation. According to the opinion, flow and gradient are the only natural conditions to be considered (p. 8). But not even the volume of water would be controlling; for engineering science long ago learned to supply necessary water by head-water reservoirs and other expedients. Certainly under this rule it is difficult to understand why the question of gradients would be material; for obviously, by building dams in sufficient number and to a sufficient height, any gradients on any stream in the land could be overcome.

The purported limitation that "There must be a balance between cost and need at a time when the improvement would be useful" (p. 8) is plainly illusory. It is a limitation in form of words but none in law or in fact, for the following reasons:

First, Federal navigability is, and always has been, a Constitutional fact which delimits in many aspects the scope of Federal Constitutional authority. However, this purported judicial and Constitutional definition of Federal navigable waters sets up criteria which, were they susceptible of practical application, would fall solely within the field of legislative determination and wholly outside the sphere of judicial action. Under the settled law, Congress is the sole judge of such questions as whether the cost of artificial improvements on streams, navigable or non-navigable, is justified by the probable or assumed benefits. *Arizona* v. *California,* 283 U. S. 423, 455-6. Obviously, therefore, under the definition now enunciated, the question whether a stream non-navigable in its natural condition may be made artificially navigable at a reasonable cost will be solely for the determination of the Congress. The inescapable consequences of the decision are to transfer to the Congress the power and duty vested by the Constitution in the Federal courts to safeguard and preserve our Constitutional system in this wide field.

Second, the rule, even if it fell within the scope of judicial determination, would be wholly impossible of application. In the case of a non-navigable stream claimed to be susceptible of being made navigable by artificial improvements, how is the Court to say what structures would be necessary to make the stream useful for interstate commerce, or at what cost they could be provided? How is the Court to determine what would be the value of the "need at a time when the improvement would be useful" (p. 8). Indeed, how is the Court to determine when the "time when the improvement would be useful" (p. 8) will arrive? Obviously such a rule, if it stated a principle within the field of judicial action, would engage the Court in a maze of speculation, conjecture and prophesy.

Thus, in the instant case: What is the nature, scope and extent of the artificial improvements which will be necessary to make New River thus navigable? What is the time "when the improvement would be useful"? What will be the character and cost of the artificial improvements necessary at that unknown time? What will be the value of the "need" at that unknown time? Will the unknown value of the need at this unknown time balance the unknown cost of the undeterminable improvements necessary?

6. This new proposition of law (completely destructive of the proprietary and sovereign rights of the States and of the proprietary rights of Respondent and other riparian owners under the law as it has been previously enunciated by this Court as well as the State Courts generally and understood by the profession) has been promulgated without any opportunity to Respondent or to the States to be heard upon this vital issue.

As we read the Government's petition and briefs in this Court, no such proposition as that now enunciated was therein urged. As we understood the argument, no such proposition was urged by the Solicitor General before this Court but rather it was expressly disclaimed by him. That Respondent's understanding in this respect was fully shared by the States appearing herein as *amici curiae* is, we think, clear from a reading of their briefs. Obviously, had either Respondent or such States understood that such an issue was raised before this Court, the proposition would have been fully briefed and argued by both and shown to be untenable under the decisions of this Court. Manifestly, in the light of the fact that, as hereinbefore shown, the proposition is at war with all the relevant previous decisions of this Court, neither Respondent nor the States could anticipate the enunciation of such a rule. Plainly a rehearing should be granted and Respondent and the States should be given an opportunity to be heard—particularly in view of the destructive effect of the proposition upon the rights of Respondent, the States and riparian owners generally.

Since, as we believe, no such issue was presented to this Court in petition, brief or oral argument, it is, we think, immaterial whether such an issue had been raised in the courts below and abandoned here. However, as we understand the record and proceedings in the lower courts, the proposition now enunciated was not urged by the Government in either court.

In the District Court, the Government requested no findings which would embody the indispensable factual bases for application of the rule now promulgated, and no conclusion of law which embodied such a proposition in any form (R. 84, *et seq.*). No error was assigned by the Government to the failure of the District Court to make any of the findings which are necessary for the application of the rule now announced for the first time. The only reference to any subject-matter even remotely related to the subject-matter of the rule, advanced in the Government's 556-page brief in the Trial Court, was an argument (based upon a misconception of the rule that navigability shall be determined under natural and ordinary conditions) that artificial improvements do not destroy the "ordinary condition" of a stream until the stream has been fully canalized (pp. 29-30).

In the court below, the Government stated that "the presence of falls and rapids, shoals and sandbars," may constitute "evidence against navigability" although asserting that such obstacles do not "necessarily establish non-navigability" (Pet. Supp. Br. below 34-35) and further that "there is little or no disagreement with the court below (District Court) as to the meaning of 'navigable waters of the United States' " (Pet. Supp. Br. below 31). In reference to a statement in Respondent's brief below, to the effect that the Government apparently contended "that a river is a navigable water of the United States if it would be possible to make it navigable by artificial means", the Government stated categorically: "We did not make such a contention" (Pet. Reply Br. below 2, footnote 3).

While it would be immaterial that a proposition not presented or argued in this Court had once been urged in a court below, Respondent was, we think, fully justified in its understanding that no such proposition had been presented in either court below.

7. From the practical standpoint, the outstanding characteristic of the newly enunciated criterion as to navigability in law is that, *however non-navigable* a stream may be *in fact* and no matter whether the sovereign rights of a State and the property and riparian rights of a State and its citizens have been exercised and relied upon in the light of such non-navigability-in-fact, such actions may be nullified and any such rights, investments or values grievously injured, if not destroyed, by some future holding that the stream in point is nevertheless susceptible of being made navigable artificially at a cost held to be reasonable—even though such improvement is a mere possibility and may never take place at all.

The inequitable effect upon an investment, whether State or private, is typified by the instant case. Here Respondent made its investment of over $1,000,000. in lands and riparian rights for the Radford project in light of the commonly recognized fact that New River is not navigable-in-fact in interstate commerce. The earlier acquisitions by the immediate predecessor of Respondent were made at a time when the Chief of Engineers of the War Department had in a report of July 13, 1911, stated to the Secretary of War:

> "There has been no useful navigation on New River at any time, and none is possible under existing natural conditions, nor without the expenditure of vast and prohibitive sums in improvement work." (Ex. 566, R. 2844)

The Federal Power Commission, after mature consideration and in the light of the December 29, 1925, report of the Chief of Engineers, General Harry Taylor (Ex. 97, R. 2528-32), itself on June 1, 1927, had made a finding of non-navigability (Ex. 97, R. 2492-4). Again in July, 1930, the Commission certified to the Attorney General of the United States that:

> "New River is neither navigated nor navigable in fact" (Ex. 531, R. 2779).

The investment of the many millions of dollars involved in the actual building of the dam was not begun until, at the instance of the State of Virginia, the Engineers of the War Department had again made an exhaustive examination of the question as to whether New River is navigable in fact. That examination took place because the Federal Bureau of Roads had raised the question as to whether War Department authorization was necessary for highway bridges across New River, including a bridge at Glen Lyn, Virginia. The ensuing October-November, 1930, reports by the District Engineer (Ex. 579-B, R. 2862), the Division Engineer, Col. Spalding (Ex. 579-C, R. 2864), and the Chief of Engineers, Gen. Brown (Ex. 539-B, R. 2795-6), had put on record their findings that *New River is not navigable in fact at any point of its course.*[1]

Respondent recognized that administrative attitudes and actions are not conclusive in regard to navigability. However, Respondent, in view of the attitude and the April, 1931, order of the Federal Power Commission, had attempted to obtain a judicial determination of the matter in controversy, in which attempt it had been unsuccessful[2]; and it believed that such unbroken line of considered opinions by Federal officials and agencies holding New River non-navigable in interstate commerce fully confirmed the conclusions which it had reached as the result of its own investigations. Accordingly in 1934 it began this investment of additional millions, the dam being completed in 1939. And now, under a holding by this Court, in pursuance of its newly enunciated criterion, Respondent is, under penalty of complete abatement of its dam, required to subject itself to a license with exceedingly onerous, and in our view confiscatory, conditions.[3] The terms of this license are destructive of riparian rights, State and private, which throughout historical times and until now have been recognized, along the entire length of New River and by Federal as well as by State Governments, as appertaining to a stream Federally non-navigable. The license conditions will greatly reduce, without compensation, the value of Respondent's investment.

---

[1] To be sure the Federal Power Commission subsequently in 1932, during the pendency of the so-called first New River case, had without notice or hearing adopted a self-serving resolution to the effect that New River is navigable. But such action was obviously nothing more than an attempt to bolster its position in the pending litigation. (Op. District Court, R. 140.)

[2] *Appalachian Electric Power Co.* v. *Smith,* 67 F. (2d) 451, cert. denied, 291 U. S. 674.

[3] In this connection it is of interest to note that the dam involved in *Economy Light Co.* v. *United States, supra,* had, during the pendency of that case, hardly been begun and its construction was never carried further.

A multitude of owners of mills and manufacturing establishments, as well as other water-power developments, old as well as modern, small as well as large, located along and utilizing the waters of streams similarly non-navigable in fact but, under the instant decision of this Court, subject to being held navigable, are faced with similar contentions and possibilities of abatement without compensation or imposition of like Federal licenses.

B.

The Court erred in finding that, under the definition of navigability enunciated in the opinion, New River is a navigable water of the United States upon the facts appearing in the record.

1. Under the criterion now announced by this Court "There must be a balance between cost and need at a time when the improvement *would be useful*" (p. 8). We here deal with a stream which is non-navigable in interstate commerce in its natural condition and which has never heretofore been made navigable in interstate commerce by artificial means.

Manifestly, the criterion cannot mean that a stream which is non-navigable in fact is nevertheless navigable in law merely because it be found or assumed that at some time in the past, however remote, it would have been possible to have made the stream navigable, by artificial improvements never made, at a cost which would have balanced a then existent, but since vanished, need. However, the evidence in the instant record clearly establishes that in the past, as well as at present, New River was not susceptible of being made navigable in fact by artificial means at reasonable cost.

In reviewing in summary form the essential showing of the record in respect of the "improvability" of New River, we begin for convenience with the actual attempt artificially to make portions of New River navigable, an attempt which was abandoned far short of completion of the project which had been initiated. In the early Reports of the Chiefs of Engineers, including the 1872 Report cited by the Court in its opinion (p. 15), were contained statements optimistic as to the results which could be accomplished by the project and the reasonableness of the cost thereof. However, as the work progressed, difficulties were encountered, other difficulties appeared in prospect and the funds were expended at rates in excess of those anticipated. The optimism gradually disappeared.

Thus, after the improvement had been under way for two seasons, Captain Cuyler of the United States Engineers in 1879 reported upon the difficulties involved and the inadequacy of the type of improvement contemplated in the original estimates. As to the difficulties, he stated:

> "Here the simple go-ahead work of *blasting* down to a *depth* and *clearing* out *obstructions* is *ineffective, as by as much* nearly as the *bottom* is so *lowered* does the *surface fall shortly afterwards*" (R. 2341).

He concluded that it was necessary

> "to adopt a *more general and radical method* to effect a permanent improvement than has heretofore been tried" (R. 2340).

He recommended the

> "free use of dams to collect into pools the water, which construction should be *much* more elaborate than any heretofore attempted" (R. 2340).

Furthermore Captain Cuyler observed that the open river system of improvement

> "* * * from Hinton up to Sifford, 64 miles * * * will, I think, be found to be but partially applicable," (R. 2341);

instead

> "the dimensions of the river and of the main falls will necessitate the construction, at these latter, of *locks* and *dams;*" (R. 2341).

In short, as Captain Cuyler stated, after two seasons of actual work on the river, the character of the contemplated improvement had been found to be inadequate

> "even for the *batteau* navigation and *rafting*" (R. 2340).

Great as was the confidence initially as to the adequacy of the estimates of cost and great as was the then purchasing power of the dollar (labor was 10¢-12½¢ per hour, R. 2388), the inadequacy, of the estimated and appropriated sums to accomplish anything worth while, was increasingly realized, until in the 1887 Report the Chief of Engineers pointed out that the estimates and appropriations had been insufficient even to make a proper beginning. He stated:

> "As Congress has never given such a sum of money as would justify the proper *beginning* of a connected project for a continuous navigation from the North Carolina border to Hinton * * *" (R. 2826).

And, as the opinion points out (p. 16), the Radford-Wiley's Falls section was never improved, i.e., was left in its natural condition.

The recognition of the fact that New River could not be made navigable at any reasonable cost is to be found in the War Department Reports for 1900, wherein it is stated:

> "No work has been done on this river since 1889 and the *cost* of further improvement would be *out of all proportion* to the benefits to be conferred" (R. 2809).

And again in the same report:

> "The expense of further improvement of the stream, even under the present project, is *very large* in *proportion to the results attained,* since a great deal of rock excavation must be done, while the cost of canalizing the river would be *out of all relation* to the benefits to be derived now or in the near future" (R. 2810).

Statements made in debates in the House of Representatives are to the same effect. Thus, for January 14, 1901, the Congressional Record reads as regards New River:

> "Mr. Burton. This item is included with some 9 or 10 others, on page 86, to be repealed and the amount of the appropriation covered back into the treasury. The committee thought it was time to take up a few of these projects which it was thought were *impracticable,* or, I might say, *absurd,* * * *"
>
> "I want to say to the gentleman from Virginia, further, that $2300. would be a bagatelle in improving *that* river, because the improvement, if any should be made, would be rock excavation, which would cost tens of thousands of dollars *even to make a beginning*" (R. 2810).

Again on January 16, 1901, Mr. Burton stated on the floor of the House:

> "* * * The engineer reports that it is useless to do any work. The stream runs through a rocky gorge, and in order to improve it it will need *expensive* works and very *extensive* rock excavations would have to be made. * * * It seems to me this House should have the courage, in so clear a case as this, after ten years in which not a dollar has been expended and where there is *no probability of any money ever being expended,* to pursue a businesslike course and take it off the books" (R. 2812).

The fact that the river could not be improved at reasonable expense is likewise shown by the statement of the

Chief of Engineers to the Secretary of War dated July 13, 1911, which is quoted in a memorandum for the Secretary of War from the Chief of Engineers dated May 19, 1916, as follows:

> "There has been no useful navigation on New River at any time, and none is possible under existing natural conditions nor without the expenditure of *vast* and *prohibitive* sums in improvement work" (R. 2844).

In 1912 the Board of Engineers for Rivers and Harbors reported (R. 2420):

> "Physical conditions are such that it could not be improved for useful navigation except at *prohibitive* cost."

And Lieut. Col. George R. Spalding, as Division Engineer, reported to the Chief of Engineers under date of October 24, 1930, that New River

> "was not made navigable in fact except for precarious and occasional navigation by the federal improvements, and that it is not now navigable in fact or *capable* of being made so at any *reasonable* expense" (R. 2864).

The present situation clearly appears from a comprehensive report upon the Kanawha River and its tributaries which was made to Congress in January, 1935, by the United States Engineering Department for the specific purpose *inter alia* of determining what, if any, plans of improvement are feasible for purposes of navigation (Original Exhibit 145). That report is one of the series of so-called "308" reports which Congress directed to be made upon practically all navigable rivers and their tributaries in the United States (Act of Congress of January 21, 1927). This report plainly negatives the possibility of making New River navigable in interstate commerce at reasonable cost.

Thus the Division Engineer, Col. Spalding, states:

> "Because of their unfavorable natural characteristics (steep slope and tortuous alignment)[1] none of the tributaries of Kanawha River offer [even] *potentialities* for development in the interests of modern navigation" (R. 2690).

In due sequence the Board of Engineers for Rivers and Harbors reports:

> "*None of the tributaries* [of the Kanawha] because of their unfavorable natural characteristics, are *suitable for development* for navigation, although prior to 1902 the United States expended funds intermittently on some of the tributaries to facilitate rafting and shallow draft navigation" (R. 2684).

And finally the Chief of Engineers, General Markham, with evident recognition of the facts reported by his subordinates, that New River is not suitable for development for navigation at reasonable cost, considers the question of whether developments for navigation would be economically feasible even if all of the large number of dams and reservoirs or pools were provided free of cost to navigation improvement. He reports, with respect to the larger tributaries of the Kanawha, including of course the New River, that although they

> "are susceptible of improvement for navigation by the utilization of the pools formed by the construction of high dams for power and flood control purposes if locks or other devices are constructed for passing vessels from one pool to another" (R. 2678).

yet

> "The *large cost* of providing and operating such locks or other devices *does not appear to be justified* by any commerce immediately in prospect * * *" (R. 2678).

---

[1] The parenthetical reference to "steep slope and tortuous alignment" is included in Col. Spalding's statement.

In short, not even the locks or other devices, let alone the dams, could be provided at reasonable cost.

Such Report on the part of the Chief of Engineers is of course entirely in keeping with the fact that the dam of the Federal Bluestone Reservoir Project will have no locks or other means for navigation[1] and will constitute a complete barrier to navigation in the stretch of New River above Hinton, W. Va., or, as stated by the Circuit Court of Appeals,

> "will destroy any possibility of navigation from Glen Lyn to Hinton" (R. 2909).

We submit, therefore, that the evidence in the record before this Court overwhelmingly establishes the fact that New River, including the section between Radford and Wiley's Falls, cannot be made navigable at reasonable cost and that, therefore, even under the new definition enunciated by this Court, New River is not a navigable water of the United States.

C.

The Court erred in holding that the phrase "natural and ordinary condition", as used in the definition of navigable waters adopted and applied in a long and unbroken line of decisions of this Court, merely "refers to volume of water, the gradients and the regularity of flow" (pp. 7-8).

1. No precedent is cited to support the exclusion of all natural conditions except flow and slope from the long-established definition of Federal navigable waters; and we know of no judicial support for the pronouncement. On the contrary the decisions of this Court, as well as facts of common knowledge, squarely negative the propriety of excluding from consideration all other natural conditions,

---

[1] The verified bill of particulars filed by the Government in the pending condemnation proceeding for the Bluestone Project states that no facilities will be provided for water transportation. Cf. R. 2899.

and especially obstacles to navigation, in determining whether a stream is navigable-in-fact.

Not merely low or irregular stream flow, ~~but~~ limited depths and widths of channel, high and irregular velocities, shallows, falls, rapids, tortuous channels, rocky beds, scattered boulders (exposed and concealed) and rocky ledges, are all evidence of non-navigability. Cf. Pet. Supp. Br. below, 34-35. These various types of obstacles (all excluded from consideration by the pronouncement of this Court) have been repeatedly examined by this Court on an issue of navigability.[1] *The Montello*, 20 Wall. 430 (rocks, falls, rapids, sand bars); *Economy Light & Power Co.* v. *United States*, 256 U. S. 113 (rapids, shoals, boulders and "obstructions"; l.c. 118); *United States* v. *Holt State Bank*, 270 U. S. 49 (depths, sand bars and vegetation); *United States* v. *Utah*, 283 U. S. 64.

In *United States* v. *Utah* the obstacles to navigability, urged by the Government as precluding the existence of navigability-in-fact, included (in addition to slopes which over-all ranged only 20 per cent to 40 per cent as great as the slope in the 40-mile stretch of New River above Round Bottom, West Virginia),[1] "logs and debris, ice, floods, rapids and riffles in certain parts, rapid velocities with sudden changes in the water level, sand and sediment which combined with the tortuous course of the rivers produce a succession of shifting sand-bars, shallow depths, and instability of channel" (l.c. 84). This Court in a unanimous decision carefully reviewed the extent and combined effect of all these obstructions as shown by the facts found by the Special Master (the suit being one within the original jurisdiction of this Court). Indeed, the opinion devotes nearly two pages to consideration of the effect of sand bars alone

---

[1] We think no previous case can be found where this Court has held navigable a stream with an over-all gradient remotely approaching that of the 40-mile section of New River above Round Bottom, West Virginia (Resp. Appendix A, p. 124, footnote).

(l.c. 85-86)—obviously one of the least hazardous and least difficult of all natural obstacles to navigation. The Court pointed out that the sand bars, which were obviously considered as evidence making against navigability, had to be considered in connection with other natural conditions making for navigability. In short, all natural conditions, making for or against navigability, must be weighed together to determine whether under all the natural conditions navigability in fact exists under natural and ordinary conditions. Surely it can not be assumed that for one hundred years this Court, when passing upon issues of navigability, has been engaged in considering various natural conditions (other than flow and gradient) which really have nothing whatever to do with the existence of navigability-in-fact.

And apart from the decisions of this Court, it is a matter of common knowledge that the exclusion of all of these other natural conditions in determining the existence of navigability-in-fact is not in accord with the known facts of practical navigability *vel non.* Given only the "volume of water, the gradients and the regularity of the flow" (p. 8), a board composed of the greatest navigation engineers in the world could not determine whether a particular stream is navigable-in-fact in its natural and ordinary condition. Thus there is no particular volume of flow which brands a stream either as navigable or non-navigable. A given volume of water may be insufficient for navigation on one stream and yet in the case of another be either ample or so excessive as to be itself an obstruction to navigability-in-fact. The answer depends upon numerous other "natural conditions" which the present pronouncement of this Court excludes from consideration.

This is well illustrated by the Snake River, to which the Government referred in its reply brief (Pet. Reply Br. 14). Although the Snake River has a low-water discharge of 14,000 c.s.f. (many times that of many streams which are highly navigable at all seasons) and an average slope of only three feet per mile in its lower 168-mile reach, the Chief of Engineers states that the Snake was "practically non-navigable at low water", and that its navigability was limited to the lower 140 miles at stages "which gave a navigable depth of about 6 feet * * * with a minimum channel width of about 150 feet" (Rep. of C. of E., 1924, p. 1739). This, the Chief of Engineers states, was "on account of narrow and crooked channels through rock ledges, gravel shoals and boulders". Yet obviously, if the test announced by this decision (disregarding everything but flow and slope) were in fact correct, the Snake would have been highly navigable in its natural condition even during lowest water.

It will not do, either as a matter of law or well-known fact, to say that only one or two selected natural conditions, which may make for or against navigability, shall be considered. We know that this would be impossible for a navigator in practical everyday life. It ought not to be assumed to be possible for the purposes of judicial decision.

Furthermore, promulgation of such a rule is destructive of our Constitutional system of Government. Such a rule substitutes a technical, theoretical, legalistic definition, divorced from the realities of everyday life, for the rule, established by a long and unbroken line of decisions of this Court, that a stream to be navigable in fact and hence to be navigable in law must have a real, practical and genuinely useful capacity for carrying interstate commerce of a substantial and permanent character. The result is that by an artificial legal formula, divorced from the facts determinative of practical utility, the powers of the States and the rights of their citizens in relation to vast and valuable water resources are taken over by the Federal Government without Constitutional amendment and without compensation. As pointed out in *United States* v. *Doughton,* 62 F. (2d) 936 (C. C. A. 4):

> "Congress would thus be enabled under the commerce clause to exercise control over internal affairs of the states in relation to streams where interstate commerce has no existence, actual or potential; and the states would be deprived of vital power in regulating matters of domestic concern, having no relation to commerce. This would clearly contravene the whole theory of the Constitution as to the division of the powers of sovereignty between states and national government" (l.c. 938).

2. As we understood and now understand the petition, briefs and oral arguments in this Court, this proposition was never advanced by the Government nor intimated by the Court during oral argument; and consequently it is a proposition, at variance with all of the previous decisions, upon which neither the Respondent nor the States appearing herein as *amici curiae* have been heard.

D.

The Court erred in holding that a different test of navigability was applicable in cases involving riparian rights or title to beds of streams than in cases involving the extent of Federal power under the commerce clause.

1. The cases relied upon by the Court as involving title to beds or riparian rights (except *Shively* v. *Bowlby,* 152 U. S. 1, which did not consider any question of navigability) were based upon the definition of navigability as set forth in the decisions of this Court in *The Daniel Ball,* 10 Wall. 557; *The Montello,* 20 Wall. 430; *United States* v. *Rio Grande D. & I. Co.,* 174 U. S. 690; *Economy Light & Power Co.* v. *United States,* 256 U. S. 113; *Leovy* v. *United States,* 177 U. S. 621; *United States* v. *Cress,* 243 U. S. 316, all of which cases construed the power of the Federal Government over navigable streams under the commerce clause.

2. The definition of navigability, from which this Court in this case has departed, is applicable to all cases involving "the Constitution and laws of the United States" (*United States* v. *Holt State Bank,* 279 U. S. 49, 56) regardless of whether the controversy relates to Federal power under the commerce clause or to riparian rights.

3. The Government did not contend in the court below, or in this Court, that a different rule was applicable in cases involving the extent of Federal power under the commerce clause.

4. Neither Respondent nor the States have ever been heard on the question.

E.

The Court erred in holding inapplicable, to a finding that a stream is not navigable in fact in interstate commerce, the long established rule that factual findings concurred in by two lower courts will be accepted in this Court unless clear error is shown.[1]

1. Under our Constitutional system it is, and always has been, the law that Federal navigability is a question of fact. *Arizona* v. *California,* 283 U. S. 423, 452; *Crowell* v. *Benson,* 285 U. S. 22, 55; *Oklahoma* v. *Texas,* 258 U. S. 574, 586, 590-1; *United States* v. *Utah,* 283 U. S. 64, 87. With the exception of the decision announced in this case, it has been, and apparently continues to be, the settled rule of this Court that concurrent findings of fact will be accepted as unassailable in this Court if supported by substantial evidence. *Alabama Power Co.* v. *Ickes,* 302 U. S. 464, 477; *United States* v. *O'Donnell,* 303 U. S. 501; *United States* v. *Commercial Credit Co.,* 286 U. S. 63; *United States* v. *Chemical Foundation,* 272 U. S. 1. This Court has ex-

---

[1] While Respondent properly relied upon this long established rule, Respondent also insisted, and now insists, that the concurrent finding of the lower courts is supported by the overwhelming weight of the evidence.

pressly applied the rule to the issue of navigability. *Brewer-Elliott Oil Co.* v. *United States,* 260 U. S. 77, 86. None of the cases cited in the Court's opinion supports the abrogation of this rule on an issue of navigability-in-fact.

Under this rule, the only questions open to the Government in this Court are (a) whether the lower courts applied the correct criteria of law, and (b) whether the concurrent finding is supported by substantial evidence. Questions of the weight, credibility, relevance and inferences of fact to be drawn from conflicting items of evidence by the trier of fact are not open here. In each of the cases cited in the opinion, it will be found that this Court did nothing more than either examine the correctness of the criteria of law applied by the lower courts or examine the record only in so far as was necessary to determine whether a concurrent finding was supported by substantial evidence.

Indeed, in *Leovy* v. *United States,* 177 U. S. 621 (cited in the opinion, p. 5), this Court merely passed upon the correctness of instructions given to a jury to which had been submitted an issue of navigability. Obviously, where this Court finds that a jury has been erroneously instructed or that the lower courts have applied erroneous criteria of law, the resulting finding can not be accepted as determinative and this Court will, in accordance with the usual practice, determine whether the case may be disposed of without remand for a new trial or hearing. *Cf.* also *United States* v. *Holt State Bank, supra.* But that circumstance furnishes no support for the abrogation of the two-court rule in any kind of a case.

The abrogation of this rule is not only in the teeth of prior decisions of this Court but carries with it hazards of a dangerous nature. We are not dealing with a mere "conventional rule" (p. 5) or a rule of convenience, to be applied as a matter of discretion or as a labor-saving device, but with a rule which rests upon substantial grounds essential to a fair administration of justice. The rule recognizes the compelling fact that the trial court, before argument or submission of briefs, hears all of the evidence and testimony as it is unfolded on the record, sees and hears the witnesses and is in a position properly to appraise the credibility and weight of testimony. The very process of trial in open court is such that the court is afforded time to digest, understand and sift the evidence which is of particular importance in cases with voluminous records. Thus in the instant case, the trial court heard testimony continuously from July 13, 1936, through September 5, 1936, later heard oral argument for three days and painstakingly examined and studied not only the record but printed briefs totaling 1257 pages in which the evidence was carefully sifted and reviewed from every viewpoint.

No such opportunity for weighing and sifting the evidence is available in this Court. Yet the decision in this cause not only sets aside the concurrent finding but also gives no weight whatsoever to the finding of either lower court. Under such circumstances, it would be idle for lower courts painstakingly, laboriously and carefully to discharge what they have conceived to be their judicial duty in weighing and sifting the evidence to the end that the material facts might be found not only for decision of the cause by those courts, but as the basis of review in this Court. If the rule now announced is to stand, it would seem that Rule 52 of The Federal Rules of Civil Procedure only recently promulgated by this Court should be drastically limited or entirely eliminated. Rule 52 provides that even the finding of a trial court (lacking the reinforcement of a painstaking review by a Court of Appeals) "shall not be set aside unless clearly erroneous."

The dangers in the innovation adopted in the instant case are, we think, graphically illustrated (a) by the erroneous statement that the only disagreement is over the conclusions "to be drawn from this *uncontroverted evidence*" (p. 5) and (b) by the fact that much of the evidence or testimony cited in the opinion as "uncontroverted" is evidence or testimony which we believe, and certainly the lower courts may well have believed, was not credible or in any event was testimony given by witnesses entitled to neither credibility nor weight and contradicted by evidence and testimony entitled to much more weight, but to which the opinion does not refer. The overlooking of material evidence, the reliance upon evidence unduly stressed or placed out of relation to the evidence with which it must be weighed, is the natural and inescapable consequence of any attempt by this Court to undertake to determine such issues of fact *de novo*.

2. Nor, we submit, can the abrogation of the two-court rule be justified by the statement that on the issue of navigability "facts and their *constitutional significance* are too closely connected to make the two-court rule a serviceable guide" (p. 5). The circumstance that the determination of facts one way or another may lead to different conclusions, as to the existence or non-existence of Constitutional rights or authority, is only an added reason why they should be determined in the manner in which long judicial experience has shown will best serve the ends of justice. Whether the fact be determinative of a Constitutional right or merely determinative of tort liability, the only objective in any system of justice is that the fact be honestly and rightly found.

Except in this case, no one has ever suggested, nor does anyone now suggest, that the findings of the lower courts (including the better opportunity of the trial court in particular to weigh and appraise the testimony) are to be disregarded merely because the facts so conscientiously determined may, upon application of the law, prove to be turning points of Constitutional decision.

3. Nor, we submit, can the abrogation of the two-court rule be based upon the proposition that "The legal con-

cept of navigability embraces both public and private interests." (p. 5) It would be difficult to imagine any issue of fact in a suit involving the rights of a citizen *vis-à-vis* his Government which does not involve public and private interests in the sense that determination of the facts may well determine the respective rights of the citizen and his Government, regulatory and governmental or other. The Court cites no precedent, and we think none can be found, in which any such principle has been announced or applied. But there is no more reason for changing the rules with respect to an issue of navigability-in-fact because it may affect the outcome of the suit than there is for changing the rule long applicable, and not now set aside, to the determination of every other fact in every Constitutional case which comes before this Court. Indeed, there is in our judgment less justification for this change in rule as applied to navigability-in-fact than in relation to almost any other issue of Constitutional fact which comes before this Court. Invariably every stream is *sui generis* as to its physical characteristics, its use or non-use and the other relevant circumstances bearing upon its navigability *vel non*. Invariably such cases involve a mass of evidence which must be carefully sifted and appraised in order to arrive at the fact. Laying aside the lack of opportunity for this Court to judge the weight and credibility of testimony of witnesses, such issues can not be adequately presented within the compass of briefs or arguments permissible under the established practice, which has prevailed in this Court since its earlier days.

4. Nor, we submit, can this change in rules be sustained upon the ground that "Both the standards and the ultimate conclusion involve questions of law inseparable from the particular facts to which they are applied" (pp. 5-6). Every determination of fact either by a court or a jury is, of course, an appraisal of the weight to be given, and the in-

ferences to be drawn from, the testimony and evidence by the trier of fact (whether it be court or jury) in the light of some legal definition. It matters not whether the issue be negligence, fraud or navigability. Naturally, in finding the facts in any case, the applicable legal criteria are inseparable from the particular facts of that case in the sense that the inferences to be drawn from the evidence in the light of the applicable instruction to the jury or the legal definition by the court are, or at least may be, *sui generis*. But in this aspect no peculiar situation exists, in finding whether a stream is navigable-in-fact in interstate commerce, which does not exist on every issue of fact.

In short, every reason given by the opinion for departing from the established two-court rule applies as well to every Constitutional case that ever has been, or ever will be, submitted to this Court. The departure not only affects the rights of the parties hereto but will return to plague this Court in every term until it shall be overruled.

II.

License Conditions.

The Court erred in holding that in relation to projects on a navigable stream the challenged license conditions are within the Constitutional authority of the United States.

A.

The Court erred in holding that "The license conditions to which objection is made have an obvious relationship to the exercise of the commerce power" (p. 22).

[illegible] The Government concedes (Pet. Rep. Br. 38), and as we read the opinion the Court holds, that the challenged conditions are not "even concerned with navigation as such" (p. 20). Any Constitutional basis must, therefore, be found in some exercise of the commerce power not concerned with, or dependent upon, the fact that the subject-matter regulated is navigable waters. Apart from their use as highways of interstate commerce, navigable waters are subject to no greater or different authority under the commerce clause than fast land and are no more subject to "national planning" (p. 22) than any other natural resources of the States.

The statement that Federal Constitutional authority over navigable waters *as such* is not limited to control thereof for purposes of navigation is unsupported by any citation of authority and is, we submit, denied by every previous decision of this Court which has examined the nature and scope of Federal Constitutional authority in relation to such waters (See cases cited, Resp. Br. 109). The concession, that the regulations are not concerned with control of navigable waters for purposes of navigation, renders the location of the project sought to be regulated irrelevant to a determination of whether the challenged conditions are within the commerce power and the only issue remaining is whether they fall within the scope of the commerce power regardless of where the project thus regulated may be situated.

2. The commerce power does not extend to anything and everything merely because an attempted regulation is described as "national planning." Since the challenged conditions are unrelated to navigation or to the preservation and use of navigable waters as highways of interstate commerce, what is their relation to the commerce power?

Respondent's project is a power project. It is neither built nor susceptible of use for any other purpose. To the extent that flood protection is within any Constitutional authority of the Federal Government, it is not involved in this case (Pet. Br. 102, n28; Resp. Br. 86-7, 118-9). The commerce clause, apart from such power as may be exercised over navigable waters as highways of interstate commerce or apart from the authority to construct an artificial navigable waterway provided compensation be made for property taken (neither of which is involved in this case), no more grants authority to engage in "watershed development" (p. 22) than it grants authority to develop and exploit the mines, timberlands, or agricultural resources of the States.

If the commerce power be construed to embrace such subjects, then, contrary to that fundamental principle of our Constitutional system, which has been unchallenged since its foundation, the Federal Government will, without Constitutional amendment, have been converted into a completely centralized Government.

3. No relation to the commerce clause may be founded upon a claimed right to recover "cost of improvements through utilization of power" (p. 22). The Government is not here making any improvement or recovering the cost of any improvement.

The Government has no more authority to develop water power for the purpose of paying the cost of a particular Federal improvement than it has to develop water power in order to augment the general fund of the Government or to embark on any other business for the purpose of making money. This Court said in *Ashwander* v. *T. V. A.*, 297 U. S. 288, 340:

> " * * * And the Government rightly conceded at the bar, in substance, that it was without constitutional authority to acquire or dispose of such (electrical) energy except as it comes into being in the operation of works constructed in the exercise of some power delegated to the United States."

The plain and unequivocal meaning is that the development of water power for profit or otherwise is not *per se* "a power delegated to the United States"

B.

The Court erred in holding that, even if the license conditions are unrelated to the commerce power, the plenary power of Congress over navigable waters vests authority in Congress to impose such unrelated conditions.

1. Under the commerce power, as under any other Constitutional power, the Government may not impose regulations in excess of its Constitutional authority. The principle here declared by the Court sanctions for the first time the exercise of authority not granted but forbidden to the Federal Government (See cases cited, Resp. Br. 128).

2. To say that "Congressional authority under the commerce clause is complete unless limited by the Fifth Amendment" (p. 22) manifestly furnishes no basis for sustaining regulations postulated to be without relation to, and therefore outside the scope of, the commerce power. For illustration, Congress may not forbid citizens to engage in interstate commerce, unless they will turn their property over to the Federal Government or unless they will otherwise submit to unauthorized Federal regulation. While it is no objection if an exercise of commerce power happens to be "attended by the same incidents which attend the exercise of the police power of the states" (p. 22), it does not follow that the Federal Government may therefore exercise any authority, even though not granted, so long as it partakes of the nature of police power.

C.

The Court erred in holding that the capture clause is Constitutional.

1. The Court erred in holding not only that the capture clause is not confiscatory but also that the Government could capture Respondent's project at all, for whatever compensation—this for the reason that it is plainly beyond the Constitutional authority of the Government to acquire such a project. Respondent's project is a power project and is neither built nor susceptible of use for any other purpose. Moreover, there should be no confusion as to the

purpose of "taking over" by the Government under Section 14 of the Act. The contract right thus sought to be acquired is to "take over and thereafter to maintain and operate any project or projects as defined in Section 3" of the Act. Thus, by the very terms of the Act the statutory contract is to take over, maintain and operate a power project adapted to, or suitable for, no other purpose. Moreover, under Section 15 of the Power Act, the Government would also have the right to turn Respondent's project over to some other power company for operation. To test whether any Constitutional authority so to take over and maintain Respondent's power project exists, it is only necessary to consider what would be the situation if the Government were to file a suit to condemn Respondent's property for the declared purpose of engaging in the power business. Plainly such a declaration in condemnation would be dismissed on demurrer or motion as an attempt to condemn property for a purpose in excess of any Constitutional authority of the United States.

The statement that "Since the United States might [has power to] erect *a* structure in these waters itself, even one equipped for electrical generation, it may constitutionally acquire one already built" (p. 23) is either inapposite or a complete *non sequitur*. The Government would have power to build a postoffice on a city lot, but it would not follow that it could therefore condemn or otherwise acquire a department store, bakery or other mercantile establishment located on that lot for the purpose of maintaining and operating the mercantile business theretofore established.

For the foregoing reasons, it is respectfully urged that this petition for a rehearing be granted, and that the decree of the Circuit Court of Appeals for the Fourth Circuit be, upon further consideration, affirmed.

Respectfully submitted,

Raymond T. Jackson,
A. Henry Mosle,
Creswell M. Micou,
Fraser M. Horn,
Wendell W. Forbes,
M. W. Belcher, Jr.,
John L. Abbot;
Counsel for Respondent.

January 10, 1941.

We hereby certify that the foregoing petition is presented in good faith and not for delay.

Raymond T. Jackson,
A. Henry Mosle,
Creswell M. Micou,
Fraser M. Horn,
Wendell W. Forbes,
M. W. Belcher, Jr.,
John L. Abbot,
Counsel for Respondent.

1

PP. 1, 2, 8, 24

SUPREME COURT OF THE UNITED STATES.

No. 12.—October Term, 1940.

The United States of America, Petitioner, *vs.* Appalachian Electric Power Company.	On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit.

[December 16, 1940.]

Mr. Justice Reed delivered the opinion of the Court.

This case involves the scope of the federal commerce power in relation to conditions in licenses, required by the Federal Power Commission, for the construction of hydroelectric dams in navigable rivers of the United States. To reach this issue requires, preliminarily, a decision as to the navigability of the New River, a water-course flowing through Virginia and West Virginia. The district court and the circuit court of appeals have both held that the New River is not navigable, and that the United States cannot enjoin the respondent from constructing and putting into operation a hydroelectric dam situated in the river just above Radford, Virginia.

Sections 9 and 10 of the Rivers and Harbors Act of 1899 make it unlawful to construct a dam in any navigable water of the United States without the consent of Congress.[1] By the Federal Water Power Act of 1920,[2] however, Congress created a Federal Power Commission with authority to license the construction of such dams upon specified conditions. Section 23 of that Act provided that persons intending to construct a dam in a nonnavigable stream may file a declaration of intention with the Commission. If after investigation the Commission finds that the interests of interstate or foreign commerce will not be affected, permission shall be granted

---

[1] 30 Stat. 1151, 33 U. S. C. §§ 401, 403.

[2] 41 Stat. 1063. The Act was amended by 49 Stat. 838 (1935), U. S. C. Supp. V, Title 16, § 791 *et seq.*, by which it became known as the Federal Power Act.

a

for the construction. Otherwise construction cannot go forward without a license.

The Radford Dam project was initiated by respondent's predecessor, the New River Development Company, which filed its declaration of intention with the Federal Power Commission on June 25, 1925. The Commission requested a report from General Harry Taylor, then Chief of Engineers of the War Department. He first reported that the river was navigable, and also that while the water flow from the dam, if not properly regulated, could have an adverse effect on navigation during low water stages in the Kanawha River (of which the New was one of the principal tributaries), such possible adverse effect would not warrant refusing a license to construct the dam if control was maintained by the United States. On review at the Commission's request, however, General Taylor rendered a second report, concluding that the New River in its present condition was not navigable and that navigation on the Kanawha would not be adversely affected by the proposed power development. On March 2, 1926, the Commission held a hearing on the declaration; the only evidence then submitted was General Taylor's second report.

Respondent, the Appalachian Electric Power Company, took an assignment of the declaration of intention on August 30, 1926, and several days later filed an application for a license on the Commission's suggestion that this would expedite matters and could be withdrawn if it later developed that no federal license was required. In October, the district engineer of the War Department held a public hearing at Radford. On June 1, 1927, the Commission made a finding that the New River was not "navigable waters" within the definition in section 3(8) of the Federal Water Power Act of 1920 but that (under section 23 of the Act) the project would affect the interests of interstate and foreign commerce. On July 1, 1927, the Commission tendered to respondent a standard form license which the respondent refused in April, 1928, principally on the ground that the conditions—especially those concerning rates, accounts and eventual acquisition—were unrelated to navigation. In February, 1930, respondent reiterated that its project was not within the Commission's jurisdiction, but nevertheless offered to accept a "minor-part" license[3] containing only such conditions as would protect the interests of the United States in navigation. In

---

[3] Section 10(i).

September, 1930, Attorney General Mitchell advised the Commission that it could properly issue such a minor-part license;[4] the question submitted by the Commission had stated that the New River was neither navigated nor navigable in fact. On November 25, the Commission "declined to take action on the application favorable or adverse," on the ground that a court adjudication was desirable. After the establishment of the Commission as an independent agency,[5] it held another hearing in February, 1931; in April it denied the application for a minor-part license, directed that the respondent be tendered a standard form license under the Act, and ordered it not to proceed without such a license. A minority of the Commission then favored a finding that the New River was navigable; the majority, however, thought that question was for the courts and that the Commission's jurisdiction was properly based upon section 23 of the Federal Water Power Act.

On June 8, 1931, the respondent brought an action against the Commission to remove a cloud on its title and to restrain interference with the use of its property. This case was dismissed for jurisdictional reasons.[6] While it was pending, on October 12, 1932, the Commission without notice adopted a resolution that the New River, from the mouth of Wilson Creek, Virginia, north, was navigable.

The respondent began construction work on the dam about June 1, 1934. On May 6, 1935, the United States filed this bill for an injunction against the construction or maintenance of the proposed dam otherwise than under a license from the Federal Power Commission, and in the alternative a mandatory order of removal. It alleged that the New River is navigable; that the dam would constitute an obstruction to navigation and would impair the navigable capacity of the navigable waters of the United States on the New, Kanawha and Ohio Rivers; that the Commission had found the dam would affect the interests of interstate or foreign commerce; and that its construction therefore violated both the Rivers and Harbors Act and the Federal Water Power Act. Respondent denied these allegations, and also set forth a number of separate defenses based on the assumption that the New River was nonnavigable. The fortieth and forty-first paragraphs of the answer, however, set forth defenses relied on by the respondent even if the river were held navigable. The substance of these was (1) that the conditions of any federal license must be strictly limited to the protection of the navigable capacity of the waters of the United States; and (2) that the Commission's refusal to grant the minor-part license containing only such conditions was unlawful, and that any relief should be conditioned upon the Commission's granting respondent such a license. By these defenses respondent put in question—in the event of an adverse holding on navigability—the validity of the conditions of the Act carried over into the standard form license which relate to accounts, control of operation and eventual acquisition of the project at the expiration of the license.

---

[4] 36 Op. A. G. 355.

[5] Originally it consisted of three cabinet officers, ex officio: the Secretaries of War, Interior, and Agriculture. By 46 Stat. 797 it was reorganized into an independent Commission with five members. The new Commission began to function on December 22, 1930.

[6] Appalachian Electric Power Co. *v.* Smith, 67 F. (2d) 451, cert. denied, 291 U. S. 674.

After trial, in an opinion reinforced by formal findings of fact and law, the district court decided that the New River is not a navigable water of the United States; that respondent's dam would not obstruct the navigable capacity of the Kanawha or any other navigable river, and would not affect the interests of interstate commerce; that the Power Commission's findings on these matters were not final but subject to the determination of the courts;[7] that the Federal Water Power Act did not vest in the Commission authority to require a license in a nonnavigable river; that even if the Commission had authority to require some license for a dam in nonnavigable waters, it could not impose conditions having no relation to the protection of the navigable capacity of waters of the United States; and that its effort to impose upon respondent a license containing unlawful conditions barred the United States from relief. The district judge therefore dismissed the bill, but left it open to the Government to assert its rights if future operation of the project interfered with the navigable capacity of the waters of the United States. The circuit court of appeals, with one judge dissenting, affirmed. We granted certiorari.[8]

Concurrent Findings. The district court's finding that the New River was not navigable was concurred in by the circuit court of appeals after a careful appraisal of the evidence in the record.[9]

---

[7] In both courts below the Government unsuccessfully urged that the findings of the Commission, if supported by substantial evidence, were conclusive. Although it still regards this contention as correct, the Government does not seek to have this Court pass on it in this case.

[8] 309 U. S. 646.

[9] 107 F. (2d) 769, 780, 787.

Both courts stated in detail the circumstantial facts relating to the use of the river and its physical characteristics, such as volume of water, swiftness and obstructions. There is no real disagreement between the parties here concerning these physical and historical evidentiary facts. But there are sharp divergencies of view as to their reliability as indicia of navigability and the weight which should be attributed to them. The disagreement is over the ultimate conclusion upon navigability to be drawn from this uncontroverted evidence.

The respondent relies upon this Court's statement that "each determination as to navigability must stand on its own facts,"[10] and upon the conventional rule that factual findings concurred in by two courts will be accepted by this Court unless clear error is shown.[11]

In cases involving the navigability of water courses, this Court, without expressly passing on the finality of the findings, on some occasions has entered into consideration of the facts found by two courts to determine for itself whether the courts have correctly applied to the facts found the proper legal tests.[12] When we deal with issues such as these before us, facts and their constitutional significance are too closely connected to make the two-court rule a serviceable guide. The legal concept of navigability embraces both public and private interests. It is not to be determined by a formula which fits every type of stream under all circumstances and at all times. Our past decisions have taken due account of the changes and complexities in the circumstances of a river. We do not purport now to lay down any single definitive test. We draw from the prior decisions in this field and apply them, with due regard to the dynamic nature of the problem, to the particular circumstances presented by the New River. To these circumstances certain judicial standards are to be applied for determining whether the complex of the conditions in respect to its capacity for use in interstate commerce render it a navigable stream within the Constitutional requirements. Both the standards and the ultimate conclusion involve questions of law inseparable from the particular facts to which they are applied.

---

[10] United States *v.* Utah, 283 U. S. 64, 87.

[11] Brewer Oil Co. *v.* United States, 260 U. S. 77, 86; e. g., Alabama Power Co. *v.* Ickes, 302 U. S. 464, 477; Pick Mfg. Co. *v.* General Motors Corp., 299 U. S. 3; Texas & N. O. R. Co. *v.* Ry. Clerks, 281 U. S. 548, 558; United States *v.* O'Donnell, 303 U. S. 501, 508.

[12] United States *v.* Rio Grande Irrigation Co., 174 U. S. 690, 699; Leovy *v.* United States, 177 U. S. 621; Economy Light Co. *v.* United States, 256 U. S. 113, 117; United States *v.* Holt Bank, 270 U. S. 49, 55.

Navigability. The power of the United States over its waters which are capable of use as interstate highways arises from the commerce clause of the Constitution. "The Congress shall have Power . . . To regulate Commerce . . . among the several States." It was held early in our history that the power to regulate commerce necessarily included power over navigation.[13] To make its control effective the Congress may keep the "navigable waters of the United States" open and free and provide by sanctions against any interference with the country's water assets.[14] It may legislate to forbid or license dams in the waters;[15] its power over improvements for navigation in rivers is "absolute."[16]

The states possess control of the waters within their borders, "subject to the acknowledged jurisdiction of the United States under the Constitution in regard to commerce and the navigation of the waters of rivers."[17] It is this subordinate local control that, even as to navigable rivers, creates between the respective governments a contrariety of interests relating to the regulation and protection of waters through licenses, the operation of structures and the acquisition of projects at the end of the license term. But there is no doubt that the United States possesses the power to control the erection of structures in navigable waters.

The navigability of the New River is, of course, a factual question[18] but to call it a fact cannot obscure the diverse elements that enter into the application of the legal tests as to navigability. We are dealing here with the sovereign powers of the Union, the Nation's right that its waterways be utilized for the interests of the commerce of the whole country. It is obvious that the uses to which the streams may be put vary from the carriage of ocean liners to the floating out of logs;[19] that the density of traffic varies equally widely from the busy harbors of the seacoast to the sparsely settled regions of the Western mountains.[20] The tests as to navigability must take these variations into consideration.

---

[13] Gibbons *v.* Ogden, 9 Wheat. 1, 189; Leovy *v.* United States, 177 U. S. 621, 632.

[14] Gilman *v.* Philadelphia, 3 Wall. 713, 724-25; United States *v.* Coombs, 12 Pet. 72, 78.

[15] Willson *v.* The Black Bird Creek Marsh Co., 2 Pet. 245, 250; United States *v.* Rio Grande Irrigation Co., 174 U. S. 690, 703.

[16] United States *v.* River Rouge Co., 269 U. S. 411, 419.

[17] Water Power Co. *v.* Water Commissioners, 168 U. S. 349, 366; United States *v.* Rio Grande Irrigation Co., 174 U. S. 690, 702.

[18] Arizona *v.* California, 283 U. S. 423, 452.

[19] The Montello, 20 Wall. 430, 441.

Both lower courts based their investigation primarily upon the generally accepted definition of *The Daniel Ball*.[21] In so doing they were in accord with the rulings of this Court on the basic concept of navigability.[22] Each application of this test, however, is apt to uncover variations and refinements which require further elaboration.

In the lower courts and here, the Government urges that the phrase "susceptible of being used, in their ordinary condition," in the *Daniel Ball* definition, should not be construed as eliminating the possibility of determining navigability in the light of the effect of reasonable improvements. The district court thought the argument inapplicable.[23]

The circuit court of appeals said:

> "If this stretch of the river was not navigable in fact in its unimproved condition, it is not to be considered navigable merely because it might have been made navigable by improvements which were not in fact made. Of course if the improvements had been made the question of fact might have been different."[24]

To appraise the evidence of navigability on the natural condition only of the waterway is erroneous. Its availability for navigation must also be considered. "Natural and ordinary condition''[25] refers to volume of water, the gradients and the regularity of the flow. A waterway, otherwise suitable for navigation, is not barred from that classification merely because artificial aids must make the highway suitable for use before commercial navigation may be undertaken. Congress has recognized this in section 3(8) of the Water Power Act by defining "navigable waters" as those "which either in their natural or improved condition" are used or suitable for use. The district court is quite right in saying there are obvious limits to such improvements as affecting navigability. These limits are necessarily a matter of degree.[26] There must be a balance between cost and need at a time when the improvement would be useful. When once found to be navigable, a waterway remains so.[27] This is no more indefinite than a rule of navigability in fact as adopted below based upon "useful interstate commerce" or "general and common usefulness for purposes of trade and commerce" if these are interpreted as barring improvements.[28] Nor is it necessary that the improvements should be actually completed or even authorized. The power of Congress over commerce is not to be hampered because of the necessity for reasonable improvements to make an interstate waterway available for traffic.

---

[20] United States *v.* Utah, 283 U. S. 64, 83.

[21] 10 Wall. 557, 563:

" . . . Those rivers must be regarded as public navigable rivers in law
which are navigable in fact. And they are navigable in fact when they are
used, or are susceptible of being used, in their ordinary condition, as highways
for commerce, over which trade and travel are or may be conducted in the
customary modes of trade and travel on water. And they constitute navigable
waters of the United States within the meaning of the acts of Congress, in
contradistinction from the navigable waters of the States, when they form in
their ordinary condition by themselves, or by uniting with other waters, a con-
tinued highway over which commerce is or may be carried on with other States
or foreign countries in the customary modes in which such commerce is con-
ducted by water."

United States *v.* Appalachian Electric Power Co., 23 F. Supp. 83, 98; same, 107 F. (2d) 769, 780.

[22] United States *v.* Rio Grande Irrigation Co., 174 U. S. 690, 698; Brewer
Oil Co. *v.* United States, 260 U. S. 77, 86; United States *v.* Holt Bank,
270 U. S. 49, 56; United States *v.* Utah, 283 U. S. 64, 76; United States *v.*
Oregon, 295 U. S. 1, 15.

[23] 23 F. Supp. at 99-100.

[24] 107 F. (2d) at 786.

Of course there are difficulties in applying these views. Improvements that may be entirely reasonable in a thickly populated, highly developed, industrial region may have been entirely too costly for the same region in the days of the pioneers. The changes in engineering practices or the coming of new industries with varying classes of freight may affect the type of the improvement. Although navigability to fix ownership of the river bed[29] or riparian rights[30] is determined as the cases just cited in the notes show, as of the formation of the Union in the original states or the admission to statehood of those formed later, navigability, for the purpose of the regulation of commerce, may later arise.[31] An analogy is found in admiralty jurisdiction,[32] which may be extended over places formerly non-navigable.[33] There has never been doubt that the navigability referred to in the cases was navigability despite the obstruction of falls, rapids, sand bars, carries or shifting currents.[34] The plenary federal power over commerce must be able to develop with the needs of that commerce which is the reason for its existence. It cannot properly be said that the federal power over navigation is enlarged by the improvements to the waterways. It is merely that improvements make applicable to certain waterways the existing power over commerce.[35] In determining the navigable character of the New River it is proper to consider the feasibility of interstate use after reasonable improvements which might be made.[36]

---

[25] United States *v.* Oregon, 295 U. S. 1, 15.

[26] Thus in the Rio Grande case, the record contained reports of army engineers that improvements necessary to make the river navigable would be financially, if not physically, impracticable because of the many millions of dollars that would be required. The supreme court of the Territory of New Mexico observed that "the navigability of a river does not depend upon its susceptibility of being so improved by high engineering skill and the expenditure of vast sums of money, but upon its natural present conditions" (9 N. M. 292, 299). This Court agreed that too much improvement was necessary for the New Mexico stretch of the river to be considered navigable. United States *v.* Rio Grande Irrigation Co., 174 U. S. 690, 699.

[27] Economy Light Co. *v.* United States, 256 U. S. 113.

[28] See 107 F. (2d) at 780.

[29] Shively *v.* Bowlby, 152 U. S. 1, 18 and 26; United States *v.* Utah, 283 U. S. 64, 75.

[30] Oklahoma *v.* Texas, 258 U. S. 574, 591, 594; United States *v.* Oregon, 295 U. S. 1, 14.

Nor is it necessary for navigability that the use should be continuous. The character of the region, its products and the difficulties or dangers of the navigation influence the regularity and extent of the use.[37] Small traffic compared to the available commerce of the region is sufficient.[38] Even absence of use over long periods of years, because of changed conditions, the coming of the railroad or improved highways does not affect the navigability of rivers in the constitutional sense.[39] It is well recognized too that the navigability may be of a substantial part only of the waterway in question.[40] Of course, these evidences of nonnavigability in whole or in part are to be appraised in totality to determine the effect of all. With these legal tests in mind we proceed to examine the facts to see whether the 111-mile reach of this river from Allisonia to Hinton, across the Virginia-West Virginia state line, has "capability of use by the public for the purposes of transportation and commerce."[41]

---

[31] Cf. United States *v.* Rio Grande Irrigation Co., 174 U. S. ~~690~~; 699.

[32] Art. III, section 2, cl. 1. Cf. Genessee Chief *v.* Fitzhugh, 12 How. 443.

[33] The Robert W. Parsons, 191 U. S. 17, 28; Ex parte Boyer, 109 U. S. 629; Marine Transit Co. *v.* Dreyfus, 284 U. S. 263, 271-72.

[34] The Montello, 20 Wall. 430, 442-43; Economy Light Co. *v.* United States, 256 U. S. 113, 122; United States *v.* Utah, 283 U. S. 64, 86. See also Mr. Justice McLean in Spooner *v.* McConnell; 22 Fed. Cas. No. 13,245, at p. 944 (C. C. D. Ohio 1838).

[35] Illustrative of this natural growth is United States *v.* Cress, 243 U. S. 316, involving riparian proprietors' rights where improvements raise the river level so that uplands are newly and permanently subjected to the servitude of public use for navigation. Compensation was decreed for the taking with a declaration that the waterways in question, as artificially improved, remained navigable waters of the United States (pp. 325 and 326). Cf. Arizona *v.* California, 283 U. S. 423, 454.

[36] Cf. Barnes *v.* United States, 46 Ct. Cl. 7, 28.

[37] United States *v.* Utah, 283 U. S. 64; Arizona *v.* California, 283 U. S. 423, 452-54.

[38] United States *v.* Utah, 283 U. S. 64, 82.

[39] Ashwander *v.* Tennessee Valley Authority, 297 U. S. 288, 329.

Physical Characteristics. New River may be said to assume its character as such at the mouth of Wilson Creek near the North Carolina-Virginia line. From that point it flows first in a northeast and then in a northwest direction something over 250 miles to Kanawha Falls, West Virginia. It passes through Allisonia and Radford, Virginia, and then Hinton, West Virginia. It is joined by many tributaries, the largest of which is the Gauley. At Kanawha Falls it changes its name to the Kanawha, a navigable river of commercial importance which joins the Ohio 97 miles below. The whole territory traversed by the New is broken and mountainous. Between Hinton and Kanawha Falls, the river is swift and the gorge precipitous. Above Hinton the river flows more slowly, through a broader valley and between less rugged mountains. The same may be said of the area above Radford. Throughout the river there is an abundance of water, and the respondent hardly denies that the flowage suffices if other conditions make the New available for navigation.[42]

It will conserve discussion to appraise the navigability of the 111-mile stretch between Allisonia and Hinton in three sections which together form the whole reach between these points: the 28 miles from Allisonia to Radford, which the United States improved between 1876 and 1883; the 59-mile stretch from Radford to Wiley's Falls, Virginia, never improved except at Wiley's Falls itself; and the 24 miles from Wiley's Falls across the state line to Hinton, West Virginia, which, like the upper section, the Government improved during 1876-1883. We shall examine chiefly the disputed middle section, for as to the others the evidence of navigability is much stronger and that of obstructions much weaker. For instance, the report of the Chief of Engineers for 1873 refers to certain keelboats operating on the river, and his report for 1883 shows that 17 keelboats operated above Hinton. Keelboats were flat-bottomed bateaux, 50 to 70 feet long, with a draft of two feet and a carrying capacity varying up to 10 or 12 tons. They were used commercially to transport lumber, tobacco and other products of the region. The evidence is clear that these bateaux plied from Hinton up to near Glen Lyn with fair regularity through the first decade of this century and well into the second; timber and lumber in large quantities apparently were boated and rafted down to Hinton from various up-river points below Glen Lyn until about the beginning of the World War.[43] Around and above Radford the Chief of Engineers reported two keelboats operating in 1881, eight in 1882, and eight together with a small steamboat in 1883. The corroborating testimony of many witnesses shows that in the 80s these boats carried iron ore and pig iron, as well as produce and merchandise, between Allisonia and New River Bridge, which is a little above Radford.[44] At the Hinton and New River Bridge railroad stations, freight brought in by the keelboats or other river craft was transshipped, and freight arriving by rail was forwarded by river.

---

[40] Economy Light Co. *v.* United States, 256 U. S. 113, 124; Arizona *v.* California, 283 U. S. 423, 453.

[41] Cf. The Montello, 20 Wall. 430, 441.

[42] See 23 F. Supp. at 91.

We come then to a consideration of the crucial stretch from Radford to below Wiley's Falls where junction is made with the interstate reach from Wiley's Falls to Hinton. In the report of the Secretary of War for 1872 appears Hutton's useful mile-by-mile survey of the river from above Allisonia to the mouth of the Greenbrier, which is nearly down to Hinton. It was made as a basis for plans to improve the New by federal appropriation.[45] This survey designates the Radford-Wiley's Falls stretch as "mile 46" to "mile 104" inclusive. Eighteen of these miles have grades falling, gradually or abruptly, more than four feet in the mile. Several of these where there are rapids or falls show drops of eight, nine and in one instance 11½ feet. The higher footage represents, of course, miles in which small falls are found. Between these more precipitous sections are many miles of what is called "good water," with a gradual fall of 4 feet or less. Even in miles where the declivity is rapid, the fall is apparently largely in sections containing obstructions. For instance, the 51st mile reads "Rapid, over bowlders and gravel, 1,500 feet long; fall, 8½ feet," and the 100th mile "Neilley's Falls and rapids; whole fall, 11 feet, 6 of it nearly vertical. A sluice 500 feet long, along left bank, will pass them, with 50 feet of rock excavation and 450 feet of bowlders and gravel." Quite frequently where the fall is moderate, other obstructions appear, as the 78th mile "Rapids, 500 feet long, over bowlders and gravel; fall, 2 feet." Large isolated rocks are scattered abundantly throughout the stretch. A geologist testifying for the respondent tells strikingly how the faulting and folding of the surface at this stretch has resulted in the tilting of the rock strata to a steep degree. "In its flow, the water of New River moves along and up the slopes of successive rock strata or ledges . . . this results in a river with numerous ledges of rock strata, some partly submerged, some exposed, which are substantially vertical or standing on end, and which extend across the stream at right angles to the line of flow . . . The slope of the strata is downward in an upstream direction rather than in a downstream direction," contrary to the usual condition. No other data point to material variations from these descriptions.

---

[43] This is shown by the testimony of Weiss, Peters, Starbuck, Lane, E. M. Smith, Farley, Kenley, Lucas, E. W. Lilly, W. L. Burks, Z. V. Burks, Johnson, Wauhop, Stover, R. Calloway, J. C. Martin, Tomkies, and B. C. Lilly.

[44] E. g., the testimony of R. L. Howard, Graham, J. Breeding, Owen, Z. Farmer, H. B. Allison, J. H. Howard, Peterson, Moore, Likens, Roop, and Ingles. In 1885 the assistant engineer reported that "from inquiries it is thought that the channel-way made in former years [on the improved sections] still keeps open, and bateaux are in constant use on them, iron having been shipped to New River bridge up to the time of the suspension of the furnaces by the prevailing hard times" (Report of the Chief of Engineers for 1886).

[45] 17 Stat. 376.

Use of the River from Radford to Wiley's Falls. Navigation on the Radford-Wiley's Falls stretch was not large. Undoubtedly the difficulties restricted it and with the coming of the Norfolk & Western and the Chesapeake & Ohio railroads in the 80s, such use as there had been practically ceased, except for small public ferries going from one bank to the other.[46] Well authenticated instances of boating along this stretch, however, exist. In 1819 a survey was made by Moore and Briggs, whom the General Assembly of Virginia had sent to report on the availability of the New for improvement. Beginning at the mouth of the Greenbrier they boated up to the mouth of Sinking Creek, some 55 miles, noting the characteristics of the river as they went. They reported that they ascended all falls with their boat, "though, in two or three instances, with considerable difficulty, after taking out our baggage, stores,

---

[46] At different times before 1935 ferries crossed the river at no less than ten points along the Radford-Wiley's Falls stretch. In 1935 there were five such public ferries.

&c.''[47] Sinking Creek is about half way up this stretch of river we are considering.

In 1861 the Virginia General Assembly appropriated $30,000 to improve the New River to accomodate transportation of military stores by bateaux from Central depot [Radford] to the mouth of the Greenbrier.[48] While there is no direct proof that this particular appropriation was spent, reports of the War Department engineers make it clear that the Confederate government effected some improvements on the river.[49] These facts buttress the testimony of several witnesses, one a Confederate veteran, that during the Civil War keelbottom boats brought supplies from Radford to a commissary at the Narrows (about 7 miles above Glen Lyn), and then continued further downstream.[50] This testimony the circuit court of appeals accepted as true.[51]

From the end of the Civil War to the coming of the railroads, the evidence of elderly residents familiar with events along the banks of the river between Radford and Wiley's Falls leaves no doubt that at least sporadic transportation took place in and throughout this stretch. By this it is not meant that the keelboats above Radford and above Hinton, which operated frequently in the improved sections, made regular through trips from Allisonia past Radford to Hinton. Through navigation, however, did occur, as is shown by the testimony of a number of witnesses and recognized by the lower courts.[52] There are also numerous references to isolated bits of boating along parts of the Radford-Wiley's Falls reach.[53] And when the Government stopped improvement in 1883, it ordered the boats it was using in the lead mines' division above Allisonia, and at various places downstream, to be brought down the full stretch of the river to Hinton for sale. Under the supervision of the assistant engineer, a derrick boat, four bateaux, and numerous flat boats, skiffs and canoes—more than twenty vessels in all—were taken down to Hinton, a number of them from points above Radford. This was accomplished, as the Chief of Engineers' report shows, despite difficulties occasioned by "weather, low water, and scarcity of labor."[54]

---

[47] Report of Moore and Briggs. Fourth and Fifth Annual Reports of the Board of Public Works to the General Assembly of Virginia (1819). Report of the Principal Engineer of the Board of Public Works.

While Marshall was Chief Justice he was head of a Virginia commission which had surveyed part of the New River by boat in 1812, but only going downstream from the mouth of the Greenbrier. Report of the Commissioners, printed 1816.

[48] Virginia Acts of 1861-62, c. 50.

[49] ''But little has been done in the way of improving the river since the time of Moore and Briggs, though an effort is said to have been made in that direction by the confederate government in the late war'' (Report of Chief of Engineers for 1873). ''Experience as developed by the universal fate of the work of the late Confederate States on this river (though this seems to have been injudiciously located and poorly built), is adverse to anything like rigid structures . . .'' (Report of Chief of Engineers for 1879).

[50] Testimony of Snyder, Snidow, Skeen.

[51] 107 F. (2d) at 783.

[52] See 23 F. Supp. at 93; 107 F. (2d) at 786.

Testimony of bateaux going from Radford, or above, to Hinton, is given by Flannagan, Linkous, Collins, Webb, Snyder.

A boat, 50 feet by 8, with a gasoline motor, went from Radford to Hinton in 1901, though after the river had been materially raised by a rain.

In addition to the testimony of use in the days before railways and good roads, there was a demonstration of the possibility of navigation by a government survey boat with an outboard motor, 16 feet long, five feet wide, drawing 2½ to 3 feet, loaded with a crew of five and its survey equipment. This boat made a round trip from the Narrows, just above Wiley's Falls, to Allisonia, a distance of 72 miles one way, in July, 1936, when the river stage was normal summer low water. While the crew was out of the boat and used poles a number of times, there were no carries or portages. Going upstream it was not necessary to pull or push the boat more than a mile and a quarter and not more than a few hundred feet on the return trip.

Use of a stream long abandoned by water commerce is difficult to prove by abundant evidence. Fourteen authenticated instances of use in a century and a half by explorers and trappers, coupled with general historical references to the river as a water route for the early fur traders and their supplies in pirogues and Durham or flat-bottomed craft similar to the keelboats of the New, sufficed upon that phase in the case of the DesPlaines.[55] Nor is lack of commercial traffic a bar to a conclusion of navigability where personal or private use by boats demonstrates the availability of the stream for the simpler types of commercial navigation.[56]

---

[53] E. g., testimony of Coleman, Howard, Webb, Snyder, Price, Martin, Anderson.

[54] Report of the Chief of Engineers for 1883. See also testimony of Owen, Crowell, Dickinson.

[55] Economy Light Co. *v.* United States, 256 Fed. 792, 797-98; affirmed 256 U. S. 113.

[56] United States *v.* Utah, 283 U. S. 64, 82.

The evidence of actual use of the Radford-Wiley's Falls section for commerce and for private convenience, when taken in connection with its physical condition make it quite plain that by reasonable improvement the reach would be navigable for the type of boats employed on the less obstructed sections. Indeed the evidence detailed above is strikingly similar to that relied upon by this Court in *United States* v. *Utah*[57] to establish the navigability of the Colorado from Cataract Canyon to the Utah-Arizona boundary line. There had been seventeen through trips over a period of sixty years from the original exploration; and these together with sporadic trips on parts of the stretch, and considerable use—in connection with gold placer mining—of other parts from 1888 to 1915, sufficed to sustain navigability.[58]

Effect of Improvability. Respondent denied the practicability of artificial means to bring about the navigability of the New River and the effectiveness of any improvement to make the river a navigable water of the United States. The Government supported its allegation of improvability by pointing out that the use of the section for through navigation and local boating on favorable stretches of the Radford-Wiley's Falls reach showed the feasibility of such use and that little was needed in the way of improvements to make the section a thoroughfare for the typical, light commercial traffic of the area. Keelboats, eight feet wide, drawing two feet, were the usual equipment. In the 1872 report of the Chief of Engineers, Major Craighill in charge of New River reports that to get "good sluice navigation of 2 feet at all times" for 54 miles up from the mouth of the Greenbrier River, near Hinton, would cost $30,000 and for 128 miles, Greenbrier to the lead mines (above Allisonia), would cost $100,000. The depth over the shoals could be increased to 2 feet without "too much increase of velocity of the current." This recommendation was based on Hutton's mile-by-mile survey and includes all of the Radford-Wiley's Falls section.

The improvements were undertaken beginning in 1877. As the region was becoming better developed, a higher type of improvement became desirable, wider sluice ways and a deeper channel, usable by small steamboats. Work went forward above Hinton and above Radford to meet the pressing demands of the communities. Annual reports of the Chief of Engineers assumed or reaffirmed the navigability of the entire river above Hinton and the practicality of the improvements.[59] By 1891, $109,733.21 had been spent. It was in that year estimated $159,000 more would be required to complete the project the full length from Wilson Creek to Hinton.[60] Useful navigation moved regularly between Hinton and near Glen Llyn and between Radford and Allisonia. About half the reach between Hinton and Allisonia was improved. The Radford-Wiley's Falls section was never improved. It was reported that conditions had changed and the project should not be completed.[61] The provisions for improvements were repealed in 1902.[62] By 1912 the region's need for use of the river had so diminished that the army engineers advised against undertaking improvements again, and even referred to the cost as "prohibitive."[63] From the use of the Radford-Wiley's Falls stretch and the evidence as to its ready improvability at a low cost for easier keelboat use, we conclude that this section of the New River is navigable. It follows from this, together with the undisputed commercial use of the two stretches above Radford and Hinton, that the New River from Allisonia, Virginia, to Hinton, West Virginia, is a navigable water of the United States.

---

[57] 283 U. S. 64, 81.

[58] See the Report of the Master, p. 127 *et seq.*

License Provisions. The determination that the New River is navigable eliminates from this case issues which may arise only where the river involved is nonnavigable.[64] But even accepting the navigability of the New River, the respondent urges that certain provisions of the license, which seek to control affairs of the licensee, are unconnected with navigation and are beyond the power of the Commission, indeed beyond the constitutional power of Congress to authorize.

The issue arises because of the prayer of the bill that the respondent be compelled to accept the license as required by law or remove the dam as an obstruction and the answer of the respondent that the license required by law and tendered to it by the Commission contains provisions, unrelated to navigation or the protection of navigable capacity, which are beyond the constitutional authority of Congress to require on account of the Fifth and Tenth Amendments. There is no contention that the provisions of the license are not authorized by the statute. In the note below[65] the chief statutory conditions for a license are epitomized. The license offered the respondent on May 5, 1931, embodied these statutory requirements and we assume it to be in conformity with the existing administration of the Power Act. We shall pass upon the validity of only those provisions of the license called to our attention by the respondent as being unrelated to the purposes of navigation. These are the conditions derived from sections 10a, 10c, 10d, 10e and 14. We do not consider that the validity of other clauses has been raised by the respondent's general challenge to the constitutionality of any provision "other than those relating solely to the protection" of navigable waters.[66] It should also be noted that no complaint is made of any conditions of the license dependent upon the authorization of § 10g, the omnibus clause requiring compliance with such other conditions as the Commission may require.

---

[59] Report for 1878, pp. 69, 495-99; 1879, pp. 79, 530-45; 1880, pp. 107-08, 676-81; 1881, pp. 144-45, 904-11; 1882, pp. 140-42, 913-19; 1883, pp. 144-45, 699-705; 1886, pp. 281-82, 1599-1602.

[60] Report of the Chief of Engineers for 1891, p. 303.

[61] *Id.*, at 302-303.

[62] 32 Stat. 374.

[63] House Doc. No. 1410, 62nd Cong., 3d Sess., p. 3.

[64] Cf. United States *v.* Appalachian Electric Power Co., 107 F. (2d) 769, 793 *et seq.*

---

[65] § 4(a) of the Act allows the Commission to regulate the licensee's accounts.

§ 6 limits licenses to 50 years.

§ 8 requires Commission approval for voluntary transfers of licenses or rights granted thereunder.

§ 10(a), as amended in 1935, requires that the project be best adapted to a comprehensive plan for improving or developing the waterway for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes. Under § 10(c) the licensee must maintain the project adequately for navigation and for efficient power operation, must maintain depreciation reserves adequate for renewals and replacements, and must conform to the Commission's regulations for the protection of life, health and property; (d) out of surplus earned after the first 20 years above a specified reasonable rate of return, the licensee must maintain amortization reserves to be applied in reduction of net investment; (e) the licensee must pay the United States reasonable annual charges for administering the Act, and during the first 20 years the United States is to expropriate excessive profits until the state prevents such profits; (f) the licensee may be ordered to reimburse those by whose construction work it is benefited.

By § 11, for projects in navigable waters of the United States the Commission may require the licensee to construct locks, etc., and to furnish the United States free of cost (a) lands and rights-of-way to improve navigation facilities, and (b) power for operating such facilities.

§ 14 gives the United States the right, upon expiration of a license, to take over and operate the project by paying the licensee's "net investment" as defined, not to exceed fair value of the property taken. However, the right of the United States or any state or municipality to condemn the project at any time is expressly reserved.

§ 19 allows state regulation of service and rates; if none exists, the Commission may exercise such jurisdiction.

[66] Denver Stock Yard Co. *v.* United States, 304 U. S. 470, 484; Pacific States Co. *v.* White, 296 U. S. 176, 184.

The petitioner suggests that consideration of the validity of section 14, the acquisition clause, and the license conditions based upon its language are properly to be deferred until the United States undertakes to claim the right to purchase the project on the license terms fifty years after its issuance.[67] Assuming that the mere acceptance of a license would not later bar the objection of unconstitutional conditions, even when accompanied by a specific agreement to abide by the statute and license,[68] we conclude that here the requirements of section 14 so vitally affect the establishment and financing of respondent's project as to require a determination of their validity before finally adjudging the issue of injunction.

The respondent's objections to the statutory and license provisions, as applied to navigable streams, are based on the contentions (1) that the United States' control of the waters is limited to control for purposes of navigation, (2) that certain license provisions take its property without due process, and (3) that the claimed right to acquire this project and to regulate its financing, records and affairs, is an invasion of the rights of the states, contrary to the Tenth Amendment.

Forty-one states join as amici in support of the respondent's arguments. While conceding, as of course, that Congress may prohibit the erection in navigable waters of the United States of any structure deemed to impair navigation, the Attorneys General speaking for the states insist that this power of prohibition does not comprehend a power to exact conditions, which are unrelated to navigation, for the permission to erect such structures. To permit, the argument continues, the imposition of licenses involving conditions such as this acquisition clause, enabling the Federal Government to take over a natural resource such as water-power, allows logically similar acquisition of mines, oil or farmlands as consideration for the privilege of doing an interstate business. The states thus lose control of their resources and property is withdrawn from taxation in violation of the Tenth Amendment.

---

[67] Cf. Electric Bond & Share Co. *v.* Securities and Exchange Comm., 303 U. S. 419, 435; W. W. Cargill Co. *v.* Minnesota, 180 U. S. 452, 468; New Jersey *v.* Sargent, 269 U. S. 328, 339.

[68] Section 6.

Further, the point is made that a clash of sovereignty arises between the license provisions of the Power Act and state licensing provisions. The Commonwealth of Virginia advances forcibly its contention that the affirmative regulation of water-power projects on its navigable streams within its boundaries rests with the state, beyond that needed for navigation. "While the supremacy of the Federal Government in its own proper sphere, as delineated in the Constitution, is cheerfully conceded, yet just as earnestly does Virginia insist upon the supremacy of her own government in its proper field as established by that instrument." Virginia has a Water Power Act.[69] It, too, offers a fifty-year license, with the right to use the natural resources of the state, the stream flow and the beds of the water courses for the period of the license or its extensions subject to state condemnation at any time on Virginia's terms for ascertainment of value. Operation is likewise regulated by state law.[70] The Commonwealth objects that the development of its water power resources is subjected to Federal Power Act requirements such as are detailed above in stating the respondent's objection, even to the point that Virginia itself may not build and operate a dam in navigable water without authorization and regulation by the Federal Government.

The briefs and arguments at the bar have marshaled reasons and precedents to cover the wide range of possible disagreement between Nation and state in the functioning of the Federal Power Act. To predetermine, even in the limited field of water power, the rights of different sovereignties, pregnant with future controversies, is beyond the judicial function. The courts deal with concrete legal issues, presented in actual cases, not abstractions.[71] The possibility of other uses of the coercive power of license, if it is here upheld, is not before us. We deem the pictured extremes irrelevant save as possibilities for consideration in determining the present question of the validity of the challenged license provisions. To this we limit this portion of our decision.[72]

---

[69] Michie's 1936 Code, §§ 3581 (1)-(16).

[70] Michie's 1936 Code, §§ 4065a, 4066.

[71] Cherokee Nation *v.* Georgia, 5 Pet. 1, 75; United States *v.* West Virginia, 295 U. S. 463, 474; New Jersey *v.* Sargent, 269 U. S. 328; cf. McGuinn *v.* High Point, 217 N. C. 449, 458.

[72] Ashwander *v.* Tennessee Valley Authority, 297 U. S. 288, 339.

The respondent is a riparian owner with a valid state license to use the natural resources of the state for its enterprise. Consequently it has as complete a right to the use of the riparian lands, the water, and the river bed as can be obtained under state law. The state and respondent, alike, however, hold the waters and the lands under them subject to the power of Congress to control the waters for the purpose of commerce.[73] The power flows from the grant to regulate, i. e., to "prescribe the rule by which commerce is to be governed."[74] This includes the protection of navigable waters in capacity as well as use.[75] This power of Congress to regulate commerce is so unfettered that its judgment as to whether a structure is or is not a hindrance is conclusive. Its determination is legislative in character.[76] The Federal Government has domination over the water power inherent in the flowing stream. It is liable to no one for its use or non-use. The flow of a navigable stream is in no sense private property; "that the running water in a great navigable stream is capable of private ownership is inconceivable." Exclusion of riparian owners from its benefits without compensation is entirely within the Government's discretion.[77]

Possessing this plenary power to exclude structures from navigable waters and dominion over flowage and its product, energy, the United States may make the erection or maintenance of a structure in a navigable water dependent upon a license.[78] This power is exercised through section 9 of the Rivers and Harbors Act of 1899 prohibiting construction without Congressional consent and through section 4(e) of the present Power Act.

It is quite true that the criticized provisions summarized above are not essential to or even concerned with navigation as such. Respondent asserts that the rights of the United States to the use of

---

[73] New Jersey *v.* Sargent, 269 U. S. 328, 337; United States *v.* River Rouge Co., 269 U. S. 411, 419; United States *v.* Cress, 243 U. S. 316, 320; Willink *v.* United States, 240 U. S. 572, 580; United States *v.* Chandler-Dunbar Co., 229 U. S. 53, 62; Gibson *v.* United States, 166 U. S. 269, 271.

[74] Gibbons *v.* Ogden, 9 Wheat. 1, 196.

[75] Gilman *v.* Philadelphia, 3 Wall. 713, 725.

[76] United States *v.* Chandler-Dunbar Co., 229 U. S. 53, 64, 65; Union Bridge Co. *v.* United States, 204 U. S. 364, 400; cf. Pennsylvania *v.* Wheeling Bridge Co., 13 How. 518, 18 How. 421.

[77] United States *v.* Chandler-Dunbar Co., 229 U. S. 53, 66, 69, 76; cf. Ashwander *v.* Tennessee Valley Authority, 297 U. S. 288, 330.

[78] Greenleaf Lumber Co. *v.* Garrison, 237 U. S. 251, 268; United States *v.* Rio Grande Irrigation Co., 174 U. S. 690, 707.

e waters is limited to navigation. It is pointed out that the fed-
al sovereignty over waters was so described in *Port of Seattle* v.
regon & Washington Railroad Company,[79] *United States* v. *Ore-*
m,[80] *Kansas* v. *Colorado,*[81] *United States* v. *River Rouge Com-*
iny,[82] and *Wisconsin* v. *Illinois.*[83] The first two of these cases
ntered around the issue of title to land under navigable water.
othing further was involved as to the use of the water than its
avigability. In *Kansas* v. *Colorado* the point was the Govern-
ent's advocacy of the doctrine of sovereign and inherent power
justify the United States taking charge of the waters of the
rkansas to control the reclamation of arid lands (pp. 85-89).
here was found no constitutional authority for irrigation in the
ommerce clause or the clause relating to property of the United
tates.[84] It cannot be said, however, that the case is authority for
miting federal power over navigable waters to navigation,[85] es-
ecially since the stretch of the Arkansas River involved in the dis-
ute was asserted by the Government to be nonnavigable (p. 86). In
ie *River Rouge* controversy, this Court spoke of the limitation "to
ie control thereof for the purposes of navigation." But there,
o, it was a question of the riparian owner's use of his property
or access to the channel, a use fixed by state law. The conclusion
hat the United States could not interfere, except for navigation,
vith his right of access to navigable water, required no appraisal
f other rights. *Wisconsin* v. *Illinois* is a part of the Chicago
)rainage Canal litigation. In so far as pertinent here, it merely
ecided that under a certain federal statute[86] there was no authority
or diversion of the waters of Lake Michigan for sanitary purposes
p. 418). There is no consideration of the constitutional power to
ise water for other than navigable purposes, though it is plain that
ther advantages occur (pp. 415, 419).

---

[79] 255 U. S. 56, 63.

[80] 295 U. S. 1, 14.

[81] 206 U. S. 46, 85-86.

[82] 269 U. S. 411, 419.

[83] 278 U. S. 367, 415.

[84] Art. IV, § 3, cl. 2.

[85] Cf. United States *v.* Hanson, 167 Fed. 881, 884; Cincinnati Soap Co. *v.*
Jnited States, 301 U. S. 308, 322.

[86] Cf. Sanitary District *v.* United States, 266 U. S. 405, 428.

In our view, it cannot properly be said that the constitutional power of the United States over its waters is limited to control for navigation. By navigation respondent means no more than operation of boats and improvement of the waterway itself. In truth the authority of the United States is the regulation of commerce on its waters. Navigability, in the sense just stated, is but a part of this whole. Flood protection, watershed development, recovery of the cost of improvements through utilization of power are likewise parts of commerce control.[87] As respondent soundly argues, the United States cannot by calling a project of its own "a multiple purpose dam" give to itself additional powers, but equally truly the respondent cannot, by seeking to use a navigable waterway for power generation alone, avoid the authority of the Government over the stream. That authority is as broad as the needs of commerce. Water power development from dams in navigable streams is from the public's standpoint a by-product of the general use of the rivers for commerce. To this general power, the respondent must submit its single purpose of electrical production. The fact that the Commission is willing to give a license for a power dam only is of no significance in appraising the type of conditions allowable. It may well be that this portion of the river is not needed for navigation at this time. Or that the dam proposed may function satisfactorily with others, contemplated or intended. It may fit in as a part of the river development. The point is that navigable waters are subject to national planning and control in the broad regulation of commerce granted the Federal Government. The license conditions to which objection is made have an obvious relationship to the exercise of the commerce power. Even if there were no such relationship the plenary power of Congress over navigable waters would empower it to deny the privilege of constructing an obstruction in those waters. It may likewise grant the privilege on terms. It is no objection to the terms and to the exertion of the power that "its exercise is attended by the same incidents which attend the exercise of the police power of the states."[88] The Congressional authority under the commerce clause is complete unless limited by the Fifth Amendment.

---

[87] Cf. Ashwander *v.* Tennessee Valley Authority, 297 U. S. 288.

[88] United States *v.* Carolene Products Co., 304 U. S. 144, 147. Cf. Mulford *v.* Smith, ~~207~~ U. S. 38, 48.

The respondent urges that as riparian owner with state approval of its plans, it is entitled to freedom in the development of its property and particularly cannot be compelled to submit to the acquisition clause with a price fixed at less than a fair value, in the eminent domain sense, at the time of taking. Such a taking, it is contended, would violate the Fifth Amendment. It is now a question whether the Government in taking over the property may do so at less than a fair value. It has been shown, note 77, *supra,* that there is no private property in the flow of the stream. This has no assessable value to the riparian owner. If the Government were now to build the dam, it would have to pay the fair value, judicially determined,[89] for the fast land; nothing for the water power.[90] We assume without deciding that by compulsion of the method of acquisition provided in section 14 of the Power Act and the tendered license, these riparian rights may pass to the United States for less than their value. In our view this "is the price which [respondents] must pay to secure the right to maintain their dam." The quoted words are the conclusion of the opinion in *Fox River Company* v. *Railroad Commission.*[91] The case is decisive on the issue of confiscation. It relates to an acquisition clause in a Wisconsin license by which a dam in navigable water of the state might be taken over at such a price as would, this Court assumed, amount to violation of the due process clause of the Fourteenth Amendment if it were not for the license provision. Title to the bank and bed were in the objector, just as, by virtue of the state's license and the riparian ownership, all rights here belong to respondent. There, as here, the rights were subject to governmental "control of navigable waters."[92] The fact that the *Fox River* case involved a state and that this case involves the United States is immaterial from the due process standpoint. Since the United States might erect a structure in these waters itself, even one equipped for electrical generation,[93] it may constitutionally acquire one already built.

---

[89] Monongahela Navigation Co. *v.* United States, 148 U. S. 312, 327.

[90] United States *v.* Chandler-Dunbar Co., 229 U. S. 53, 66, 76.

[91] 274 U. S. 651.

[92] *Id.*, 656.

[93] Ashwander *v.* Tennessee Valley Authority, 297 U. S. 288; Arizona *v.* California, 283 U. S. 423.

Such an acquisition or such an option to acquire is not an invasion of the sovereignty of a state. At the formation of the Union, the states delegated to the Federal Government authority to regulate commerce among the states. So long as the things done within the states by the United States are valid under that power, there can be no interference with the sovereignty of the state. It is the non-delegated power which under the Tenth Amendment remains in the state or the people. The water power statutes of the United States and of Virginia recognize the difficulties of our dual system of government by providing, each in its own enactments, for the exercise of rights of the other.[94]

Reversed and remanded to the District Court with instructions to enter an order enjoining the construction, maintenance or operation of the Radford project otherwise than under a license, accepted by the respondent within a reasonable time, substantially in the form tendered respondent by the Federal Power Commission on or about May 5, 1931, or in the alternative, as prayed in the bill.

The Chief Justice took no part in the consideration or decision of this case.

A true copy.

Test:

Clerk, Supreme Court, U. S.

---

[94] §§ 10e, 14 and 19 of the Federal Power Act; Michie's 1936 Virginia Code, § 3581(16).

9

SUPREME COURT OF THE UNITED STATES.

No. 12.—October Term, 1940.

The United States of America, Petitioner, *vs.* Appalachian Electric Power Company.	On Writ of Certiorari to the United States Circuit Court of Appeals for the Fourth Circuit.

[December 16, 1940.]

Mr. Justice Roberts.

The judgment of reversal rests on the conclusion that New River is navigable,—a conclusion resting on findings of fact, made here *de novo,* and in contradiction of the concurrent findings of the two courts below. I am of opinion that the judgment of the Circuit Court of Appeals should be affirmed, first, because this court ought to respect and give effect to such concurrent findings which have substantial support in the evidence; secondly, because the evidence will not support contrary findings if the navigability of New River be tested by criteria long established.

1. A river is navigable in law if it is navigable in fact.[1] Indeed the issue of navigability *vel non* is so peculiarly one of fact that a determination as to one stream can have little relevancy in determining the status of another. As this court has said, "each determination as to navigability must stand on its own facts."[2]

The evidence supports,—indeed I think it requires,—a finding that, applying accepted criteria, New River is not, and never has been, in fact navigable. On this record the rule of decision, many times announced by this court, that the concurrent findings of fact of two lower courts, if supported by substantial evidence, will be accepted here, requires affirmance of the judgment. The rule applies not only to evidentiary facts but to conclusions of fact based thereon. Moreover, it has been the basis of this court's decision in a suit involving the question of navigability. Invoking the rule, this court, in *Brewer-Elliott Oil & Gas Co.* v. *United States,* 260 U. S. 77, 86, declined to review a judgment based on a concurrent finding of two lower courts that a stream "was not, and had never been, navigable within the adjudged meaning of that term."

---

[1] Oklahoma *v.* Texas, 258 U. S. 574, 585, 590-1; Arizona *v.* California, 283 U. S. 423, 452; Crowell *v.* Benson, 285 U. S. 22, 55.

[2] United States *v.* Utah, 283 U. S. 64, 87.

The cases cited for the proposition that where navigability was an issue this court has reconsidered the facts found by the courts below to determine whether they have correctly applied the proper legal tests do not, when the questions involved are understood, lend support to the action of the court in this case.[3]

The petitioner, in effect, asks this court to convict the courts below of error in determining the credibility, weight and relevance of the evidence. But that determination is peculiarly within their province, as this court has often said. The doctrine applies in this case with especial force. The respondent says, without contradiction, that the Government in its brief in the Circuit Court stated: "It cannot be said that the New River presents a 'clear case' of navigability or non-navigability . . . ". Yet this court is asked to ignore concurrent findings on the subject.

If the evidence may fairly support these findings, the courts below can be convicted of error only in applying an erroneous rule of law to the facts found.

Examination of the opinions below shows that the courts faithfully followed the decisions of this court in applying the law to the facts. They adopted the definition[4] and applied the criteria this court has announced in appraising the effect of the facts found.

---

[3] The cases cited are United States *v.* Rio Grande Irrigation Co., 174 U. S. 690, 699, where this court said with respect to the findings: "We are not, therefore, disposed to question the conclusion reached," by the courts below; Leovy *v.* United States, 177 U. S. 621, where a judgment on a jury's verdict was reversed for error in the judge's instructions as to the criteria of navigability; Economy Light Co. *v.* United States, 256 U. S. 113, 117, where the court did not reexamine the facts but affirmed the judgment of the Circuit Court of Appeals, as that court had correctly applied the test laid down in The Daniel Ball; and United States *v.* Holt Bank, 270 U. S. 49, 55, where the courts below treated the question of navigability as one of local law to be determined by applying the rule adopted in Minnesota, and this court, though holding that they applied the wrong standard, as the question was one of federal law, affirmed the findings, instead of remanding the case, since the record disclosed that according to the right standard the water was navigable.

[4] Cf. The Daniel Ball, 10 Wall. 557; The Montello, 11 Wall. 411, 415; United States *v.* Oregon, 295 U. S. 1, 23.

As shown by the cases cited in the margin,[5] a stream to be navigable in fact must have "a capacity for general and common usefulness for purposes of trade and commerce". Exceptional use or capability of use at high water or under other abnormal conditions will not suffice. Moreover, the stream must be used, or available to use, "for commerce of a substantial and permanent character". Where the stream "has never been impressed with the character of navigability by past use in commerce, . . . commerce actually *in esse* or at least *in posse* is essential to navigability" and "a theoretical or potential navigability or one that is temporary, precarious and unprofitable is not sufficient." The most important criterion by which to ascertain the navigability of a stream is that navigability in fact must exist under "natural and ordinary conditions". Application of these tests by the court below to the evidence in the case led to but one conclusion,—that New River has not been, and is not now, a navigable water of the United States. If the findings below had been the other way, the Government would be here strenuously contending that they could not be set aside, as it successfully did in *Brewer-Elliott Oil & Gas Co.* v. *United States, supra.*

2. The petitioner contends that the application of the accepted tests to the facts disclosed amounts to a ruling of law, and asserts that error in their application is reviewable. As I read the court's opinion, the argument is not found persuasive. While apparently endorsing it in the abstract the court, instead of relying on it, adopts two additional tests in the teeth of the uniform current of authority. If anything has been settled by our decisions it is that, in order for a water to be found navigable, navigability in fact must exist under "natural and ordinary conditions". This means all conditions, including a multiplicity of obstacles, falls and rapids which make navigation a practical impossibility. The court now, however, announces that "natural and ordinary conditions" refers only to volume of water, gradients, and regularity of flow. No authority is cited and I believe none can be found for thus limiting the connotation of

---

[5] The Montello, 20 Wall. 430; United States *v.* Rio Grande Co., 174 U. S. 690; Leovy *v.* United States, 177 U. S. 621; Donnelly *v.* United States, 228 U. S. 243; United States *v.* Cress, 243 U. S. 316; Oklahoma *v.* Texas, 258 U. S. 574; United States *v.* Holt State Bank, 270 U. S. 49; United States *v.* Oregon, 295 U. S. 1; Harrison *v.* Fite, 148 Fed. 781; Gulf & I. Ry. Co. *v.* Davis, 26 F. (2d) 930, 31 F. (2d) 109; United States *v.* Doughton, 62 F. (2d) 936.

the phrase. But further the court holds, contrary to all that has heretofore been said on the subject, that the natural and ordinary condition of the stream, however impassable it may be without improvement, means that if, by "reasonable" improvement, the stream may be rendered navigable then it is navigable without such improvement; that "there must be a balance between cost and need at a time when the improvement would be useful." No authority is cited and I think none can be cited which countenances any such test. It is of course true that if a stream in its natural and ordinary condition is navigable it does not cease to be so because improvements have bettered the conditions of navigation.[6] But the converse is not true,—that where a stream in its natural and ordinary condition is non-navigable, a project to build a canal along its entire course, or dams and locks every few miles, at enormous expense, would render it a navigable water of the United States. Who is to determine what is a reasonable or an unreasonable improvement in the circumstances; or what is a proper balance between cost and need? If these questions must be answered it is for Congress, certainly not for this court to answer them. If this test be adopted, then every creek in every state of the Union which has enough water, when conserved by dams and locks or channelled by wing dams and sluices, to float a boat drawing two feet of water, may be pronounced navigable because, by the expenditure of some enormous sum, such a project would be possible of execution. In other words, Congress can create navigability by determining to improve a non-navigable stream.

If this criterion be the correct one, it is not seen how any stream can be found not to be navigable nor is it seen why this court and other federal courts have been at pains for many years to apply the other tests mentioned when the simple solution of the problem in each case would have been to speculate as to whether, at "reasonable" cost, the United States could render a most difficult and forbidding mountain torrent suitable for the least pretentious form of water traffic. In the light of the court's opinion, if this test be applied to the New River it must, of course, be admitted that by blasting out channels through reefs and shoals, by digging canals around falls and rapids, and possibly by dams and locks, the New

---

[6] Economy Light Co. *v.* United States, 256 U. S. 113.

River could be rendered fit for some sort of commercial use. What the expense would be no one knows. Obviously it would be enormous. Congress in the past has undertaken to render the river navigable and decades ago gave up the attempt. Still we are told that, at "reasonable" cost, the thing can be done, and so the stream is navigable.

In the light of the grounds upon which the decision of the court is based it hardly seems necessary to comment on the evidence, for it is in the main addressed to issues no longer in the case. The two courts below have analyzed it and examined it in detail and reference to their carefully considered opinions suffices.[7] I think the conclusion reached by the courts below must stand unless the two novel doctrines now announced be thrown into the scale to overcome it.

Mr. Justice McReynolds concurs in this opinion.

END

---

[7] 23 F. Supp. 83; 107 F. (2d) 769.